



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas

Package 05:
Ramu Upazila, District: Cox's Bazar &
Rangunia Upazila, District: Chittagong

FINAL SURVEY REPORT

of

Rangunia Upazila

June 2016

Joint venture of

 **HOUSE OF CONSULTANTS LIMITED (HCL)**
and
 **dm.Watch Disaster Management Watch(dm. Watch)**



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Executive Summary

Development planning is an important source of development and a tool for reducing inequality. The methodological nature of preparation of Development Plan creates ample scope of people's participation in plan making process. The incorporation of PRA (Participatory Rural Appraisal) is an innovative approach that opens the windows to empower people by sharing information and making decisions regarding the implementation of "Preparation of Development Plan for Fourteen Upazilas", Package-05 (Ramu Upazila and Rangunia Upazila). The study at Rangunia Upazilla at Chittagong district used three core tools of PRA, respectively Social Mapping, Venn diagram and Technology of Participation (ToP) Consensus Workshop.

Through PRAs, study team tried to find out spatial aspects, major problems, significant potential factors and development priorities. Things were different within and between urban and rural and geographic locations. Spatial aspects were derived from Social map. For Rangunia Upazilla, common resources included haat-bazar, agricultural land, health facilities, educational institutions, river, canal, tube wells, electricity, Masjid, Temple, and Pagoda. For Rangunia Paurashava, participants mentioned exactly the same thing mentioned in the Rangunia Upazilla. Here they added few more things, like- street light, drainage system, gas connection etc.

Major Problems and potentials were identified through Venn diagram. For Rangunia Upazilla, main problems were lack of health facility considering the amount of population, poor communication system and broken road, lack of educational infrastructure, unemployment, river erosion, unemployment, lack of industrialization and lack of adequate number of haat-bazar. On the other hand, main potentials factors were people's awareness, gas provisions, sufficient place for health and education facilities, sufficient raw materials, people's cooperativeness, growing trend of industrialization, social unity, drainage system, availability of agricultural land, hardworking man power, donor activities, initiatives for embankment, local leader and law enforcement agency, fertile land and growing trend of school going

For Rangunia Paurashava, main problems were poor communication system and broken road, river erosion, lack of proper drainage system, lack of health facility considering the amount of population, lack of educational infrastructure, load shedding and lack of supply in electricity and lack of gas connection. On the other hand, main potentials were availability of agricultural land, availability of demesne land, people's enthusiasm and spontaneous participation, hardworking man power, government initiatives, sufficient hilly area for waste management and for infrastructural development, availability of raw materials (bricks and sand)

Participants also identified prioritized development issues for 20 years and categorized it into three categories, respectively- short term, mid-term and long term. Development priorities were identified through ToP. For Rangunia Upazilla, participants identified improving community, health & education facilities as key areas. They also mentioned about preventing terrorism, drug addiction, gas & electricity connection etc. For Rangunia Paurashava, participants identified almost same areas as Rangunia Upazilla. They added the initiatives of promoting poultry & fisheries culture, promotion of dairy industry, prevention of load shedding, new gas & electricity connection etc.

Bayazid

Md. Bayazid Hasan
Social Expert

Abbreviation/Acronyms

| | |
|-----|-------------------------------|
| GIS | Geographic Information System |
| PRA | Participatory Rural Appraisal |
| ToP | Technology of Participation |
| UDD | Urban Development Directorate |
| UP | Union Parishad |

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Chapter 1 Participatory Rural Appraisal (PRA) Approach and Process

1.1 Introduction

Mass people's participation in development works is increasing in a rapid speed day by day. It has also drawn authoritarian's concerns. The top down approach of decision making and planning process fails to attain the desired result towards sustainable urban development. As a result, urbanization in reality takes place haphazardly. A lot of resources have been misused so far. Being a poor country the planning approach should be keeping in view with people's needs, problems and demands. Thus the paradigm shifts of the planning process from top down approach to bottom up approach have been initiated both the government and non-government organizations. Urban development Directorate (UDD) is one of the leading national planning organizations dealing with the physical planning matters of the country. Recognizing the changing scenario and the importance of people's participation in the planning process, UDD has shifted of making traditional Master Plan towards more people oriented development plan. The methodological nature of preparation of Development Plan creates ample scope of people's participation in plan making process. The incorporation of PRA (Participatory Rural Appraisal) is an innovative approach that opens the windows to empower people by sharing information and making decisions regarding the implementation of "Preparation of Development Plan for Fourteen Upazilas", Package-05 (Ramu Upazila of Cox's Bazar District and Rangunia Upazila of Chittagong District)

1.2 Project Context for PRA

"Preparation of Development Plan for Fourteen Upazilas" project was initiated by Urban Development Directorate, Ministry of Housing and Public Works, Government of Bangladesh. Initially the project area consisted of nine Upazilas under Constitutional area of member of the Parliamentary Standing Committee concerning Ministry of Housing and Public works. The total Project area is 2748.37 sq. km. and total population is 2698872 (BBS, 2011).

Brief outline and scope of the project

The project planning area will cover the whole Upazilas which might have potential for development within the next 20 years up to 2033 A.D. The project is planned to be completed in five stages/tiers. In the first stage, there will be preparation of *sub-regional plan*; then *Structure Plan* for the whole Upazila and surrounding areas in the second tier. The third phase will be preparation of *Urban Area Plan* for problems or opportunities, which need immediate intervention. Due to heterogeneous topography containing undulating lands and water bodies, the study must be based on Geographic Information system (GIS) and images. The fourth stage will be preparation of *Rural Area Plan* and the fifth stage will be *Action Area Plan/Detailed Area Plan* in the form of sectoral projects and programs for immediate intervention based on local need. Rangunia Upazilla was in this initial list.

Tentative Output of the Project:

- Conservation plan (primary, secondary and tertiary flood)
- Delineation of the structure of different infrastructures: Point, Linear and Area
- Interpretation of proposal of upper level policies
- To guide long term growth and development
- To provide basis from coordinating decision, development action within the urban area
- Provide guidance for development control
- Framework for local plan
- Focus planning issues of the urban area to the govt. and public

1.3. Purpose of PRA

- To involve the local people in the planning process by letting the local people identify their own problems, potentials, development needs and planning priorities for next 20 years.
- To match PRA findings matching with technical analysis of different sectoral findings, particularly for spatial analysis and GIS mapping, and to supplement other data sources.
- To make participants own the project and its activities towards realizing participatory planning approach.

1.3.1 Mapping Resources and Identifying Areas

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise mapping to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

1.3.2 Identifying Problems and Potentials

Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/faced problems are sought out in A2 paper sheet which is shown to all and form the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

1.3.3 Proposing Development Priorities

Technology of Participation (ToP) Workshop was conducted in order to identify the development priorities. This was done at the last of the PRA session. The people involvement is very important which will have great impact on the Development Plan for 20

years by major sectors for sub-regional, structural, urban, rural action plans based on the identified locations, issues, problems and potentials to be gathered from social mapping and Venn diagram. This approach is done by the following ways:

- People were asked to think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream was attributed/sited in three phases of development namely Short term (within 0-5 years), Midterm (5-10) and Long term (10-20).

1.4. Tools of PRA

The study used three core tools of PRA, respectively

1. Social Mapping
2. Venn Diagram and
3. Technology of Participation (ToP) Consensus Workshop

1.4.1 Social/ Resource Mapping

Objectives : Social maps were prepared according to resource base of the area
Duration : 45 minutes
Material : Poster Paper, Marker Pen, Sign Pen, Sticker, Table or Floor and Color Paper may be used (if necessary)

Procedure of Social Mapping

- A. The facilitator explained the procedure of the preparation of social mapping to the participants in an easy and simple manner. A PPT was presented
- B. The facilitator elected a key person for drawing the social map on the basis of discussion make with the participants’ and request the other participants’ to the person involved in social mapping.
- C. The poster or paper was placed on the table, floor or board.
- D. The boundary of the area was drawn cautiously, and then the map drew collectively with the help of marker of sign pen.
- E. Different types of resources such as road, pond, agricultural land, river, homesteads, school etc. were located on the map by using marker or sign pen.
- F. Surrounding unions and important areas or establishments around the boundary were also plotted on the map.
- G. North direction was shown in the map
- H. Necessary correction was made by displaying the map just drawn.

Figure 1 Social Map Drawing Session



(Source: PRA Survey, 2016)

1.4.2 Venn Diagram (Problems and Potentials)

Objectives : To identify the problems/risks (social and environmental) of the area/UP/ward of Paurashava

Duration : 40 minutes

Material : Poster Paper (white and color), Sign Pen, Scissors, Glue stick, masking tape, Wall or Black Board

Procedure of Venn diagram

- The facilitator will have selected a person among the participants for assistance, who would cut the paper into circular form of different size for Venn diagram and stick them on poster paper.
- The facilitator identified the problems of the basis of their severity e.g., 1,2,3... with the help of participants'.
- Color poster paper was cut into circular form according the severity of the problems and would stick them on the white color poster paper
- The biggest circular sized paper indicated the most severe problem i.e., no. 01 problem and the size of the circle will reduce according to descending order.
- The main area was stickled at the center of the poster paper.
- The problems were arranged according their importance for aesthetics.
- Signature of all the participants was taken on the Venn diagram.
- Necessary corrections were made in the Venn diagram by participants.

1.4.3 ToP Consensus Workshop

Objectives

1. To identify priorities for development and planning for next 20 years by major sectors for sub-regional, structural, urban, rural action plans based on the identified locations, issues, problems and potentials to be gathered from social mapping and Venn diagram.
2. To get getting people's in-depth knowledge and views about their assets, problems, potentials, development needs and planning aspirations.
3. In all cases spatial dimension of local people's information will be checked for development planning purpose.

Materials

First field facilitators ensured materials needed --- flip chart, sticky wall, spray, masking tape, sticky glue, board pin, Meta cards, white papers, color markers, sign pens, poster papers, registration signup sheets, camera and videos, etc.

They hung social map, Venn diagrams, tables from previous sessions, day agenda, working assumptions, norms etc. on wall visible to all participants.

Introductions and Context

Then ToP session started with explaining the context (purpose, aims and goals and the process) of ToP session. A warm up or ice breaking exercise was conducted at the beginning of ToP.

Brainstorming

The facilitator read out the focus question (e.g. what they wanted to see taking place in next 20 years in their area).

Organizing

The facilitator asked the best card first from each person, the co-facilitator collected and gave it to the facilitator. The facilitator read each card and checked if all are clear, if not then he asked the writer to clarify the intent of the card. The facilitator put 1st cards on the sticky wall or board. Then the facilitator asked the participants for pairing on wall and he asked for 2nd best card same way.

Naming

After clustering cards based on participants' suggestion, for preliminary naming, the facilitator read out cards of each cluster starting from the longest one (in terms of size) and asked participants label the cluster of ideas with two or few words based on the intents/intuition of cards. Thus all clusters were roughly labeled.

Conversation on Priorities

For identifying development priorities for short-term (within 5 years), medium (5-10 years) and long term (10-20 years) planning, the facilitator asked the followings: Read the names of the clusters out loud.

- Which of these are you most passionate about?
- Which of these would be easiest to make happen? Hardest?

- Which would make the most difference for us in the community? (Each person puts a blue dot on the title card they choose)
- Which needs to happen first so other things can happen? (Put a red dot)
- Which would take the longest to accomplish and can be done later? (Put a yellow dot)

Closing Reflection

At the end of PRA with ToP, the facilitator asked following questions:

- What one thing/term/phrase do you remember from the day?
- What one activity you did today?
- What did you like? High point?
- What didn't you like? Low point?
- What did go well? What went wrong?
- What one thing you will take from here? Participants will be asked to make a comment or to express one thing they will do after this event.

The Guest of honor or the designated person offered a closing speech and the team thanked the participants for their cooperation and working together for development for all.

1.5. Participants and Facilitators of the PRA Sessions

PRA Participants: For each PRA, 15-20 persons who were knowledgeable, willing and local representing Union or municipal wards were must. The participants included Ward Members/ Ward Councilors, Teachers, Businessmen/dealers/brokers/traders, NGOs/CBOs/ Clubs, Imams/ religious priests or leaders, Farmers/laborers, Journalist, Professional (physician/engineers), Local elite/politician/Other.

Facilitator and Co-Facilitator and Rapporteur: These three persons were responsible for communication with and confirming participants, facilitating sessions and documenting. Among three, two persons interchangeably played role as facilitator and co-facilitator and were responsible to communicate, coordinate and facilitate the PRA session; material distribution, assist facilitators and participants and one person responsible for taking notes, record and take photos/videos of the PRA Session.

1.6. Setting of PRA Sessions

It was expected to start each PRA at 10 am with registration sheet sign up. But, it couldn't be possible in all cases. Few PRA sessions were started after lunch time. For Rangunia Upazila, most of the sessions were conducted in the morning session. On the other hand, for Rangunia Paurashava, most of the sessions were conducted in the second half of the day and continued till evening. The concerned UP chairman or Municipal Mayor/ward councilor opened the session. Sometimes, Upazilla chairman or Mayor were present at the session. In the opening session, participants were introduced and oriented to the goals and objectives as well different methods of PRAs reminding the debriefing meetings conducted prior to PRA meeting. Major development and planning sectors were also introduced to the participants. Participants were cordially requested to provide accurate data and views to the best possible. Facilitators were maintained the following format for each session of ranging 3.5 hours to 4 hours.

- Registration (sign up)
- Opening, introductions, expectations
- Social mapping
- Venn diagram
- Lunch break
- Technology of Participation (ToP) Consensus Workshop
- Reflection and closing

1.7. PRA Process

1.7.1 Preparation

Study team completed some task to prepare and finalize tools & technique for conducting PRA in preparation period which describes below-

Review of existing documents

Consultant reviewed PRA documents i.e. available and previously used in different national and international projects PRA materials and reports. Consultant consulted with the project team before starting drafting the PRA. Basic selections and outline of the content were designed and fixed as the immediate outcome of that consultation and developed content. Then the developed content was shared with UDD.

Sharing the tools & techniques of PRA

The draft content was shared with the project team and made finalized with their feedback incorporation which was followed by the consultant in the course of PRA tools development process. Following are the consultation outcome as per agreed content. Consultant developed draft tools and techniques within the stipulated timeline and shared with the project team for their comments and feedback.

Dry run/field test and finalization the tools & techniques of PRA

There were two main objective of the dry run session, one was facilitation practice of PRA of facilitators and second was testing the tools & technique. After preparing the 'basket of tools & techniques' a dry run session was conduct for testing the prepared tools and techniques. Based on the experience of field test PRA tools & techniques were finalized.

Facilitation period of PRA

After finalizing PRA tools & technique a work plan was prepared to consult with project management and other stakeholders for facilitating the PRA.

Participants of PRA

It was accepted that 25-30 participants are good enough to manage for getting quality information. But, this assumption and pre set issue couldn't not be followed all the time. Sometimes, there were less than 25 people and sometimes the number of participants exceeded the limit of expected maximum range. Decisions were also made to involve the grass root local government organisations to participate in the planning process because of their benighted sole authority of the implementation of the development works. The elected representatives of local government, civil society organizations, community leaders and representatives from social strata were requested to take part in the PRA sessions.

Place of PRA

Calm and quiet environment was a prerequisite to conduct a PRA. We proposed Union Parishad (UP) office as the venue of conducting PRA for Rangunia Upazilla, as it is known to the inhabitants. For Rangunia Paurashava, we chose Paurashava office, Primary school in respective ward and clubs as the venue to conduct PRA. It was taken as a challenge that; people would feel hesitated to convey messages to any strangers at the first place. But the members of PRA team made a positive impression on the participants regarding the project during their visit to the study area for preparatory work.

Selection and invitation of participant

A brief discussion of the project was presented for inviting the participants. The objectives of the PRA session, the procedure of conducting the session etc were described in details to participant by the PRA team. A formal letter was also sent to UP/Paurashava Chairman to assist for conducting the PRA.

PRA Facilitation Team Members:

Facilitator: 01 (one) Person, (Responsibility: communicate, coordinate and facilitate the PRA session)

Co-Facilitator: 01 (one) Person, (Responsibility: material distribution, assist to facilitators and participants)

Rapporteur: 01 (one) Person (Responsibility: Taking notes of the PRA Session)

Logistic Personnel/Supporting: 01 (one) Person (Responsibility: resource and necessary logistics like pen, pencil, notebook, color, drawing paper etc arrangement and to assist the Facilitator, Co-facilitator and Rapporteur)

1.7.2 Fieldwork

Collection of Materials and Contact Lists: Field facilitators ensured collection of materials including maps and logistics, official letter, and contact lists and any other administrative and logistics in consultation with the management. In case of any issue, s field facilitators immediately informed the social experts for necessary action.

Selection and invitation of participants: Trained field facilitators were responsible for contacting, inviting and confirming minimum number of participants of PRA representing the target area (Union/Municipal Ward). With due respect and professional standards, they informed about their purpose of contacts, the host and consulting agencies of the project, previous visits by the project team and as following the PRA session and their roles, the procedure of conducting the session were described to participant by the PRA team.

Facilitate Sessions and reflection for better facilitation: As trained, field facilitators were solely responsible for facilitating PRA sessions in each Union/Municipal Ward of project Upazilas using selected tools to ensure PRA outcomes. At the end of each day, they conducted a peer discussion and reflected on what they did and how they can do better in next sessions.

1.7.3 Reporting

Every PRA session covered in each PRA documentation report covering objectives, methods, team description and outputs like; Social map, description and analysis of the community and its context, identification of problems and potential solutions, and project design and programming of activities for project implementation.

A Working paper was supposed to prepare covering brief output from all PRA sessions and compilation of all individual PRA documentations.

Documentation and compilation of PRA

After completing a PRA session, field facilitators wrote down and compiled all notes and check PRA documents, and document individual PRA report as per the prescribed/ standard format (Annexure 1). For every PRA session, one report was prepared by field facilitators covering objectives, methods, team description, group dynamics, description and analysis of the community and its context, and outputs like social map, identification of problems and potentials, and long-, medium- and short term development needs.

Report preparation of PRA/deliverable

Field facilitators ensured quality, reliability and validity of PRA outcomes keeping in mind that individual PRA report will be matched with other reports. Besides, compiled report analysis would also be crosschecked with other reports as well. The team leader integrated PRA findings and socioeconomic survey data with other spatial topographic, hydrogeological, and environmental, land use, transport data during the comprehensive development planning stage.

1.8. Schedule of PRA Sessions at Rangunia Upazila

The following table presents Union/ward wise PRA session schedule.

Table 1: PRA Session Schedule of Rangunia Upazila and Rangunia Paurashava

| Rangunia Upazila | | Rangunia Paurashava | |
|------------------------|------------|---------------------|------------|
| Name of Union Parishad | Date | Number of Ward | Date |
| Hosnabad | 03.10.2015 | 2 No. Ward | 04.10.2015 |
| Rajanagar | 04.10.2016 | 5 No. Ward | 06.10.2016 |
| South Rajanagar | 04.10.2016 | 1 No. Ward | 08.10.2016 |
| Pomra | 05.10.2016 | 8 No. Ward | 10.10.2016 |
| Sarapbhata | 05.10.2016 | 4 No. Ward | 11.10.2016 |
| Betagi | 06.10.2015 | 6 No. Ward | 11.10.2016 |
| Silok | 06.10.2016 | 3 No. Ward | 13.10.2016 |
| Mariamnagar | 07.10.2016 | 7 No. Ward | 14.10.2015 |
| Parua | 07.10.2016 | 9 No. Ward | 14.10.2016 |
| Chandraghona Kadamtali | 08.10.2016 | | |
| Lalanagar | 08.10.2010 | | |
| Kodala | 10.10.2016 | | |
| Islampur | 10.10.2016 | | |
| Padua | 12.10.2016 | | |
| Rangunia | 13.10.2016 | | |

(Source: Individual PRA Report, PRA Survey, 2016)

1.9. Quality control measures

It is now internationally recognized that for any research activity to collect authentic information and to produce reliable data it must implement an appropriate program of quality control measure. It must as a minimum:

1. Ensure that, the process is using methods which have validated as fit for the similar types of purposes before.
2. The method should be fully documented, staffs should be trained well and quality control mechanism should be present to ensure that the procedures are under close supervision.

Chapter 2 Participatory Rural Appraisal (PRA) at Union Level at Rangunia Upazila

2.1. Overview of Rangunia Upazila

Rangunia Upazila is an Upazila of Chittagong District in the Division of Chittagong, Bangladesh and has an area of around 410.73 sq km (Banglapedia and Rangunia Upazila Website). It is located at 22.4667° North 92.0833° east. It is bounded by Kawkhali on the north, Dhandanaish, Patiya and Boalkhali on the south, Kaptai, Rajasthali and Bandarban on the east, Raozan and Kawkhali on the west. "Rangunia" is not a Bengali word. Some believes that it has similarities with Burmese word "Rengun" because Rangunia was ruled by Burmese Arakans once upon a time. Administration Rangunia Thana was formed on 24 January 1962 and it was turned into an Upazila in 1983. Rangunia has 15 Unions, 73 Mauzas/Mahallas, and 149 villages. Union wise introductory information is given below in Table (Banglapedia, Rangunia Upazila Website).



Figure 2 Map of Rangunia Upazila

Table 2 Union wise Population and Area of Rangunia Upazila

| Name of UP | Area (km ²) | Population | |
|---------------------------|-------------------------|------------|--------|
| | | Male | Female |
| Rajanagar | 30 | 24275 | 20069 |
| Hosnabad | 26 | 13098 | 13300 |
| Rangunia | 10 | 5262 | 4980 |
| Mariamnagar | 10 | 8683 | 8459 |
| Parua | 30 | 7175 | 7190 |
| Pomra | 22 | 12666 | 12050 |
| Betagi | 17 | 10312 | 10306 |
| Sarapbhata | 28 | 11650 | 11820 |
| Silok | 23 | 8385 | 8515 |
| Padua | 65 | 15456 | 14466 |
| Chandraghona Kadamtali | 11 | 13202 | 11487 |
| Kodala | 21 | 8174 | 7320 |
| Islampur | 15 | 10895 | 9007 |
| South Rajanagar | 29 | 5612 | 4640 |
| Lalanagar | 14 | 2751 | 2793 |

(Source: Rangunia Upazila Website and Banglapedia)

2.2. Rangunia Upazila Union PRAs

2.2.1. Spatial Aspects

Social Map was one of the key tools of PRA. The reason of using Social Map was to identify resources and facilities within the respective area. Resources included both government and non-government facilities. Facilitators of Social map tried to capture all resources available in the area. Generally resources covered by PRA include, educational institutions, health facilities, haat bazar, river & canal, transport facilities, land uses, water options, sanitation scenario, industrialization, gas connection etc. *(for more information please see the Annex-2)*

It was found during Social Map that, almost all Union had haat and bazar situated in government land. Most of the Union had just one haat. But some Unions had more than one. As for example, 6 No. Pomra Union had two market situated in government facility.

The life of Rangunia Upazilla was partially dependent on agricultural production. All Unions have reserved agricultural land. Most of lands of any Union were used as agricultural purposes. Besides, some union has the potential to become a tourist spot. People visits there during tourist season. But, there are no adequate arrangements for tourist attractions. 11 No. Rashidnagar Union has three promising tourist spots. But, facilities for the tourist are not enough there.

Health is one of the key components any society. As Bangladesh is dominated by government led health facility, most of the health facilities of Rangunia Upazilla were government. Health facilities include hospital, maternity clinic, community clinic etc. Besides, there are some privatized health facilities. Each Union has one an average 2-3 health facility. According to the community people number of health facilities existing in each Union is not sufficient for its population. More government health facilities need to establish.

According to Banglapedia, average literacy rate of Rangunia Upazila is 54.3%; male 57.4%, female 50.9%. Almost all Unions had similar kind of literacy scenario. Whereas. Literacy rate plays a key role in development activities. Study found government, semi government and private education institutions within the study areas. Government institutions include mostly primary school, madrasa and high school, college, University College etc. On the other hand, private and semi government institutions include madrasa, primary school, kindergarten, high school, pre-primary school, college, vocational institutions etc. According to Rangunia Upazila Website, Rangunia has 9 colleges, 41 secondary school, 148 primary school and 15 madrasa. Each Union had around 6-12 primary schools, 2-4 non-government primary schools, 2-4 secondary schools and 2-3 madrasa. According to PRA survey findings, highest number of educational institutions found in 3 No. Shonirbhar Rangunia and lowest number was found in 12 No. Kodala Union. This is to mention that, study found some kind of imbalance between number of educational institutions and population size.

Considering the information of Banglapedia, main sources of income of Rangunia Upazilla is Agriculture, which contributes 39.71% of its total economy. Rangunia has total 1732254 hectares of cultivable land. Main crops include Paddy, tobacco, wheat, potato, onion, garlic, betel leaf, vegetables etc. Other sectoral contribution is respectively- non-agricultural laborer 4.30%, industry 0.58%, commerce 16.24%, transport and communication 3.57%, service 12.31%, construction 1.03%, religious service 0.49%, rent and remittance 10.91% and others 10.86%.

For water option, most of the people use tube well, pond and well for cooking, drinking and sanitation related purposes. According to Banglapedia, contribution of tube-well is 87.79%, tap/supply water is 1.45%, pond is 2.99%, and others 7.77%. Most of the roads were found pacca or semi-pacca. But the problem appeared that, no repairing work took place for long period of times. From people's perception, weak or unimproved transportation/communication was appeared as one of the key problems.

Study found a mentionable number religious platform like Masjid, Temple and Pagoda. This is to mention that, all Muslims, Hindu and Buddhist live in Rangunia Upazilla. That's why study found all three prayer house of these three religions. Almost all Unions had Masjid and Temple. Sequentially Temple falls after Masjid in numbers. But, Pagoda wasn't found in every Union. That indicates that, Buddhists don't live in every Union.

PRA participants mentioned about sanitation facilities and options. According to Banglapedia, 48.31% (rural 45.90% and urban 59.77%) of dwelling households of the Rangunia Upazila use sanitary latrines and 36.20% (rural 37.23% and urban 31.30%) of dwelling households use non-sanitary latrines; 15.49% of households do not have latrine facilities.

Rangunia Upazilla can be potential tourist zone. Notable Tourists spots include Remnants of the Chakma Rajbari (Shukbilash Padua), Mahamuni Buddhist Monastery, Tea garden (Agunia, Kodalia, Thandachhari). Some participants mentioned about this issues. But, unfortunately there was no tourist facilities available in the area.

2.2.2. Major Problems and Potentials

Identification of Major Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and form the list of problems 5 major problems are identified through Venn diagram.

According to the participant's opinion and their own prioritization, the study identified the below listed problems which were found most acute.

- Lack of Health Facility considering the amount of population
- Poor Communication System and broken road
- Lack of Educational Infrastructure
- Unemployment
- River Erosion
- Unemployment
- Lack of Industrialization
- Lack of adequate number of Haat-bazar

Among the above mentioned problems lack of health, sanitation, communication, education facilities were identified as key problems. These issues were found in all Unions of Rangunia Upazila as burning issue. Apart from these seven issues, the participants also mentioned about poor sanitation facilities, drug addiction, growing trend of terrorism, environmental pollution, lack of gas connection and eve teasing etc. Rangunia Upazilla is a agriculture based area, which has already mentioned in the previous segment. But, no such provision was found during the study to promote or sustain agricultural activities. Few loopholes found which had been blocking agricultural production. Nevertheless, people were found searching their fate in agricultural activities.

Basically, the problems found in all 15 unions of Rangunia Upazilla were as same as the other parts of Bangladesh. Lack of necessary educational and health facility is not satisfactory throughout the country. Geographic position added some more problems, which made their life more difficult than other parts of the country. *(For detailed features of identified problems, please see Annex-2)*

Table 3: Identified major problems of the Rangunia Upazila

| SL | Major Problems of the Area | |
|----|---------------------------------------|---|
| | Type of problems | Name of the UP |
| 01 | Transportation | Rajanagar, Hosnabad, Shonirbhar Rangunia, Mariamnagar, Betagi, Sharafvata, Shilok, Padua, Chondroghona Kadamtali, Kodala, Islampur, Daksin Rajanagar, Lalanagar |
| 02 | Educational Institution | Rajanagar, Hosnabad, Mariamnagar, Parua, Betagi, Sharafvata, Shilok, Chondroghona Kadamtali, Kodala, Lalanagar |
| 03 | Health/Medical Facilities | Rajanagar, Mariamnagar, Parua, Betagi, Sharafvata, Shilok, Padua, Kodala, Islampur, Daksin Rajanagar, Lalanagar |
| 04 | River Erosion | Mariamnagar, Parua, Betagi, Shilok, Padua, Kodala, Daksin Rajanagar, Lalanagar |
| 05 | Security system/ Terrorism/Robbery | Rajanagar, Islampur |
| 06 | Electricity | Shonirbhar Rangunia, Parua |
| 07 | Drainage | Shonirbhar Rangunia, Mariamnagar, Pomra |
| 08 | Gas | Rajanagar, Hosnabad, Shonirbhar Rangunia, Pomra, Betagi, Chondroghona Kadamtali |
| 09 | Unemployment | Rajanagar, Hosnabad |
| 10 | Water logging and salinity | Chondroghona Kadamtali |
| 11 | Drug | Islampur |
| 12 | Haat/Bazar | Hosnabad, Islampur, Daksin Rajanagar |
| 13 | Eve teasing | Shonirbhar Rangunia |
| 14 | Road | Parua, Pomra |
| 15 | Sanitation | Pomra |
| 16 | Irrigation | Pomra |
| 17 | Recreation facilities | Sharafvata |
| 18 | Housing | Sharafvata |
| 19 | Disturbance of elephant | Padua |

(Source: PRA Survey, 2016)

Identification of Major Potentials

Community base programs and projects around the world played significant roles in developing certain community. Pineda (2012) emphasized on various potentials and possibilities within the community for effective community development. Through spatial analysis, the study tried to map the existing problems. After knowing the problems, the next step was to identify the potentials and possibilities of the respective area following to the previous stage. The sought out most prominent potential's list is followed as below:

- People's Awareness
- Gas Provisions
- Sufficient Place for Health and Education Facilities
- Sufficient Raw Materials
- People's Cooperativeness
- Growing Trend of Industrialization

- Social Unity
- Drainage System
- Availability of Agricultural Land
- Hard Working Man Power
- Donor Activities
- Initiatives for Embankment
- Local Leader and Law Enforcement Agency
- Fertile Land
- Growing Trend of School Going

These prominent potentials were identified during the drawing of Venn diagram. Each of PRA participants was asked to identify five prominent potential factors. Apart from these potential factors, the participant also mentioned about government initiatives to establish embankments to prevent river erosion, promotion of business activities, increase of literacy rate, fertile land, local leader's initiatives, and activities of law enforcement agencies and growing trend of school going as some significant indicators for development. Besides, some of the participants mentioned about two interesting issues. First one is about having a Minister from their area and another one is about proposed government scheme to establish a hospital in Rangunia Upazilla. (For detailed features of identified major potentials, please see Annex-2)

Table 4: Identified major Potentials of the Rangunia Upazila

| SL | Major Potentials of the Area | |
|----|--|--|
| | Type of potentials | Name of the UP |
| 01 | Agricultural Land | Rajanagar, Hosnabad, Shonirbhar Rangunia, Mariamnagar, Parua, Betagi, Sharafvata, Shilok, Padua, Chondroghona Kadamtali, Kodala, Daksin Rajanagar, Lalanagar |
| 02 | Remittance | Hosnabad, Shonirbhar Rangunia, Mariamnagar, Parua, Betagi, Sharafvata, Shilok, Padua, Kodala, Islampur, Daksin Rajanagar, Lalanagar |
| 03 | Fruit/ Vegetable Orchard/Cultivation | Hosnabad, Sharafvata |
| 04 | Livestock | Betagi, Shilok, Padua, Chondroghona Kadamtali, Kodala, Lalanagar |
| 05 | Fisheries | Shonirbhar Rangunia, Mariamnagar, Parua, Betagi, Sharafvata, Shilok, Padua, Chondroghona Kadamtali |
| 06 | Human power | Rajanagar, Mariamnagar, Parua, Betagi, Chondroghona Kadamtali |
| 07 | Forest | Rajanagar, Pomra, Betagi, Padua, Kodala, Islampur, Daksin Rajanagar |
| 08 | Haat/Bazar | Pomra, Daksin Rajanagar |
| 09 | Poultry Farm/industries | Rajanagar, Shonirbhar Rangunia, Mariamnagar |
| 10 | Brick Field | Islampur |
| 11 | Rubber dam | Hosnabad, Islampur |
| 12 | Tourism | Sharafvata |
| 13 | River | Chondroghona Kadamtali |
| 14 | Hill | Rajanagar, Parua, Kodala, Islampur, Daksin Rajanagar, Lalanagar |
| 15 | Technical college/ Educational Institute | Pomra |

| SL | Major Potentials of the Area | |
|----|---------------------------------|---------------------------------|
| | Type of potentials | Name of the UP |
| 16 | Sheikh Rasel Eco park/ Eco park | Hosnabad, Islampur |
| 17 | Dairy | Shonirbhar Rangunia, Sharafvata |
| 18 | Water Treatment plant | Pomra |
| 19 | Registry Office | Pomra |
| 20 | Tea industries | Kodala |
| 21 | Small industries | Daksin Rajanagar, Lalanagar |

(Source: PRA Survey, 2016)

2.2.3. Perceived Development Priorities

Technology of Participation (ToP) Workshop was conducted in order to identify the development priorities. This was done at the last of the PRA session. The people involvement is very important which will have great impact on the Development Plan for 20 years by major sectors for sub-regional, structural, urban, rural action plans based on the identified locations, issues, problems and potentials to be gathered from social mapping and Venn diagram. This approach is done by the following ways:

- People were asked to think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dreams were attributed/sited in three phases of development namely Short term (within 0-5 years), Midterm (5-10) and Long term (10-20).

According to participant's opinion, the ToP Workshop team identified various development priorities into three categories respectively- short term, midterm and long term. (*For, Details information about perceived development priorities, please see Annex-2*)

Participants mentioned about improved transport facility, education facility, health facility, preventing river erosion, availability of safe drinking water, proper drainage system, employment opportunity, prevention of terrorism & drug use, setting up banks, sufficient gas & electricity connection, prevention of environment pollution etc as short term development priorities. Here short term development priorities indicate to the quick response of the responsible authority towards these areas. Participants also mentioned about market development, infrastructural development, promotion of agricultural activities etc as short term development priorities. Midterm development priorities are little bit longer in terms of implementation which has already stated in the before (5-10 years in length). Participants mentioned about improving health and education related provisions as two key areas of development activities. Apart from these two areas, participants also emphasized on improving communication system, prevention or reduction of load shedding, availability of gas & electricity, prevention of river erosion, initiatives to reduce poverty & unemployment, prevention of river erosion, available sanitation facilities, promotion of fisheries & livestock rearing etc as midterm development priorities.

Long term developments priorities are comparatively vastly time consuming. In other words, long term development priorities take very long time to implement. Most of the participants of ToP mentioned about improving communication system as well as construction of roads and establishment of adequate education & health facility as long term development priorities.

Participants also mentioned about continuous irrigation facility for agricultural production, initiates to ensure gender equality, prevention of river erosion, setting up bank, availability of fire service, presence of good governance, establishing cold storage and vocational educations institutions as long term development priorities. (For, Details information about perceived development priorities, please see Annex-2)

There was huge overlapping in identification of short term, midterm and long term development priorities. This was so difficult to separate these three items without repetition. Because, participants repeated one issue in both long term and short term development priorities or midterm and long term development priorities or short term and midterm development priorities or in all three sections. Sometimes they used different name but the issues were the same like- in one place they said road construction and in other place they used improved communication system.

Table 5: Perceived development priorities of Rangunia Upazila

| Short term | | Mid term | | Long term | |
|---------------------------------|--|--------------------------------------|---|----------------------------|---|
| Priority issues | Name of the UP | Priority issues | Name of the UP | Priority issues | Name of the UP |
| Educational Institutions | Hosnabad, Shonirbhar Rangunia, Parua, Shilok, Sharafvata, Chondroghona Kadamtali, Kodala, Daksin Rajanagar | Security | Kodala | Electricity | Lalanagar |
| Transportation system | Hosnabad, Mariamnagar, Parua, Shilok, Padua, Kodala, Daksin Rajanagar | Development of Agriculture | Betagi, Sharafvata, Shilok, Kodala | Bank/ Probashi Kollan Bank | Shonirbhar Rangunia, Sharafvata, Shilok, Daksin Rajanagar |
| Police Camp/Security/ Violation | Rajanagar, Shonirbhar Rangunia, Islampur, Lalanagar | Drainage system | Shonirbhar Rangunia, Sharafvata | Health/ medical facilities | Shonirbhar Rangunia, Padua, Chondroghona Kadamtali |
| River Erosion | Hosnabad, Parua, Betagi, Shilok, Lalanagar, Hosnabad | Electricity | Rajanagar, Shonirbhar Rangunia, Padua, Islampur | Employment generation | Rajanagar, Pomra, Islampur |
| Electricity | Hosnabad, Parua, Kodala, Daksin Rajanagar | Land Management/ Protect Hill/forest | Kodala | Recreational Facilities | Sharafvata |
| Haat/Bazar | Shilok, Islampur | River erosion | Padua, Chondroghona Kadamtali | Sanitation | Kodala |
| Sanitation | Shonirbhar Rangunia | Transportation | Rajanagar, Shonirbhar Rangunia, Sharafvata, Chondroghona Kadamtali, Islampur, Lalanagar | Agriculture | Rajanagar |

| Short term | | Mid term | | Long term | |
|---------------------------|---|-------------------------------|---|-------------------------------------|---|
| Priority issues | Name of the UP | Priority issues | Name of the UP | Priority issues | Name of the UP |
| Cyclone Shelter/Housing | Sharafvata | Health/Medical Facilities | Rajanagar, Hosnabad, Mariamnagar, Parua, Pomra, Lalanagar | River erosion | Hosnabad, Mariamnagar |
| UP Building | Parua | Education | Hosnabad, Mariamnagar, Parua, Betagi, Lalanagar | Poverty | |
| Internet facilities | Betagi | Gas | Rajanagar | Planned residence | Chondroghona Kadamtali |
| Fisheries | Shilok, Padua | Sanitation | Pomra, Islampur | Industrialization | Pomra, Shilok, Padua, Chondroghona Kadamtali |
| Livestock | | Fire Service | Hosnabad, Parua, Shilok | Gas | Shonirbhar Rangunia, Betagi |
| Drainage | Mariamnagar, Chondroghona Kadamtali, Lalanagar | Poverty | Hosnabad, Parua | Information Technology Center | Mariamnagar |
| Bank | Hosnabad, Parua | Employment | Betagi, Daksin Rajanagar | Haat/Bazar | Betagi |
| Industrialization | Shonirbhar Rangunia | Livestock | Betagi | Livestock | Padua |
| Social Development | Mariamnagar | Recreational Facilities | Shilok | Poultry | |
| Gas | Pomra, Chondroghona Kadamtali, Lalanagar | Religious infrastructure | Shilok | Women oppression/ Women empowerment | Rajanagar, Hosnabad, Parua, Betagi, Daksin Rajanagar, Lalanagar |
| Agriculture | Pomra, Chondroghona Kadamtali, Daksin Rajanagar | Bank | Padua | Education | Rajanagar, Padua |
| Irrigation | Pomra | Water logging | Padua | Good Governance | Hosnabad, Parua, Betagi |
| Health/Medical Facilities | Sharafvata, Islampur | Voc/Technical training center | Daksin Rajanagar | Irrigation | Hosnabad, Parua |
| Control of Drug | Shilok | Veterinary Hospital | Daksin Rajanagar | Fire Service | Mariamnagar |
| | | UP Building | Lalanagar | Transportation | Pomra |
| | | | | Environment | Sharafvata |
| | | | | Cold storage | Padua |
| | | | | Voc/Technical training center | Chondroghona Kadamtali |
| | | | | Dowry | Daksin Rajanagar |
| | | | | Child protection | Daksin Rajanagar |

(Source: PRA Survey, 2016)

Chapter 3 Participatory Rural Appraisal (PRA) at Rangunia Paurashava (Municipality)

3.1 Overview

Rangunia Paurashava established in 2000 and belongs to class B. It has an area of 8 sq km with 9 wards. Rangunia Paurashava belongs to Rangunia Upazila, Chittagong District. According to Population Census-2011, there are about 53,035 populations in Rangunia Paurashava. PRA methods applied at Rangunia Paurashava on October, 2015.

3.2. Rangunia Paurashava PRAs

3.2.1. Spatial Aspects

Social Map was one of the key tools of PRA. The reason of using Social Map was to identify resources and facilities within the respective area. Resources included both government and non-government facilities. Facilitators of Social map tried to capture all resources available in the area. Few major resources covered educational institutions, health facilities, haat bazar, river & canal, transport facilities, land uses, water options etc (*for more information please see the Annex-2*).

Rangunia Paurashava at a Glance

Table 6: Features/Characteristics of Rangunia Paurashava

| Features/ Characteristics | Remarks |
|-----------------------------|--|
| Establishment of Paurashava | 04-07-2000 |
| Category | "B" Class Paurashava |
| Area | 8 km ² |
| No. of Ward | 09 |
| Population | 53035 |
| Male | 27244 |
| Female | 25789 |
| No. of Voter | Male- 9367 and Female- 8467 |
| Literacy Rate | 70% |
| Educational Institutions | Primary School-12 High School-05 Girl's High School-01 Satellite School-02 College-02 Girl's College-01 University College-01 Madrasha-02 Vocational Institutions-01 Others -07 |
| No. of Holdings | Residential & Commercial-4373 Mixed Government-38 Industry- 04 |

| | |
|---------------------------|--|
| | Villages-20 |
| Transportation Facilities | Bituminous Carpeting Road-39.2 km Pucca Road-10.2 km Semi Pucca Road- 1 km Katcha Road- 11.1 km |
| Health Facilities | Government Hospital-01 Satellite Clinic-01 |
| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Banglapedia and Rangunia Upazila Website)

Health is one of the key components any society. As Bangladesh is dominated by government led health facility, most of the health facilities of Rangunia Paurashava are government. Health facilities include hospital and satellite clinic etc. Study found one government hospital and one satellite clinic in Rangunia Paurashava. According to the community people number of health facilities existing in Paurashava was not sufficient for its population. More government health facilities needed to establish. Following adequate health facility, education is one of the key components in development initiatives. Study found both government, semi government and private education institutions within the study areas. Types of educational institutions include primary school, high school, girl's high school, satellite school, college, girl's college, University College, madrasa, vocational institutions etc.

Most of the roads of Rangunia Paurashava are pucca, semi-pacca, katcha and bituminous carpeting road. There are 4 market laces found in Rangunia Paurashava situated in government land. Rangunia had no Paurashava Market and bus terminal. Study found 12 public toilets in Rangunia Paurashava.

Study found a mentionable number religious platform like Masjid, Temple and Pagoda. This is to mention that, all Muslims, Hindu and Buddhist live in Rangunia Paurashava area. That's why study found all three prayer house of these three religions. A total of 46 Masjids, 19 Temples and 12 Pagodas were found in Rangunia Paurashava. Besides these above mentioned resources, the study found a private bank in 9 No. Khuniar Palong Union.

As an urban area, Rangunia Paurashava had enough street light. A total of 324 street lamps were found during the study time.

3.2.2. Major Problems and Potentials

Identification of Major Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and form the list of problems 5 major problems are identified through Venn diagram.

According to the participant's opinion and their own prioritization, the study identified the below listed problems which were found most acute.

- Poor Communication System and broken road
- River Erosion
- Lack of Proper Drainage System
- Lack of Health Facility considering the amount of population
- Lack of Educational Infrastructure
- Load Shedding and Lack of Supply in Electricity
- Lack of Gas Connection

(For detailed study findings about problems, please see Annex-2)

These seven issues were found in almost all wards of Rangunia Paurashava as burning problems. Apart from these seven issues, PRA participants also mentioned about lack of safe water supply, lack of recreational facilities, lack of adequate agricultural production, lack of proper waste management, lack of sanitation etc. Besides, participants also mentioned about social de-evaluation like eve teasing as an emerging problem. For river erosion, they mentioned about water flow of Kaptai Lake and heavy rainfall. Besides, sedimentation of river bed, sand collection from the channel and flash flood due to hilly water had also significant contribution for river erosion. Participants said that, most of the roads were narrow, broken or damaged. Bridges and culverts were old and risky. Besides, corruptions of contractors were also found as an emerging problem behind weak communication system. For insufficient educational facilities, participants mentioned about bureaucratic complexity, corruptions, lack of development & annual budget, lack of land and lack of entrepreneurship. These reasons were also in place for insufficient gas connection, vulnerable drainage system and lack of health facilities.

Basically, the problem found in all 9 wards Rangunia Paurashava were resemble to other parts of Bangladesh. Lack of necessary educational and health facility is not satisfactory throughout the country. Geographic position added some more problems to Rangunia Paurashava, which made their life more difficult than other parts of the country.

Table 7: Identified major problems of the Rangunia Pourashava

| SL | Major Problems of the Area | |
|----|----------------------------|---------------------------|
| | Type of problems | Ward No |
| 01 | Transportation | 1, 3, 6, 8, 9 |
| 02 | Educational Institution | 1, 2, 3, 4, 5, 7 |
| 03 | Health/Medical Facilities | 6, 9 |
| 04 | River Erosion | 2, 4, 5, 6, 7, 9 |
| 05 | Electricity/ Loadshading | 1, 2 |
| 06 | Drainage | 1, 2, 3, 4, 5, 6, 7, 8, 9 |
| 07 | Gas | 1, 2, 3, 5, 6, 7 |
| 08 | Road | 7 |
| 09 | Sanitation | 8 |
| 10 | Recreation facilities | 8, 9 |
| 11 | Water Supply | 3 |
| 12 | Eve teasing | 4 |
| 13 | Road | 4 |
| 14 | Waste Management | 8 |

(Source: PRA Survey, 2016)

Identification of Major Potentials

Community base programs and projects around the world played significant roles in developing certain community. Pineda (2012) emphasized on various potentials and possibilities within the community for effective community development. Through spatial analysis, the study tried to map the existing problems. After knowing the problems, the next step was to identify the potentials and possibilities of the respective area following to the previous stage. The sought out most prominent potential's list is followed as below:

- Availability of Agricultural Land
- Availability of Demesne Land
- People's enthusiasm and spontaneous participation
- Hard Working Man Power
- Government initiatives
- Sufficient hilly area for waste management and for infrastructural development
- Availability of raw materials (bricks and sand)

These prominent potentials were identified during the drawing of Venn diagram. Each of PRA participant was asked to identify five prominent potential factors. Apart from these potential factors, the participant also mentioned about social unity, massive local supports, gas line coverage in nearby areas etc. *(For details information about major identified potentials, please see Annex-2)*

Table 8: Identified major potentials of the Rangunia Pourashava

| SL | Major Potentials of the Area | |
|----|--|---------------------------|
| | Type of potentials | Ward No |
| 01 | Agricultural Land | 1, 2, 3, 4, 5, 6, 7, 8, 9 |
| 02 | Remittance | 1, 2, 3, 4, 5, 6, 7, 8, 9 |
| 03 | Fruit/ Vegetable Orchard/Cultivation | 6 |
| 04 | Fisheries | 1, 2, 4, 7, 9 |
| 05 | Human power | 1, 2, 3, 4, 6, 8, 9 |
| 06 | Forest | 1, 2, 3 |
| 07 | Haat/Bazar | 8 |
| 08 | Poultry Farm/industries | 6 |
| 09 | Tourism | 5 |
| 10 | River | 5 |
| 11 | Hill | 5 |
| 12 | Technical college/ Educational Institute | 8 |
| 13 | Small industries/ Business | 2, 3, 4, 7, 9 |
| 14 | | |

(Source: PRA Survey, 2016)

3.2.3. Perceived Development Priorities

Technology of Participation (ToP) Workshop was conducted in order to identify the development priorities. This was done at the last of the PRA session. The people involvement is very important which will have great impact on the Development Plan for 20 years by major sectors for sub-regional, structural, urban, rural action plans based on the identified locations, issues, problems and potentials to be gathered from social mapping and Venn diagram. This approach is done by the following ways:

- People were asked to think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dreams were attributed/sited in three phases of development namely Short term (within 0-5 years), Midterm (5-10) and Long term (10-20).

According to participant's opinion, the ToP Workshop team identified various development priorities into three categories respectively- short term, midterm and long term. *(For details information about perceived development priorities, please see Annex-2)*

Participants mentioned about improved transport facility, adequate education facility, sufficient health facility, preventing river erosion, availability of safe drinking water, prevention of child marriage, providing gas connection etc as short term development priorities. Here short term development priorities indicated to quick response of the responsible authority towards these areas. Participants also mentioned about sufficient electricity supply, decreasing load shedding, managing playground & recreational facilities, proper drainage system, government sponsored religious centers, exploration of potential dairy & poultry industry, social development, availability of street lights, promotion of industries etc. Some of the participants identified bureaucratic complications and legacy as one of the main factors behind negative or slow trend of development. They mentioned about dealing about bureaucratic legacy and complications.

Midterm development priorities are little bit longer in terms of implementation which has already stated in the before (5-10 years in length). Participants mentioned about emphasizing on employment related issue, promotion of industries, man power exportation, improvement of drainage system, emphasis on agricultural activities, improvement of health & recreational facilities, availability of gas connection etc as midterm development priorities. Some of the participants mentioned about improving communication system in this section also.

Long term developments priorities are comparatively vastly time consuming. In other words, long term development priorities take very long time to implement. Most of the participants of ToP mentioned about improving communication system as well as construction of roads, establishment of adequate education & health facility, prevention of corruption, employment opportunity, poverty reduction, prevention of drugs, availability of playground etc as long term development priorities. Participants also mentioned about continuous irrigation facility for agricultural production, promotion of fishing industries and reducing load shedding etc as long term development priorities.

There was huge overlapping in identification of short term, midterm and long term development priorities. This was so difficult to separate these three items without repetition. Because, participants repeated one issue in both long term and short term development priorities or midterm and long term development priorities or short term and midterm development priorities or in all three sections. Sometimes they used different name but the issues was the same like- in one place they said road construction and in other place they used improved communication system. As for example, participants mentioned about improving communication system in all three priority areas.

Table 9: Perceived development priorities of Rangunia Pourashava

| Short term | | Mid term | | Long term | |
|--------------------------------|------------|---------------------------|------------|---------------------------------|---------|
| Priority issues | Ward No | Priority issues | Ward No | Priority issues | Ward No |
| Educational Institutions | 1, 3, 5, 7 | Drainage system | 3, 5, 6, 7 | Electricity/Load shading | 4 |
| Transportation system | 1, 5, 7, 8 | Transportation | 4 | Employment generation | 1, 3, 6 |
| River Erosion | 2, 4, 5, 6 | Health/Medical Facilities | 1, 4, 6 | Poverty | 4 |
| Electricity | 2, 5 | Gas | 3, 5 | Haat/Bazar | 8 |
| Cyclone Shelter/Housing | 1 | Fire Service | 4 | Education | 8 |
| Fisheries | 5, 7 | Employment | 2 | Good Governance/stop corruption | 1, 2, 4 |
| Livestock | 5, 7 | Recreational Facilities | 1, 6, 8 | Irrigation | 4 |
| Drainage | 2, 4, 7, 8 | Religious infrastructure | 3, 5 | Transportation | 6 |
| Industrialization | 3 | Industrialization | 2 | Drug Control | 3 |
| Social Development | 1 | Manpower Export | 2 | Fisheries | 4 |
| Gas | 1, 2, 6 | Education Institute | 4 | Forestation | 5 |
| Health/Medical Facilities | 2, 3, 4 | Planned residence | 4, 7 | Safe drinking water | 5 |
| IT training center | 1 | Forestation | 7 | Stadium/ Play ground | 7 |
| Stadium/ Play ground | 2 | Internet Facilities | 8 | Ward Councilor Office | 7 |
| Religious Institution | 2 | | | Rehabilitation | 8 |
| Public Toilet | 3 | | | | |
| Street Light | 3 | | | | |
| Voc./Technical Training center | 4 | | | | |
| Waste Management | 8 | | | | |

(Source: PRA Survey, 2016)

Chapter 4

Conclusion

4.1. Key Observations

PRA is not evolved in scientific laboratories nor in intellectual writings but in field's situations. This can be considered as a major strength in finding rural realities. PRA can make an extremely important contribution to ensuring greater participation in development activities in the field. PRA can be used for decision making, implementation, monitoring and evaluation of the development project.

Through PRA we can get the actual picture of rural area, their geographical, socio-economical, environmental, cultural issues including aquaculture activity. This information will help in the successful implementation of a new technology in a rural area. It allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems came out in a more reprehensive way. By the active participation of people they wanted their demand to be fulfilled and government initiation based on short term, midterm and long term initiatives identified during ToP.

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Major problems of each Union are as same as other parts of the country. As for example, each Union and ward had emerging demand for improved communication system, health facilities and educational facilities. These are also the country wide demands.

4.2 Limitations

Whilst participatory appraisal in terms of resources has relatively low cost, exercises are time consuming. Ideally, to conduct an exercise, helpers are required. However, if community residents are trained effectively, this would not pose a problem. Training of helpers is essential; participatory appraisal does not rely on the tools but the approach and behavior of practitioners. Unfortunately, as Chambers and Inglis pointed out that there is a mass of bad practice from people who abuse the methodology by 'rigid, routinized applications' and 'cosmetic' labelling without substance'. Accessing all the community can be a dilemma if the population size is greater than the number of helpers of time given. The process is lengthy and when done well will continue with numerous exercises over months before collective action may be achieved. Practitioners whilst seeking diversity and participation can raise expectations of the community, a dilemma that has to be balanced when consultation is undertaken.

The success of PRA depends upon the behavior of the outsiders who come to villages and slums to initiate the process, and the quality of the rapport that the outsiders can establish. In that case, it should mention that although rapport building was one of the key components of PRA study, but the study team didn't get much time for rapport building. Time constraint is a great barrier in rapport building. PRA requires not only a technical understanding of the techniques to be applied, but also the capacity to listen, to stay in the background, to be critically self-aware, to allow local people to dominate discussion, to be taught rather than to teach. Apart from this, some of the mentionable drawbacks of this PRA study are listed below:

1. The availability of a number of specialists in different disciplines and team building with the local people may be a problem.
2. The changing attitudes towards rural people in order to be willing to learn from them and to appreciate the importance of their participation in decision-making.
3. It may not be possible to cover maximum number of participants in one season.

4.3 Implications

The main aim in this study was to identify existing resources, problems & challenges and identification of potentials. Besides, we also tried to capture people's demand and development priorities. We tried to address the almost total lack of research evidence on Rangunia Upazilla and Rangunia Paurashava. We have done so by Social mapping (resource mapping), ToP, Venn diagram etc. Besides, we also did direct observation.

Accordingly, the most significant practical implications derived from the study are as follows:

Health Sector: Number of health facilities are not adequate according to demand in Union or Municipality Ward. Government should pay concentration to this issue. Besides, there are some Unions and wards where health facility is very least. Health system here is very vulnerable. So, government should pay special attention to these three Unions.

Educational Facilities: Number of educational institutions are somewhere satisfactory and somewhere not satisfactory. Key problems of educational status are in infrastructure. There are not enough infrastructural facilities available in the study areas.

Improving Communication System: Communication system is not good in almost every Unions and Wards more or less. It is true that, development initiatives cannot be succeeding without improved communication system no. Most of roads of Rangunia Upazilla and Rangunia Paurashava are pacca, semi-pacca and Katcha. Some of the roads were found bituminous carpeting road. But, most of them are broken. Repair hadn't been initiated for last few years. Improvement of communication system is one of the most priority areas for development of Rangunia Upazilla and Rangunia Paurashava.

Gas and Electricity Facility: Gas and electricity facilities are still not satisfactory. According to the participants of Rangunia Paurashava, gas connection is a must. Load shedding was found a very common phenomenon within the study areas, whereas electricity facility is a key indicator for development activities.

Prevention of River Erosion: River erosion was found very frequent within the study areas. People were so vulnerable due to river erosion. But, no such strong initiatives were found in place to prevent river erosion. Central and local government should pay attention to this problem.

Installing improved Drainage System: Drainage system is very important for urban areas as well as rural areas. Rangunia Paurashava had no improved drainage system in place.

Promotion of Agricultural Activities: Rangunia Upazilla is very much dependent on agricultural activities. But, unfortunately agricultural land is being decreased. No initiatives yet not taken to prevent this.

Creating Employment Opportunities: Creating employments are not satisfactory in both rural and urban areas of Rangunia Upazila. Creation and growing scopes of employment is not much mentionable. Government and non-government parties should think of this issue. Development activities won't be accelerated unless more employment opportunities are created. This is also linked with terrorism, eve teasing and drug addiction. Lack of employment is partially responsible for increasing of terrorism, drug addiction among young generation and eve teasing. Participants also mentioned about these issues.

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Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

“Preparation of Development Plan for Fourteen Upazilas”

Participatory Rapid Appraisal (PRA) Guideline

A. Purpose of PRA

- i) To involve the local people in the planning process by letting the local people identify their own problems, potentials, development needs and planning priorities for next 20 years.
- ii) To match PRA findings matching with technical analysis of different sectoral findings, particularly for spatial analysis and GIS mapping, and to supplement other data sources.
- iii) To make participants own the project and its activities towards realizing participatory planning approach.

B. PRA Tools to be used:

1. Social Mapping
2. Venn Diagram
3. Technology of Participation (ToP™) Consensus Workshop

C. Duration of PRA Session: 3 hours 30 minutes – 4 hours

D. Venue: UP meeting room for union level PRA, school or community space for municipal ward level PRA

E. Field Facilitators:

Facilitator and Co-Facilitator and Rapporteur: These three persons will be responsible for communication with and confirming participants, facilitating sessions and documenting. Among three, two persons will interchangeably play role as facilitator and co-facilitator and are responsible to communicate, coordinate and facilitate the PRA session; material distribution, assist facilitators and participants and one person responsible for taking notes, record and take photos/videos of the PRA Session.

F. PRA Participants

For each PRA, 15-20 persons who are knowledgeable, willing and local representing Union or municipal wards are must. The participants include --- Ward Members/Ward Councillors, Teachers, Businessmen/dealers/brokers/traders, NGOs/CBOs/Clubs, Imams/religious priests or leaders, Farmers/labourer, Journalist, Professional (physician/engineers), Local elite/politician/Other.

G. Roles of Field Facilitators in the Field

1. Collection of Materials and Contact Lists

Field facilitators will ensure collection of materials including maps and logistics, official letter, and contact lists and any other administrative and logistics in consultation with the management. In case of any issue, social expert needs to be informed by field facilitators for necessary action. No excuse for any delay or failure will be desirable for the greater interest of the project.

2. Selection and invitation of participants

Trained field facilitators are responsible for contacting, inviting and confirming minimum number of participants of PRA representing the target area (UnionP/Municipal Ward). With due respect and professional standards, they must inform about their purpose of contacts, the host and consulting agencies of the project, previous visits by the project team and as following the PRA session and their roles, the procedure of conducting the session will describe to participant by the PRA team.

3. Facilitate Sessions and reflection for better facilitation

As trained, field facilitators are solely responsible for facilitating PRA sessions in each Union/Municipal Ward of project Upazillas using selected tools to ensure PRA outcomes. At the end of each day, they will do peer discussion and reflect on what they did and how they can do better in next sessions.

4. Documentation and compilation of PRA

After completing a PRA session, field facilitators will write and compile all notes and check PRA documents, and document individual PRA report as per the prescribed/ standard format (Annexure 1). For every PRA session, one report will be prepared by field facilitators covering objectives, methods, team description, group dynamics, description and analysis of the community and its context, and outputs like social map, identification of problems and potentials, and long-, medium- and short term development needs.

5. Report preparation of PRA/deliverable

Field facilitators ensure quality, reliability and validity of PRA outcomes keeping in mind that PRA analysis will be matched with other technical analysis (13 surveys including socioeconomic survey) and compile all PRA reports and field notes to submit to social expert/assigned person for the final deliverable – a working paper. The team leader will integrate PRA findings and socioeconomic survey data with other spatial topographic, hydrogeological, and environmental, land use, transport data during the comprehensive development planning stage.

H. Session Format

Each PRA will begin at 10 am with registration sheet sign up. The concerned UP chairman or Municipal Mayor/ward councillor will open the session. The presence of Upazilla chairman or Mayor would be appreciated. In the opening session, participants will be introduced and oriented to the goals and objectives as well different methods of PRAs reminding the debriefing meetings conducted prior to PRA meeting. Major development and planning sectors will be introduced to the participants. Participants will be requested to provide accurate data and views to the best possible.

Facilitators will maintain the following format for each session of 3.5-4 hours.

- i) Registration (sign up)
- ii) Opening, introductions, expectations
- iii) Social mapping
- iv) Venn diagram
- v) Lunch break

- vi) Technology of Participation (ToP) Consensus Workshop
- vii) Reflection and closing

I. Distribution of PRAs by Upazila, Ups and Municipality

| Upazilla | No. of Unions | No. of Municipal Wards | No. of PRA |
|-----------------|----------------------|-------------------------------|-------------------|
| Sagata | 10 | - | 10 |
| Sonatola | 7 | 9 | 16 |
| Sariakandi | 12 | 9 | 21 |
| Total | 29 | 18 | 47 |

J. Timeline for PRA Sessions

| Upazilla | PRA |
|-----------------|---------------------------------------|
| Sagatha | June 8-12, 2015 (Monday -Friday) |
| Sonatola | June 13-17, 2015 (Saturday-Wednesday) |
| Sariakandi | June 18-24, 2015 (Thursday-Wednesday) |
| Draft Report | June 30, 2015 (Tuesday) |

K. Process Description of Tools

Social Mapping

Objectives

- ❖ To map local area's assets, resources and features (natural, physical, environmental, social, economic etc.)
- ❖ to locate problems and resources in the area through map
- ❖ To prepare a map based on resource base of the area

Timeframe:

45 minutes – 60 minutes

Materials needed:

Union/Pourashava Map, Drawing paper/Flipchart paper, Colour markers/Sketch pen; Pencils, Pencil cutter, Eraser, Gum, Sticky wall, Masking Tape, Chalk, Floor mat/Carpet etc.

Norms

Set norms or remind pre-set norms for this group learning exercise and one of the norms is that it is not necessary for everyone to agree on everything but needs most people's agreement. However, everyone in the group deserves respect. Participants should refrain from judging, interrupting or ridiculing others, and should respect the privacy of others by maintaining confidentiality.

Steps

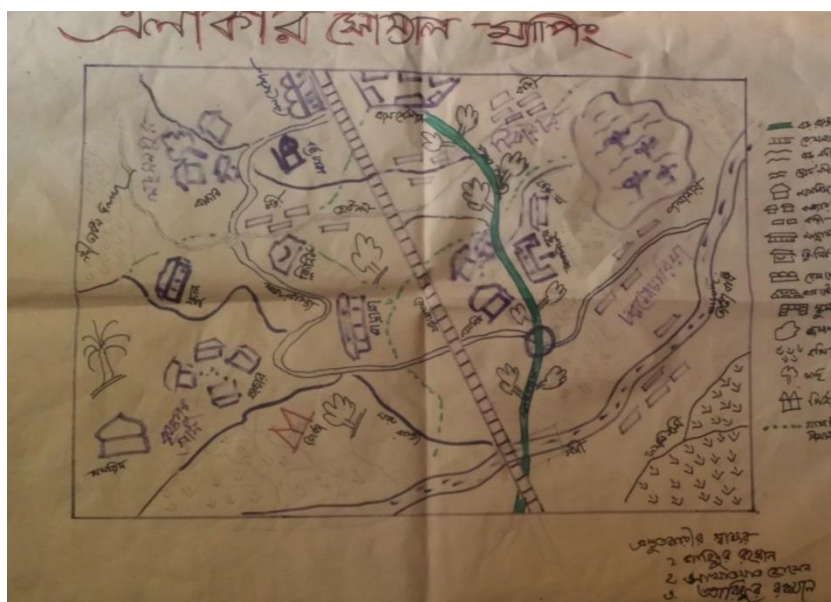
- (a) The facilitator will explain the procedure of the preparation of social mapping to the participants in an easy and simple manner.
- (b) The facilitator will elect person (s) for drawing the social map on the basis of group discussion and request the other participants to the person involve in social mapping.
- (c) Hang the Union/Pourashava map (if available) in a suitable place where all participants can look it clearly. If not available, explain that you are asking them to imagine about the existing

scenarios of their union/target wards of pourashava and draw that image on drawing paper or on the ground.

(d) The poster or paper will be placed on the table, floor or board.

(d) Some participants may not be accustomed to using a writing utensil, so encouragement and patience are needed. Some participants may not be accustomed to using a writing utensil, so encouragement and patience are needed. One alternative is to clear an area of dirt or sand and ask people to create a map using objects found in area. Reassure the participants that things do not have to be drawn exactly – the map is only to get a general idea of what the community looks like. One alternative is to clear an area of dirt or sand and ask people to create a map using objects found in area. Reassure the participants that things do not have to be drawn exactly – the map is only to get a general idea of what the community looks like. The boundary of the area will draw cautiously, and then the map will be drawn collectively with the help of marker or sign pen. Then ask to the participants to draw the wards as well as mouza boundary on the floor or on the paper.

(e) Ask the participants to draw all of the resources in the Union/Target Wards of Pourashava. Different types of resources such as road, pond, agricultural land, river, homesteads, school etc. will be located on the map by using marker or sign pen. (Explain that “resources” are buildings, organizations, people, or services that are available to the area when they are needed. “like roads, houses, health facilities (pharmacies, hospitals, clinics etc.), post office, schools/college/madrasha, religious buildings, graveyard, crematorium, water wells, public baths, markets, schools, factories, rivers, beel, pond, embankment, flood/hazard prone area, flood shelter, bus stand, launch ghat, agricultural land, forest, etc.).



(f) Surrounding unions and important areas or establishments around the boundary will also be plotted on the map.

(g) Ask the participants to mark the north direction of the map and to draw the boundary of the Union/ Wards of Pourashava on the floor with chalk on floor or on paper by wooden pencil.

(h) Signature of the participants' will take on the map drawn by them.

(i) Necessary correction will be made by displaying the map just drawn.

- (j) Facilitators will observe all activities closely and ask to the participants whether all existing features have drawn correctly or not. If the participants agreed that all available features have drawn on the map correctly and no need to adding or deleting any object. Then the map will draw on the paper without changing any object in case of map drawn on the ground.
- ❖ Ask participants to mark where different groups in the community live (i.e. the wealthy, the labourers, different religious groups, different ethnic groups etc.).
 - ❖ Ask them to identify the various community resources by name or with a symbol which can easy understand to third person.
 - ❖ Ask the participants whether all features have drawn on the paper correctly or not. If the participants agreed that all features have drawn on the paper correctly.
 - ❖ Then Facilitators will thank to participants for providing their input and product a nice purposeful map.

Venn Diagram

Objectives

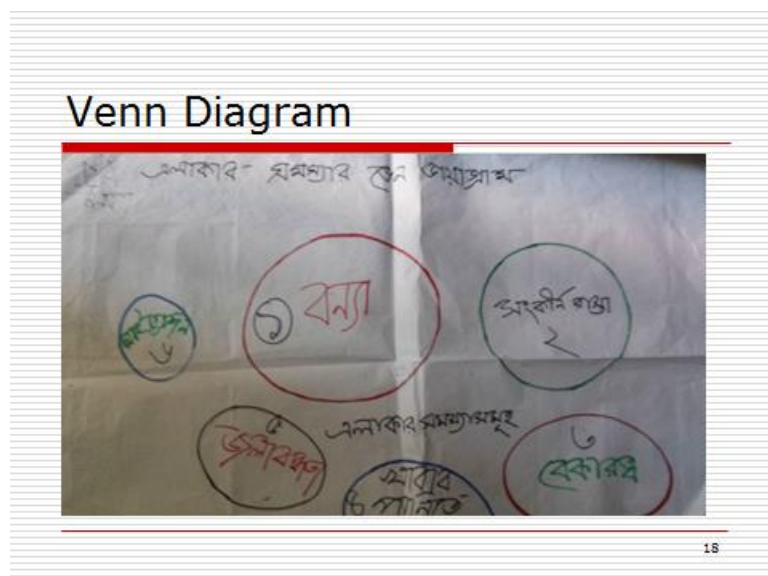
- ❖ To identify the problems/risks/threats of the areas, potentials of the area, causes and effects the major problems
- ❖ To identify the severity and impacts of problems

Norms

Set norms or remind pre-set norms for this group learning exercise and one of the norms is that it is not necessary for everyone to agree on everything but needs most people's agreement. However, everyone in the group deserves respect. Participants should refrain from judging, interrupting or ridiculing others, and should respect the privacy of others by maintaining confidentiality.

Materials: Poster Paper (white and colour), Marker Pen, Sign Pen, Scissors, Glue stick, Masking tape, Wall or Black Board, Sticker, Table or Floor and Color Paper may be used (if necessary)

Material: Poster Paper (white and colour), Sign Pen, Scissors, Glue stick, Masking tape, Wall or Black Board



Procedure of Venn Diagram:

Problem identification

- The facilitator will select a person among the participants' for assistance, who would cut the paper into circular form of different size for venn diagram and stick them on poster paper.
- The facilitator will identify the problems of the basis of their severity e.g., 1,2,3... with the help of participants'.
- Colour poster paper is cut into circular form according the severity of the problems and would stick them on the white colour poster paper.

- (d) The biggest circular sized paper will indicate the most severe problem i.e., no. 01 problem and the size of the circle will reduce according to descending order.
- (e) The main area will be stickled at the centre of the poster paper.
- (f) The problems would be arranged according their importance for aesthetics.
- (g) Necessary correction will be made in the problems diagram by participants.

Potentials identification

Same as Problem Identification

Venn Diagram

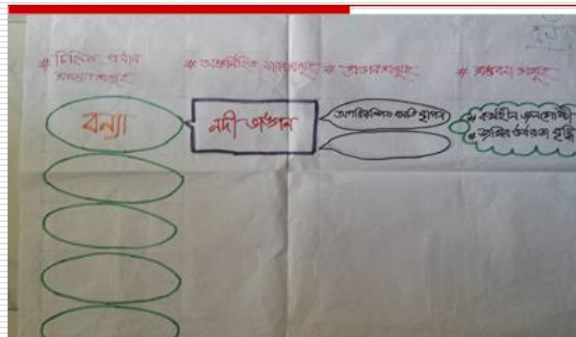


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Cause and effects of Problems and Potentials

- (a) Facilitator will select a person among participants to write the cause & effects
- (b) Facilitator will try to involve all participants in discussion to identify the cause & effects
- (c) Necessary correction will be made in the cause& effects diagram by participants.
- (a) Facilitator will select a person among participants to write the potentials
- (b) Facilitator will try to involve all participants in discussion to identify the potentials to solve the problems of the area
- (c) Necessary correction will be made in the potentials by participants.

Venn Diagram



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Technology of Participation (ToP™) Workshop
(www.ica-international.org, www.ica-bangladesh.org)

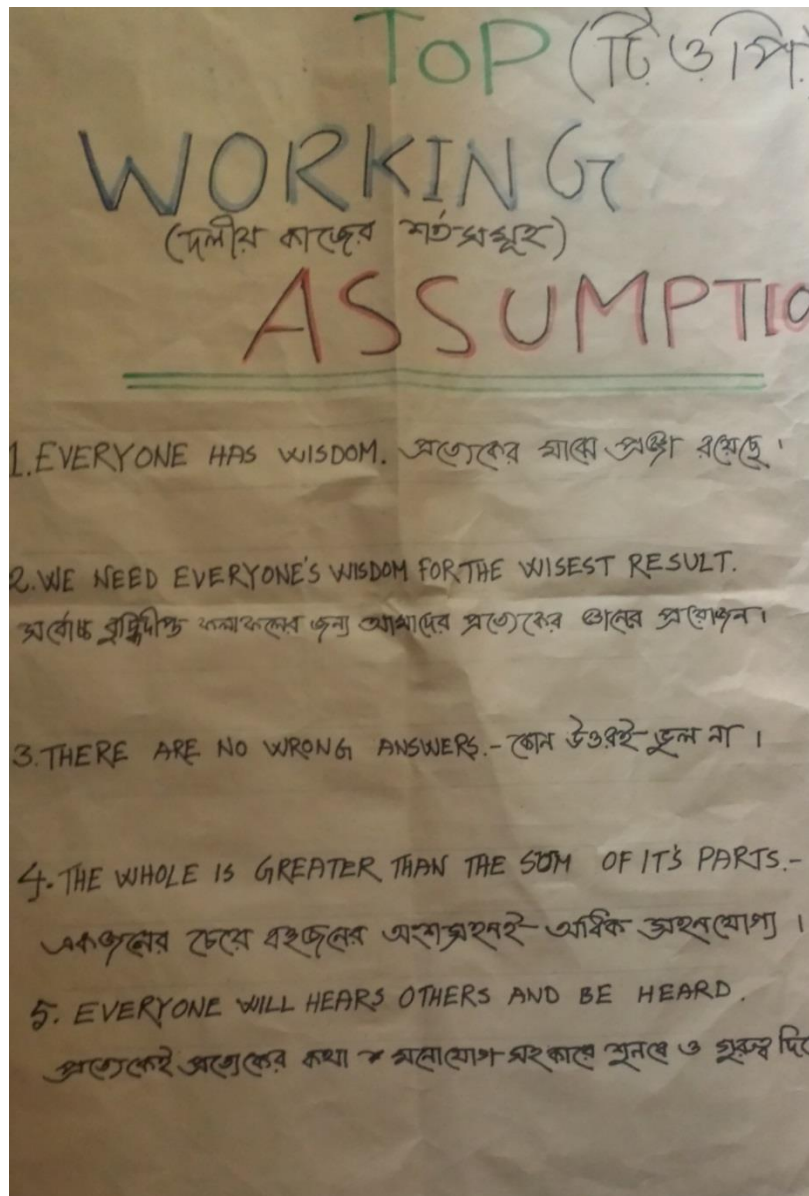
Objectives

- A. To identify priorities for development and planning for next 20 years by major sectors for sub-regional, structural, urban, rural action plans based on the identified locations, issues, problems and potentials to be gathered from social mapping and Venn diagram.
- B. To get getting people's in-depth knowledge and views about their assets, problems, potentials, development needs and planning aspirations.
- C. In all cases spatial dimension of local people's information will be checked for development planning purpose.

Materials

First field facilitators will ensure materials needed --- flip chart, sticky wall, spray, masking tape, sticky glue, board pin, meta cards, white papers, color markers, sign pens, poster papers, registration sign up sheets, camera and videos, etc.

They will hang social map, venn diagrams, tables from previous sessions, day agenda, working assumptions, norms etc. on wall visible to all participants.

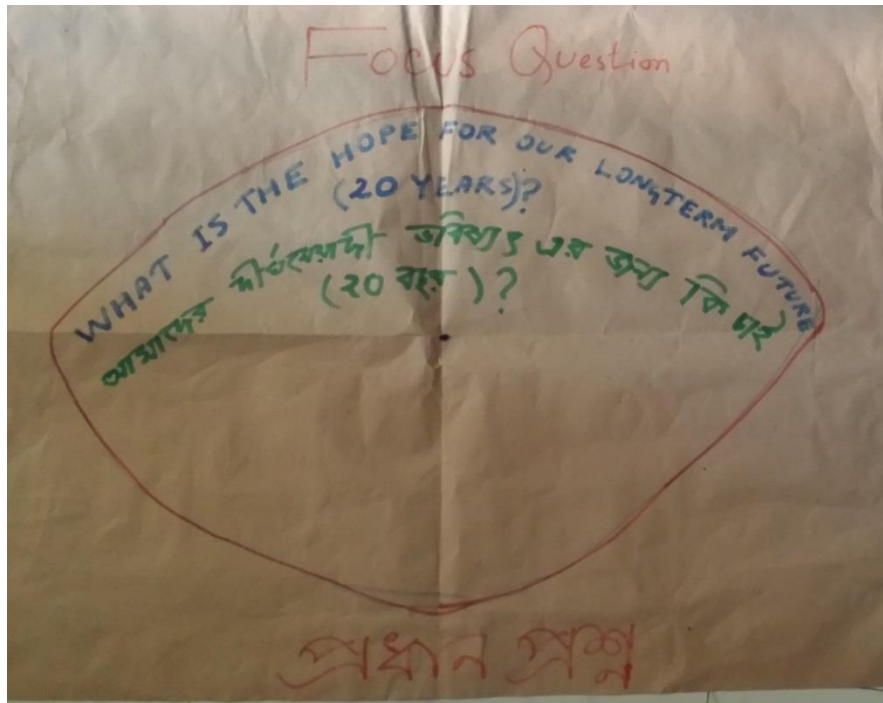


Introductions and Context (10 minutes)

Then ToP session will start with explaining the context (purpose, aims and goals and the process) of ToP session. A warm up or ice breaking exercise at the beginning may be made in the beginning of ToP.

Participants will be reminded of group norms (5 working assumptions (everybody has wisdom, no wrong answers, hear others and be heard) and others (raise hand to speak or ask for anything etc.) and also meta card instructions (1 idea per card, 5-6 words per idea, and Write BIG).

At the start, the facilitator will remind of the whole group - what they got from previous sessions (resources/assets, potentials, problems, risks etc.) showing map and diagrams hanged on room wall or sticky wall or flip chart stand. Then the facilitator will ask participants to look at the focus question if they are clear on the question wording or meanings.



Brainstorming (20 minutes)

The facilitator will read out the focus question --- What they want to see take place in next 20 years in their area.

The facilitator will ask all participants to close eyes for 2 minutes and dream of what they want to see practical things/events/actions in 20 years which will be visible if they take photograph after 20 years.

Then the facilitator will ask participants to brainstorm individually the focus question and write their ideas in note books in next 5 minutes. The facilitator will ask them to write ideas in meta cards following instructions (indicating the poster on wall) and keep 3-5 key/best ideas ready at hand to hand in to cofacilitator. The ideas written on cards will be posted on the wall. The co facilitator will keep meta-cards in hand and distribute those proportionally on tables/floor. The facilitator will the ask participants to write their 5 major ideas in meta-cards. The facilitator and co-facilitators will go to different participants in the room and check if they need any help.

The facilitator will check if they want more time (better to keep time schedule), otherwise will ask participants to select best 3 cards and keep in hands ready for instruction to post on wall.

Organizing (10 minutes)

The facilitator will ask the best card first from each person, the co-facilitator will collect and give to the facilitator. The facilitator will read each card and check if all are clear, if not ask the writer to clarify the intent of the card. The facilitator will put 1st cards on the sticky wall or board. Then the facilitator will ask participants for pairing on wall and he will ask for 2nd best card same way. Afterwards, the facilitator will ask participants for pairing on wall and he will ask participants

which cards can be pair. Some cards will be fit easily as pair and some will not. The facilitator then will ask to give next card which are different so far. Those cards will be read out and put under pair cards for clustering if fit based on suggestion from participants. And then final cards will asked if ideas not appeared yet. The facilitator will organize the longest cluster on the left hand side of the facilitator and the remaining accordingly based on participants' agreement.

ToP



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Naming (20 minutes)

After clustering cards based on participants' suggestion, for preliminary naming, the facilitator will read out cards of each cluster starting from the longest one (in terms of size) and ask participants label the cluster of ideas with two or few words based on the intents/intuition of cards. Thus all clusters will be roughly labeled.

Then the facilitator will let the group name the first column of ideas stating the underlying intents of each card. Then all participants will be divided into groups in terms of number of clusters/columns of cards and let each group name the remaining columns in their own group. The names of other clusters were put on the sticky wall and asked for consensus. Thus all clusters were named and at the end of this session. Participants will be instructed to post the column of cards with Final title on top with signs similar on all cards for not mistaking to post if displaced.

Conversation on Priorities (30 minutes)

For identifying development priorities for short-term (within 5 years), medium (5-10 years) and long term (10-20 years) planning, the facilitator will do and ask the followings:

Read the names of the clusters out loud.

Which of these are you most passionate about?

Which of these would be easiest to make happen? Hardest?

Which would make the most difference for us in the community? (Each person puts a blue dot on the title card they choose)

Which needs to happen first so other things can happen? (Put a red dot)

Which would take the longest to accomplish and can be done later? (Put a yellow dot)

Now that you can see what others have said, let's put these under the headings of immediate, medium, and long- term needs. For dots, color markers can be used.

| Focus Question? | | | | | | |
|-----------------|-------|-------|-------------|-------|-----------|-------|
| Short-term | | | Medium-term | | Long-term | |
| Title | Title | Title | Title | Title | Title | Title |
| Idea | Idea | Idea | Idea | Idea | Idea | Idea |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Closing Reflection

At the end of PRA with ToP, the facilitator will ask following questions:

What one thing/term/phrase do you remember from the day?

What one activity you did today?

What did you like? High point?

What didn't you like? Low point?

What did go well? What went wrong?

What one thing you will take from here? Participants will be asked to make a comment or to express one thing they will do after this event.

The Guest of honour or the designated person will do a closing speech and the team will thank the participants for their cooperation and working together for development for all.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam
Co-Facilitator: Rakeeb Askari
Logistics: Md. Walid Reza
Rapporteur: Md. Kawsar Uddin
Time: 10.00 a.m. to 1.30 p.m.
Date: 04.10.2015
Venue: Rajanagar Union Parishad
Name of Union: 01 No. Rajanagar
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 4, 2015 at Rajanagar Union Parishad where 29 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.

2. STUDY AREA PROFILE

Rajanagar Union under the administrative jurisdiction of Rangunia Upazila in Chittagong District is located at 92°1'46"E, 22°34'32"N, with an area of 25.74 km². The boundary of the study area is stated below:

North: On the north the study area is followed by Islampur.

South: On the south the study area follows South Rajanagar Union.

East: On the east the boundary of the study area is beside by Islampur.

West: On the west the study area runs along the boundary of Khawkhali Upazila.



Plate 1: Image of Participants

Table 1: Physiographic & Demographic Information of Rajanagar Union

| AT A GLANCE | |
|---------------------------|---|
| Features/ Characteristics | Remarks |
| Elevation | 15.2-89.8m above sea level |
| Population | 14190 |
| Male | 7718 |
| Female | 6472 |
| Religion | Muslim (84.2%), Hindus (8.1%), Buddhists (0.05%), Christians (7.72%), Tribal 0.65% & Others (0.01%). |
| Literacy Rate | Male (47.46%) & Female (43.60%) |
| Livelihood Pattern | Laborers (31%), Farmers (30.4%), Businessmen (12.1%) & Service holders (6.0%) |
| Households | 2536 |
| Housing Pattern | Pacca (4.5%), Semi Pacca (4.86%), Katcha (80.83%) & Jhupri (9.81%) |
| Soil Type | Clay loam |
| Land Use | Settlement (327 ha) Agricultural Land (604 ha) Forest (1636 ha) |
| Educational Institutions | Primary school-3, College-1 & Madrasha-1 |
| River Network | Alongside the Karnafuli River |
| Water & Sanitation | Tubewell water user 73.1% Tap Water user 0.38% Well water user 4.35% Pond Water user 4.09% Users from other sources 18.0% Hygienic latrine users 31.5% |

Source: CDMP II

3. STEPS OF PRA APPROACH

There were 29 participants in PRA Session of Rajanagar Union. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping,

Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP)

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venndiagram and Cause Effect Diagram. Besides this task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished the map has shown to the participants to locate the problems/potentials side which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

4. PRA TECHNIQUE

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships



Figure1: Social Map drawing by participants

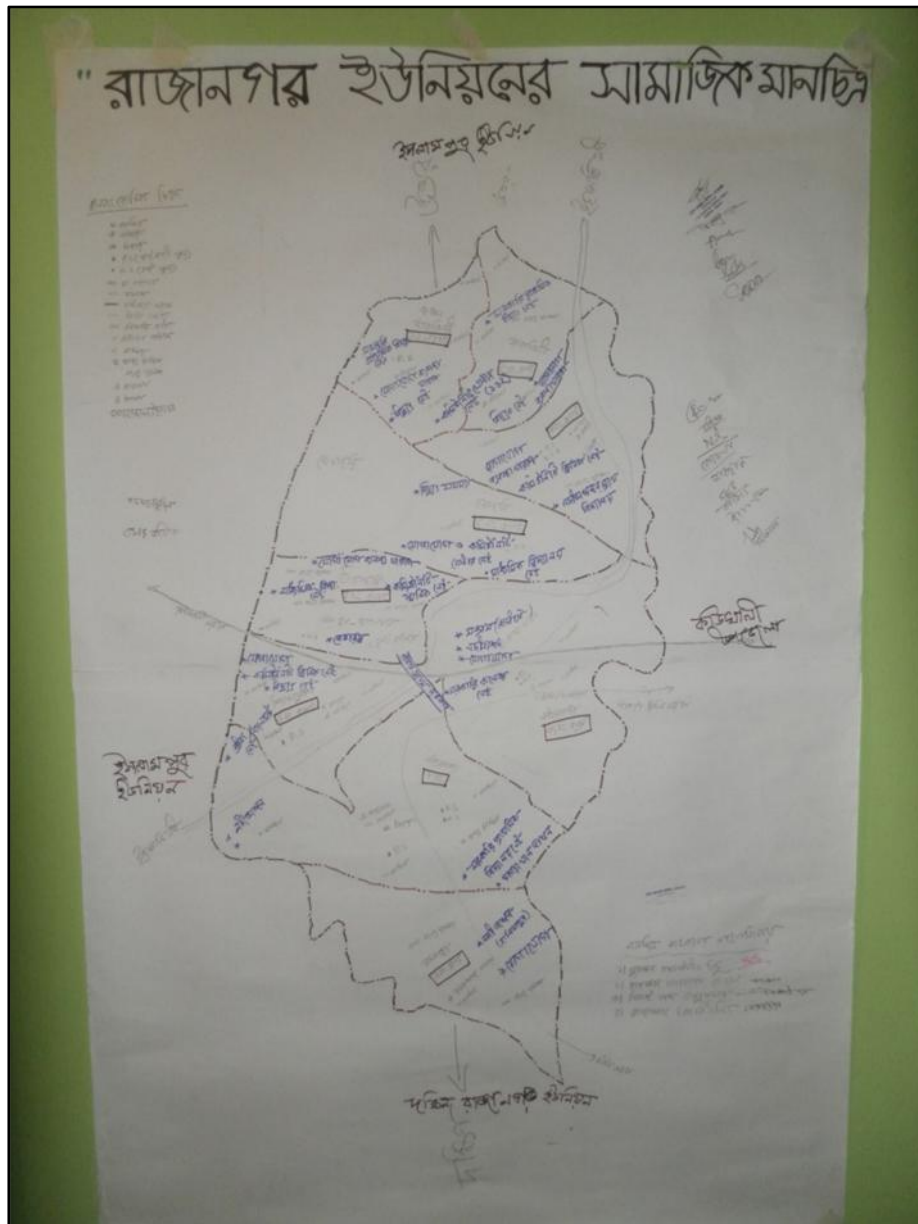


Figure 2: Social Map of Rajanagar UnionSource: Field Survey,2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and form the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- No lighting provisions in daily community market
- Lack of security in local community market
- Impact of Load shedding
- No community clinic or hospital
- Lack of responsible and sufficient doctors
- Lack of educational institutions basically primary school&Vocational institutions
- Lack of Homestead and other residential facilities

- Terrorism activities in local market (Ranir hat)
- Environment pollution
- No connection of gas line
- River erosion is excessive in Ward No. 1-9
- Bad transportation condition
- Poor condition of Network and internet facilities
- Lack of Standard Educational Strategies in existing institutions
- Poor condition of sanitation facilities
- Improper use of river for extraction of sand
- Lack of sufficient working opportunities and increasing unemployed people

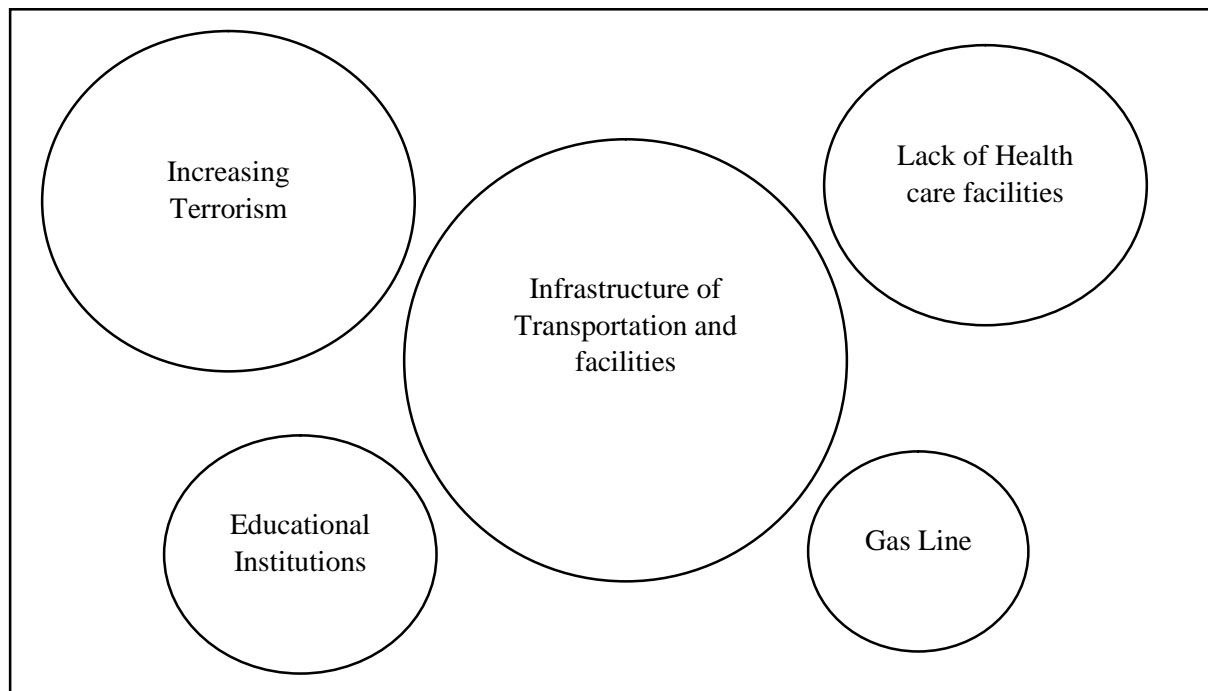


Figure 3: Venn diagram for Problems Prioritization **Source:** Field Survey, 2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land
- Forestation
- Hilly area
- Tea estate
- Poultry farm
- Migrated active human power
- River (Isamati)
- Sand Business

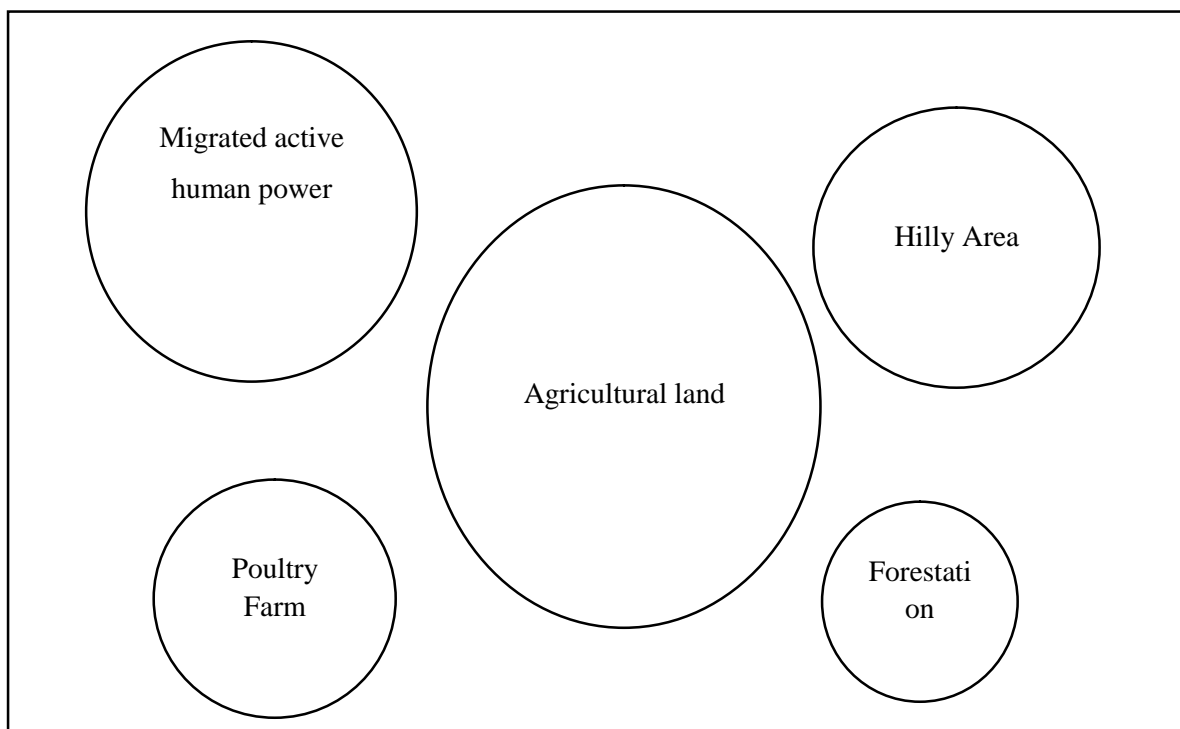


Figure 4: Venn diagram for Potentials Prioritization **Source:** Field Survey,2015



Figure 5: Problem Identification
Source: Field Survey,2015

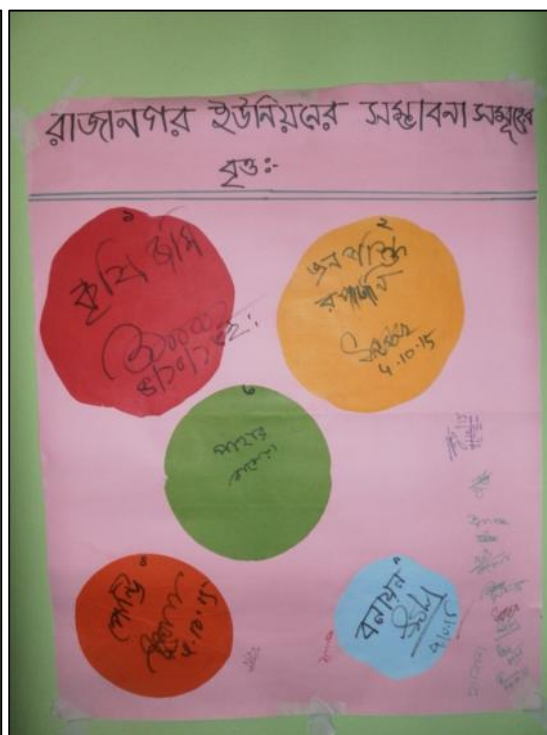


Figure 6: Potential Identification
Source: Field Survey,2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--|--|--|--|
| 1. Infrastructure of Transportation and facilities | <ul style="list-style-type: none"> Budget insufficiency. Poor condition road facilities. | <ul style="list-style-type: none"> People cannot get emergency services such as Health, Fire etc. Unable of getting proper price of commodities especially agricultural commodities. | Existing road which needed improvement. Sufficient human source. |
| 2. Increasing Terrorism | <ul style="list-style-type: none"> Impact of political imposition. Migrated people who offer such heinous works. | <ul style="list-style-type: none"> Increasing of Eve teasing Hamper of Social value and increasing crime activities. | People awareness. |
| 3. Lack of Health care facilities | <ul style="list-style-type: none"> No doctor in Gov. Community clinic. No provision Hospital Long distance from Upazila Hospital. | <ul style="list-style-type: none"> Increasing Child & Maternity death. Increasing death for sufficient distance from RanguniaUpazila. | Proposed site for Hospital within 100 bed capacity. |
| 4. Educational Institutions | No Gov. Primary education. | <ul style="list-style-type: none"> Increasing child labor. Decreasing educational status. Increasing addicted people. | Sufficient place for educational institutions. |
| 5. Gas | Bureaucratic complexity. | Hamper of forestation No Industrialization Impact of environment pollution. | Gas provisions are applied in nearly union. |



Figure 7: Participant's Signature taken in Schedule contents **Source:** Field Survey, 2015

4.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in "Development plan for 20 years" which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Rajanagar Union

| Demand | Remarks |
|---|--|
| Free from Terrorism and Drug Addiction | <ul style="list-style-type: none"> • Enforce security for Rajanagar Union • No activities of Terrorist related activities |
| Development of Model Union | <ul style="list-style-type: none"> • Assurance of Digital Union. • Provision of Decentralization. • Sufficient Facilities in Union Parishad |
| Development of Health facilities | Creation of sufficient Gov. hospital |
| Provision of Transportation facilities | <ul style="list-style-type: none"> • Development of Road • Provide bituminous carpeting road in every road |
| Provision of Gas Facilities | Provide the gas line in every houses |
| Free from Unemployment | <ul style="list-style-type: none"> • 100% working opportunity • Create working sector |
| Assurance of equality in Gender Discrimination | Remove the disparity |
| Provision of Educational Institutions & Proper Facilities | <ul style="list-style-type: none"> • Assurance of fully Educated Union • Provision of primary school • Assure a global language to enable the expatriate to communicate |
| Miscellaneous | <ul style="list-style-type: none"> • Removal of load shedding • Development of agricultural activities • Transformation of Union Parishad to Paurashava |

(Source: Field Survey, 2015)

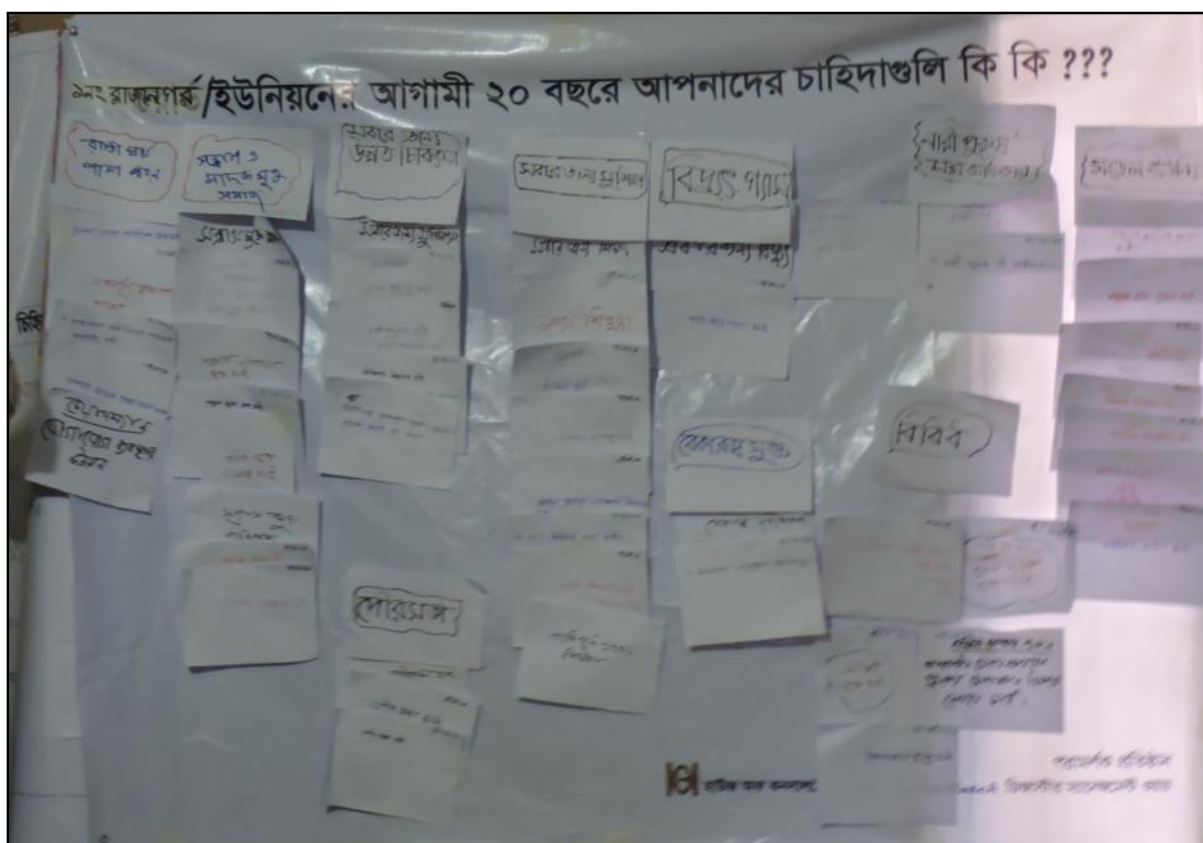


Figure 8: Demand of People for Development Plan **Source:** Field Survey,2015

Table 4.: Identification of Development Plan for Rajanagar Union

| Short term | Midterm | Long term |
|--|--|---|
| Free from Terrorism and Drug Addiction | Development of Model Union | Provision of Educational Institutions & Proper Facilities |
| | Development of Health facilities | Free from Unemployment |
| | Provision of Transportation facilities | Assurance of equality in Gender Discrimination |
| | Removal of load shedding | Development of agricultural activities |
| | Provision of Gas Facilities | |
| | Transformation of Union Parishad to Paurashava | |

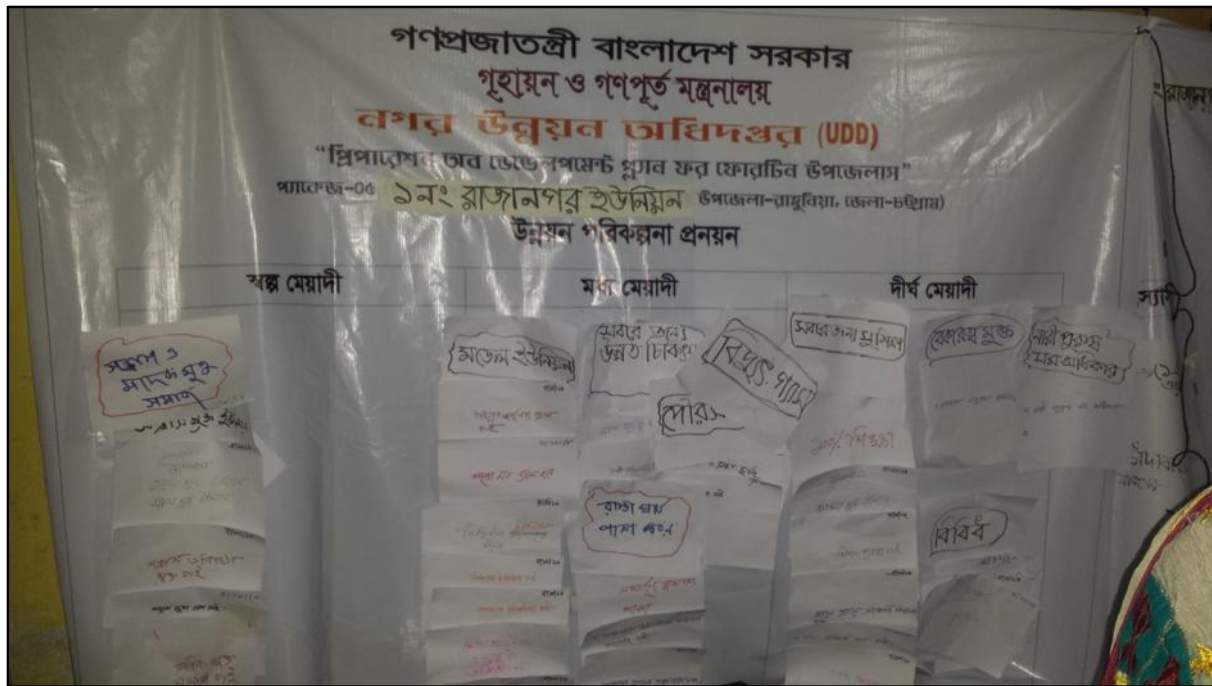


Figure 9: Identification of Demand in Preparation of Development Plan for 20 years
Source: Field Survey, 2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A & B
Facilitator: Abdul Razzak Azad
Co-Facilitator: Rakeeb Askari,
Logistics: Md. Walid Reza, Mehedi Alam
Rapporteur: Md. Kawsar Uddin & K.M Risaduzzaman
Time: 03.00 a.m. to 6.30 p.m.
Date: 03.10.2015
Venue: Hosnabad Union Parishad
Name of Union: 02 No. Hosnabad Union
Name of Upazila: Rangunia
District: Chittagong

.....

1. Introduction:

PRA for **Hosnabad** union was held on October 3, 2015 at UP complex. 23 participants attained in the session (the list is enclosed) other than three tools Social mapping, van diagram and TOP (Technology of Participants). Census, workshop, GIS map collected from national database was used to match the boundary of the union, the union's existing Comprehensive Disaster Management Program, CDMP-II Map). PRA involved the local people in the planning process by letting the local people indentify their own problems, potentials, development needs and planning priorities for next 20 years.



Figure1: Image of Participants



Source: Field Survey, 2015

2. STUDY AREA PROFILE

Hosnabad union is one of the unions of Rangunia Upazilla in Chittagong District. Hosnabad union was established in 1966. This union has traditional Mughal inheritor. Currently this union has established lucrative Sheikh Russel Aviary and Eco Park. It is a really independent, resourceful and communal free union. This union is surrounded by Kurmai

Canal, Lake canal, Ichamati River and Kaptai Upazilla. From Union There is a rubber dam 500 meter idstant from the Union Parisad. Total area of the union is 16.03 Sq.km .

North: On the north the study area is followed by Lalanagar union.

South: On the south the study area follows Sanirvor Rangunia Union.

East: On the east the study area is surrounded by Kaptai Upazilla,

West: On the west the study area runs along the boundary of Parua Union.

Table 1: Physiographic & Demographic Information of Daksin Rajanagar Union

| AT A GLANCE | |
|----------------------------------|--|
| Features/ Characteristics | Remarks |
| Population | 25000 |
| No of Village | 30 |
| Hat- Bazar | 01 |
| Literacy Rate | 70% |
| Community Clinic | 01 |
| Educational Institutions | Govt. Primary School-04 |
| | Secondary school-01 |
| | Madrasha-01 |
| NGO | 04 |
| Grave Yard | 48 |
| Temple | 05 |
| Cyclone / flood center | 01 |
| Water and sanitation | Tube well water user 84.00% |
| | Tap water user -1.42% |
| | Well water user-0.81% |
| | Use of water from other sources- 9.61% |
| | Hygiene latrine user –51.4% |
| | Pond water user – 4.20% |

(Source: Field Survey,2015)

Agriculture land of 1815.45 acres is the only one potential resource for the people of the locality. This agricultural land is irrigated by the water supplied from the rubber dam. We could find out soil type (Clay loam, loam and sandy loam), road network (district road- 2.1 Km,).

3. STEPS OF PRA APPROACH

There were 23 participants present in the PRA at Hosnabad Union (see annexure –I). The participants included UP chairman and 9 ward members (6 male and 3 female members) and secretary and other than, it had teacher, farmer, Imam, businessmen, social worker, political leader, surveyor, student, driver, entrepreneur and local people etc. PRA was started at 03.15pm and ended at 5.45 pm. Two facilitators by turn mainly lead the session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

After saying the purpose of Development Project for 20 years, the schedule of PRA Session was explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause

Effect Diagram on the basis of problems. When these two tasks were finished, the map has been shown to the participants to locate the problems/potentials side which has spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were requested to dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP)

4. PRA Technique

4.1 Social map:

Social map was sketched by the participants along this assistance of the facilitators, participants draw the boundary line of the Hosnabad Union first, than they located roads, river, settlements, institutions and also problem areas (in terms of earthen roads, broken roads, broken educational institution, lack of drainage system, conservancy management, shortage of technical education institution, agricultural extension services, product marketing, eve teasing ,flesh flood, housing, unemployment or any other risk) and potential areas (in terms of agricultural land, non agricultural land uses it is). It should be mentioned here that when the social mapping and Venn diagram respectively finished, the facilitator asked the whole group to check if the identified major problems and potentials are already located in the social map, if missed then they located on the map.



Figure 2: Social Map of Hosnabad Union. **Source:** Field Survey, 2015

4.2: Problems, Potentials, Causes and Effects and relevant potentials:

The participants were asked to discuss the problems of Hosnabad union and then to identify the major problems. The facilitator first listed all problems, method, mention by participants in the flip chart. The problems included (list of all problems here).

Then the participants were asked to select five major problems and use circles to determine the severity and influential problem and put in the problem Venn diagram (Figure 1).

4.2.1 Problems of Hosnabad Union:

- Lack of Gas connection.
- Shortage of transportation (Broken roads and bridges)
- Lack of health services.
- Poor remuneration of union parishad Chairman and members Educational Institution
- Drainage and conservancy management
- Crisis of technical education
- Lack of Community Center (Government)
- Crisis of High School (Education system)
- Irrigation system in agriculture
- Lack of Cold Storage for vegetable product
- Agricultural extension problem(lack of seed storage)
- Product marketing
- Crisis of modern seeds in agriculture
- Unemployment
- Dowry
- Eve teasing
- Flash flood
- Lack of residence

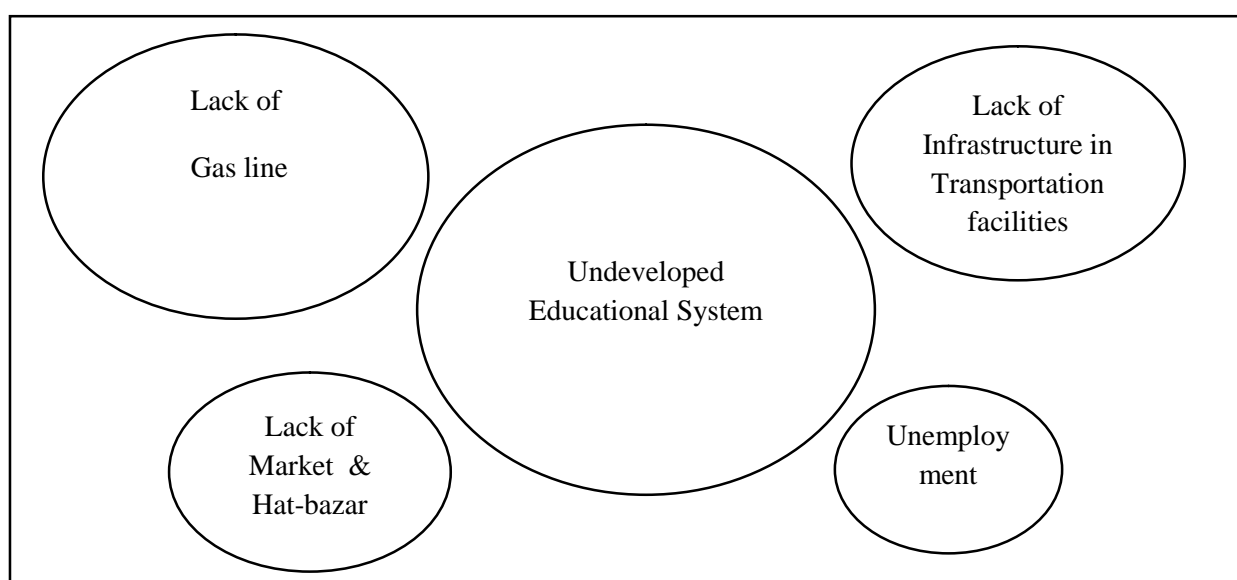


Figure 3: Venn diagram for Problems Prioritization **Source:** Field Survey,2015

4.2.2 Potentials of Hosnabad Union:

- Cultivable Agricultural land.
- Hills and Forest..
- Ponds/Fisheries
- Park(Shiekh Russel Eco Park)
- Brickfield.
- Rubber Dam.
- Poultry Farm.
- Cattle Rearing.
- Workable active man power.
- Tourism.
- Vegetable production
- Fellow land.
- Foreign
- Remittance

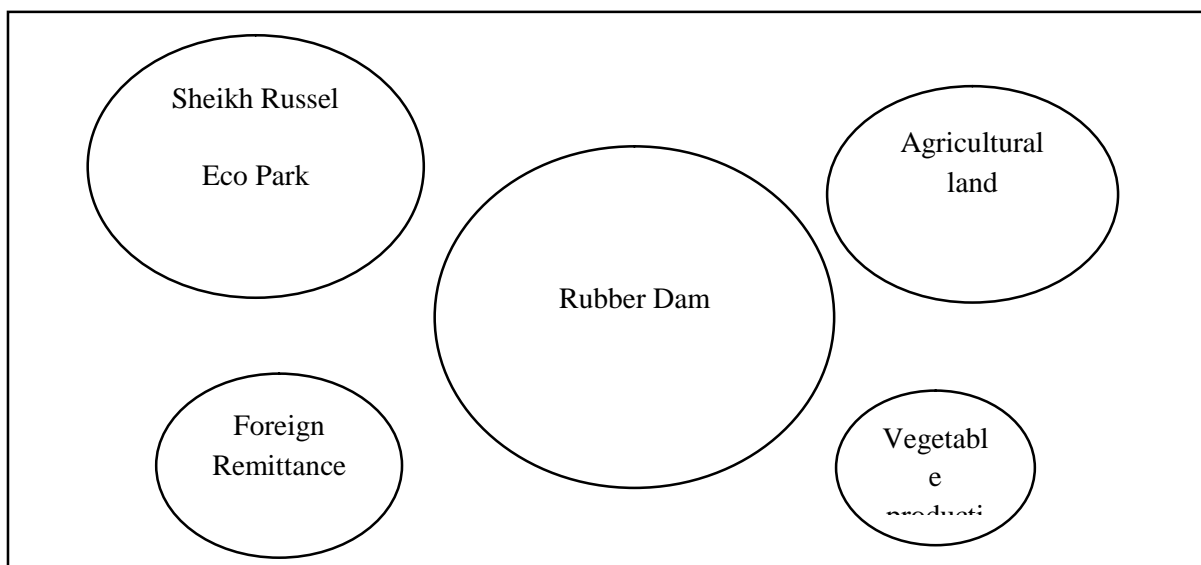


Figure 4: Venn diagram for Potentials Prioritization **Source:** Field Survey,2015

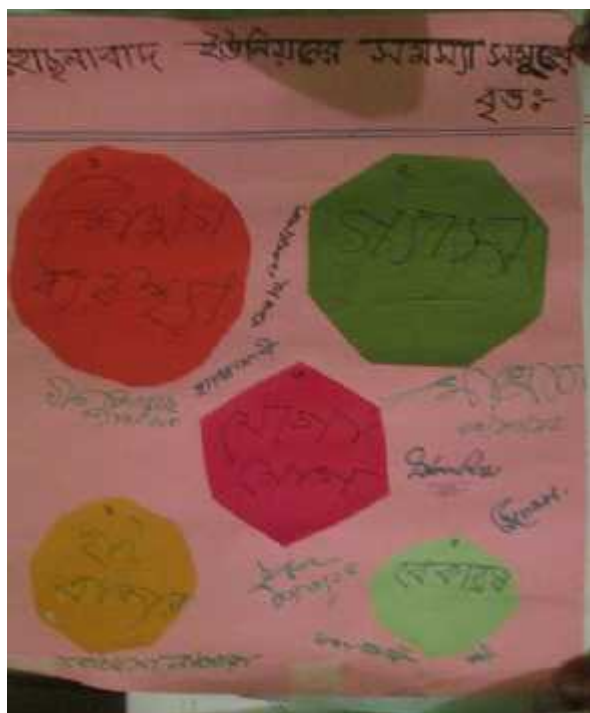


Figure 5: Venn diagram of Problems

Source: Field Survey,2015

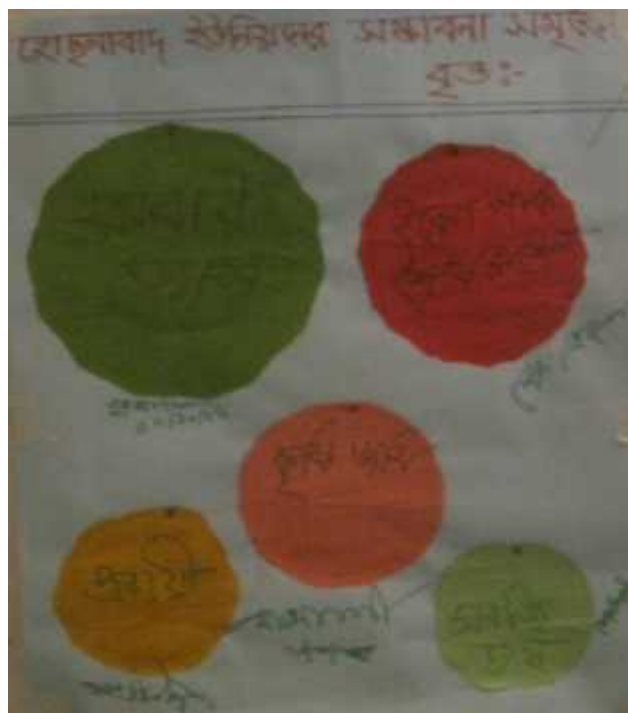


Figure 6: Venn diagram of Potentials

Source: Field Survey,2015

Table 2: Cause, Impact and Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|---|--|--|
| 1. Lack of educational institution | • No primary or Secondary School | • Low Literacy rate, | • Sufficient land • Land owners willing to give land |
| 2. Lack of Gas Line | • Bureaucratic Complexity | • Industrialization cannot take place • Higher fuel cost • Indescribable difficulty in cooking | • Gas line available in the nearby union |
| 3. Lack of Transportation Facilities | • Bureaucratic Complexity, • Lack of govt. Budget | • Emergence patients hardly reach the hospital in due time, • Education system is hampered, • Daily life become difficult | • Sufficient land • Raw materials (Brick, soil, sand), • Mass cooperation |
| 4. Lack of Hat-bazar | • Lack of sufficient land for hat bazaar, • Lack of govt. enterprise | • Marketing of the crops is hampered. Thus the farmers don not get the due price of their crops, • Overall economy of the union is affected | • Local people are cooperative in this case. |
| 5. Unemployment | • Undeveloped Educational System, • Lack of Vocational Education, • Lack of Industrialization | • Increase of Poverty, • Increase of Terrorism | • Sufficient land for Industrialization, • Scope of Agricultural development, • Scope of Tourism |

| সমস্যা (Problem) | কারণ (Cause) | প্রভাব (Impact) | সম্ভাব্য সমাধান (Potential Solution) |
|--------------------------------------|---|---|---|
| ১. শিক্ষার অভাব (Lack of Education) | • প্রাথমিক ও মাধ্যমিক বিদ্যালয় নেই। | • নিম্ন লিটারেসি রেট। | • শিক্ষা কমিশনকে চাট্টোপাড়া ইউনিয়নে একটি প্রাথমিক বিদ্যালয় ও একটি মাধ্যমিক বিদ্যালয় স্থাপন করতে অনুরোধ করা। |
| ২. গ্যাসের অভাব (Lack of Gas) | • বৈদেশিক জটিলতা। | • শিল্পায়ন হ্রাস পাবে। • রান্না-পাকের জন্য অসুবিধা। | • গ্যাসের একটি লাইন স্থাপন করা। |
| ৩. পরিবহনের অভাব (Lack of Transport) | • সরকারি বাজেটের অভাব। • জটিলতা। | • রোগীরা হাসপাতালে পৌঁছানোর সমস্যা। • শিক্ষা-বিস্তারিত হ্রাস পাবে। | • একটি জাতীয় বাজেট নির্ধারণ করা। • স্থানীয় বাজেটের মাধ্যমে পরিবহন ব্যবস্থা স্থাপন করা। |
| ৪. হাট-বাজারের অভাব (Lack of Market) | • পর্যাপ্ত জমি নেই। • সরকারি উদ্যোগ নেই। | • ফসলের মূল্য হ্রাস পাবে। • স্থানীয় অর্থনীতি হ্রাস পাবে। | • একটি হাট-বাজার স্থাপন করা। |
| ৫. বেকারত্ব (Unemployment) | • অসম্পূর্ণ শিক্ষা ব্যবস্থা। • শিল্পায়নের অভাব। | • দারিদ্র্য বৃদ্ধি। • অস্থিরতা। | • শিল্পায়ন প্রকল্প বাস্তবায়ন করা। • বেকারত্ব হ্রাস করার জন্য প্রশিক্ষণ প্রদান করা। |

Figure 7: Cause, Impact and Potentials

Source: Field Survey, 2015

4.5 Technology of Participation (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Hosnabad Union

| Demand | Remarks |
|--------------------------------------|---|
| Demand educational institution | <ul style="list-style-type: none">• Demand for college,• Repairmen of the old educational institutions,• Increasing the capacity of the educational institutions. |
| Development of transportation system | <ul style="list-style-type: none">• Demand for wide road.• Brick / pitch road are demanded,• Repairmen of the damaged roads and bridges, |
| Child Educational | <ul style="list-style-type: none">• Ensure education for all the poor child |
| Demand for Electricity Line | <ul style="list-style-type: none">• Expansion of electricity in the hilly area,• Electricity in the road |
| Development of Medical facilities | <ul style="list-style-type: none">• Health facilities should be increased to fulfill the existing demand |
| Removal of river erosion | <ul style="list-style-type: none">• Embankment and Guide wall is demanded |
| Development of irrigation | <ul style="list-style-type: none">• Budget for good irrigation system,• Good Irrigation system can accelerate the agricultural development |
| Demand for UP Building | <ul style="list-style-type: none">• Old and small UP building |
| Miscellaneous | Gender Equity, security for women, digital union, demand for fire service, good governance, poverty, Krishi Bank |

Source: Field Survey,2015

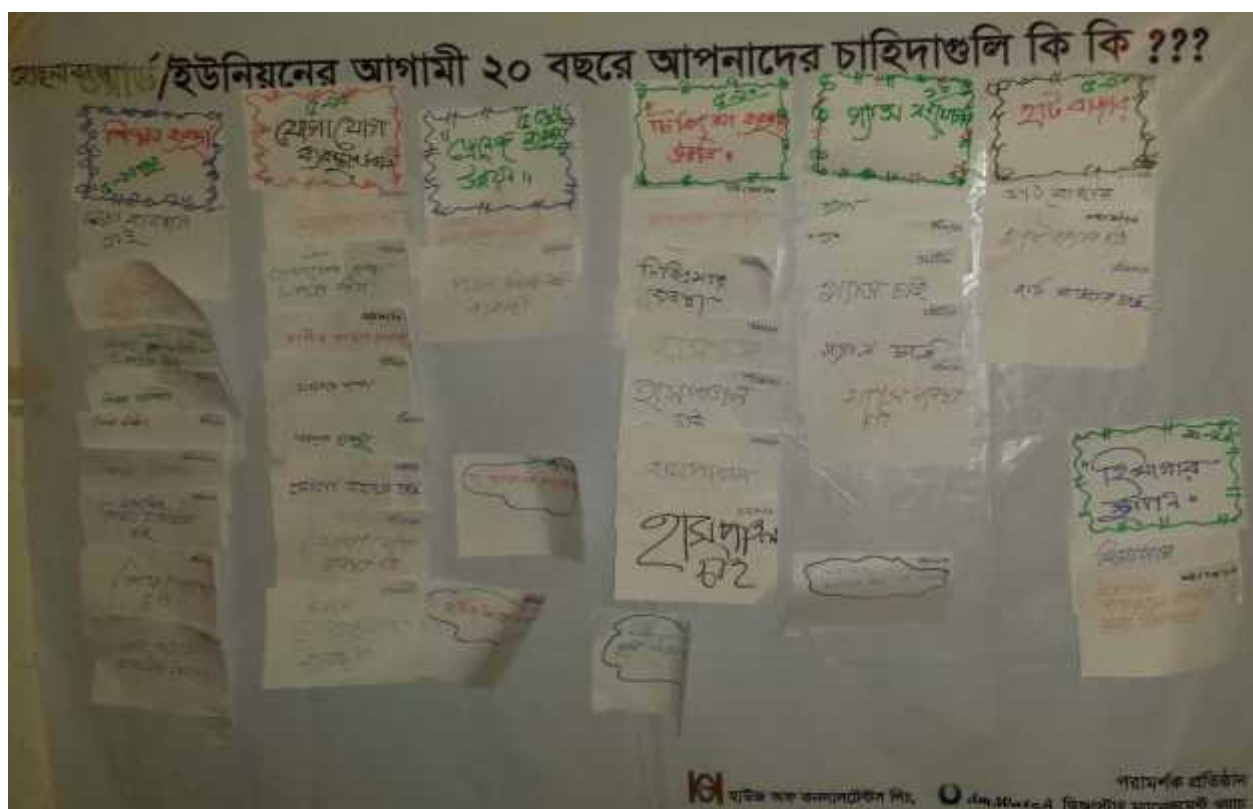


Figure 8: Demand of People for Development Plan

Source: Field Survey,2015

Table 4: Identification of Development Plan for Parua Union

| Short Term | Mid Term | Long Term |
|--------------------------------------|-----------------------------------|---------------------------|
| Removal of river erosion | Development of Medical facilities | Removal of river erosion |
| Child Educational | Demand educational institution | Development of irrigation |
| Development of transportation system | demand for fire service | Gender Equity |
| Demand for Electricity Line | poverty | security for women |
| Demand for UP Building | | digital union |
| Krishi Bank | | good governance |

(Source: Field Survey,2015)

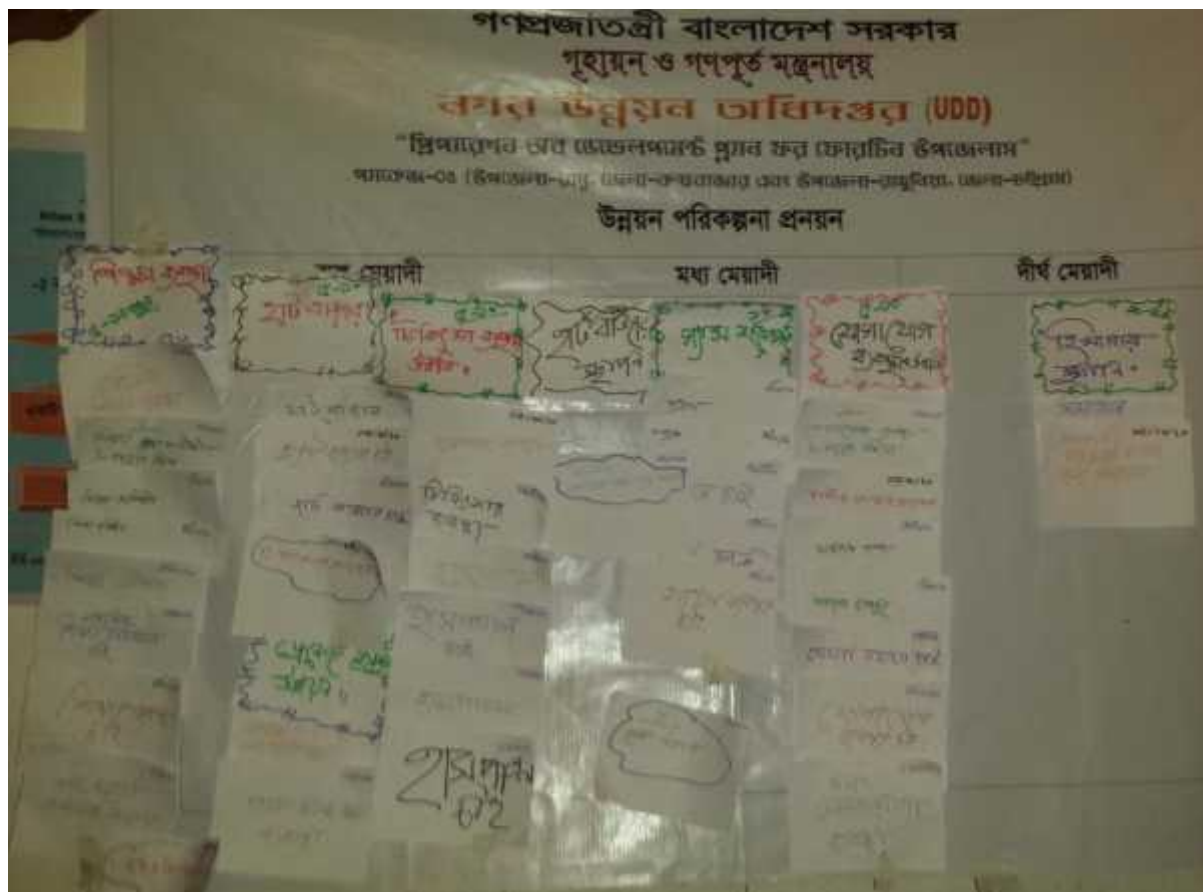


Figure 9: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, and Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam
Logistics: Mehedi Alam
Rapporteur: Md. K. M. Risaduzzaman
Time: 10.00 a.m. to 2.30 p.m.
Date: 13.10.2010
Venue: Rangunia Union Parishad
Name of Union: 03 No. Shonirbhar Rangunia
Name of Upazila: Rangunia
District: Chittagong

1. Introduction

Participatory Rapid Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA approach was held on October 13, 2010 at Rangunia Union Parishad where 16 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, and Technology of Participation (TOP) have been applied for this project which will fulfill our project goal.

2. Study Area Profile

Rangunia Union under the administrative jurisdiction of Rangunia Upazila in Chittagong District is located at 92°5'33"E, 22°28'13"N, with an area of 4.5 km². The boundary of the study area is stated below:

North: On the north the study area is follows Hosnabad Union

South: On the south the study area follows South Goma Beel.

East: On the east the boundary of the study area is beside by Chandraghona Kadamtali

West: On the west the study area runs along the boundary of Rangunia Pourashava.



Plate1: Image of Participants



Source: Field Survey, 2015

Table 1: Physiographic & Demographic Information of Rangunia Union

| AT A GLANCE | |
|----------------------------------|---|
| Features/ Characteristics | Remarks |
| Elevation | 2.7-5.9m above sea level |
| Population | 16000 |
| No. of Village | 05 |
| Religion | Muslim (51.5%), Hindus (48.5%), Christians (0.04%) |
| Literacy Rate | Male (66.19%) & Female (58.01%) |
| Livelihood Pattern | Laborers (18.4%), Farmers (23.8%), Businessmen (22.2%) & Service holders (11.4%) Others(24.2%) |
| Households | 2268 |
| Housing Pattern | Pacca (4.5%), Semi Pacca (4.86%), Katcha (80.83%) & Jhupri (9.81%) |
| Soil Type | Clay loam |
| Land Use | Settlement (16 ha) Agricultural Land (565 ha) |
| No. of Educational Institutions | 20 |
| Health Facilities | Community Clinic -02 FWC-01 |
| River Network | Alongside the Karnafuli River |
| Water & Sanitation | Tubewell water user 94.7% Tap Water user 0.67% Well water user 0.27% Pond Water user 2.22% Users from other sources 2.17% Hygienic latrine users 75.3% |

(Source: Field Survey,2015)**3. Steps of PRA Approach**

There were 16 participants in PRA Session of Rangunia Union. The participants were included of UP chairman and 8 ward members (6 male and 2 female members) and secretary and other elite persons such as teacher, farmer, businessmen, social worker, political leader, surveyor, student, driver, entrepreneur and local people etc. PRA was lasted from 10.15am to 2.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP).

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has shown to the participants to locate the problems/potentials sides which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (TOP).

Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)
"PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS" PACKAGE-05
(RAMU UPAZILA AND KANGUNA UPAZILA)

তারিখ: ২০.১০.২০১৫
আয়োজনকারীর প্রতিনিধিত্ব: ৩ নং ওয়ার্ডের ০১৫ নং/১৫/১
উপস্থাপনা: ১১৫ নং/১১/১
কোড: ৫৭/১১/২

| ক্র.সং. | নাম | পেশা/পদবী | ঠিকানা | যোগাযোগ নম্বর | স্বাক্ষর |
|---------|----------------------------|----------------|----------|---------------|----------|
| ১. | শ্রী. জে.এম. হুমায়ুন কবীর | চ.প.স.স.স. | কামালপুর | ০১৭২০৭২০৭০২ | স্বাক্ষর |
| ২. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৭৫৫৫৫২৫৫ | স্বাক্ষর |
| ৩. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৩১৭৫৫৫৫ | স্বাক্ষর |
| ৪. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৫২৬৫৫ | স্বাক্ষর |
| ৫. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৬৫৫৫৫ | স্বাক্ষর |
| ৬. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |
| ৭. | শ্রী. জে.এম. হুমায়ুন কবীর | R.H.P | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |
| ৮. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |
| ৯. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |
| ১০. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |
| ১১. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |
| ১২. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |
| ১৩. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |
| ১৪. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |
| ১৫. | শ্রী. জে.এম. হুমায়ুন কবীর | অধ্যাপক-শিক্ষক | কামালপুর | ০১৮১৭২০৭২০৭ | স্বাক্ষর |

Figure 1: Attendance Sheet of Participants Source: Field Survey, 2015

4. PRA Technique

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships



Figure 2: Social Map of Rangunia Union

Source: Field Survey, 2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Problem of Transportation (Narrow road-All ward, Pond erosion-6 no. ward, Katcha Bazar on the road, broken culvert (9), muddy road,
- Problem of Electricity (lack of electric line and load shedding, unplanned electric line)
- Problem of water drainage system (lack of drain, filling of the canals)
- Eve teasing,
- Poverty (poverty of students make them not to continue their study after secondary examination, good preparation for the SSC exam)
- River erosion(Ichamati river-1,2,6)
- Lack of recreation(no playground in the whole union)
- Lack of medical facility (no hospital)
- No financial help for the religious institutions(Madrasha- All, Mandir-2,7)
- Weak law enforcing system,
- Lack of classroom in the school(Primary and secondary school)
- Lack of sanitary latrines (2,6,8 and all schools)
- Lack of safe drinking water (Iron-2,6)
- Problem in the marketing of the Agricultural Products,
- Water Logging on the road(filling of canal-6),
- Unemployment,
- Lack of Technical Education,
- Corruption of the contractors in the field level,
- Gas line problem- High price of the gas line.

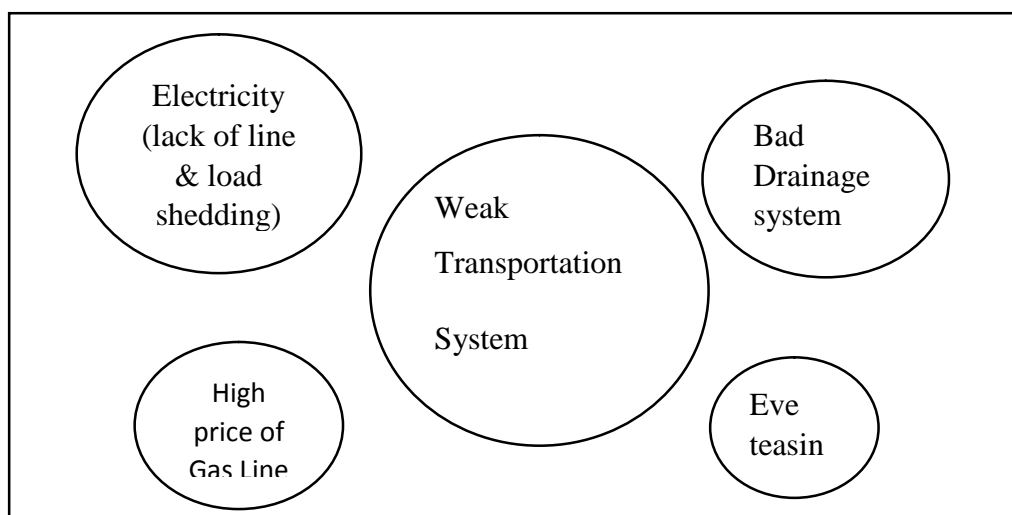


Figure 3: Problem Identification

Source: Field Survey,2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land
- Migrated active human power
- River (Isamati)
- Fisheries (Pond)
- Poultry farm
- Dairy farm
- Industry
- Man power (Educated youth)
- Local Industries (bet Silpa)

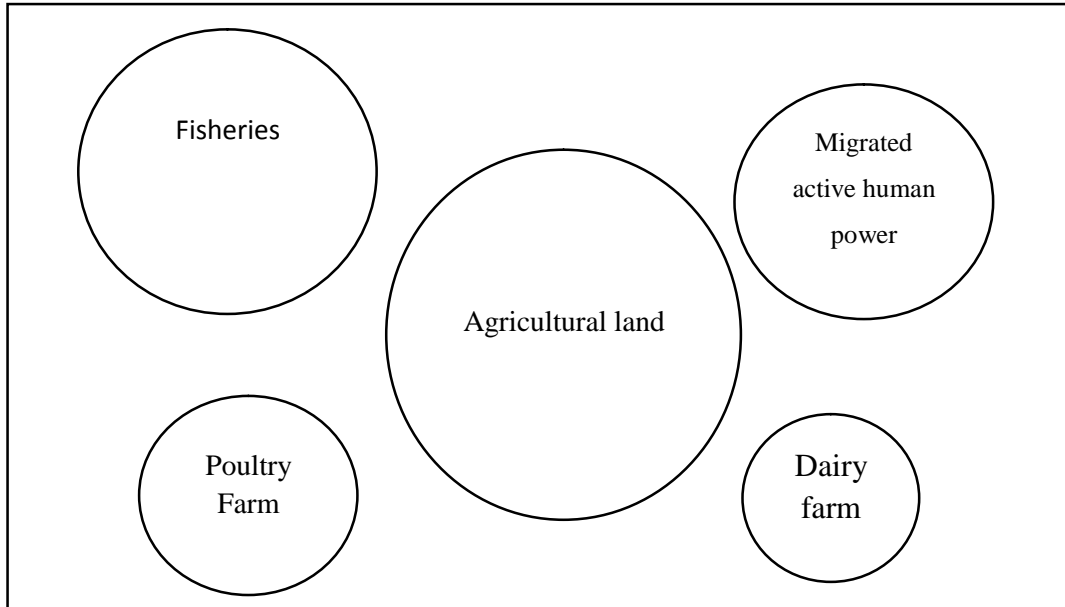


Figure 4: Venn diagram for Potentials Prioritization **Source:** Field Survey,2015



Figure 5: Problem Identification

Source: Field Survey,2015

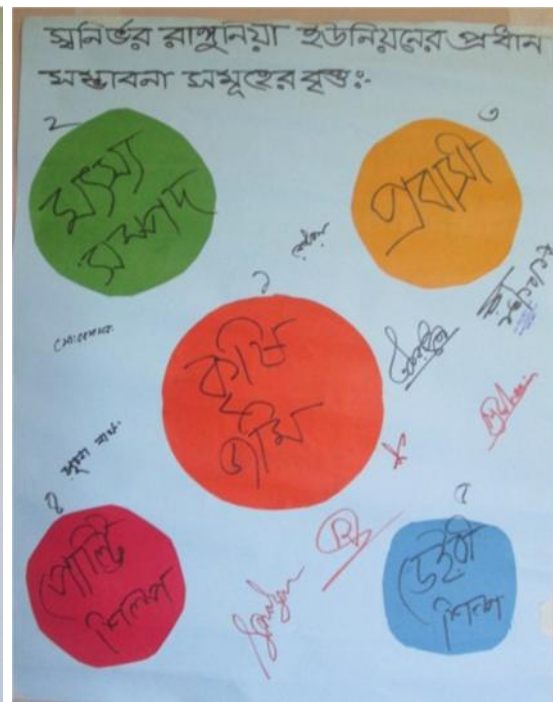


Figure 6: Potential Identification

Source: Field Survey,2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--|---|--|---|
| 1. Weak Transportation System | <ul style="list-style-type: none"> Narrow and broken roads. No drainage system, Lack of budget River and pond erosion | <ul style="list-style-type: none"> Marketing of the agricultural products, Hamper of education system, Hamper of health facilities, | Sufficient space for road, Raw materials, Man power |
| 2. Electricity(lack of line & load shedding) | <ul style="list-style-type: none"> Unplanned electric line. Load shedding, Bureaucratic complexity | <ul style="list-style-type: none"> Treatment has been hamper Hamper of education Hamper of industrialization | Man power |
| 3. Bad Drainage System | <ul style="list-style-type: none"> No drain, Siltation of canal | <ul style="list-style-type: none"> Water logging Spoiling of crops Fishes are lost from the pond | Manpower Space, Raw materials. |
| 4. Gas | Bureaucratic complexity. | Hamper of forestation No Industrialization Impact of environment pollution. | Gas provisions are applied in on union. |
| 5. Eve teasing | Unemployment, Lack of care of the guardians. | <ul style="list-style-type: none"> Security of female students is on threat, Education has been hamper | Social unity, Mass support. |

(Source: Field Survey,2015)

Table 3: Demand of People for Development Plan for 20 Years, Rangunia Union

| Demand | Remarks |
|--------------------------------------|---|
| Development of transportation system | <ul style="list-style-type: none">• Brick / pitch road are demanded,• Demand for culvert |
| Development of Electricity | <ul style="list-style-type: none">• Repair of the electric pole and planned set up of them,• Stopping of the load shedding. |
| Development of Health facilities | <ul style="list-style-type: none">• establishment of sufficient Gov. hospital• ensuring good health facilities, |
| Development of the Education System | <ul style="list-style-type: none">• Demand for the technical education center,• Demand for government school,• Education and rehabilitation for the physically disabled students. |
| Provision of Gas Facilities | Provide the gas line in every houses |
| Free from Unemployment | <ul style="list-style-type: none">• 100% working opportunity• Create working sector |
| Development of the drainage system | <ul style="list-style-type: none">• Demand for drain beside the road |
| Development for GAS | <ul style="list-style-type: none">• Gas line wanted on a low price, |
| Miscellaneous | Removal of poverty, removal of early marriage, modern agricultural tools, removal of drugs, demand for commercial bank, demand for government job for the poor people(3,5) |

(Source: Field Survey, 2015)



Figure 8: Demand of People for Development Plan

Source: Field Survey, 2015

Table 4: Identification of Development Plan for Rangunia Union

| Short term | Midterm | Long term |
|--|--|---|
| <ul style="list-style-type: none"> • Development of the Education System • Removal of drugs • Demand for Industry • Demand for allowance for physically disabled persons • Modern agricultural tools • 100% Sanitation | <ul style="list-style-type: none"> • Provision of Transportation facilities • Removal of load shedding • Development of Health facilities • Development of the drainage system | <ul style="list-style-type: none"> • Development of Health facilities • Provision of Gas Facilities • demand for commercial bank |

(Source: Field Survey, 2015)



Figure 9: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A
Facilitator: Abdul Razzak Azad
Co-Facilitator: Rakeeb Askari
Logistics: Md. Walid Reza
Rapporteur: Md. Kawsar Uddin
Time: 10.00 a.m. to 1.30 p.m.
Date: 07.10.2015
Venue: Mariamnagar Union Parishad
Name of Union: 04 No. Mariamnagar
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 7, 2015 at Mariamnagar Union Parishad where 30 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.



Plate 1: Image of Participants

Source: Field Survey, 2015

2. STUDY AREA PROFILE

Mariamnagar Union under the administrative jurisdiction of Rangunia Upazila in Chittagong District has an area of 20.02 km². The boundary of the study area is stated below:

North: On the north the study area is followed by Sanirvar Rangunia Union

South: On the south the study area follows Silok Union

East: On the east the boundary of the study area is beside by ChandraghonaKadamtali Union

West: On the west the study area runs along the boundary of Pomra Union.

Table 1: Physiographic & Demographic Information of Mariamnagar Union

| AT A GLANCE | |
|----------------------------------|---------------------|
| Features/ Characteristics | Remarks |
| Population | 18658 |
| Hat | 1 |
| Literacy Rate | 70% |
| Educational Institutions | Primary school-08 |
| | Secondary School-02 |
| | Madrasha-1 |
| Important Religious Institutions | 06 |
| Place of Tourism | 01 |

Source: CDMP II

Source: Field Survey,2015

3. Steps of PRA Approach

There were 30 participants in PRA Session of Mariamnagar Union. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP)

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venndiagram and Cause Effect Diagram. Besides this task, two or three persons from the group wereselected to draw the Social Map of the union and other participantswere involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished,themap has shown to the participants to locate the problems/potentials side which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP)

4. PRA Technique

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
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- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
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- Identify flexible funding strategies
- Cultivate new partnerships and relationships

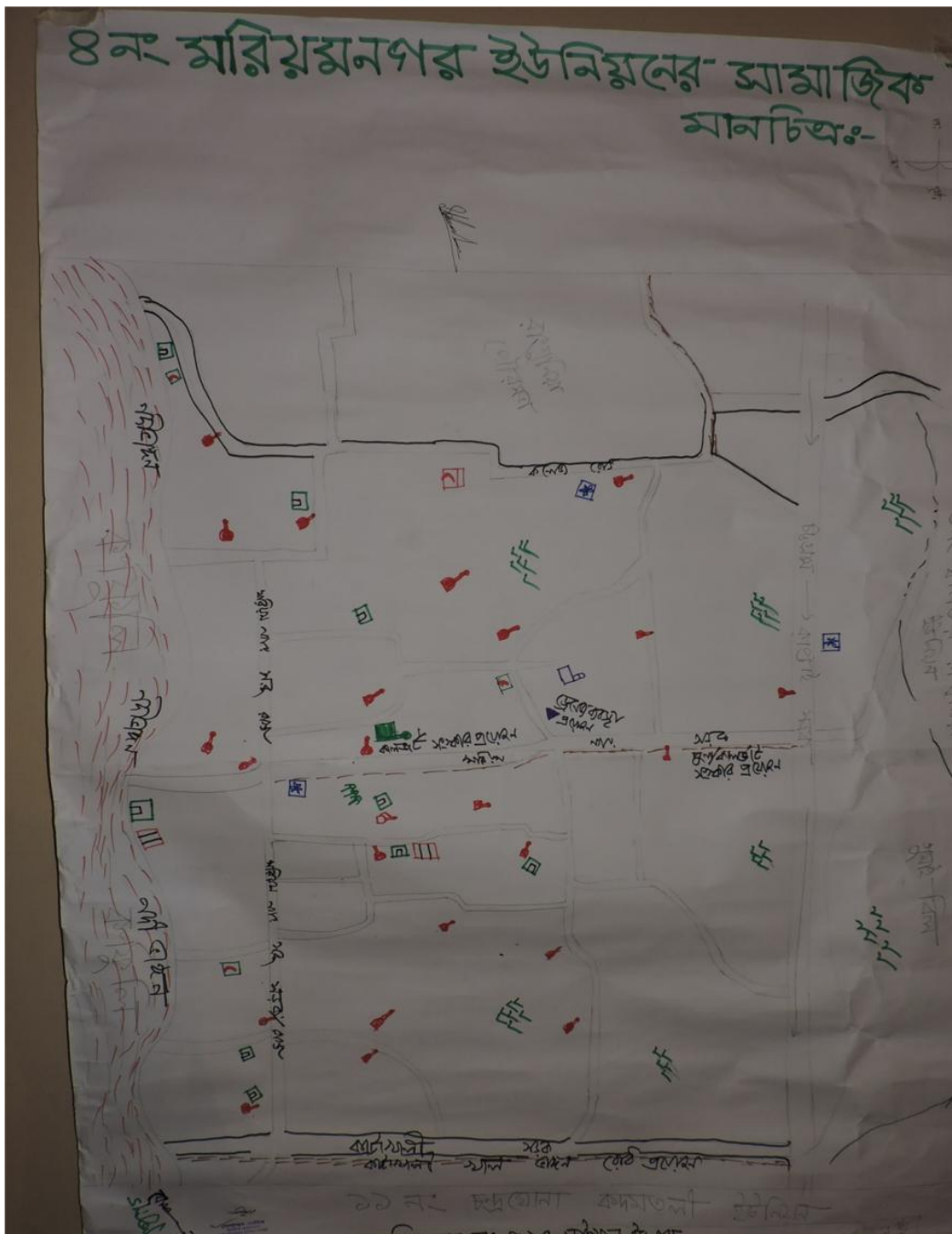


Figure 1: Social Map of Mariamnagar Union Source: Field Survey, 2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Bad drainage system
- No community clinic or hospital
- Lack of adequate health facilities
- Lack of educational institutions basically primary school, girl's college&Vocational institutions
- Inadequate agricultural fields
- Unplanned excavation of sand from river
- River & Environment pollution
- Water logging
- Unplanned infrastructure along the road side.
- Lack of monitoring committee for road
- Lack of voting problem for expatriate
- Land surveying and monitoring problem
- River erosion
- Bad transportation condition
- No excavation of river or canal.
- No provision of repairing
- Flash flood due to hill
- No provision of fire station

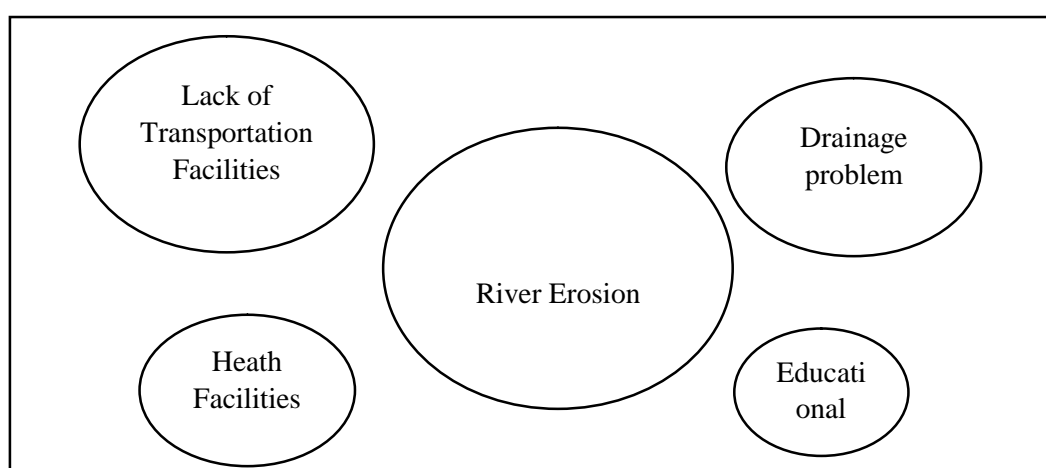


Figure2: Venn diagram for Problems Prioritization **Source:** Field Survey,2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Accreted land from Karnafuli river
- Ghumai Bill (Agricultural land)
- Pagla mama majar
- Storage for Fish
- Whole seller Fish market/ Fish business
- Poultry farm
- Active human power
- Remittance
- Wood Business
- Karnafuli river

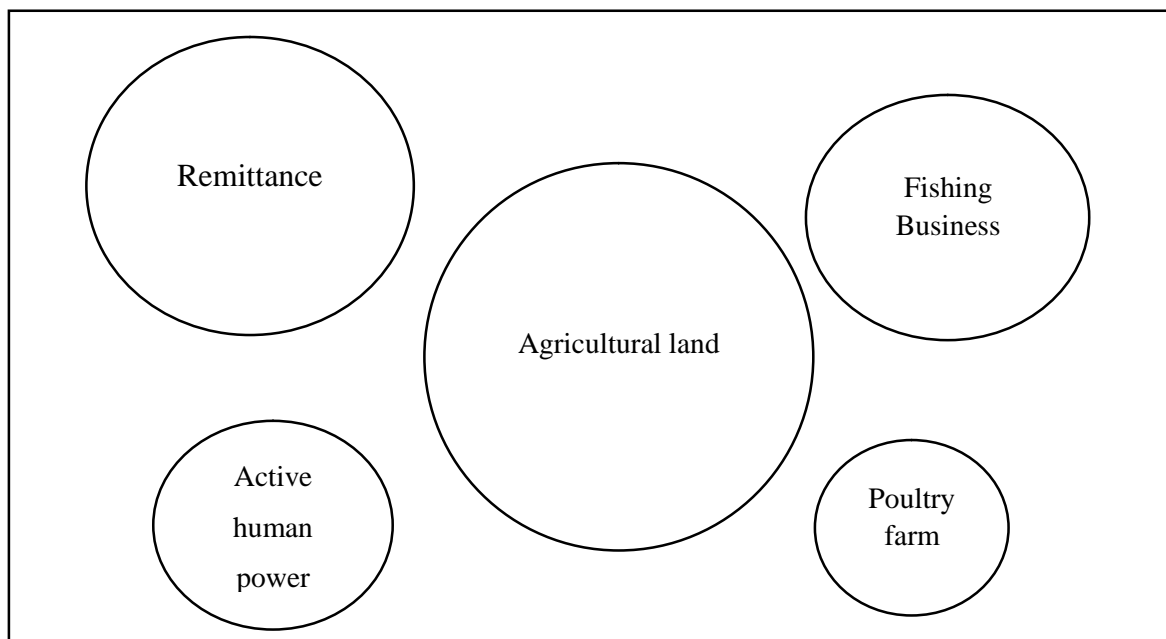
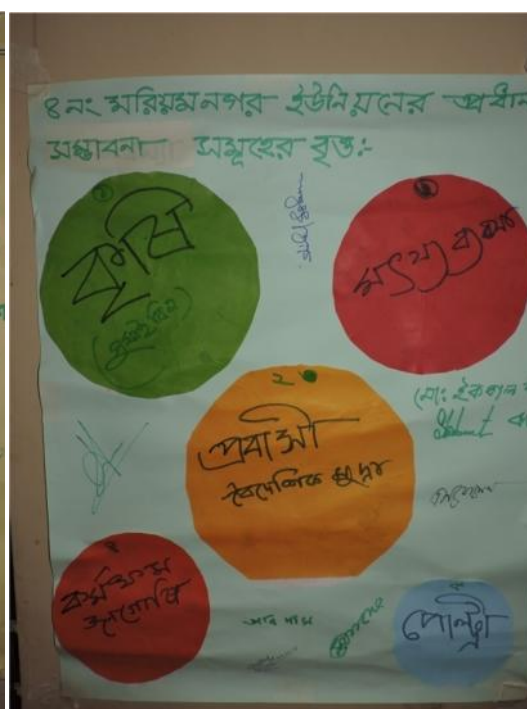


Figure3: Venn diagram for Potentials Prioritization **Source:** Field Survey,2015



Figure 4: Problem Identification

Source: Field Survey,2015



Source: Field Survey,2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|---|---|--|
| 1. River erosion | <ul style="list-style-type: none"> Excessive water from Kaptai embankment. Reducing navigation of river Lack of drainage sytem | <ul style="list-style-type: none"> Banishing homestead and agricultural land. People migrate from rural area to town for excessive flood. | <ul style="list-style-type: none"> Land Sufficient human source. |
| 2. Lack of transportation facilities | <ul style="list-style-type: none"> Narrow road Flood affected people | <ul style="list-style-type: none"> Transportation problems Deprived of fundamental services | <ul style="list-style-type: none"> People awareness. Human power |
| 3. Insufficient Drainage facilities | <ul style="list-style-type: none"> Narrow drain Lack of solid waste management Non rotting waste | <ul style="list-style-type: none"> Village affected Increasing the water level Environment pollution | Human power |
| 4. Lack of Educational Facilities | <ul style="list-style-type: none"> Lack of health facilities and responsible doctors. Lack of people awareness | <ul style="list-style-type: none"> Deprived of health facilities Increasing death rate. | <ul style="list-style-type: none"> Three community clinic available and one health complex Local doctors are available |
| 5. Lack of educational facilities | <ul style="list-style-type: none"> Lack of girl's college, vocational training. Lack of adequate teachers. | <ul style="list-style-type: none"> People deprived of education Increasing unemployment | <ul style="list-style-type: none"> Sufficient school. Having donor. |

(Source: Field Survey,2015)

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
কমর উন্নয়ন আধিদপ্তর (UDD)
 "প্রিপারেশন অব ডেভেলপমেন্ট প্ল্যান ফর ফোরটিভ উপজেলাস"
 প্রায়শঃ-০৪ (১৯৯৭-১৯৯৮-১৯৯৯-২০০০ উপজেলা-রামুগিয়া, জেলা-চট্টগ্রাম)

সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই

| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সক্ষমতা |
|--------------------|---|---|---|
| ১. নদীভাঙ্গন → | • বন্য হ্রাস • নদী ভাঙা • নদী ভাঙা | • বন্যহ্রাস কমে • বন্যহ্রাস কমে • বন্যহ্রাস কমে | • বন্যহ্রাস কমে • বন্যহ্রাস কমে • বন্যহ্রাস কমে |
| ২. জলসামগ্রিকতা → | • জল সঞ্চয় • জল সঞ্চয় • জল সঞ্চয় | • জল সঞ্চয় • জল সঞ্চয় • জল সঞ্চয় | • জল সঞ্চয় • জল সঞ্চয় • জল সঞ্চয় |
| ৩. পরিবহন → | • পরিবহন • পরিবহন • পরিবহন | • পরিবহন • পরিবহন • পরিবহন | • পরিবহন • পরিবহন • পরিবহন |
| ৪. শিল্প | • শিল্প • শিল্প • শিল্প | • শিল্প • শিল্প • শিল্প | • শিল্প • শিল্প • শিল্প |
| ৫. শিল্প | • শিল্প • শিল্প • শিল্প | • শিল্প • শিল্প • শিল্প | • শিল্প • শিল্প • শিল্প |

Figure6: Cause, Impact and Potentials **Source: Field Survey, 2015**

4.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in "Development plan for 20 years" which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Mariamnagar Union

| Demand | Remarks |
|---|--|
| Information technology | <ul style="list-style-type: none">• Creation of information technology center• Provision of 3G Internet• Creation digital union center to provide services |
| Development of Health facilities | <ul style="list-style-type: none">• Development of health facilities.• Provision of health complex with 20 or 50 bed• Assurance of hospital |
| Provision of Transportation facilities | <ul style="list-style-type: none">• Development of Road• Widening narrow road• Provide street light• Provision of Drainage along the road side |
| Prevention of River erosion | <ul style="list-style-type: none">• Establishment of embankment along the Karnafuli river• Provision of Karnafuli dredging |
| Provision of Fire service | They want fire station |
| Provision of Drainage system | <ul style="list-style-type: none">• Planned Drainage system• Removal of waterlogging |
| Social Development | <ul style="list-style-type: none">• Prevention of environment pollution• Taking steps to halt dowry• Provision of old allowance• Remove the unemployment problem• Creation of Training center• Development of women empowerment |
| Provision of Educational Institutions & Proper Facilities | <ul style="list-style-type: none">• Assurance of fully Educated Union• Provision of Girl's College• Provision of Vocational Training Center• Development of education facilities. |

(Source: Field Survey, 2015)

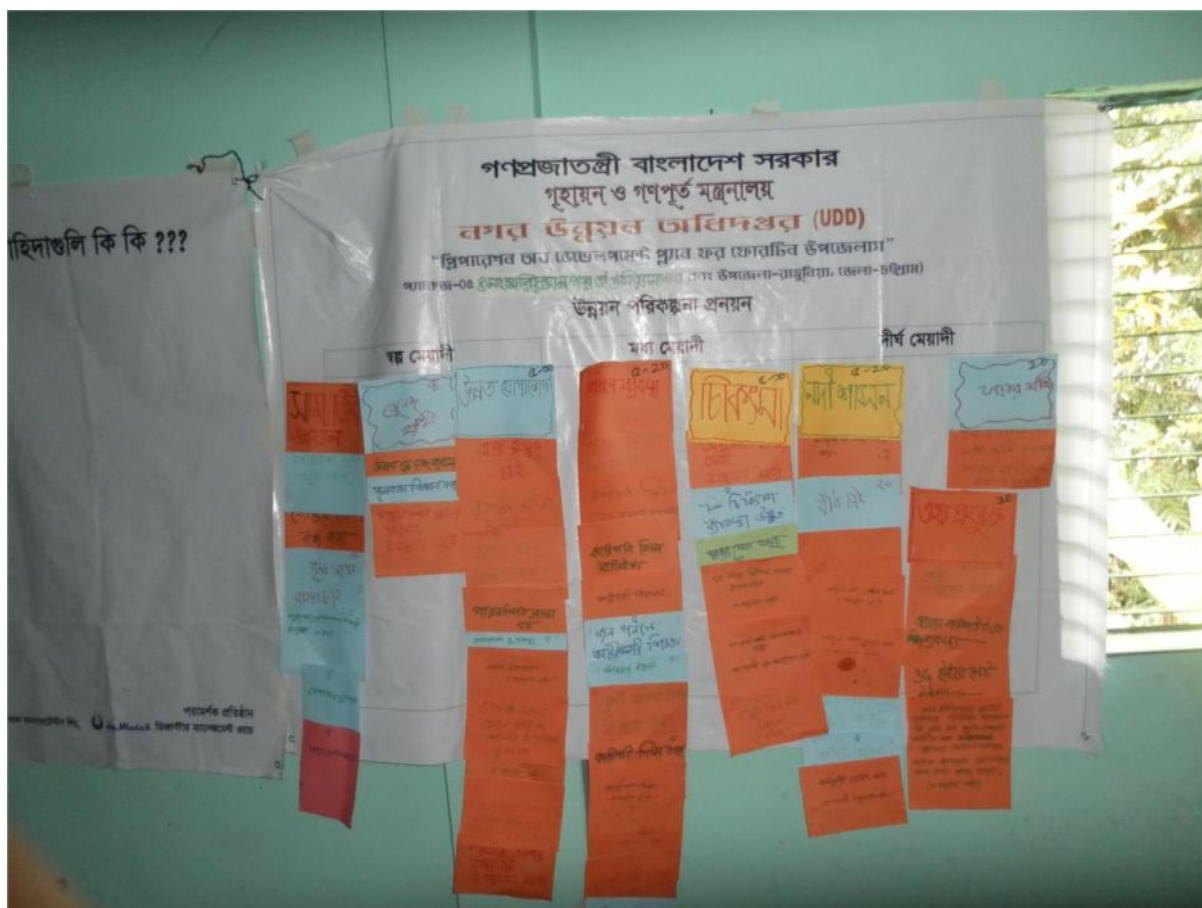


Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazilla Cox's Bazar & Rangunia Upazilla, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator r: Md. Shahidul Islam
Co-Facilitator: Rakeeb Askari
Logistics: MehediAlam
Rapporteur: K. M. Risaduzzaman
Time: 10.00 a.m. to 1.30 p.m.
Date: 07.10.2010
Venue: Parua Union Parishad
Name of Union: 05 No. Parua
Name of Upazila: Rangunia
District: Chittagong

1. Introduction

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 07, 2015 at Parua Union Parishad where 38 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (TOP) have been applied for this project which will fulfill our project goal.



Plate 1: Image of Participants



Source: Field Survey, 2015

2. Study Area Profile

Parua Union under the administrative jurisdiction of Rangunia Upazilla in Chittagong has an area of 35.51 km². The boundary of the study area is stated below:

North: On the north the study area is followed by Ichamati River.

South: On the south the study area follows Sonaichori Union.

East: On the east the study area is surrounded by Ichamati River.

West: On the west of the study area there are hills.

Table 1: Physiographic & Demographic Information of Parua Union

| AT A GLANCE | |
|----------------------------------|------------------------------|
| Features/ Characteristics | Remarks |
| Population | Total-14423 |
| | Male-6966 |
| | Female- 7457 |
| No of Village | 07 |
| Hat- Bazar | 01 |
| Literacy Rate | 79.29% |
| Educational Institutions | Govt. Primary School-05 |
| | Non- Govt. Primary School-07 |
| | KG school-02 |
| | High school-02 |
| | Madrasha- 04 |
| | |
| Important Religious Institutions | Mosque- 32 |
| | Temple-15 |
| | Pagoda- 02 |
| Rice mill | 01 |
| Paddy mill | 15 |
| Community Clinic | 03 |
| River | 04 |
| Pond | 423 |
| Agricultural land | Cultivable-350 Acre |
| | Uncultivable-150 Acre |
| Post office | 01 |
| Water body | 01 |

(Source: Field Survey,2015)

3. Steps of PRA Approach

There were 38 participants in PRA Session of Parua Union. The participants were included UP chairman and ward members (7 male and 1 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Journalist, Surveyor, Student, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

After saying the purpose of Development Project for 20 years, the schedule of PRA Session was explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has been shown to the participants to locate the problems/potentials side which has spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the

participants were requested to dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

4. PRA Technique

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships



Figure 1: Social Map of Parua Union **Source:** Field Survey, 2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Lack of land for UP building,
- River erosion (all wards except 6 no ward),
- No boundary wall of school,
- No drainage system,
- Sand collection from the cannel,
- Human trafficking,
- Poverty,
- Lack of religious education in the mosque,
- Drug addiction

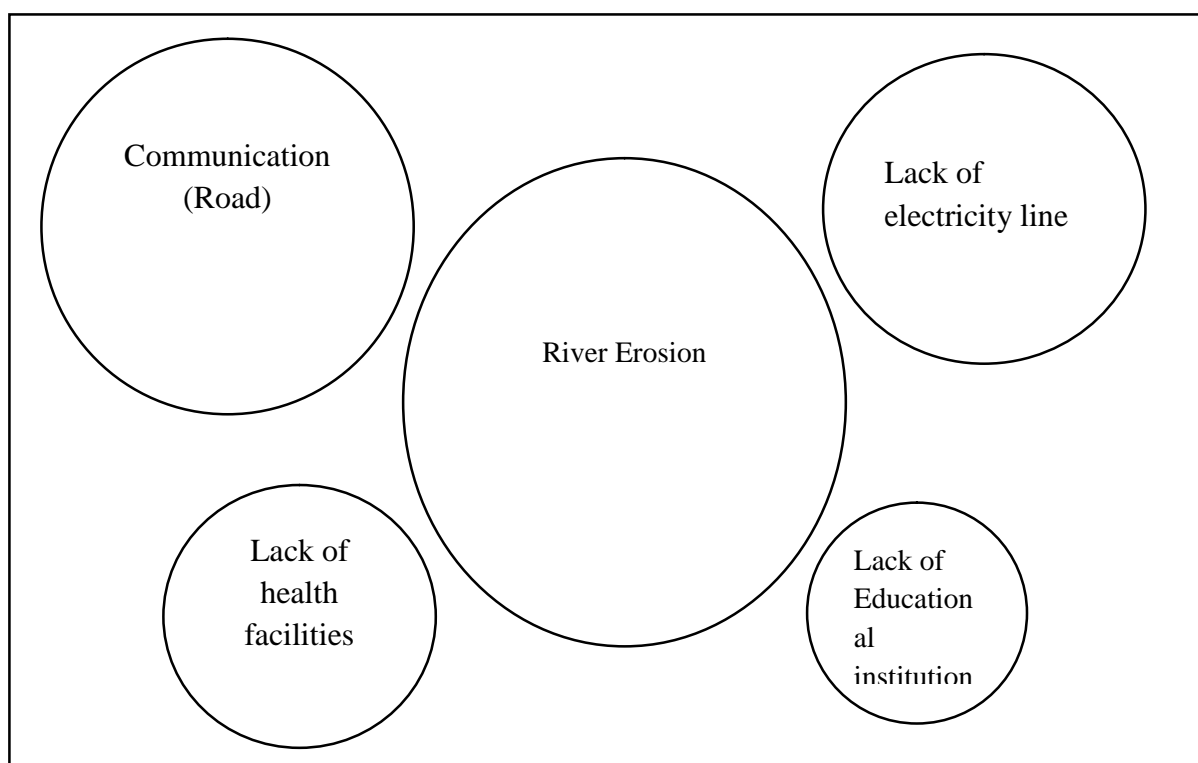


Figure 2: Venn diagram for Problems Prioritization **Source:** Field Survey, 2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land,
- Forestation,
- Hill,
- Tourism,
- Working People,
- Rubber dam, ‘
- Remittance,
- Educational Institutions

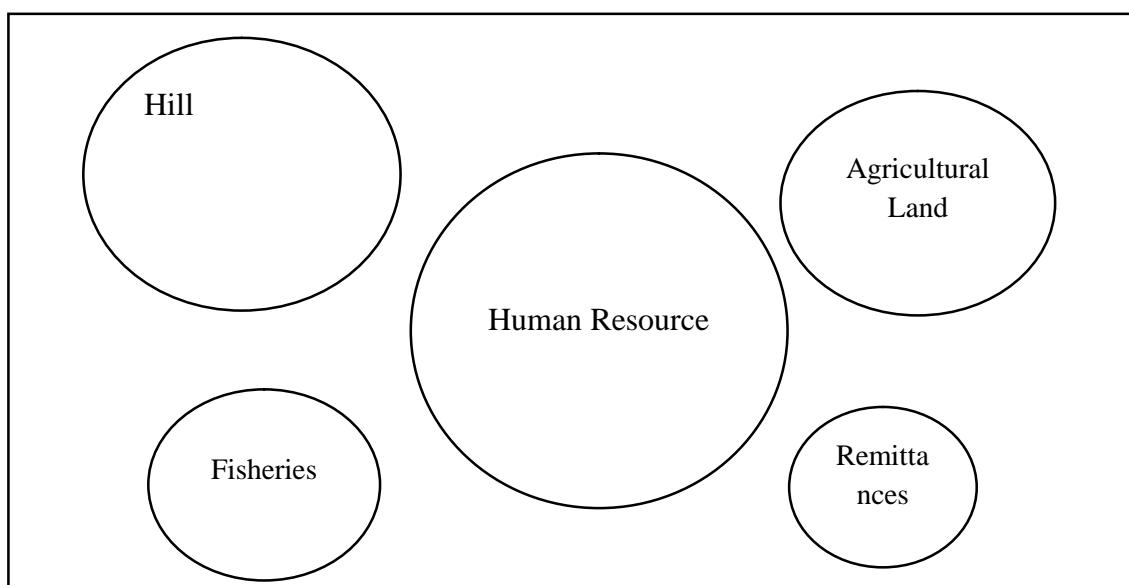


Figure 3: Venn diagram for Potentials Prioritization **Source:** Field Survey, 2015



Figure 4: Problem Identification

Source: Field Survey, 2015



Figure 5: Potential Identification

Source: Field Survey, 2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--|---|--|--|
| 1. River Erosion | <ul style="list-style-type: none"> Sand collection from the canal, Flood, Rubber dam, No guide wall | <ul style="list-style-type: none"> Damage of houses, Damage of agricultural land, Damage of culvert | <ul style="list-style-type: none"> Sufficient land Manpower |
| 2. Communication (Road) | <ul style="list-style-type: none"> Damage of road due to flash flood. River erosion, Katcha road | <ul style="list-style-type: none"> Hamper the marketing of the agricultural products, Students faces difficulties in going to school, Patients die every now and then on the way to hospital, Qualified doctor and teacher are not eagerly to come to the union. | <ul style="list-style-type: none"> Sufficient human resource, Raw materials (brick and sand) |
| 3. Lack of electric line and load shedding | <ul style="list-style-type: none"> Lack of substation Carelessness of PalliBidhyut | <ul style="list-style-type: none"> Hamper of small industries (Pottery), Hamper of education, Hamper of agricultural products Hamper in prayer | <ul style="list-style-type: none"> Sufficient land |
| 4. Medical Facilities | <ul style="list-style-type: none"> No community clinic in union, Lack of doctor, Transportation problem, | <ul style="list-style-type: none"> Patients dies due to lack of proper treatment, | <ul style="list-style-type: none"> Proper leader Manpower |
| 5. Lack of educational institution | <ul style="list-style-type: none"> Weak transportation problem, Lack of budget | <ul style="list-style-type: none"> Drop out of students Unemployment | <ul style="list-style-type: none"> Sufficient land Lots of students |

(Source: Field Survey,2015)

Table 3: Demand of People for Development Plan for 20 Years, Parua Union

| Demand | Remarks |
|--------------------------------------|---|
| Development of transportation system | <ul style="list-style-type: none">• Demand for wide road.• Brick / pitch road are demanded,• Repairmen of road,• Link road wanted, |
| Child Educational | <ul style="list-style-type: none">• Ensure education for all the poor child |
| Demand educational institution | <ul style="list-style-type: none">• Demand for college,• Demand for university.• Repairmen of the madrasa• Women college |
| Demand for Electricity Line | <ul style="list-style-type: none">• Expansion of electricity in the hilly area,• Electricity in the road |
| Development of Medical facilities | <ul style="list-style-type: none">• Health facilities should be increased to fulfill the existing demand |
| Removal of river erosion | <ul style="list-style-type: none">• Embankment and Guide wall is demanded |
| Development of irrigation | <ul style="list-style-type: none">• Budget for good irrigation system,• Good Irrigation system can accelerate the agricultural development |
| Demand for UP Building | <ul style="list-style-type: none">• Old and small UP building |
| Miscellaneous | Gender Equity, security for women, digital union, demand for fire service, good governance, poverty, Krishi Bank . |

(Source: Field Survey,2015)



Figure7 : Demand of People for Development Plan **Source:** Field Survey,2015

Table 4: Identification of Development Plan for Parua Union

| Short Term | Mid Term | Long Term |
|--------------------------------------|-----------------------------------|---------------------------|
| Removal of river erosion | Development of Medical facilities | Removal of river erosion |
| Child Educational | Demand educational institution | Development of irrigation |
| Development of transportation system | demand for fire service | Gender Equity |
| Demand for Electricity Line | poverty | security for women |
| Demand for UP Building | | digital union |
| Krishi Bank | | good governance |

(Source: Field Survey,2015)



Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

5. Conclusion

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
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**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazilla, Cox's Bazar & Rangunia Upazilla, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam
Co-Facilitator: Rakeeb Askari
Logistics: Mehedi Alam
Rapporteur: K. M. Risaduzzaman
Time: 10.00 a.m. to 1.30 p.m.
Date: 05.10.2010
Venue: Pomra Union Parishad
Name of Union: 06 No. pomra
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 5, 2015 at Pomra Union Parishad where 29 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (TOP) have been applied for this project which will fulfill our project goal.



Plate 1: Image of Participants

Source: Field Survey, 2015

2. STUDY AREA PROFILE

Pomra Union under the administrative jurisdiction of Rangunia Upazila in Chittagong has an area of 25.74 km². The boundary of the study area is stated below:

North: On the north the study area is followed by Koukhali Union.

South: On the south the study area follows South Betagi Union.

East: On the east the boundary of the study area is beside by Rangunia Pouashaba

West: On the west the study area runs along the boundary of Raojan Upazila.

Table 1: Physiographic & Demographic Information of Pomra Union

| AT A GLANCE | |
|----------------------------------|------------------------------|
| Features/ Characteristics | Remarks |
| Elevation | 15.2-89.8m above sea level |
| Population | 32045 |
| No of Village | 09 |
| Hat- Bazar | 2 |
| Literacy Rate | 80% |
| Educational Institutions | Govt. Primary School-12 |
| | Non- Govt. Primary School-03 |
| | Secondary school-04 |
| | Dakhil Madrasha-02 |
| | College-1 |
| Important Religious Institutions | 08 |

(Source: Field Survey,2015)

3. STEPS OF PRA APPROACH

There were 25 participants in PRA Session of Pomra Union. The participants were included UP chairman and ward members (5 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Journalist, Surveyor, Student, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

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4. PRA TECHNIQUE

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Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

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- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships



Figure 1: Social Map of Pomra Union

Source: Field Survey, 2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- No connection of gas line,
- Lack of Communication (Katcha and narrow Road, broken culvert),
- Impact of Load shedding,
- Lack of Agriculture Irrigations,
- Lack of Bank,
- Poor condition of sanitation facilities,
- Environmental Pollution (River water pollution, Deforestation)
- Lack of Safe Drinking Water
- lack of Security(Police Furry)
- Lack of Drainage system

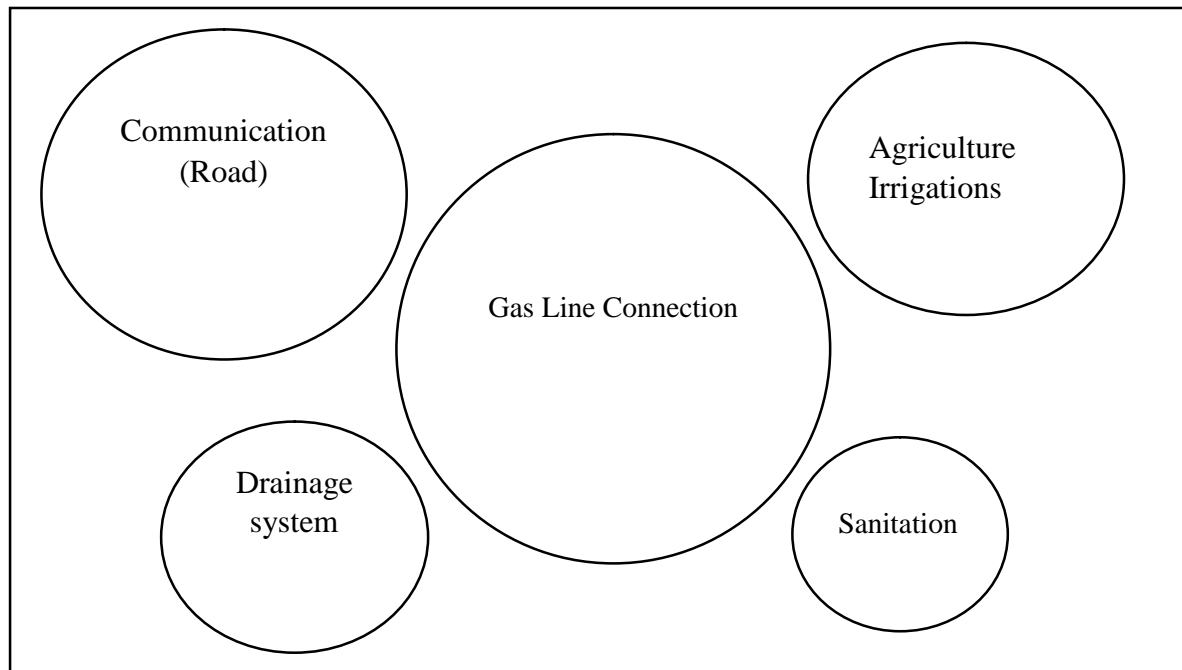


Figure2: Venn diagram for Problems Prioritization Source: Field Survey,2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Power Plant (Tap BidhutKendro),
- Water Treatment Plant (CWASA)
- Registry Office
- 3 Bazar,
- 3 Mazar,
- Hospital funded by the government of the UAE,
- Agriculture (Paddy and other Crops),
- Center of the SSC examination,
- Forest,
- Remittances
- Educational Instauration

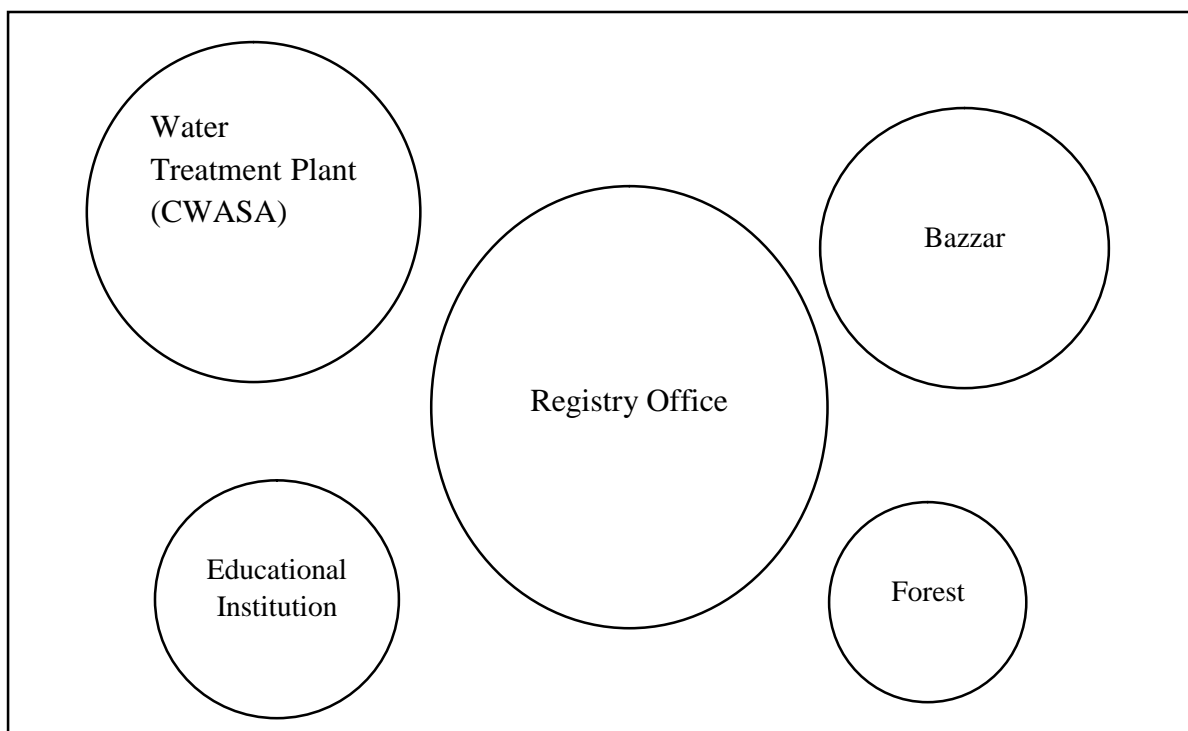


Figure3: Venn diagram for Potentials Prioritization Source: Field Survey,2015



Figure 4: Problem Identification Figure 5: Potential Identification

Source: Field Survey,2015

Source: Field Survey,2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------|---|--|---|
| 1. No Gas Line | <ul style="list-style-type: none"> Carelessness of the authority | <ul style="list-style-type: none"> Deforestation, Environmental Pollution | Gas line passes beside the union boundary. |
| 2. Communication (Road) | <ul style="list-style-type: none"> Damage of road due to flash flood. Insufficient budget. | <ul style="list-style-type: none"> Hamper the marketing of the agricultural products, Poor transport system, Due to poor transport system vehicles with raw materials can not enter the union that prevents the growth of residential area. | Sufficient human resource, Raw materials |
| 3. Problem in Irrigation | <ul style="list-style-type: none"> Carelessness of the authority, Flash flood due to hill, No system for water conservation. | <ul style="list-style-type: none"> Land remains uncultivated | <ul style="list-style-type: none"> Lots of uncultivated land, Gungun-Betagi Drainage Project. |
| 4. Drainage Problem | <ul style="list-style-type: none"> Lack of drain, Drains are filled with solid wastes, Lack of repairmen | <ul style="list-style-type: none"> Damage of roads, Agricultural lands are spoiled, | Attempt of the elite persons of the union. |
| 5. Sanitation Problem | Lack of awareness | <ul style="list-style-type: none"> Waterborne diseases (Diarrhea) | Availability of sufficient raw materials for making sanitary latrine. |

(Source: Field Survey, 2015)

4.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.

- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Pomra Union

| Demand | Remarks |
|-----------------------------------|--|
| Demand for gas | <ul style="list-style-type: none"> • No gas line in the union, so they depend only on the wood of the nearby forest and cause gradual deforestation. |
| Demand for Medical facilities | <ul style="list-style-type: none"> • Demand for a hospital. • Lack of doctor and other facilities in the community clinic force them to health risk. |
| Industrialization | Lack of industrialization create unemployment and as result poverty, social disputes take place. |
| Agricultural Development | <ul style="list-style-type: none"> • Primitive system of cultivation produces less products, so modernization of this sector is very important. |
| Development in Sanitation | Demand for 100% sanitation |
| Digitalization of the union | Initialization of the all technologies in the union |
| Development of the transportation | Development of the roads, bridge and culverts by making pavement of all roads and guide wall where canals, river or ponds are situated beside the road. |

(Source: Field Survey,2015)

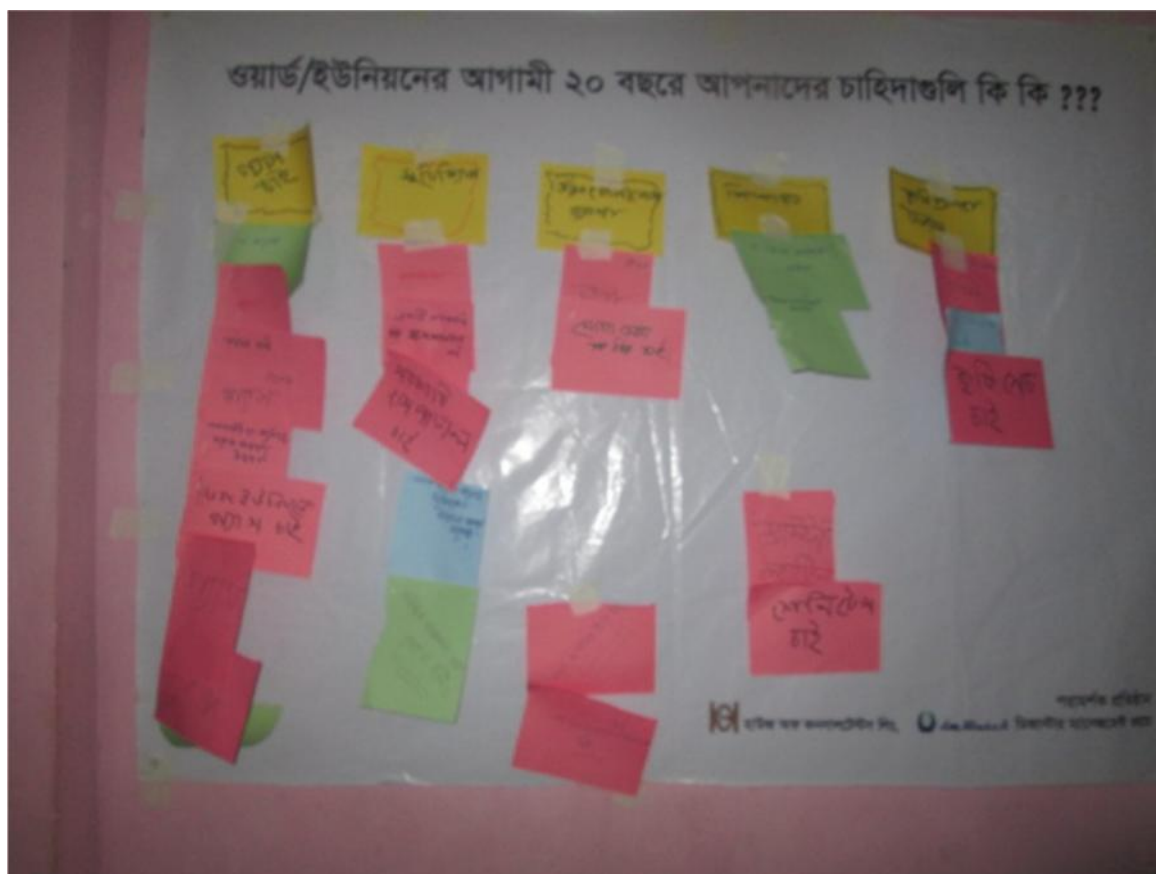


Figure 6: Demand of People for Development Plan **Source:** Field Survey, 2015

Table 4: Identification of Development Plan for Pomra Union

| Short term | Midterm | Long term |
|----------------------------------|-------------------------------------|-----------------------------------|
| Demand for Gas line | Digitalization of the union | Development of the transportation |
| Development of the Agriculture | Development of Health facilities | Free from Unemployment |
| Development of irrigation system | Development of sanitary facilities. | Industrialization |

(Source: Field Survey, 2015)

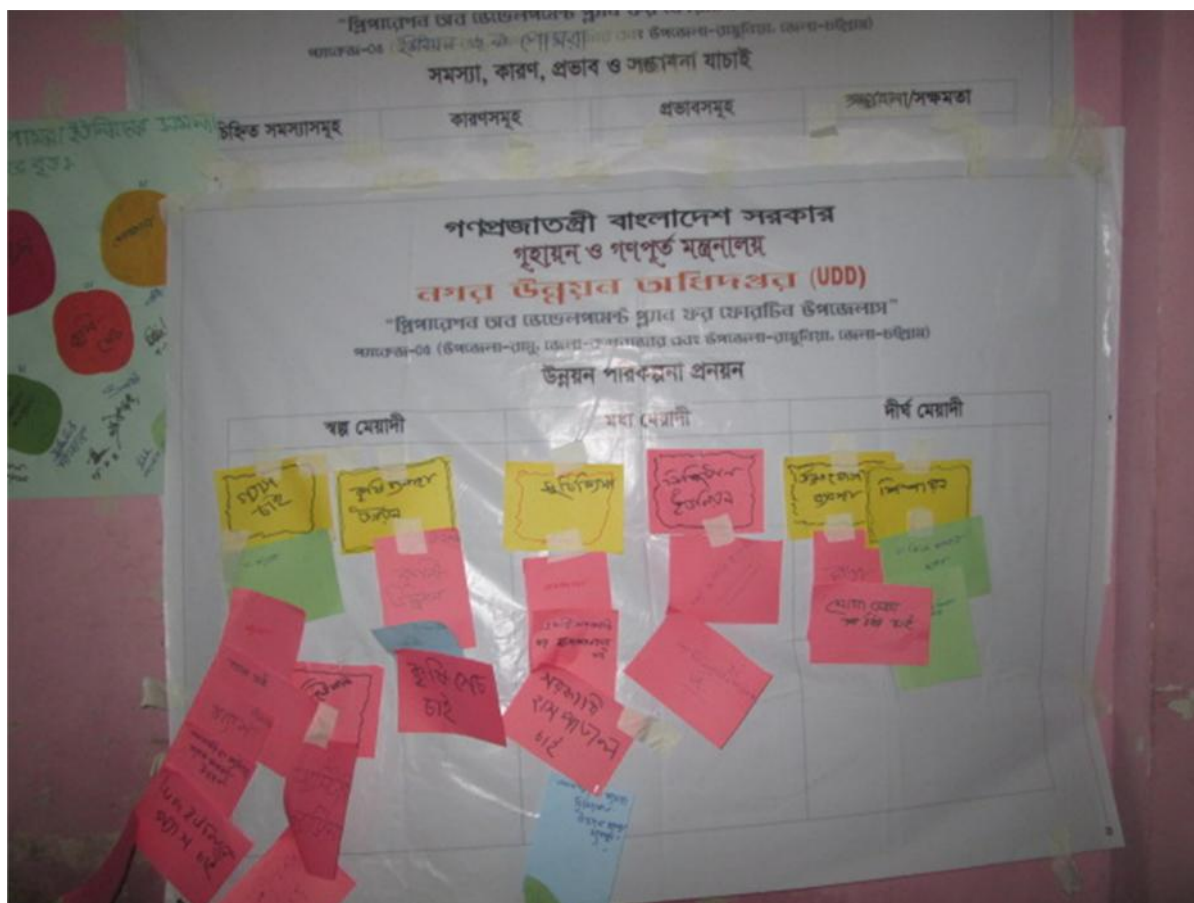


Figure 7: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

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Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam
Co-Facilitator: Md. Walid Reza
Logistics: Saiful Islam
Rapporteur: Md. KawsarUddin
Time: 10.00 a.m. to 1.30 p.m.
Date: 06.10.2015
Venue: Betagi Union Parishad
Name of Union: 07 No. Betagi
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 6, 2015 at Betagi Union Parishad where 41 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.

2. STUDY AREA PROFILE

Betagi Union under the administrative jurisdiction of Rangunia Upazila in Chittagong District has an area of 43.78 km². The boundary of the study area is stated below:

North: On the north the study area is follows by Raozan Upazila.

South: On the south the study area follows South Karnafuliriver.

East: On the east the boundary of the study area is beside by Karnafuli river.

West: On the west the study area runs along the boundary of Raozan Upazila.



Plate 1: Image of Participants

Source: Field Survey, 2015

Table 1: Physiographic & Demographic Information of Betagi Union

| AT A GLANCE | |
|---------------------------|---|
| Features/ Characteristics | Remarks |
| Population | 49000 (Approx.) |
| No. of Village | 18 |
| No. of Mouzas | 11 |
| No. of Local Market | 01 |
| Literacy rate | 65% |
| Religion | Muslim (84.2%), Hindus (8.1%), Buddhists (0.05%), Christians (7.72%), Tribal 0.65%) & Others (0.01%). |
| Literacy Rate | Male (47.46%) & Female (43.60%) |
| Educational Institutions | Primary school-10, High school-03, Madrasha-1 |
| River Network | Alongside the Karnafuli River |
| Historical place | Betagi Champatali Pahar |

(Source: Union Based Information)

3. Steps of PRA Approach

There were 41 participants in PRA Session of Betagi Union. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP).

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has shown to the participants to locate the problems/potentials side which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (TOP).

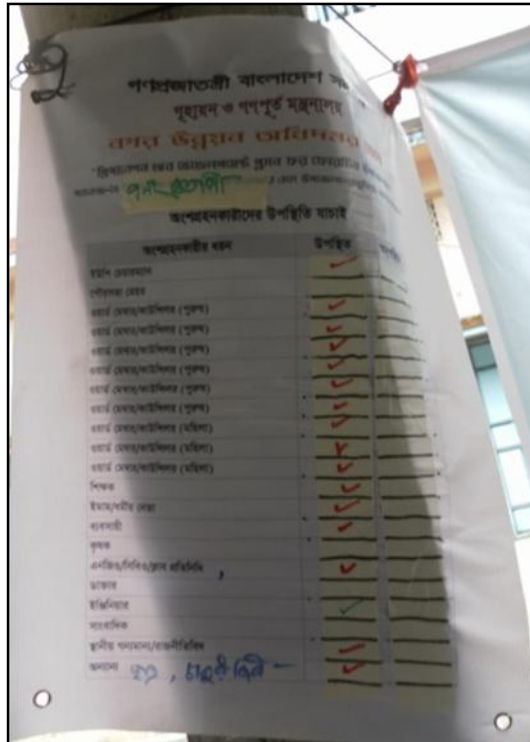


Figure 1: Attendance Sheet of Participants

Source: Field Survey, 2015

4. Findings

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services, Identify flexible funding strategies, Cultivate new partnerships and relationship

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Lack of fully occupied local community market
- Lack of Electricity connection
- Lack of health facilities such as no community clinic or hospital
- Lack of Vocational institutions
- No connection of gas line in full union
- River erosion is excessive in Ward No. 1,3,5,7,8
- Flash flood due to hill
- Water logging
- No veterinary hospital
- Bad transportation condition (Katcha road and inept or unsuitable road condition)
- Poor condition of Network and internet facilities
- Lack of maintenance for prayer centers (poor condition for mosque in ward no. 04,05,06 and no temple in ward no. 01)
- No provision for union complex
- Lack of educational institutions such as college, girl's school

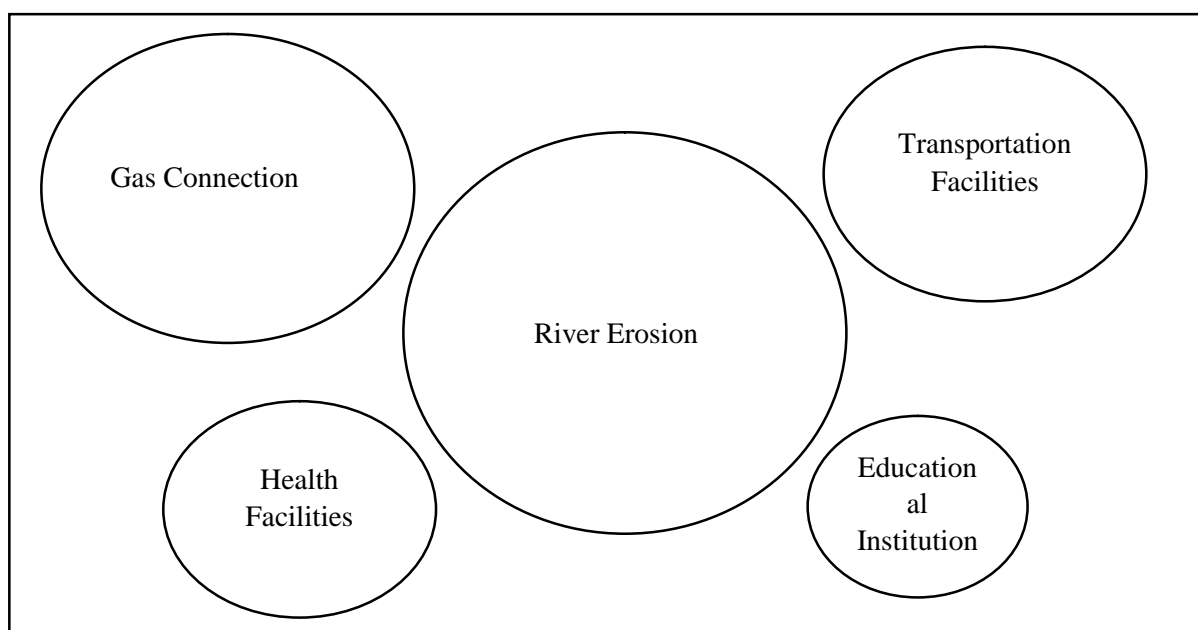


Figure 3: Venn diagram for Problems Prioritization **Source:** Field Survey, 2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land
- Forestation
- Khas land
- Fishing
- Hilly area
- Livestock rearing
- Active & Skill full man power
- Remittance

- Vocational Institutions
- Break Field

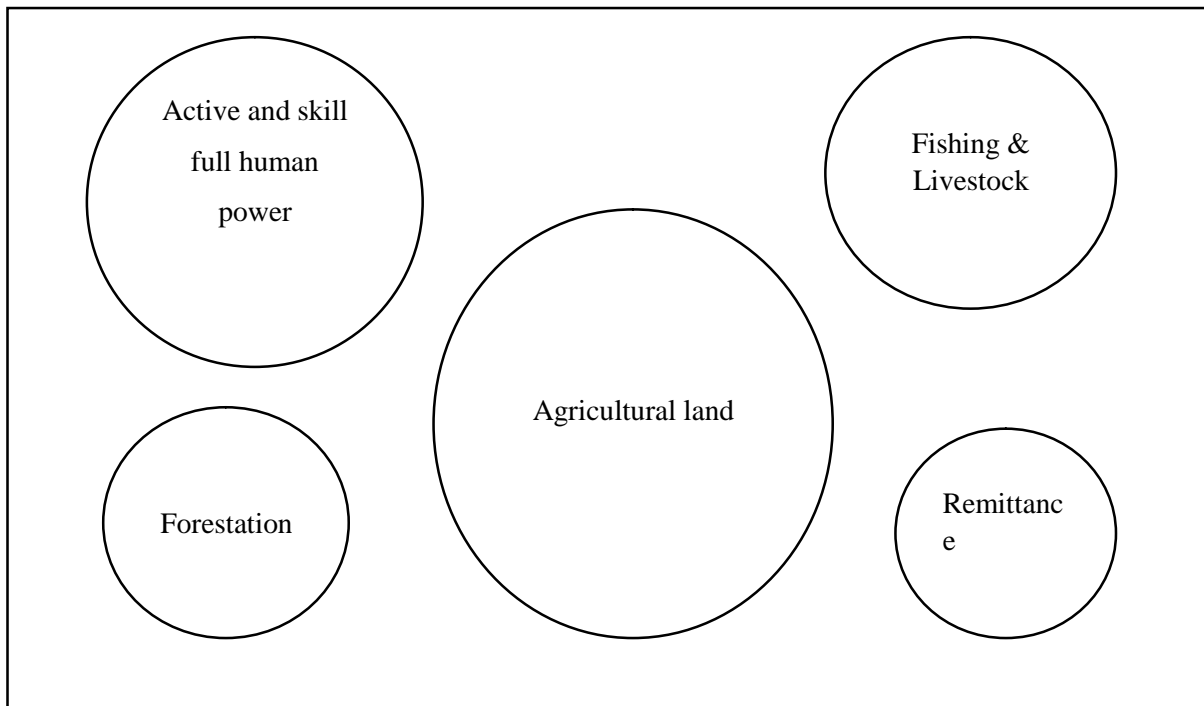


Figure 4: Venn diagram for Potentials Prioritization **Source:** Field Survey,2015

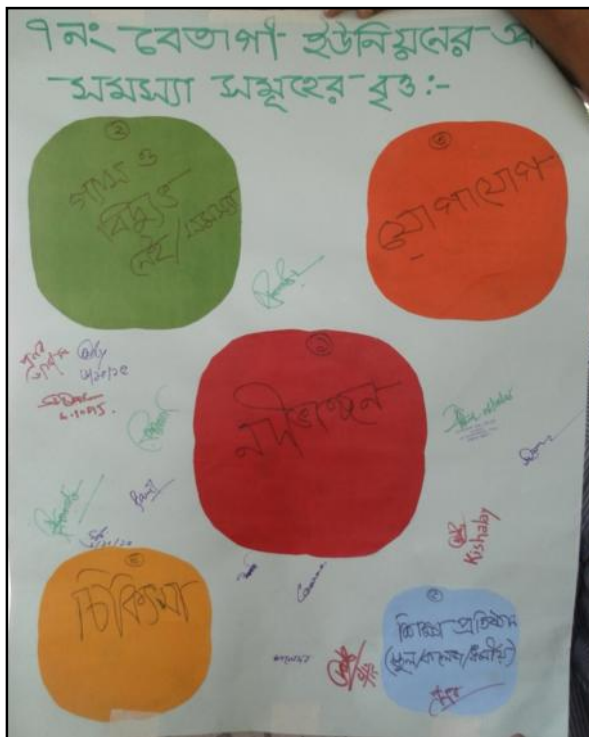


Figure 5: Problem Identification

Source: Field Survey,2015

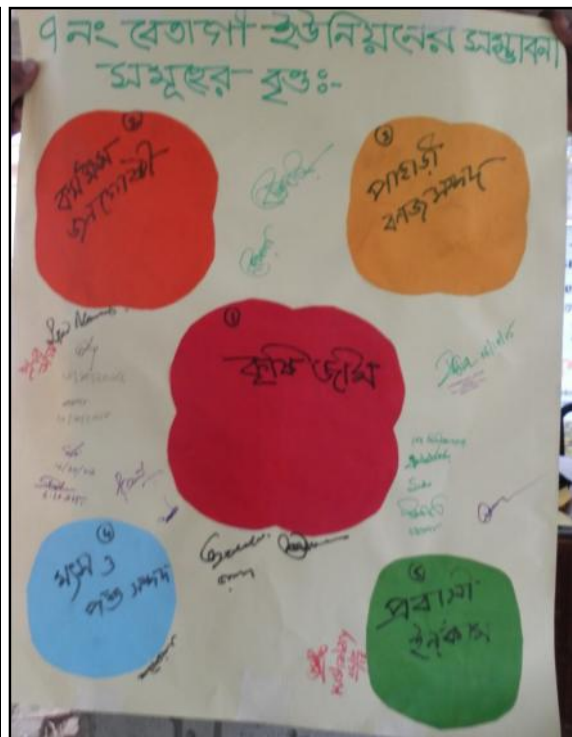


Figure 6: Potential Identification

Source: Field Survey,2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|-------------------------------------|---|---|--|
| 1. River Erosion | <ul style="list-style-type: none"> Sand extraction from Karnafuliriver. Flash flood due to hill. Impact of water current. No provision of river navigation. | <ul style="list-style-type: none"> Decreasing the cultivated land. People's homesteads are going under water. | <ul style="list-style-type: none"> Soil and enough land Sufficient human source. |
| 2. Gas connection | <ul style="list-style-type: none"> Bureaucratic complexity. | <ul style="list-style-type: none"> Bad impact on forestation. Increasing the cost due to no provision of gas. | Gas provisions are applied in nearly union. |
| 3. Transportation facilities | <ul style="list-style-type: none"> Flash flood due to hill. Drainage problem. | <ul style="list-style-type: none"> Transportation problem in Agricultural commodities. Increasing the educational cost. | <ul style="list-style-type: none"> Brick field. Sufficient land. |
| 4. Health Facilities | <ul style="list-style-type: none"> No community clinic. Doctors are not found every time. | <ul style="list-style-type: none"> Increasing the death. Increasing People's sufferings. | Sufficient place for health provisions. |
| 5. Lack of Educational Institutions | <ul style="list-style-type: none"> Insufficiency of educational institutions. No provision of Madrasha, Maktob, others religious institutions. | <ul style="list-style-type: none"> Decreasing educational status. Decreasing religious people. | Sufficient land. |



Figure 7: Participants involved in different parts of PRA Session

Source: Field Survey, 2015

4.5 Technology of Participants (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Betagi Union

| Demand | Remarks |
|---|---|
| Gas Connection | Everyone wants gas connection in every ward. |
| Development of Health facilities | <ul style="list-style-type: none"> • Creation of sufficient Gov. hospital • Construction of Community Clinic. • Development of health facilities. |
| Provision of Transportation facilities | <ul style="list-style-type: none"> • Development of Road • Provision of Guide wall. • Widening the narrow road. • Establishment of Drainage system alongside the road. |
| Setting up local market (hatbazar) | Provide well developed hatbazar. |
| Development of Mobile Network and Internet | High speed internet such as 3 G or 4G. |
| Prevention of River Erosion | Government initiation is needed and other infrastructural provisions. |
| Provision of Educational Institutions & Proper Facilities | <ul style="list-style-type: none"> • Provision of College • Assurance of Vocational Training center. • Provision of High school. • Provision of Madrasha. |
| Measures for women development | <ul style="list-style-type: none"> • Empowerment of women • Provide support for deprived women. |
| Miscellaneous | <ul style="list-style-type: none"> • Removal of corruption in Union. • Development of agricultural activities • Creation of Agricultural Consultants Center. • Removal of unemployment problem. • Conservation plan of livestock & cattle rearing. |



Figure 8: Demand of People for Development Plan **Source:** Field Survey,2015

Table 4: Identification of Development Plan for Betagi Union

| Short term | Midterm | Long term |
|--|---|------------------------------------|
| Prevention of River Erosion | Development of agricultural activities | Removal of corruption in Union. |
| Development of Health facilities | Removal of unemployment problem. | Measures for women development |
| Development of Mobile Network and Internet | Creation of Agricultural Consultants Center. | Gas Connection |
| | Conservation plan of livestock & cattle rearing. | Setting up local market (hatbazar) |
| | Provision of Educational Institutions & Proper Facilities | |



Figure 9: Identification of Demand in Preparation of Development Plan for 20 years **Source:** Field Survey,2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A
Facilitator: Abdur Razzaque Azad
Co-Facilitator: Md. Walid Reza,
Logistics: Saiful Islam
Rapporteur: Md. Kawsar Uddin
Time: 10.00 a.m. to 2.00 p.m.
Date: 05.10.2015
Venue: 8 No Sarapvata Union parisad
Name of Union: 08 No. Sarapvata Union Parisad
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION:

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 5, 2015 at 8 no. Sarapvata Union Parishad where 39 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Survey (ToP) have applied for this project which will fulfill our project goal.



Plate 1: Image of Participants

Source: Field Survey, 2015

1. STUDY AREA PROFILE

8 no. Sarapvata Union under the administrative jurisdiction of Rangunia Upazila in Chittagong District is located at 92°1'46"E, 22°34'32"N, with an area of 64.42 km². The boundary of the study area is stated below:

North: On the north the study area is follows by Islampur.

South: On the south the study area follows South Rajanagar Union.

East: On the east the boundary of the study area is beside by Islampur.

West: On the west the study area runs along the boundary of Khawkhali Upazila.

Table 1: Physiographic & Demographic Information of 8 no. Sarapvata Union

| AT A GLANCE | |
|---------------------------|---|
| Features/ Characteristics | Remarks |
| Elevation | |
| Population | 50000 |
| Men | |
| Women | |
| Religion | |
| Literacy Rate | 80.00% |
| Livelihood Pattern | |
| Households | 5210 |
| Housing Pattern | |
| Soil Type | Clay loam |
| Land Use | |
| Educational Institutions | Govt.Primary school-10, private Primary school-3,High school 3 DakhilMadrasha1,Forkania madrasa 14 |
| River Network | Alongside the Karnafuli River |
| Water & Sanitation | |

(Source: Field Survey,2015)

2. STEPS OF PRA APPROACH

There were 39 participants in PRA Session of 8No.Sarapvata Union. The participants were included UP chairman and 7 ward members (5 male and 2 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Service holder, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur, foreign employer and Local people etc. PRA was lasted from 10.15am to 2.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Parcipants (ToP).

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has shown to the participants to locate the problems/potentials side which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participants (ToP).

[illegible]

Figure 1: Attendance Sheet of Participants

Source: Field Survey, 2015

3. PRA TECHNIQUE

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

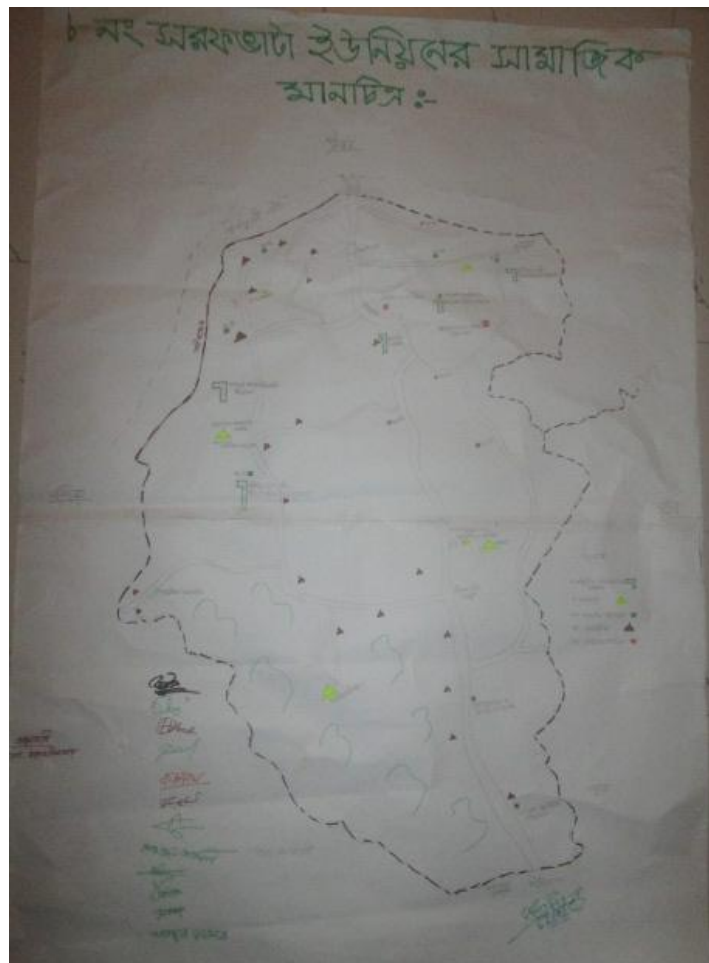


Figure 2: Social Map of 8no.Sarapvata Union

Source: Field Survey,2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Broken roads/Earthen road(Wardno1,2,Madrassa).
- River erosion is accessing in all over the union(Karnafuli).
- Living home/housing.
- Poor condition of Water/Sanitation facilities.
- Problem of Water logging.
- Stealing and robbery (Ward no 6)
- Structure of educational institutions (College, Girls high school and technical vocational institute).
- Health service (Doctors are not present in regularly in hospital)
- Problem of Women harassment
- Impact of Childhood marriage.
- Problem of Multiple marriage.
- Impact of Divorce.
- No connection of Gas line.
- Cutting and destroyed forest.
- No Entertainment.
- Lack of irrigation system.
- Terrorism of Wild Elephants.
- Lack of conservancy management.
- No industrialization.
- Lack of library.
- No playground.
- Poor condition of pure drinking water.
- Lack of cold storage.
- Lack of police farry.
- Electricity (Impact of load shedding).
- Uncontrolled brickfield.
- No U.P.complex.
- Environment pollution.
- No commercial bank.

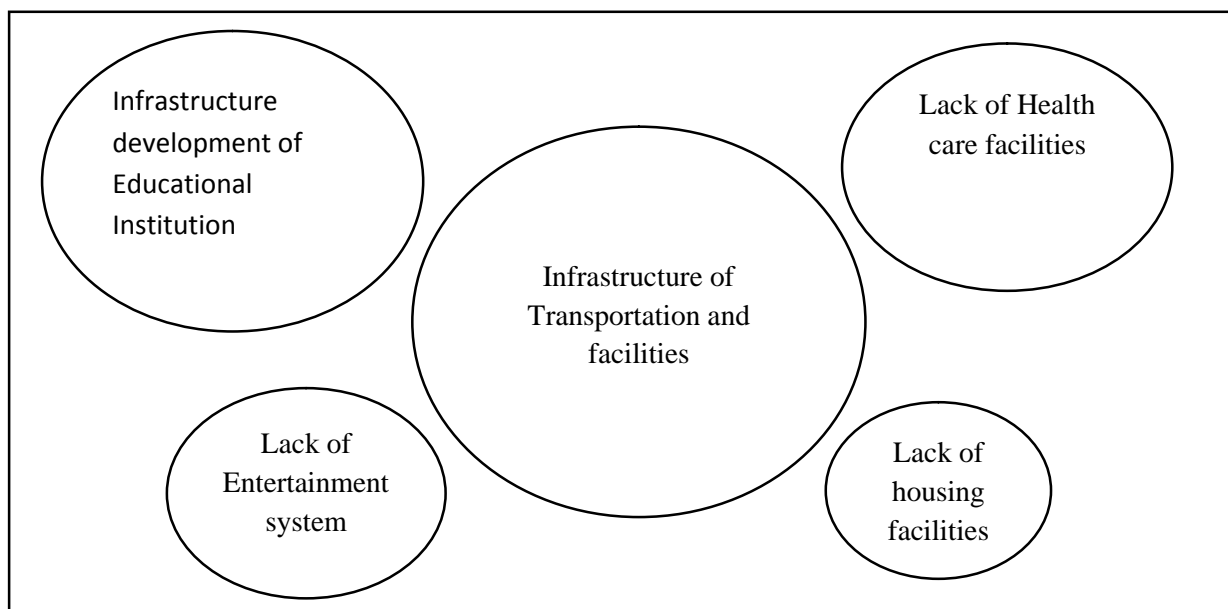


Figure 3: Venn diagram for Problems Prioritization

Source: Field Survey,2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Fisheries/Fishing
- Cattle rearing
- Land for fruit tree plantation
- A lot of uncultivable land
- Cultivable land
- Agriculture(Vegetables)
- Hills and forest station.
- Small and cottage industry
- Foreign remittance.
- Cultivable land.
- Tourism/ entertainment centre.
- Work force
- Proposed Rubber garden (five hundred acre) and more land.
- Necessary hills for explode tea industry.
- Migrated active human power
- River (Isamati)
- Sand Business\
-

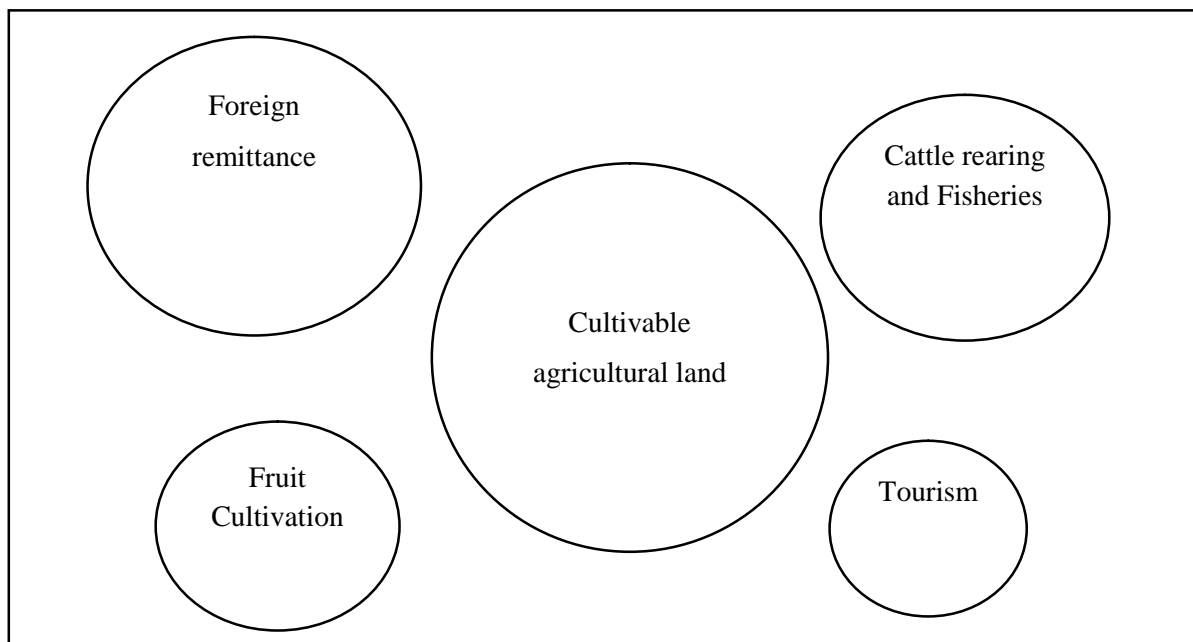


Figure 4: Venn diagram for Potentials Prioritization

Source: Field Survey,2015



Figure 5: Problem Identification

Source: Field Survey, 2015



Figure 6: Potential Identification

Source: Field Survey, 2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|---|---|---|---|
| 1. Communications | <ul style="list-style-type: none"> Flash flood. River erosion. Shortage of budget to roads Lacking of monitoring. | <ul style="list-style-type: none"> Barrier to agricultural product marketing. Patient not found proper treatment. Farmers are not getting right price. | <ul style="list-style-type: none"> Workable efficient manpower. Enough soil and land. |
| 2. Infrastructure of educational institution. | <ul style="list-style-type: none"> Shortage of demand than budget. No attraction to development to the richest people. | <ul style="list-style-type: none"> Reduce higher education. Increase childhood marriage and multiple marriages. | <ul style="list-style-type: none"> Enough space to establish structure. |
| 3. Lack of Health care facilities | <ul style="list-style-type: none"> Shortage of doctor in GOB. health complex. No GOB.ambulance | <ul style="list-style-type: none"> Without treatment lot of patient died. | <ul style="list-style-type: none"> Local M.P. like Dr.hasan Mahmud. Local Doctor. |
| 4. Lack of entertainment | <ul style="list-style-type: none"> No play ground. No park ,cultural centre and community centre. | <ul style="list-style-type: none"> Children's are reduced mental fertility. Less morality. | <ul style="list-style-type: none"> Hills, forest, jungle total 26000 acre horizontal land in Sarapvata. |
| 5. Lack of Housing facilities. | <ul style="list-style-type: none"> Increase population Weak economy. | <ul style="list-style-type: none"> Increase landless and homeless. Increase population. Polluted environment. | <ul style="list-style-type: none"> Lot of fellow land. Local leaders are Enough cordial to development. |

(Source: Field Survey,2015)

| কিছিন্ন সময়সীমাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সম্ভাব্যতা |
|----------------------------|---|---|---|
| ১. দীর্ঘমেয়াদি (২০ বছর) | • বাসগৃহের অভাব • জনসংখ্যার বৃদ্ধি • পরিবেশের দূষণ | • জনসংখ্যার বৃদ্ধি • পরিবেশের দূষণ • জনসংখ্যার বৃদ্ধি | • জনসংখ্যার বৃদ্ধি • পরিবেশের দূষণ • জনসংখ্যার বৃদ্ধি |
| ২. মধ্যমেয়াদি (৫-১০ বছর) | • জনসংখ্যার বৃদ্ধি • পরিবেশের দূষণ • জনসংখ্যার বৃদ্ধি | • জনসংখ্যার বৃদ্ধি • পরিবেশের দূষণ • জনসংখ্যার বৃদ্ধি | • জনসংখ্যার বৃদ্ধি • পরিবেশের দূষণ • জনসংখ্যার বৃদ্ধি |
| ৩. স্বল্পমেয়াদি (১-৫ বছর) | • জনসংখ্যার বৃদ্ধি • পরিবেশের দূষণ • জনসংখ্যার বৃদ্ধি | • জনসংখ্যার বৃদ্ধি • পরিবেশের দূষণ • জনসংখ্যার বৃদ্ধি | • জনসংখ্যার বৃদ্ধি • পরিবেশের দূষণ • জনসংখ্যার বৃদ্ধি |

Figure 6 : Cause, Impact and Potentials

Source: Field Survey,2015

4.5 TECHNOLOGY OF SURVEY (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Sarapvata Union

| Demand | Remarks |
|---|--|
| Development of health services. | <ul style="list-style-type: none"> • Need hospital. • Demand ambulance. • Demand higher health services. • Good doctor. • Need hundred beds hospital. • Demand health treatment services. • |
| Development agriculture expansion services | <ul style="list-style-type: none"> • Development cattle rearing industry.. • Agriculture development. • Covered irrigation. • Development agricultural housing. |
| Development infrastructure of transportation. | <ul style="list-style-type: none"> • Development of transportation .areas • Increase speed of development communication. • Repair of drainage system of irrigation. • Develop Roads. |
| Development of infrastructure educational institutions. | <ul style="list-style-type: none"> • Demand college. • Demand vocational technical school. |
| Development of entertainment system. | <ul style="list-style-type: none"> • Demand playground. • Demand entertainment. • Demand park and tourism spot. |
| Development of fisheries. | <ul style="list-style-type: none"> • Development of fisheries project. • Development of fisheries expansion services. • Expand hatcheries. |
| Development of housing and shelter centre. | <ul style="list-style-type: none"> • Demand housing. |
| Stop environment pollution | <ul style="list-style-type: none"> • Need control of break field. |
| Miscellaneous | <ul style="list-style-type: none"> • Demand Commercial bank. • Demand drainage. |



Figure.7: Demand of People for Development Plan

Source: Field Survey,2015

Table 4: Identification of Development Plan for Sarapvata Union

| Short term | Midterm | Long term |
|---|--|---|
| <ul style="list-style-type: none"> • Development of health services. • Development of infrastructure educational institutions. • Development of fisheries. • Development of housing and shelter centre. • Stop environment pollution | <ul style="list-style-type: none"> • Development agriculture expansion services • Development infrastructure of transportation. • Development agriculture expansion services • Demand drainage | <ul style="list-style-type: none"> • Enhancement of recreational facilities • Stop environment pollution • Demand Commercial bank. |

(Source: Field Survey,2015)



Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

4. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A
Facilitator: Md. AbdurRazzak
Co-Facilitator: Md. Walid Reza
Logistics: Saiful Islam
Rapporteur: Md. Kawsar Uddin
Time: 10.00 a.m. to 1.30 p.m.
Date: 06.10.2015
Venue: Silok Union Parishad
Name of Union: 09 No. Silok
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 6, 2015 at Silok Union Parishad where 28 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.

2. STUDY AREA PROFILE

Silok Union under the administrative jurisdiction of Rangunia Upazila in Chittagong District has an area of 40.62 km². The boundary of the study area is stated below:

North: On the north the study area is follows by Mariamnagar

South: On the south the study area follows Padua.

East: On the east the boundary of the study area is beside by Kodala.

West: On the west the study area runs along the boundary of Sarafvata



Plate 1: Image of Participants

Source: Field Survey, 2015

Table 1: Physiographic & Demographic Information of Silok Union

| AT A GLANCE | |
|----------------------------------|-------------------------|
| Features/ Characteristics | Remarks |
| Population | Total-18009 |
| | Male- 8487 |
| | Female-9522 |
| No. of Village | 17 |
| No. of Mouzas | 03 |
| No. of Local Market | 02 |
| Literacy rate | 78% |
| Educational Institutions | Govt. Primary school-08 |
| | Seconday School-4 |
| | Secondary School-02 |
| Important Religious Place | 04 |

Source: Union Based Information

3. STEPS OF PRA APPROACH

There were 28 participants in PRA Session of Silok Union. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP).

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venndiagram and Cause Effect Diagram. Besides this Task, two or three persons from the group wereselected to draw the Social Map of the union and other participantswere involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished,the map has shown to the participants to locate the problems/potentials side which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Illegal structure on road,
- Water logging,
- Problem of being a full thana,
- Lack of waste management in marketing,
- Lack of guide wall around the grave yard,
- Lack of fire service,
- Drug addiction,
- Lack of information before natural calamities,
- Lack of repairmen of playground,
- Lack of medical facilities,
- Lack of educational facilities (Primary school and Madrasha),
- Lack of embankment beside the river,
- River erosion (Karnafulli- 5,6,7,8 No Ward),
- Attack by wild Elephant (1,2,6,7,8,9 No ward),
- Deforestation,
- Lack of Vocational Education (Vocational School),
- Weak transportation system (Broken Bridge- Mora Khal, Gopal Ghat-3 No ward,)
- Forestation,

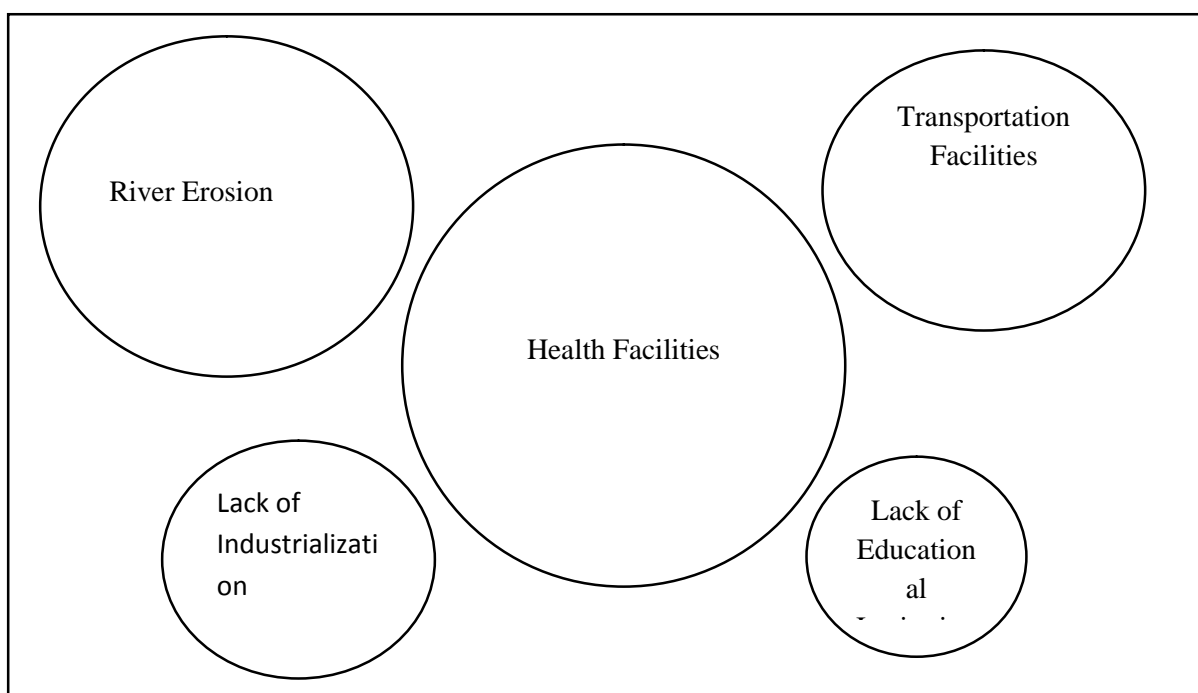


Figure 3: Venn diagram for Problems Prioritization **Source:** Field Survey, 2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land (Robi Crops)
- Fisheries,
- Pottery,
- Livestock,

- Toilavanga Bill,
- Remittance,
- Karnafulli River,
- SilokKhal,

- Active Human resource,
- Literate People,
- Rubber Dam
- Tourism,

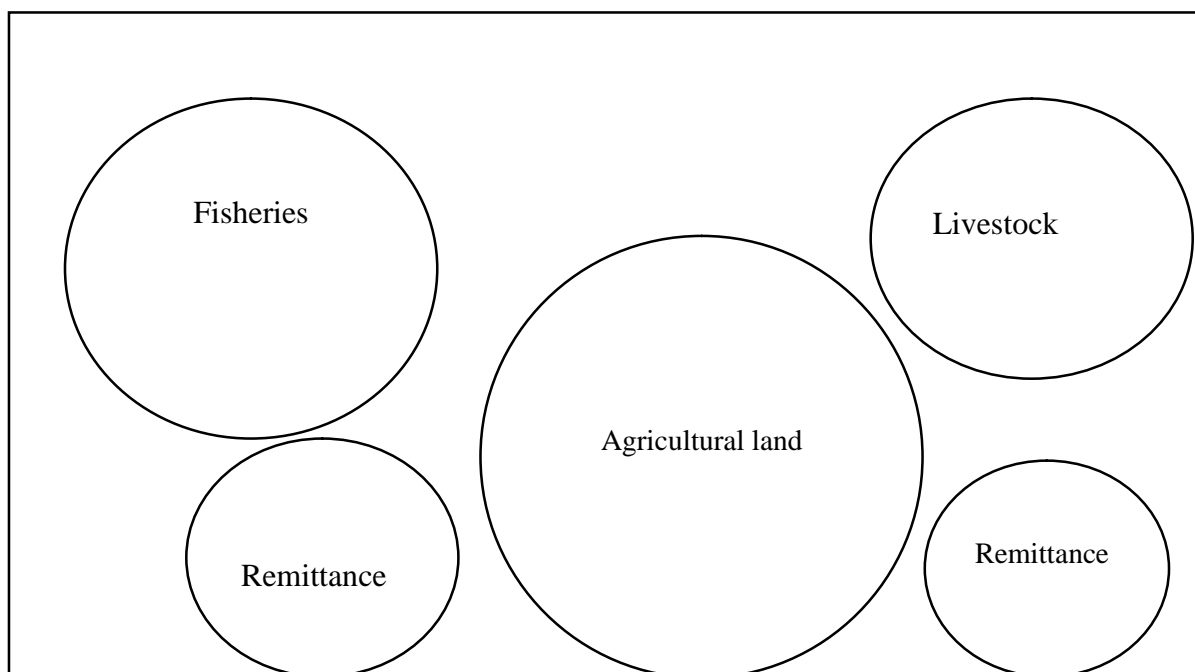


Figure 4: Venn diagram for Potentials Prioritization **Source:** Field Survey,2015



Figure 5: Problem Identification **Figure 6:** Potential Identification

Source: Field Survey,2015

Source: Field Survey,2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|-------------------------------------|--|---|--|
| 1. Health Facilities | <ul style="list-style-type: none"> • Insufficient Budget • Doctors are not found every time. • Undeveloped Upazilla health Complex | <ul style="list-style-type: none"> • Increasing the death. • Increasing People's sufferings. | Sufficient place for health provisions. |
| 2. River Erosion | <ul style="list-style-type: none"> • Sand extraction from Karnafulliriver. • Flash flood due to hill. • Impact of water current. • No provision of river navigation. | <ul style="list-style-type: none"> • Decreasing the cultivated land. • People's homesteads are going under water. | <ul style="list-style-type: none"> • Soil and enough land • Sufficient human source. |
| 3. Transportation facilities | <ul style="list-style-type: none"> • Insufficient Budget. | <ul style="list-style-type: none"> • Transportation problem in Agricultural commodities. • Increasing the educational cost. | <ul style="list-style-type: none"> • Sufficient human source • Soil. |
| 4. Lack of Industrialization | <ul style="list-style-type: none"> • Weak transportation system • Lack of electricity facility, • Lack of gas, • Carelessness of the government | <ul style="list-style-type: none"> • Unemployment, • Economical Loss, | <ul style="list-style-type: none"> • Sufficient human source. • Land |
| 5. Lack of Educational Institutions | <ul style="list-style-type: none"> • Insufficiency of educational institutions. | <ul style="list-style-type: none"> • Dropping out of students | Sufficient land. |

(Source: Field Survey, 2015)

| <p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার</p> <p>গৃহায়ন ও গণপূর্ত মন্ত্রণালয়</p> <p>কমর উন্নয়ন জরিদপত্র (UDD)</p> <p>"স্বিপারেশন অব ডেভেলপমেন্ট প্রায় মাত্র ১০০০টির উপজেলায়"</p> <p>সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই</p> | | | |
|---|----------------|----------------|-----------------|
| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সমস্যা |
| ১. যমুনা | ১.১.১.১ FWRHSC | ১.১.১.১ FWRHSC | ১.১.১.১ FWRHSC |
| ২. নদী/ওয়ে | ২.১.১.১ FWRHSC | ২.১.১.১ FWRHSC | ২.১.১.১ FWRHSC |
| ৩. মাথাপিছু | ৩.১.১.১ FWRHSC | ৩.১.১.১ FWRHSC | ৩.১.১.১ FWRHSC |
| ৪. শিল্পায়ন | ৪.১.১.১ FWRHSC | ৪.১.১.১ FWRHSC | ৪.১.১.১ FWRHSC |
| ৫. শিল্প | ৫.১.১.১ FWRHSC | ৫.১.১.১ FWRHSC | ৫.১.১.১ FWRHSC |

Figure 7: Cause, Impact and Potentials

Source: Field Survey, 2015

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in "Development plan for 20 years" which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Silok Union

| Demand | Remarks |
|--|---|
| Provision of Transportation facilities | <ul style="list-style-type: none">• Development of Road• Repairmen of the damaged road in ward 1 and brick road is wanted. |
| Demand of Educational Institutions | <ul style="list-style-type: none">• Provision of High school.• Two storied building is wanted for school. |
| Industrialization | <ul style="list-style-type: none">• Small and medium industries• Demand for employment |
| Development of agricultural facilities | <ul style="list-style-type: none">• Repairmen of Toilvanga Bill which is famous for robi crops and paddy• Protection of the crops from flood |
| Development of Health facilities | <ul style="list-style-type: none">• Creation of sufficient Gov. hospital• Construction of Community Clinic.• Development of health facilities. |
| Demand for recreational facilities | <ul style="list-style-type: none">• Demand for playground,• Demand for tourism beside rubber dam in ward 1. |
| Prevention of River Erosion | <ul style="list-style-type: none">• Want to get rid of erosion of Karnafulli river• Excavation of cannel is needed• Embankment is demanded. |
| | <ul style="list-style-type: none">• |
| Miscellaneous | <ul style="list-style-type: none">• Demand for fire service• Demand for commercial bank,• Demand for fishery farm• Cremation Place• Control on drug |

(Source: Field Survey,2015)

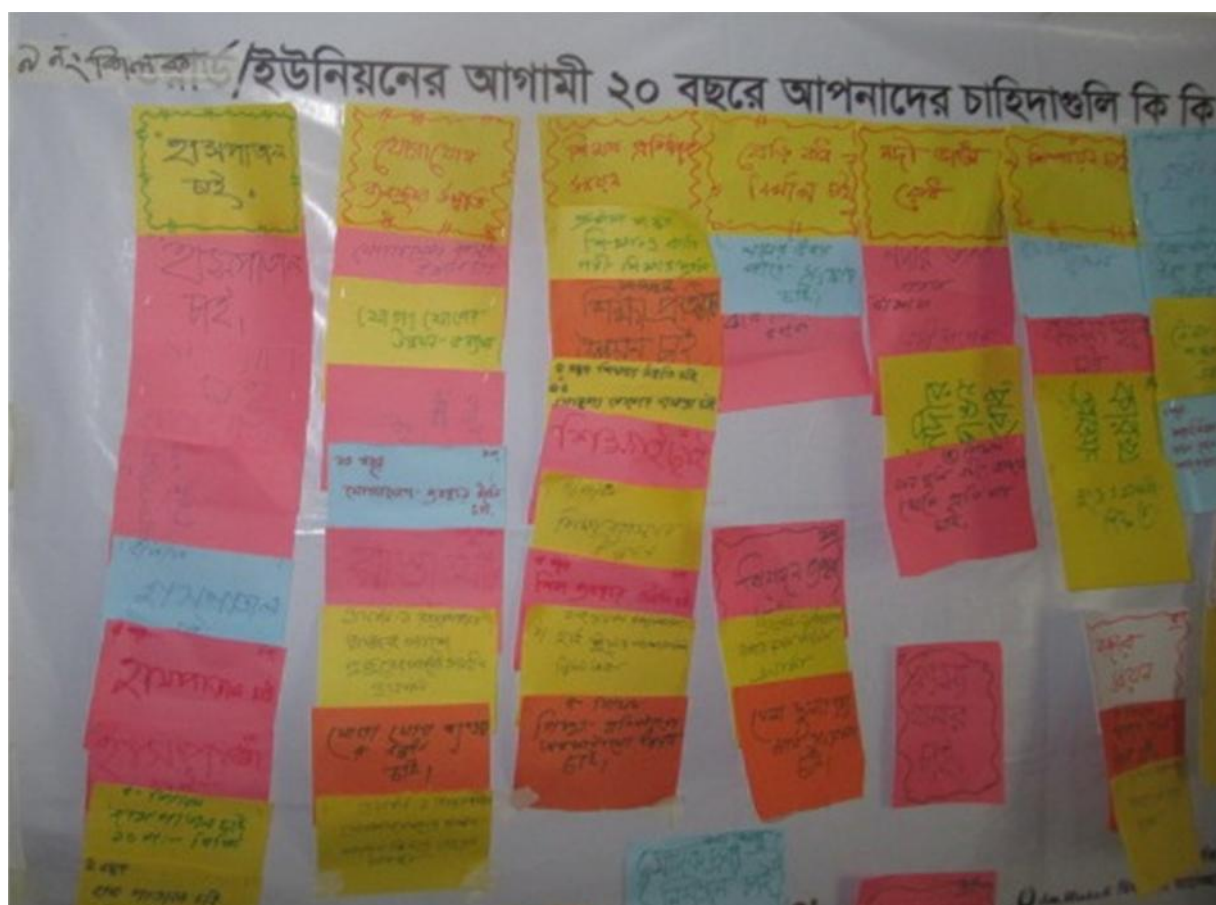


Figure 8: Demand of People for Development Plan **Source:** Field Survey, 2015

Table 4: Identification of Development Plan for Silok Union

| Short term | Midterm | Long term |
|---|--|--|
| <ul style="list-style-type: none"> • Demand for good transportation facilities • Proper Educational Facilities • Removal of river erosion • Development of the local markets • Boundary wall of the grab yards • Demand for fishery farm • Control on drug | <ul style="list-style-type: none"> • Demand for fire service • Development of agricultural facilities • Cremation Place • Demand for repairmen of the religious institutions | <ul style="list-style-type: none"> • Industrialization, • Demand for Bank, |

(Source: Field Survey, 2015)

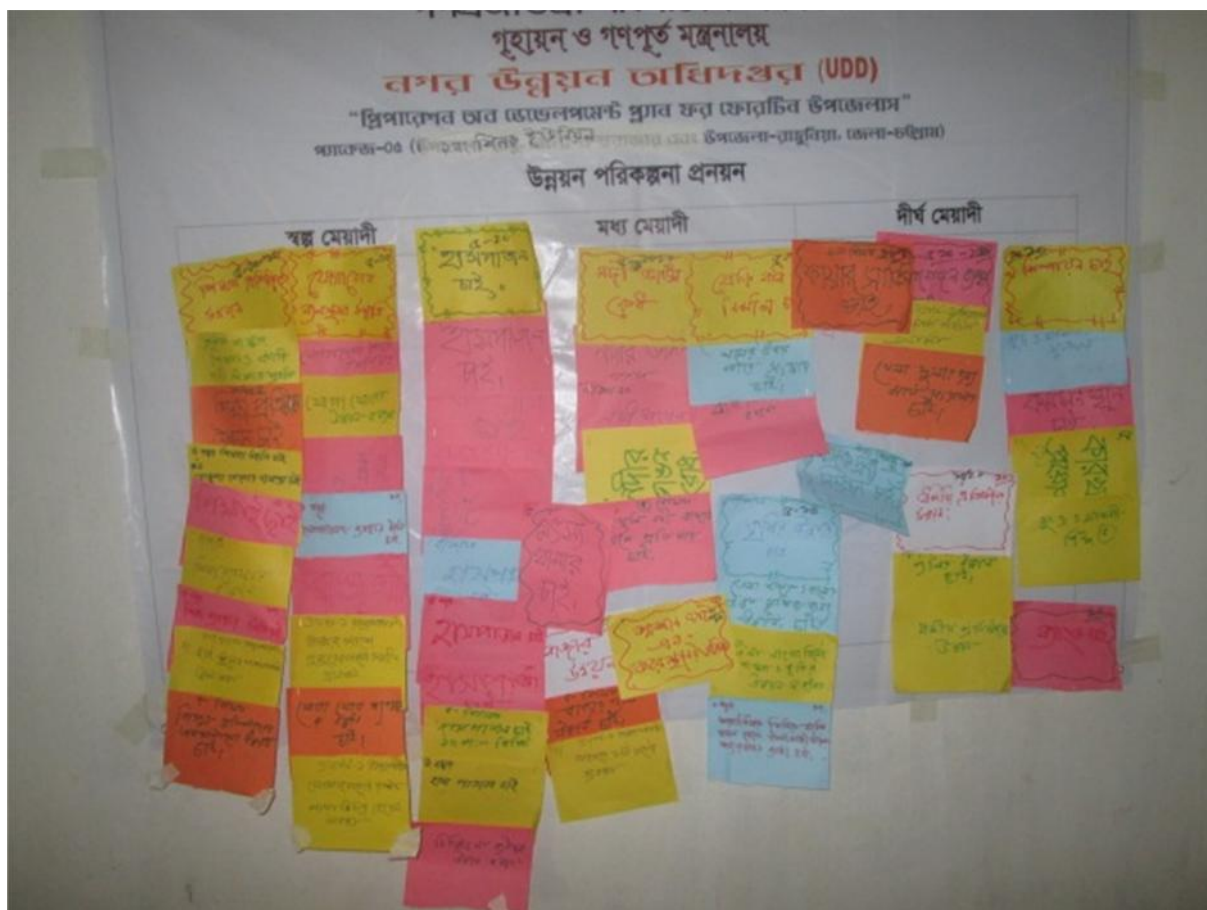


Figure 9: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A
Facilitator: Md. Abdul Razzak Azad
Co-Facilitator: Md. Walid Reza
Logistics: Saiful Islam
Rapporteur: Md. KawsarUddin
Time: 10.00 a.m. to 1.30 p.m.
Date: 12.10.2015
Venue: Podua Union Parishad
Name of Union: 10 No. Podua Union
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rapid Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 12, 2015 at Podua Union Parishad where 31 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.

2. STUDY AREA PROFILE

Podua Union under the administrative jurisdiction of Rangunia Upazila in Chittagong District has an area of 20.90 km². The boundary of the study area is stated below:

North: On the north the study area is followed by Kodala Union.

South: On the south the study area follows Dhobachori Union.

East: On the east the boundary of the study area is beside by Bandarban and Rangamati.

West: On the west the study area runs along the boundary of Boalkhali and Patya



Plate 1: Image of Participants

Source: Field Survey, 2015

Table 1: Physiographic & Demographic Information of Podua Union

| AT A GLANCE | |
|----------------------------------|-----------------------------|
| Features/ Characteristics | Remarks |
| Population | 75000 |
| No. of Village | 15 |
| No. of Mouzas | 10 |
| No. of Local Market | 03 |
| Literacy rate | 40% |
| Educational Institutions | Govt. Primary school-08, , |
| | Non- govt. Primary schoo-20 |
| | High school-05 |
| | Madrasha-02 |
| Important Religious Institutions | Mosque-74 |
| | Idgao-04 |
| | Graveyard-75 |
| | Temple-40 |

(Source: Field Survey, 2015)

3. STEPS OF PRA APPROACH

There were 31 participants in PRA Session of Podua Union. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP).

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venndiagram and Cause Effect Diagram. Besides this Task, two or three persons from the group wereselected to draw the Social Map of the union and other participantswere involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished,the map has shown to the participants to locate the problems/potentials side which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (TOP).

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর (UDD)
"প্রিপারেশন অব ডোডলপ্লান্ট প্রায় ফর ফেরাটচিং উপজেলাস"
স্মারক-০৫ (১৫ নং) পট্টা ইং: উপজেলা-চাট্টা, জেলা-চট্টগ্রাম
অংশগ্রহনকারীদের উপস্থিতি যাচাই

| অংশগ্রহনকারীর ধরন | উপস্থিত | অনুপস্থিত |
|---------------------------------------|---------|-----------|
| ইউপি চেয়ারম্যান | ✓ | |
| পৌরসভা মেয়র | | ✓ |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (মহিলা) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (মহিলা) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (মহিলা) | ✓ | |
| শিক্ষক / ক্রীড়াবিদ | ✓ | |
| ইমাম/ধর্মীয় নেতা | ✓ | |
| ব্যবসায়ী | ✓ | |
| কৃষক/প্রাচীন | ✓ | |
| এনজিও/সিবিও/ক্লাব প্রতিনিধি | ✓ | |
| ডাক্তার | ✓ | |
| ইঞ্জিনিয়ার | ✓ | |
| সাংবাদিক | ✓ | |
| স্থানীয় গণ্যমান্য/রাজনীতিবিদ | ✓ | |
| অন্যান্য নোদী, অংশগ্রহণী, ১/১০ | | |

Figure 1: Attendance Sheet of Participants

Source: Field Survey, 2015

4. PRA TECHNIQUE

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.

- [illegible]

Source: Field Survey, 2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Lack of Electricity connection and load shedding
- Lack of health facilities
- Lack of Vocational institutions
- River erosion
- Problems in Agriculture development
- Lack of Educational institutions & facilities
- Flood affected area
- Lack of provision for cold storage
- Disturbance by wild elephant in local community
- Poor condition of sanitation facilities
- Unplanned residential growth
- Terrorism
- No provision of Thana
- Water logging
- Insufficiency of Transport Facilities (Katcha road and inept or unsuitable road, bridge or culvert)
- Extraction of Sand
- Impact of Women violence and Dowry

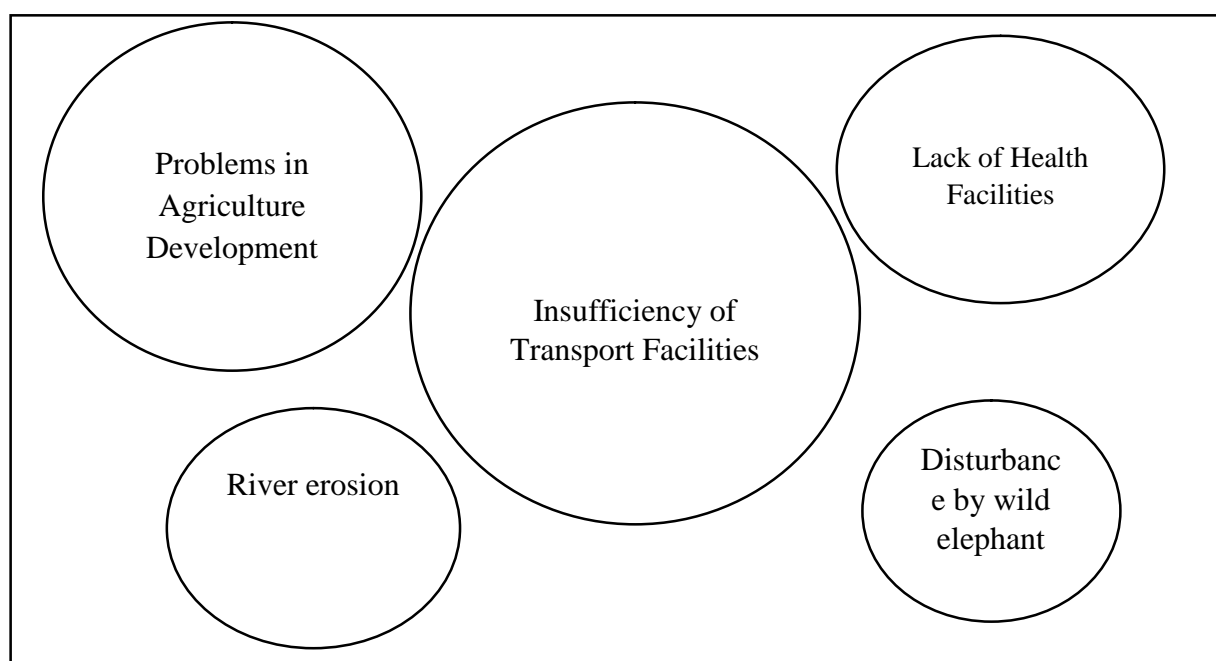


Figure 3: Venn diagram for Potentials Prioritization **Source:** Field Survey, 2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land
- Forestation
- Fish cultivation
- Fruit cultivation
- Livestock rearing
- Tourism (Eco park in Khurulia)
- Rubber Dam
- Extraction of Sand
- Rice mill
- Active & Skill full man power

- Remittance

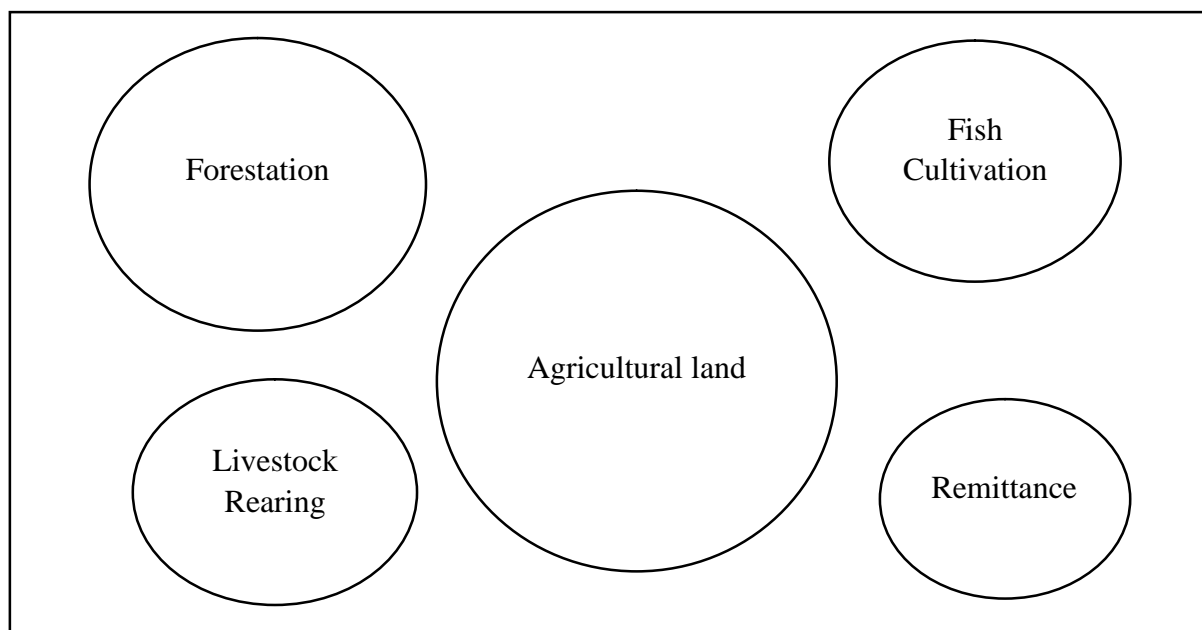


Figure 4: Venn diagram for Potentials Prioritization **Source:** Field Survey, 2015

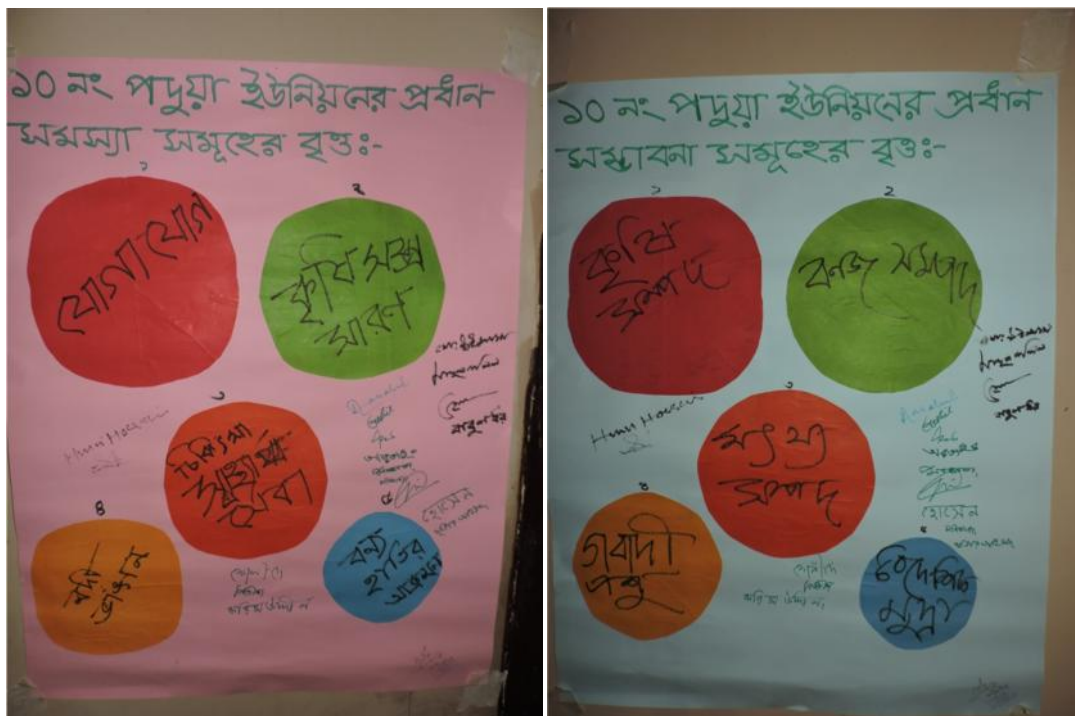


Figure 5: Problem Identification **Figure 6:** Potential Identification

Source: Field Survey, 2015

Source: Field Survey, 2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--|--|--|---|
| 1. Lack of Transportation facilities | <ul style="list-style-type: none"> • Sand extraction from Karnafuli River. • Flash flood due to hill. • River erosion | <ul style="list-style-type: none"> • Transportation problem in Agricultural commodities. • Increasing the educational cost for students and patients. • Problems in providing security. | <ul style="list-style-type: none"> • Soil and enough land • Sufficient human source. • Existing road but reconstruction is needed. |
| 2. Problems in Agriculture Development | <ul style="list-style-type: none"> • Callousness of concerned authority • Lack of irrigation facilities • Lack of ingredients and rules & regulations for agricultural development. | <ul style="list-style-type: none"> • Bad impact on Agricultural development. • Increasing the economic cost for the farmers. • Deprived of demandable money according to their efforts. | <ul style="list-style-type: none"> • Sufficient human source. • Sufficient agricultural land |
| 3. Health Facilities | <ul style="list-style-type: none"> • No community clinic and hospital • Doctors are not found every time • Mismanagement and callousness in existing health centers. | <ul style="list-style-type: none"> • Increasing the Child & maternity death. • Increasing the sufferings for the poor • Deprived of proper health emergency facilities | Sufficient place for health provisions. |
| 4. River Erosion | <ul style="list-style-type: none"> • Sand extraction from Karnafuli River. • Flash flood due to hill | <ul style="list-style-type: none"> • Banishing Homestead. • Loosing agricultural land. • Decreasing fertility of land. | <ul style="list-style-type: none"> • Active and skilled human power • Sufficient Sand & Soil |
| 5. Disturbance by wild elephant | <ul style="list-style-type: none"> • Insufficiency of foods for elephants in forest. • Deforestation hampers their habilitation • Callousness of forest department | <ul style="list-style-type: none"> • Damaging the crops • Increasing the death | Hilly & Forest area |

(Source: Field Survey, 2015)

| <p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার</p> <p>গৃহায়ন ও গণপূর্ত মন্ত্রণালয়</p> <p>নগর উন্নয়ন অধিদপ্তর (UDD)</p> <p>“প্রিপারেশন অব ডেভেলপমেন্ট প্রারম্ভিক ফর ফোরটিন উপজেলাস”</p> <p>প্রাকড-০৫ ১০ নং পদক্ষেপ ইতিপূর্বে নির্ধারিত উপজেলা-গায়বানিয়া, জেলা-চট্টগ্রাম</p> <p>সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই</p> | | | |
|--|--|--|--|
| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সক্ষমতা |
| ১। ট্রাফিক | ১। জটিল রাস্তা ২। নদী অংশ ৩. এর ইতিহাস | ১। জটিল রাস্তা ২। জটিল রাস্তা (১৯৮৩ সাল) ৩. জটিল রাস্তা (১৯৮৩ সাল) ৪। জটিল রাস্তা (১৯৮৩ সাল) ৫। জটিল রাস্তা (১৯৮৩ সাল) | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা |
| ২। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা |
| ৩। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা |
| ৪। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা |
| ৫। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা | ১। জটিল রাস্তা ২। জটিল রাস্তা ৩। জটিল রাস্তা ৪। জটিল রাস্তা ৫। জটিল রাস্তা |

Figure6: Cause, Impact and Potentials

Source: Field Survey,2015

4.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Podua Union

| Demand | Remarks |
|---|--|
| Development of Health facilities | <ul style="list-style-type: none"> • Construction of Community Clinic. • Development of health facilities. |
| Development of Transportation facilities | <ul style="list-style-type: none"> • Development of Road • Provision of Guide wall. • Widening the narrow road. • Construction & reconstruction of road |
| Prevention of Entering Wild Elephant in locality | For security of life and crops, they want government steps to conserve their habitation. |
| Improvement of Electricity service | <ul style="list-style-type: none"> • Provide electricity in every ward • Provision of better service |
| Development of Fish cultivation | They want development of water bodies and ingredients and advice to develop their fish cultivation |
| Prevention of River Erosion | <ul style="list-style-type: none"> • Provision of River Regulation and Navigation • Provision of river digging • Take steps to stop sand extraction |
| Provision of Educational Institutions & Proper Facilities | <ul style="list-style-type: none"> • Provision of College • Assurance of Vocational Training center. • Provision of High school. • Provision of Madrasha. |
| Miscellaneous | <ul style="list-style-type: none"> • Provision of Bank • Creation of Agricultural and Livestock Consultants Center. • Removal of unemployment problem. • Take steps to stop sand extraction • Provision of veterinary hospital • Provide economic help to the destitute • Provision of Industry • Provision of Rubber Dam • Provision of Cold Storage • Stop water logging |

(Source: Field Survey, 2015)



Figure7: Demand of People for Development Plan **Source:** Field Survey, 2015

Table 4: Identification of Development Plan for Podua Union

| Short term | Midterm | Long term |
|---|--|---|
| <ul style="list-style-type: none"> • Development of Transportation facilities • Development of Fish cultivation • Prevention of Entering Wild Elephant in locality | <ul style="list-style-type: none"> • Prevention of River Erosion • Provision of Bank • Improvement of Electricity service • Stop water logging | <ul style="list-style-type: none"> • Development of Health facilities • Provision of Educational Institutions & Proper Facilities • Creation of Agricultural and Livestock Consultants Center. • Removal of unemployment problem. • Provision of veterinary hospital Provide economic help to the destitute • Provision of Industry • Provision of Rubber Dam • Provision of Cold Storage |

(Source: Field Survey, 2015)



Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam
Co-Facilitator: Md. Walid Reza
Logistics: Saiful Islam
Rapporteur: Md. Kawsar Uddin
Time: 10.00 a.m. to 1.30 p.m.
Date: 08.10.2015
Venue: Chondroghona Kadamtali Union Parishad
Name of Union: 11 No. Chondroghona Kadamtali
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 8, 2015 at Chondroghona Kadamtali Union Parishad where 23 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.



Plate 1: Image of Participants

Source: Field Survey, 2015

2. STUDY AREA PROFILE

Chondroghona Kadamtali Union under the administrative jurisdiction of Rangunia Upazila in Chittagong District has an area of 2774.98 acre. The boundary of the study area is stated below:

North: On the north the study area is followed by 2 No. Hosnabad Union.

South: On the south the study area follows Karnafuli river.

East: On the east the boundary of the study area is beside by Tripura Shundori Khal.

West: On the west the study area runs along the boundary of Katakhal khal.

Table 1: Physiographic & Demographic Information of Chondroghona Kadamtali Union

| AT A GLANCE | |
|-------------------------------|--|
| Features/ Characteristics | Remarks |
| Population | 30221 |
| Male | 15499 |
| Female | 14722 |
| Households | 6197 |
| Educational Facilities | High shool-01, madrasha-05, Primary school-06, Kindergarten school-06. |
| No. of Hospital | 04 |
| No. of Hatbazar | 01 |
| Brick Field | 01-Chondroghona Dobhashi Bazar |
| River & Canal | 06 |
| Religious Infrastructure | Grave yard-20, Mosque-33, Temple-12. |
| Registered Doctors | 35 |
| Land Use | Agricultural land-2065.94 acre <ul style="list-style-type: none">• Fallow land- 312 acre• Forestation-150 acre• Homestead-247 acre |
| Transportation Infrastructure | No. of Pacca raod-04 No. of Rural road-50 |

(Source: CDMP II)

3. STEPS OF PRA APPROACH

There were 23 participants in PRA Session of ChondroghonaKadamtali Union. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.23 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP)

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venndiagram and Cause Effect Diagram. Besides this task, two or three persons from the group wereselected to draw the Social Map of the union and other participantswere involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has shown to the participants to locate the problems/potentials side which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর (UDD)
 "প্রিপ্রাণেশ্বর অত্র ডেভেলপমেন্ট প্রায় ফর ফোরটিভ উপজেলাস"
 প্যারফর্ম-০৫ **১১নং চক্ৰঘোনা** ৫ নং উপজেলা-গোমুখিয়া, জেলা-চট্টগ্রাম

অংশগ্রহনকারীদের উপস্থিতি যাচাই

| অংশগ্রহনকারীর ধরন | উপস্থিত | অনুপস্থিত |
|----------------------------------|---------|-----------|
| ইউপি চেয়ারম্যান | ✓ | |
| পৌরসভা মেয়র | | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (মহিলা) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (মহিলা) | | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (মহিলা) | | |
| শিক্ষক | ✓ | |
| ইমাম/খলীফ নেতা | ✓ | |
| বাবসায়ী | ✓ | |
| কৃষক | ✓ | |
| এনজিও/সিবিও/ক্লাব প্রতিনিধি | ✓ | |
| ডাক্তার | ✓ | |
| ইঞ্জিনিয়ার | | |
| সাংবাদিক | | |
| স্থানীয় গন্যমান্য/রাজনীতিবিদ | ✓ | |
| অন্যান্য | ✓ | |

Figure 1: Attendance Sheet of Participants **Source:** Field Survey,2015

4. PRA TECHNIQUE

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

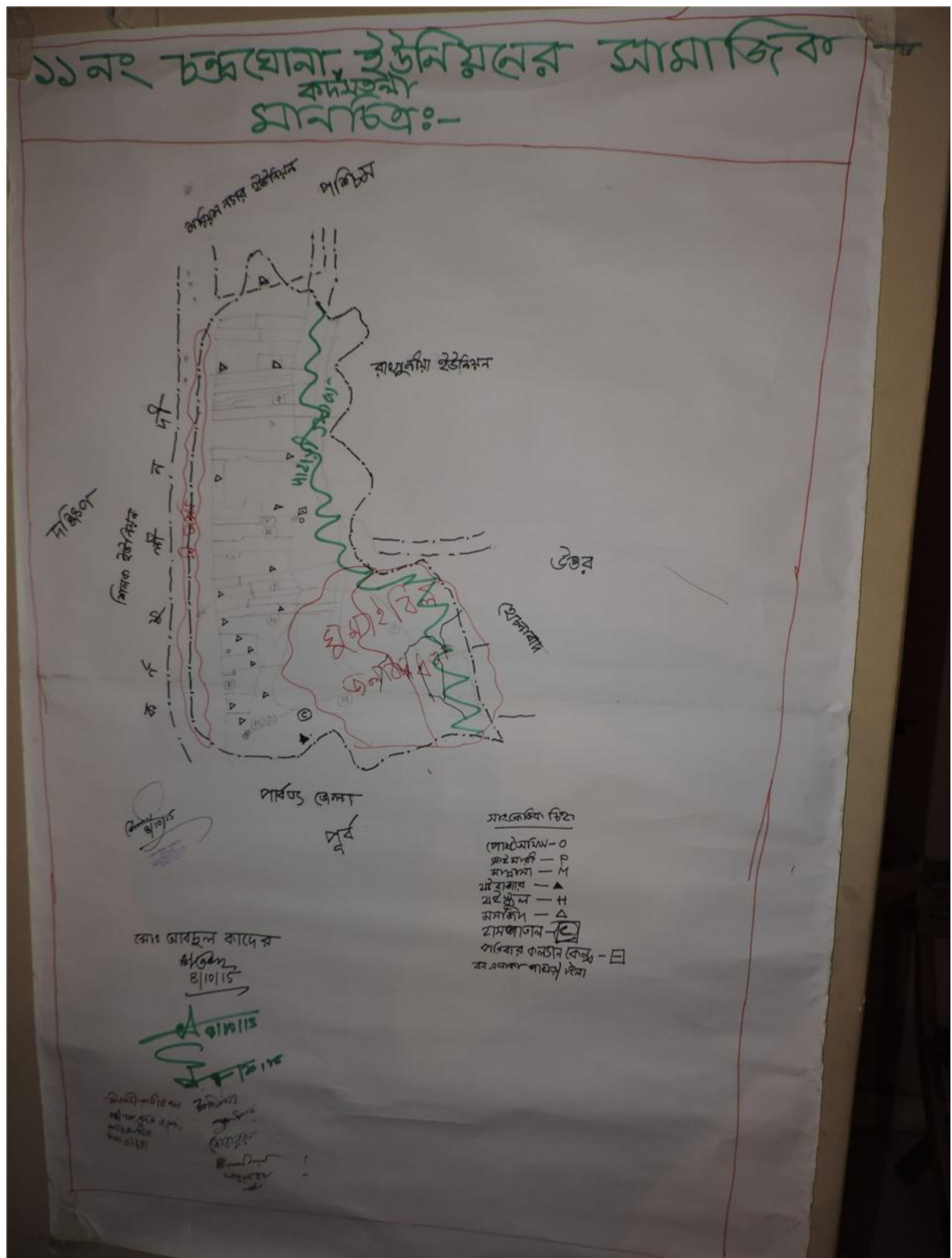


Figure 2: Social Map of Chondroghona Kadamtali Union Source: Field Survey,2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in

A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Lack of adequate health facilities
- Lack of educational institutions and facilities
- Habilitation problem
- Lack of agricultural training center
- Water logging
- Lack of information technology training center
- Gas connection problem
- Lack irrigation facilities in agriculture
- Industrialization problem
- River erosion
- Bad transportation condition
- Impact of Eve teasing
- Unemployment problem
- Reconstruction or repairing of bridge or culvert

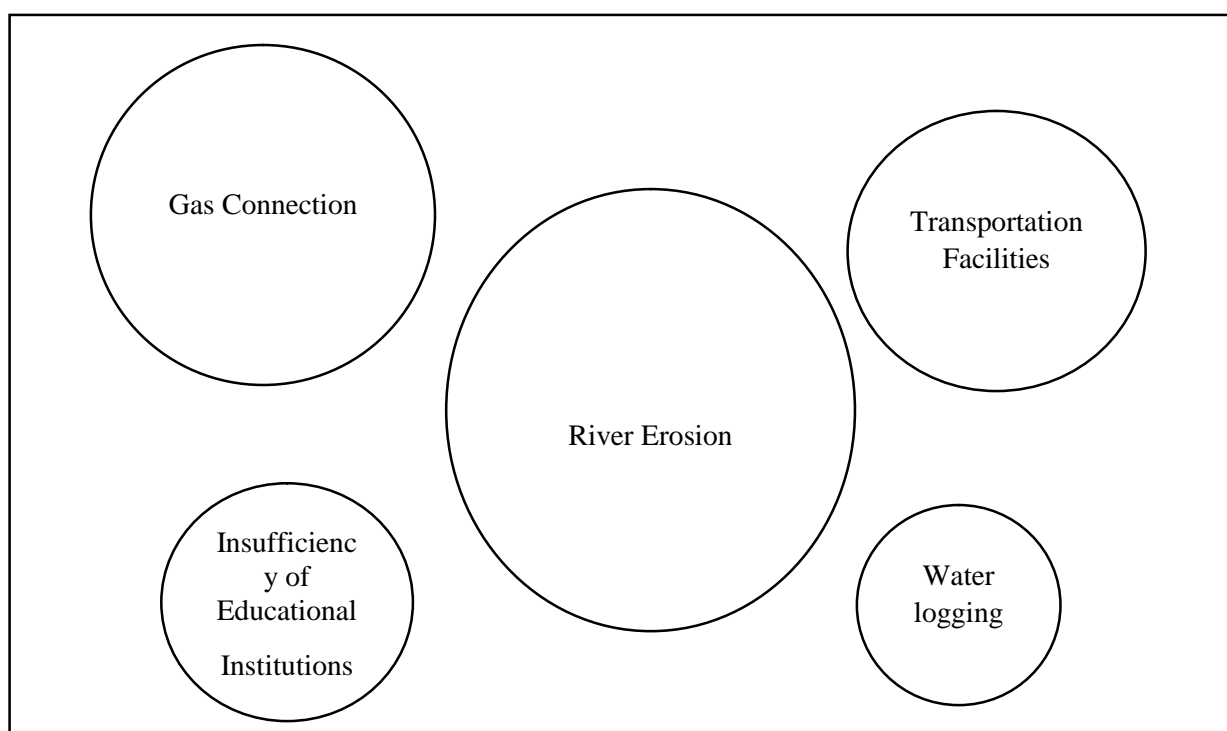


Figure 3: Venn diagram for Problems Prioritization **Source:** Field Survey,2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land
- Livestock rearing
- Forestation
- Ghumai bill
- Inter connecting road with Rangamati,Bandarban, chittagong, Khagrachari.
- Brick field
- Extraction of sand
- Fishing business
- Poultry farm
- Active human power
- Remittance
- Ferry Ghat
- Business
- Karnafuli river

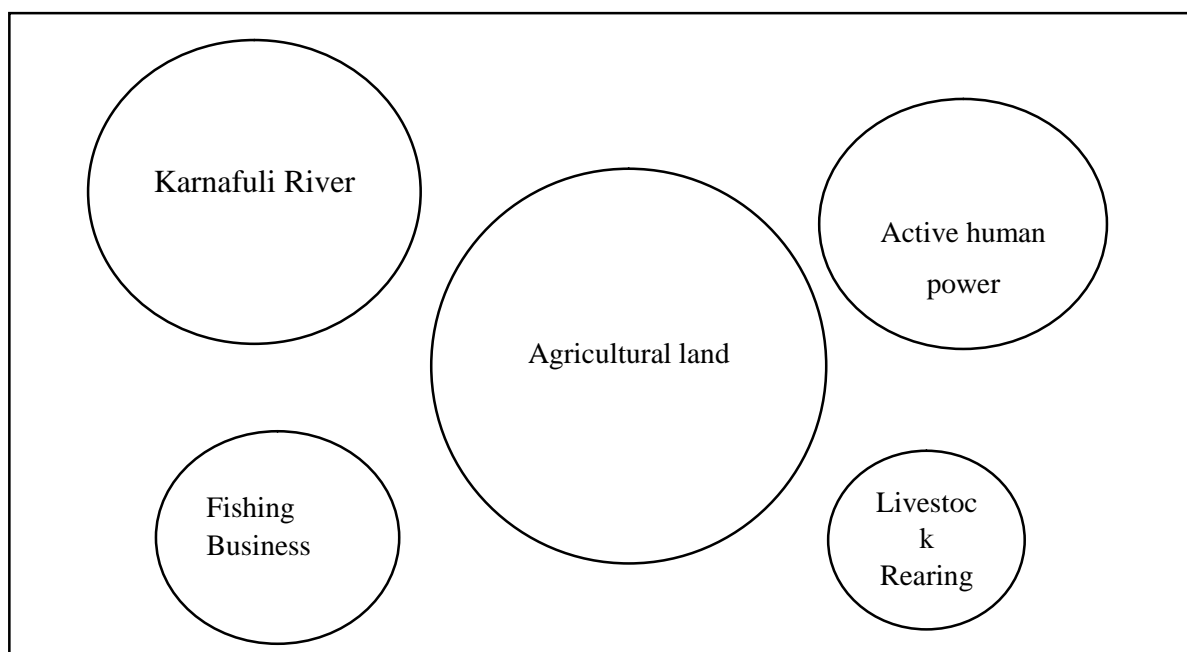


Figure 4: Venn diagram for Potentials Prioritization **Source:** Field Survey,2015

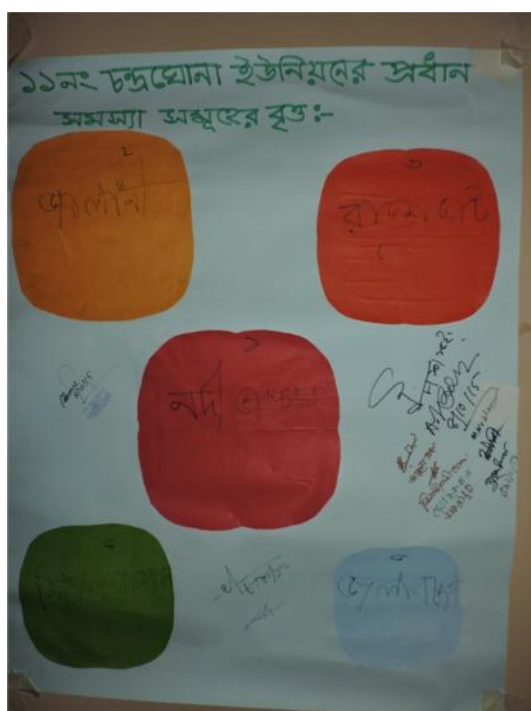


Figure 5: Problem Identification

Source: Field Survey,2015

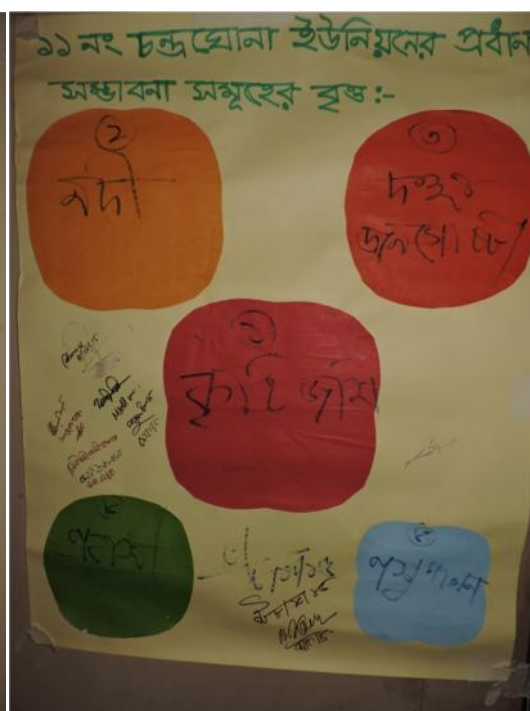


Figure 6: Potential Identification

Source: Field Survey,2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|---|---|--|
| 1. River erosion | <ul style="list-style-type: none"> Excessive water from Kaptai embankment. Reducing water conserving capacity of Kaptai water electricity plant. High percentage of rain. Unplanned extraction of sand. Impact of Ferry Ghat. Lack of dredging. | <ul style="list-style-type: none"> Increasing Habilitation problem Banishing agricultural land Increasing water logging. | <ul style="list-style-type: none"> Brick field Sufficient human source. |
| 2. Gas Connection | <ul style="list-style-type: none"> Bureaucratic complexity. | <ul style="list-style-type: none"> Increasing the cost for cooking Bad impact on economy. | <ul style="list-style-type: none"> Gas connection is available in nearby union. Gas available in their local market. |
| 3. Lack of Transportation Facilities | <ul style="list-style-type: none"> Unplanned infrastructure along the road side. Damaging the road due to rain. Bad drainage problems. | <ul style="list-style-type: none"> Farmers cannot get their payment according to their demand. Deprived of fundamental services. | <ul style="list-style-type: none"> Human power. Equipments available for construction of infrastructure. |
| 4. Lack of Educational Facilities | <ul style="list-style-type: none"> Lack of sufficient of land. Bad impact on infrastructure development. | <ul style="list-style-type: none"> Decreasing the literacy rate. Have to attend their congested classes | <ul style="list-style-type: none"> Availability of Students. Guardian's interaction and interest. |
| 5. Water logging | <ul style="list-style-type: none"> Filling the river or canal Flash flood due to hill Excessive rain | <ul style="list-style-type: none"> Damaging the agricultural land. Farmers are losing their crops. Increasing the poverty. | Having local interest and donor. |

(Source: Field Survey,2015)

| <p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার</p> <p>গৃহায়ন ও গণপূর্ত মন্ত্রণালয়</p> <p>নগর উন্নয়ন আধিদপ্তর (UDD)</p> <p>“প্রিপাতিশত চার ডেভেলপমেন্ট প্ল্যান ফর ফোরটিভ উপজেলাস”</p> <p>প্যারফেক্ট-১১নং চক্ৰঘোনা ইউনিয়ন এবং উপজেলা-চাটখোয়া, জেলা-চট্টগ্রাম</p> <p>সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই</p> | | | |
|--|--|--|--|
| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সম্ভবতা |
| ১। নদী জলদস্যুতা | <ul style="list-style-type: none"> • নদীতে নদীতে নদীতে নদীতে নদীতে • নদীতে নদীতে নদীতে নদীতে নদীতে • নদীতে নদীতে নদীতে নদীতে নদীতে • নদীতে নদীতে নদীতে নদীতে নদীতে | <ul style="list-style-type: none"> • নদীতে নদীতে নদীতে নদীতে নদীতে • নদীতে নদীতে নদীতে নদীতে নদীতে • নদীতে নদীতে নদীতে নদীতে নদীতে • নদীতে নদীতে নদীতে নদীতে নদীতে | <ul style="list-style-type: none"> • নদীতে নদীতে নদীতে নদীতে নদীতে • নদীতে নদীতে নদীতে নদীতে নদীতে • নদীতে নদীতে নদীতে নদীতে নদীতে • নদীতে নদীতে নদীতে নদীতে নদীতে |
| ২। জলদস্যুতা | <ul style="list-style-type: none"> • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা | <ul style="list-style-type: none"> • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা | <ul style="list-style-type: none"> • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা |
| ৩। জলদস্যুতা | <ul style="list-style-type: none"> • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা | <ul style="list-style-type: none"> • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা | <ul style="list-style-type: none"> • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা |
| ৪। জলদস্যুতা | <ul style="list-style-type: none"> • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা | <ul style="list-style-type: none"> • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা | <ul style="list-style-type: none"> • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা • জলদস্যুতা জলদস্যুতা জলদস্যুতা |
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Figure 7 : Cause, Impact and Potentials

Source: Field Survey,2015

4.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

**Table 3: Demand of People for Development Plan for 20 Years,
ChondroghonaKadamtali Union**

| Demand | Remarks |
|---|---|
| Development of Health facilities | <ul style="list-style-type: none"> • Development of health facilities. • Assurance of hospital |
| Gas Connection | They have to seek alternative sources such as gas cylinder, wood etc. which demand high economic cost, so gas connection is necessary. |
| Provision of Transportation facilities | <ul style="list-style-type: none"> • Development of Road • Construction or reconstruction of bridge or culvert. |
| Prevention of River erosion | <ul style="list-style-type: none"> • Establishment of embankment along the Karnafuli river • Take steps to dig the river. |
| Establishment of Industry | <ul style="list-style-type: none"> • Creation of big industry. • Government initiations for industrialization. |
| Provision of Drainage system | <ul style="list-style-type: none"> • Planned Drainage system • Taking steps to halt water logging in Ghumai bill |
| Development of Agriculture | They want well equipment and facilities in agricultural activities. |
| Provision of Educational Institutions & Proper Facilities | <ul style="list-style-type: none"> • Provision of College • Provision of High school • Development of education facilities. |
| Miscellaneous | <ul style="list-style-type: none"> • Provision of vocational training center. • Planned residential areas • Ban the sand excavation. • Remove the unemployment. |



Figure 8: Demand of People for Development Plan **Source:** Field Survey, 2015

Table 4: Identification of Development Plan for ChondroghonaKadamtali Union

| Short term | Midterm | Long term |
|---|--|--|
| Gas Connection | Provision of Transportation facilities | Development of Health facilities |
| Provision of Drainage system | Prevention of River erosion | Establishment of Industry |
| Development of Agriculture | | Provision of vocational training center. |
| Provision of Educational Institutions & Proper Facilities | | Planned residential areas |



Figure 9: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazilla Cox's Bazar & Rangunia Upazilla, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam
Co-Facilitator: Rakeeb Askari
Logistics: Mehedi Alam
Rapporteur: K. M. Risaduzzaman
Time: 10.00 a.m. to 1.30 p.m.
Date: 10.10.2010
Venue: Kodala Union Parishad
Name of Union: 12 No. Kodala
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 07, 2015 at Kodala Union Parishad where 38 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (TOP) have been applied for this project which will fulfill our project goal.

2. STUDY AREA PROFILE

Kodala Union under the administrative jurisdiction of Rangunia Upazilla in Chittagong has an area of 16.03 km². The boundary of the study area is stated below:

North: On the north the study area is followed by Raikhali Union, Kaptai,

South: On the south the study area follows Mariomnagar Union.

East: On the east the study area is surrounded by Shilok Union,

West: On the west of the study area there is Chandraghona Union



Plate1: Image of Participants

Source: Field Survey,2015

Table 1: Physiographic & Demographic Information of Kodala Union

| AT A GLANCE | |
|----------------------------------|-------------|
| Features/ Characteristics | Remarks |
| Population | Total-18000 |
| No of Village | 04 |
| Hat- Bazar | 01 |
| Literacy Rate | 70% |
| Educational Institutions | Madrasha- 3 |
| Important Religious Institutions | Mosque- 23 |
| Community Clinic | 02 |

3. STEPS OF PRA APPROACH

There were 26 participants in PRA Session of Kodala Union. The participants were included UP chairman and 12 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Journalist, Surveyor, Student, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

After saying the purpose of Development Project for 20 years, the schedule of PRA Session was explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has been shown to the participants to locate the problems/potentials side which has spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were requested to dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

4. PRA TECHNIQUE

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

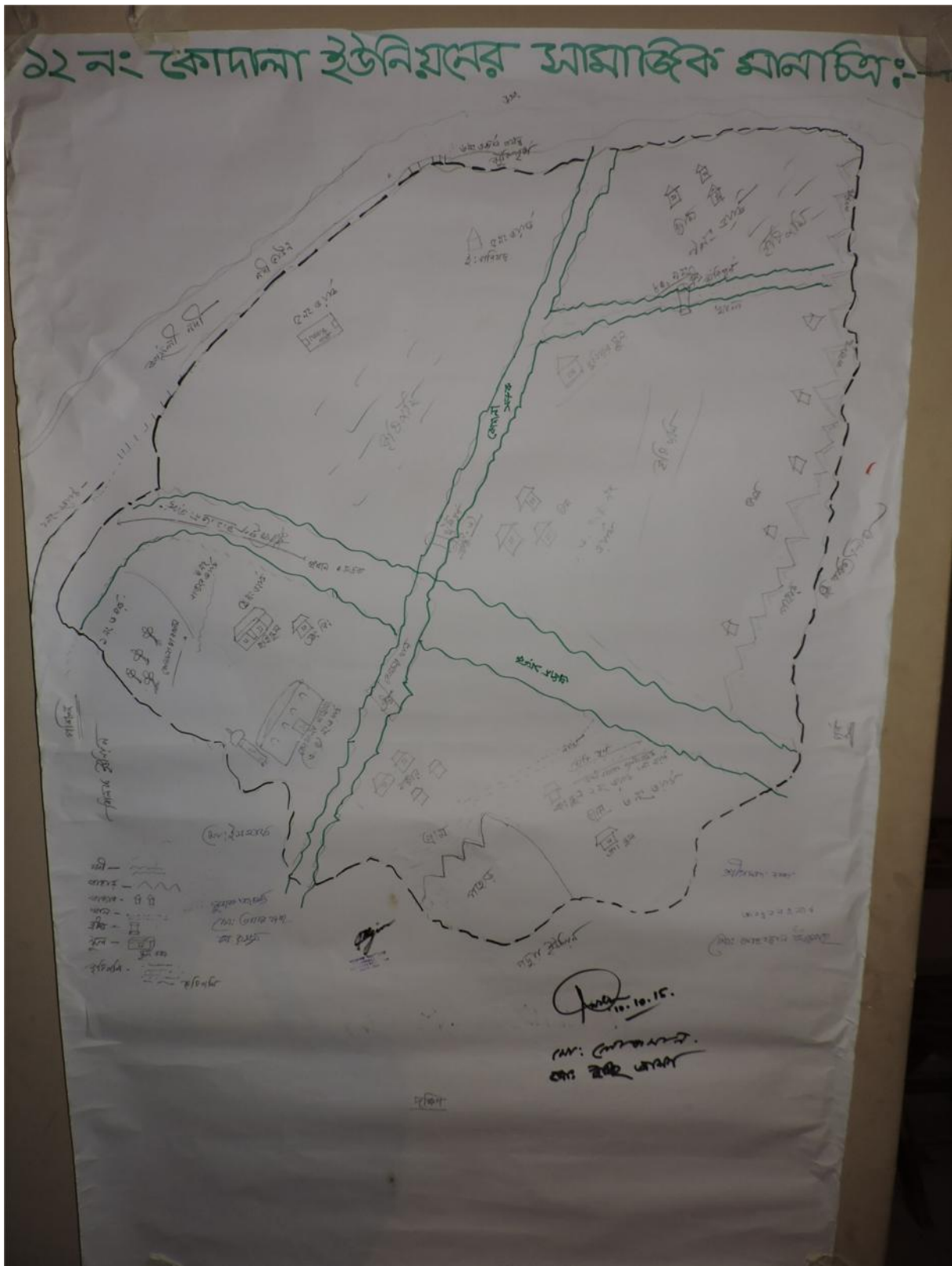


Figure 1: Social Map of Kodala Union

Source: Field Survey, 2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- No hat bazaar,
- Lack of repairmen of the mosques (5 no ward),
- Poverty,
- Women violence,
- Unemployment,
- Lack of agricultural expansion,
- Lack of sanitation facilities,
- Lack of drinking water,
- Water logging,
- No industrialization,
- No bank,
- Bad irrigation system (No switch gate-2,3,5,6),
- Lack of Electricity line and Load shedding,
- Lack of infrastructure in tourism industry,
- Attack by wild animal(Elephant) (1,2,3,4,5,9 no ward),
- Flood,
- Lack of sheltering center,
- Problem in boat transportation (corruption of the" Kheya Ghat" contractor in providing sufficient boat),
- Lack of drains (4 no ward),
- Lack of playground,
- River erosion (1 to 8 no ward),
- Lack of Transportation facilities ,
- No FWC (Family welfare center),
- Lack of Educational institutions,

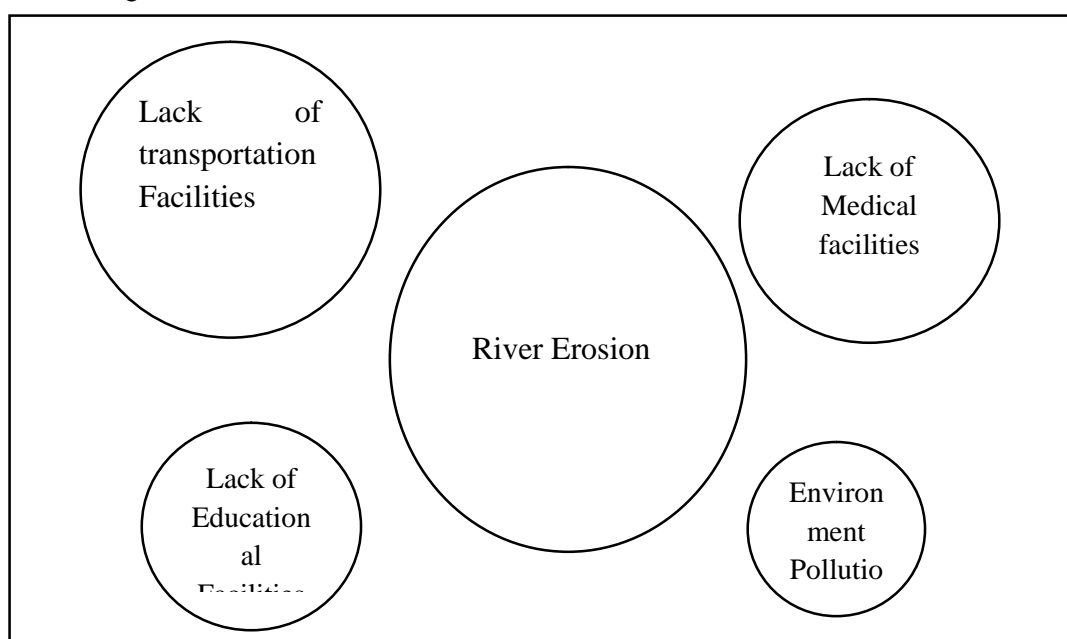


Figure 2: Venn diagram for Problems Prioritization **Source:** Field Survey, 2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Forestation,
- Tourism,
- Tea garden,
- Livestock,
- Agricultural Products,
- Fisheries,
- Poultry farm,
- Remittances,

- Karnauli river,
- Kodala bill, Noyakahal
- Hill

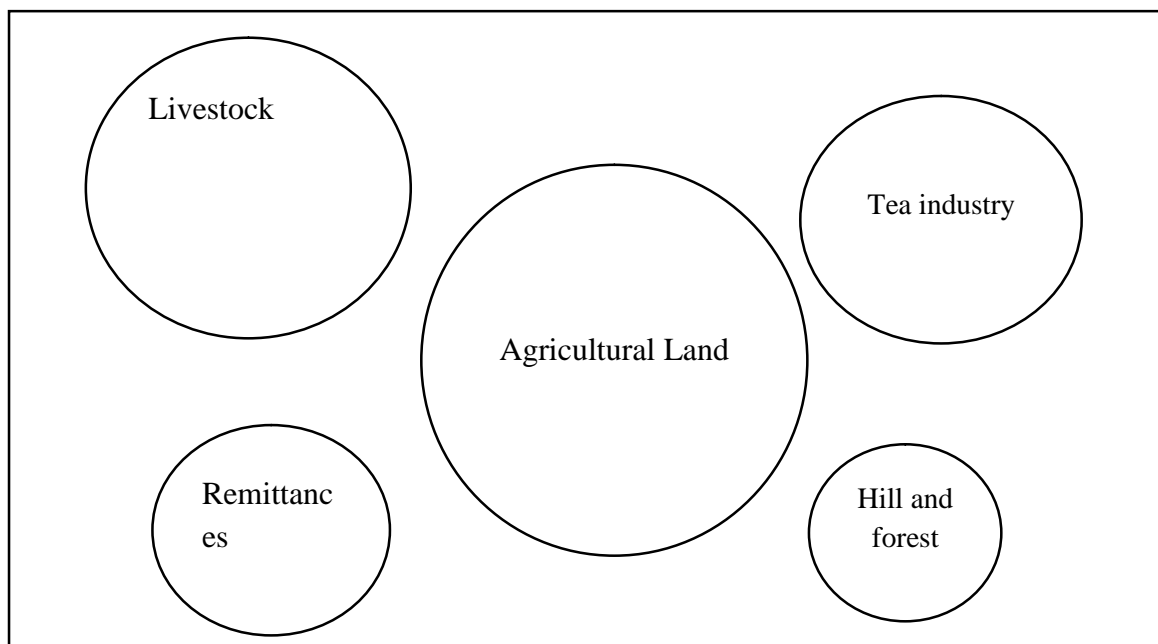


Figure 3: Venn diagram for Potentials Prioritization **Source:** Field Survey,2015



Figure 4: Problem Identification

Source: Field Survey,2015

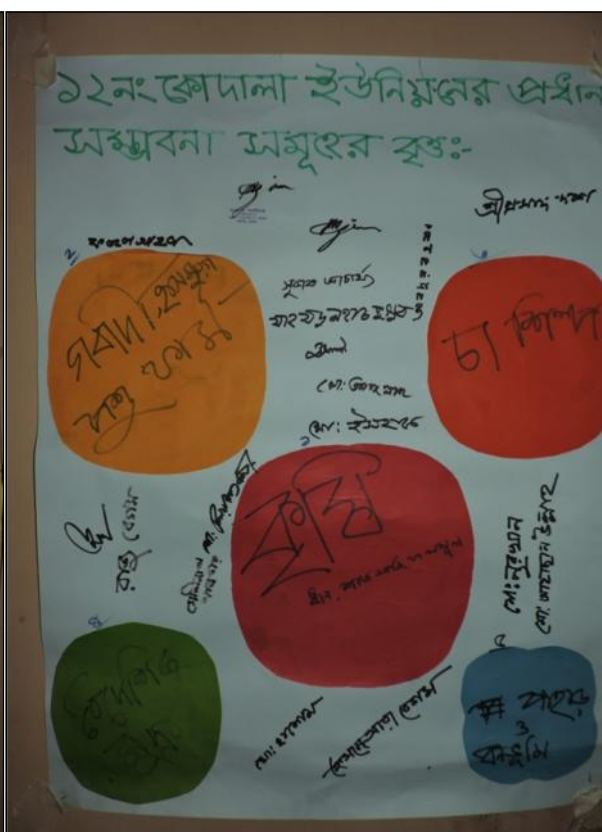


Figure 5: Potential Identification

Source: Field Survey,2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials
Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|---|--|--|
| 1. River Erosion | <ul style="list-style-type: none"> Decrease in the navigation of the Karnafulli river, Water flow of the Kaptai lake, Heavy rainfall, | <ul style="list-style-type: none"> Agricultural lands are over flooded, | <ul style="list-style-type: none"> One project of embankment is running, Another project of 1200 meter embankment is on the way to implementation. |
| 2. Lack of transportation Facilities | <ul style="list-style-type: none"> Damage of road Broken bridge and culvert. River erosion, Roads are damaged by heavy rainfall, Flash flood due to hilly water, Heavy vehicles of Brick industry and wood Katcha road | <ul style="list-style-type: none"> Hamper the marketing of the agricultural products, Students faces difficulties in going to school, Patients die every now and then on the way to hospital, | <ul style="list-style-type: none"> Sufficient human resource, Raw materials (brick and sand) |
| 3. Lack of Medical Facilities | <ul style="list-style-type: none"> No hospital Lack of doctor, Transportation problem, | <ul style="list-style-type: none"> Poor patients die on the way to hospital, Common people are deprived of emergency treatment | <ul style="list-style-type: none"> Sufficient land for hospital |
| 4. Lack of educational institution | <ul style="list-style-type: none"> Weak transportation problem, Lack of Educational institutions | <ul style="list-style-type: none"> Drop out of students Hamper education | <ul style="list-style-type: none"> Sufficient land Manpower |
| 5. Environment Pollution | <ul style="list-style-type: none"> Deforestation Brick Industry | <ul style="list-style-type: none"> Attack by wild elephant, Air pollution | <ul style="list-style-type: none"> Sufficient land for forestation |

| <p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার গৃহায়ন ও গণপূর্ত মন্ত্রণালয় বঙ্গবন্ধু উন্নয়ন আধিদপ্তর (UDD) "প্রিপারেশন অব ডেভেলপমেন্ট প্রায় ফর ফোরটিব উপজেলাস" প্রাক-জ-০৫ তারিখ-১২/১১/১৫ (কাসিমাবাদ ও বঙ্গ উপজেলা-রামুবিয়া, জেলা-চট্টগ্রাম) সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই</p> | | | |
|---|--|--|----------------------------------|
| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সংস্কার/সক্ষমতা |
| ১. বর্জ্যপ্রদূষণ | বর্জ্যপ্রদূষণ হ্রাস-কমানিয়েনস গারি মাল, অর্থাৎ বর্জ্যপ্রদূষণ | বৃষ্টি-কাল-প্রাক-প্রভাব-প্রদূষণ | বৃষ্টি-কাল-প্রাক-প্রভাব-প্রদূষণ |
| ২. প্রাথমিক | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ বর্জ্য-প্রদূষণ-প্রদূষণ-প্রদূষণ বর্জ্য-প্রদূষণ-প্রদূষণ-প্রদূষণ | বর্জ্য-প্রদূষণ, প্রদূষণ-প্রদূষণ বর্জ্য-প্রদূষণ-প্রদূষণ-প্রদূষণ | বর্জ্য-প্রদূষণ, প্রদূষণ-প্রদূষণ |
| ৩. প্রাথমিক | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ বর্জ্য-প্রদূষণ-প্রদূষণ-প্রদূষণ | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ বর্জ্য-প্রদূষণ-প্রদূষণ-প্রদূষণ | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ |
| ৪. প্রাথমিক | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ বর্জ্য-প্রদূষণ-প্রদূষণ-প্রদূষণ | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ বর্জ্য-প্রদূষণ-প্রদূষণ-প্রদূষণ | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ |
| ৫. প্রাথমিক | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ বর্জ্য-প্রদূষণ-প্রদূষণ-প্রদূষণ | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ বর্জ্য-প্রদূষণ-প্রদূষণ-প্রদূষণ | প্রাথমিক, বর্জ্য-প্রদূষণ-প্রদূষণ |

Figure 6 : Cause, Impact and Potentials

Source: Field Survey, 2015

4.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in "Development plan for 20 years" which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Kodala Union

| Demand | Remarks |
|-------------------------------------|--|
| Demand for Electricity | <ul style="list-style-type: none"> Expansion of electricity in the hilly area, Electricity on the road |
| Development of transportation | <ul style="list-style-type: none"> Demand for wide road. Brick / pitch road are demanded, Repairmen of road, Link road wanted, |
| Increasing educational institution | <ul style="list-style-type: none"> Demand for college Demand for school |
| Removal of terrorism | <ul style="list-style-type: none"> Safety of the union is on threat due to terrorism, |
| Removal of river erosion | <ul style="list-style-type: none"> Dredging of canal is needed. Embankment and Guide wall is demanded |
| Protection of hills and forest area | <ul style="list-style-type: none"> Strong supervision on hill cutting and deforestation is needed. |
| Expansion of agriculture | <ul style="list-style-type: none"> More investment is needed to accelerate the agricultural production |
| Development of sanitation | <ul style="list-style-type: none"> Sanitation problem is acute in some wards. |
| Development of medical facilities | <ul style="list-style-type: none"> Health facilities should be increased to fulfill the existing demand |

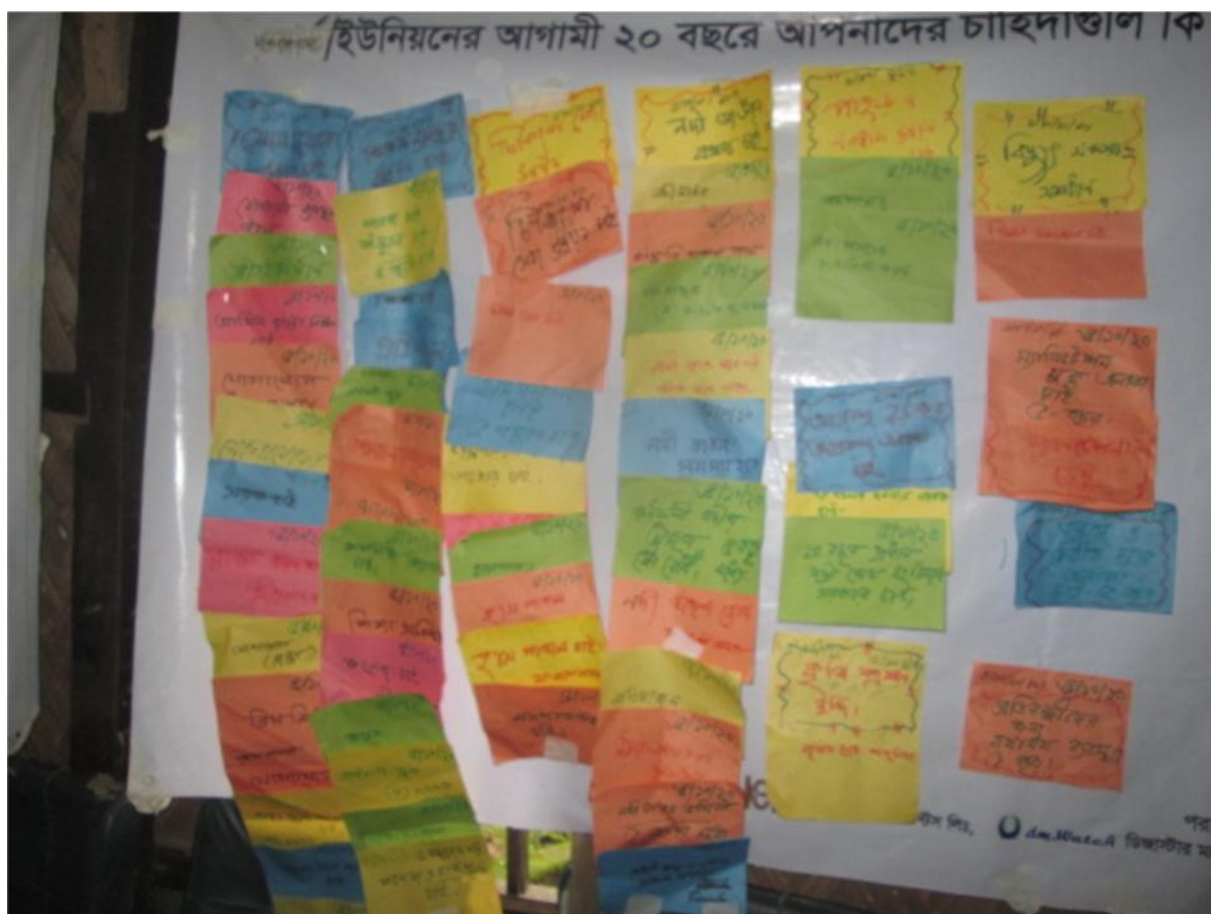


Figure 7: Demand of People for Development Plan Source: Field Survey, 2015

Table 4: Identification of Development Plan for Kodala Union

| Short Term | Mid Term | Long Term |
|------------------------------------|-------------------------------------|---|
| Demand for Electricity | Development of medical facilities | Proper help for physically disable people |
| Development of transportation | Removal of terrorism | Development of sanitation |
| Increasing educational institution | Removal of river erosion | Demand for Awamileague government |
| | Protection of hills and forest area | |
| | Expansion of agriculture | |



Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazilla Cox's Bazar & Rangunia Upazilla, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A&B
Facilitator: AbdurRazzaque Azad
Co-Facilitator: RakeebAskari,
Logistics: Md. Walid Reza, MD .MehediAlam
Rapporteur: Md. KawsarUddin &K.M.Risaduzzaman
Time: 10.00 a.m. to 2.30 p.m.
Name of Union: 13 No. Islampur Union
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 03, 2015 at Islampur Union Parishad where 36 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (TOP) have been applied for this project which will fulfill our project goal.

2. STUDY AREA PROFILE

Islampur Union under the administrative jurisdiction of Rangunia Upazilla in Chittagong has an area of 35.78 sq. km. The boundary of the study area is stated below:

North: On the north the study area is followed by hills,

South: On the south the study area follows Rajanagar and South Rajanagar Union.

East: On the east the study area is surrounded by hills,

West: On the west of the study area there is Rajanagar Union.



Plate 1: Image of Participants **Source:** Field Survey, 2015

Table 1: Physiographic & Demographic Information of Islampur Union

| AT A GLANCE | |
|----------------------------------|---|
| Features/ Characteristics | Remarks |
| Population | Total-18700 |
| Agricultural Land | 2904.72 acre |
| Growth Center | 01 |
| Cyclone / flood center | 01 |
| Water and sanitation | tube well water use 73.15% |
| | tap water use -0.38% |
| | well water use-4.35% |
| | pond water use – 4.09% |
| | use of water from other sources- 18.03% |
| | Hygiene latrine user –31.48% |
| Family welfare Center | 01 |
| No of Village | 07 |
| Hat- Bazar | 01 |
| Literacy Rate | 79.29% |
| Educational Institutions | Govt. Primary School-03 |
| | College-01 |
| | Madrasha- 01 |

3. Steps of PRA Approach

There were 36 participants in PRA Session of Islampur Union. The participants included UP chairman and ward members (9 male and 1 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Journalist, Surveyor, Student, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

After saying the purpose of Development Project for 20 years, the schedule of PRA Session was explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has been shown to the participants to locate the problems/potentials side which has spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were requested to dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

4. PRA Technique

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.

- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

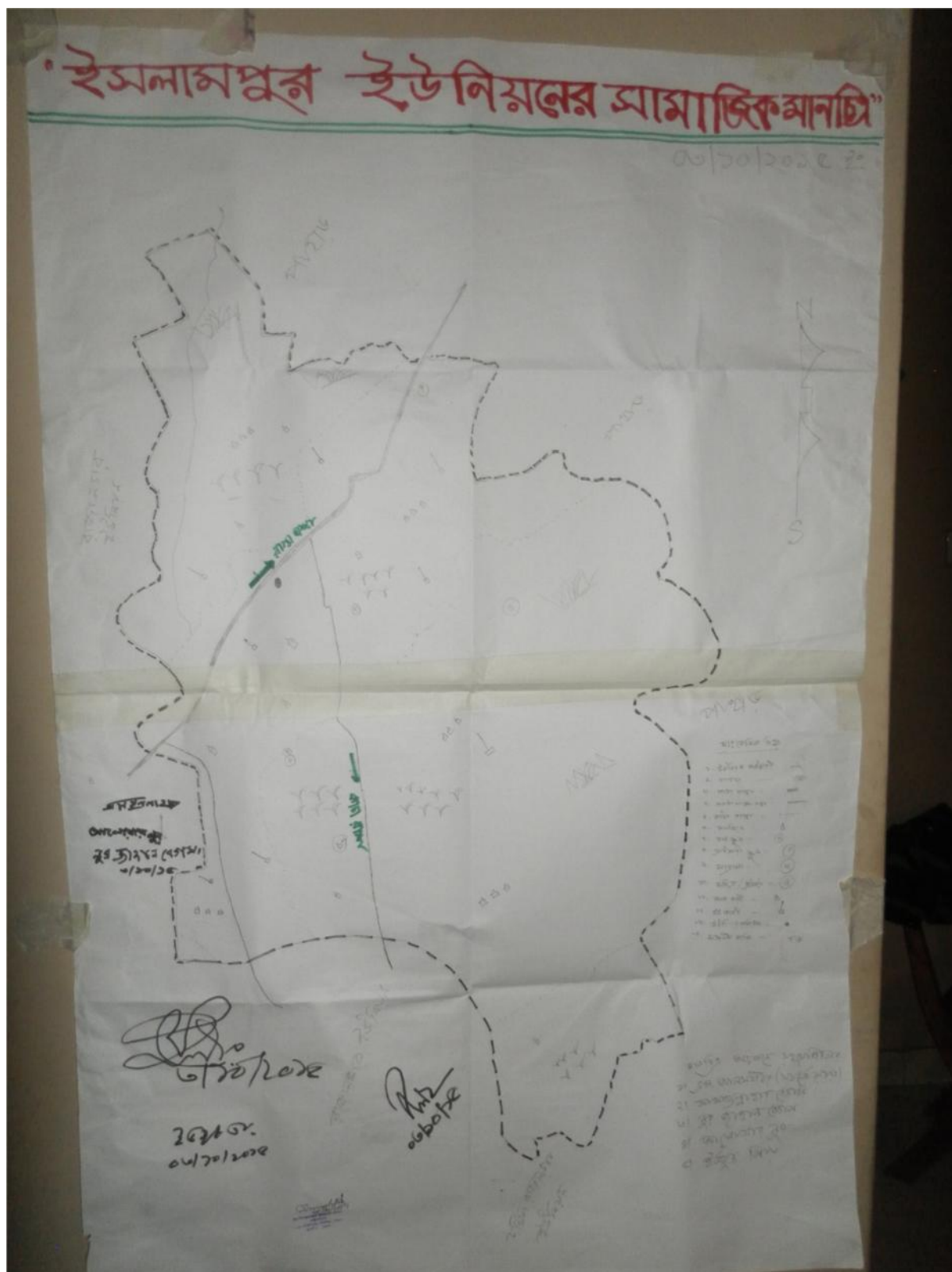


Figure 1: Social Map of Islampur Union

Source: Field Survey, 2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in

A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Communication (Broken Roads, Gubtol to ruisa bill to kaukhali Ward no 2, 6 and 8).
- Lack of Hospital.
- Shortage of Hut Bazar.
- Educational Institution (Ward No 2, 3, 4 and 5).
- Lack of Post Office.
- Spread Drug addiction problems.
- Terrorism (Broken law and order).
- Thief of trees.
- Slow implementation of shelter project.
- Lack and Broken Bridges (Ward No.1, 2, 3 and 7).
- Lack of Security (Police Ferry)
- Unemployment.
- Hills Stairs (Ward No 4, 5 and 6)
- Close of Adult Education project.
- Inadequate Electricity (Ward No. 1,3and 6).
- Graveyard (Ward No 1,2 and 3)
- Sanitation Problems.
- Gas Connection.
- Shortage of Safe Drinking Water.

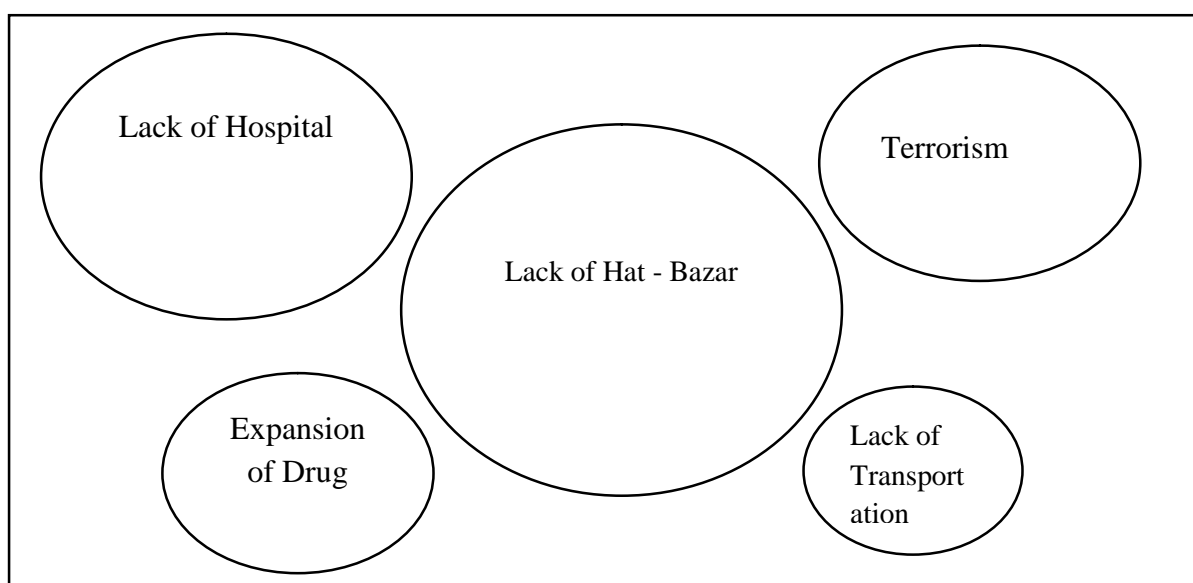


Figure 2: Venn diagram for Problems Prioritization

Source: Field Survey,2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Rubber dam.
- Eco Park.
- Luminary like Dr.Hasan Mahmud M.P.
- Cultivable agricultural Land.
- Hills and Forest.
- Man power (Educated youth).
- Brick Field.
- Fisheries.
- Workable active man power.
- Small and Cottage (Personal).
- Remittance.
- Exportable Vegetables.
- Fruits (Local).

- Poultry.

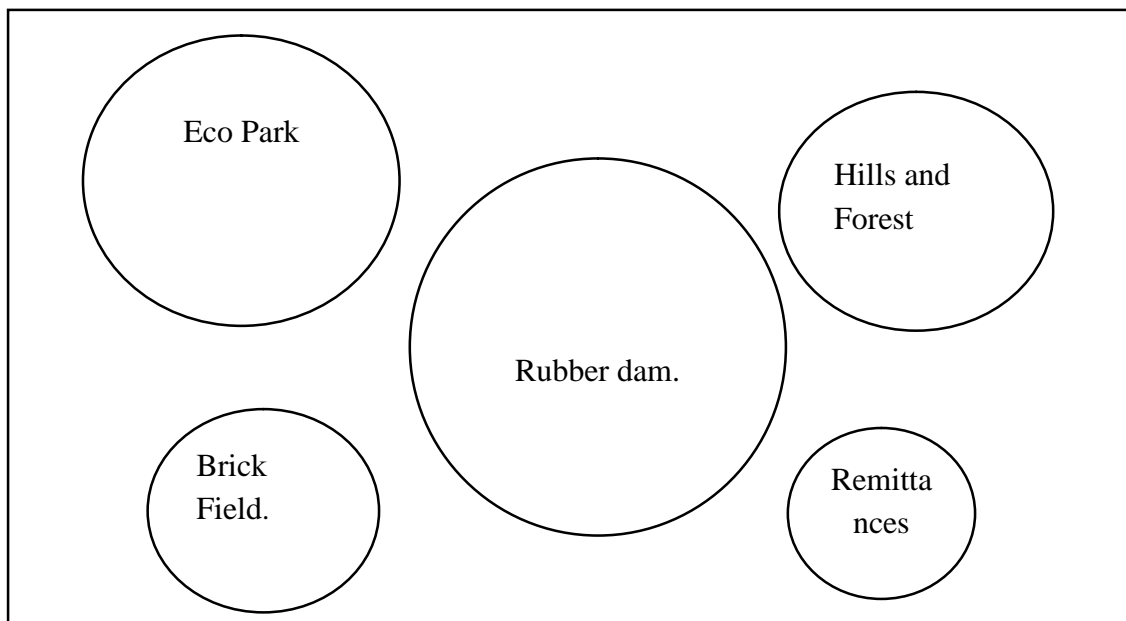


Figure 3: Venn diagram for Potentials Prioritization

Source: Field Survey, 2015

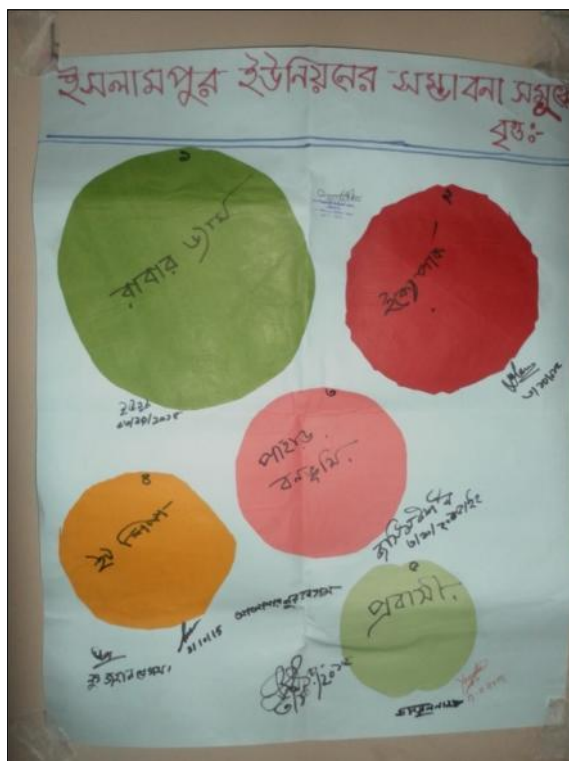


Figure 4: Problem Identification

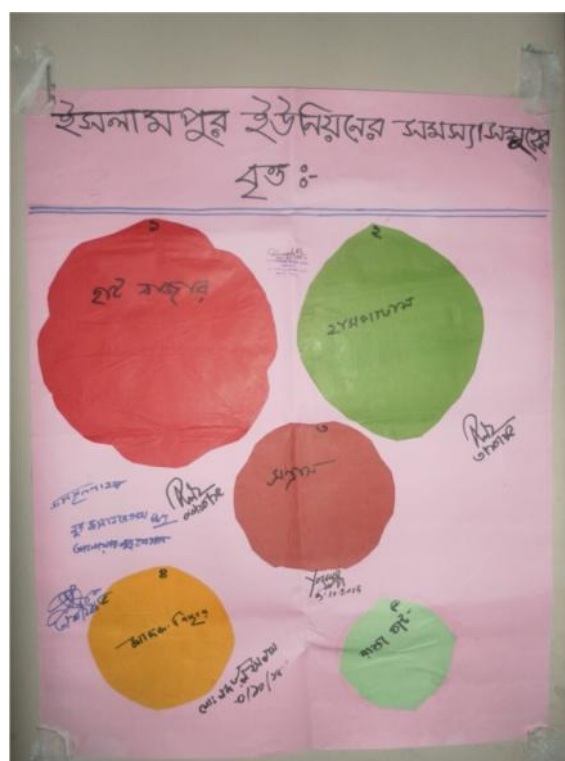


Figure 5: Potential Identification

Source: Field Survey, 2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|--|---|--|
| 1. Lack of Hat-Bazar | <ul style="list-style-type: none"> Bureaucratic Complexity | <ul style="list-style-type: none"> Hamper in marketing of Agricultural products, Economic loss of the farmers | <ul style="list-style-type: none"> Sufficient land for establishing hat-bazar. |
| 2. Lack of Medical Facilities | <ul style="list-style-type: none"> Lack of budget, Lack of govt. Khas land | <ul style="list-style-type: none"> Lots of Patients die due to lack of proper treatment, Poor people are deprived of basic right | <ul style="list-style-type: none"> Sufficient land owners who can give land |
| 3. Terrorism | <ul style="list-style-type: none"> Lack of sufficient administrative attempts | <ul style="list-style-type: none"> Degradation of security system, Lack of peace among the people, | <ul style="list-style-type: none"> Local leader Defense |
| 4. Drug Addiction | <ul style="list-style-type: none"> Unemployment, Lack of cooperation from family | <ul style="list-style-type: none"> Social devaluation, Increase in stealing and robbery | <ul style="list-style-type: none"> RAB |
| 5. Lack of Transportation Facilities | <ul style="list-style-type: none"> Lack of Govt. Budget, Lack of cooperation from government | <ul style="list-style-type: none"> Hamper the marketing of the agricultural products, Loss of valuable time, Hamper in transporting emergence patients | <ul style="list-style-type: none"> Sufficient human resource, Cooperation of local people. |

(Source: Field Survey,2015)

| পঞ্চাঙ্গাতী বাংলাদেশ সরকার | | | |
|-----------------------------------|--|---|--|
| চিহ্নিত প্রধান সমস্যা | প্রধান কারণসমূহ | প্রস্তাবনাসমূহ | অবশ্যই, সমাধান |
| ১। রাষ্ট্র বাহ্যিক ২। হাঙ্গামা | ১। আশ্রয় গার্ডিও স্টেশন ২। | ১। দশা বাস্তবায়ন ২। হাঙ্গামা ক্রমবিকাশ ৩। | ১। হাঙ্গামা হ্রাস ২। |
| ৩। জমিদার | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি • জমিদার বসতি | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি |
| ৪। জমিদার | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি • জমিদার বসতি | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি |
| ৫। জমিদার | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি • জমিদার বসতি | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি |
| ৬। জমিদার | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি • জমিদার বসতি | <ul style="list-style-type: none"> • জমিদার বসতি • জমিদার বসতি |

Figure6: Cause, Impact and Potentials

Source: Field Survey, 2015

4.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in "Development plan for 20 years" which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Islampur Union

| Demand | Remarks |
|--|---|
| Establishment of Hat-Bazar | <ul style="list-style-type: none"> There is no hat in the union People are in distress since they have to go far away to buy daily necessities Farmers cannot sell their crops at due price. |
| Development of Hospital | <ul style="list-style-type: none"> Patients do not get proper treatment Lack of qualified doctors |
| Removal of Terrorism | <ul style="list-style-type: none"> Terrorism is a great problem in the union, People can not live in peace due to lack of security |
| Development of Transportation Facilities | <ul style="list-style-type: none"> Demand for brick and pitch road, Roads and bridges should repaired. |
| Demand for Electricity Line | <ul style="list-style-type: none"> Expansion of electricity in the union, |
| Development of Sanitation Facilities | <ul style="list-style-type: none"> Sanitary latrine should be ensured for all families |
| Creation of Employment | <ul style="list-style-type: none"> Industrialization is demanded, New employment is necessary |
| Demand educational institution | <ul style="list-style-type: none"> Demand for college, Demand for university. Repairmen of the madrasa Women college |

(Source:Field Survey,2015)

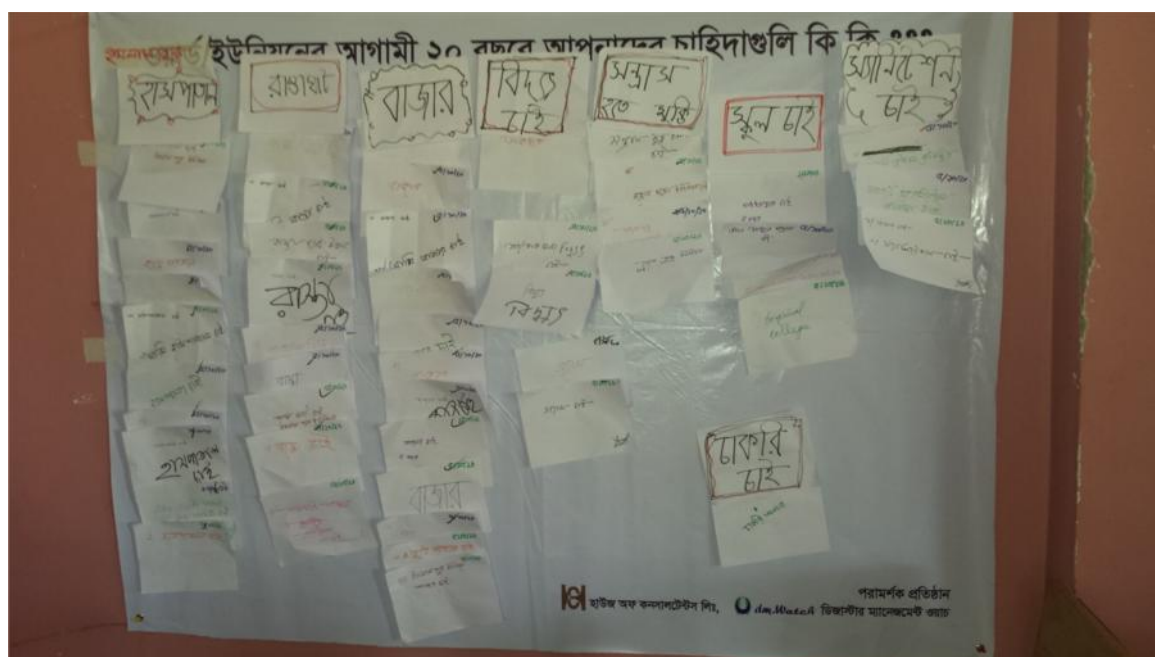


Figure7: Demand of People for Development Plan **Source:** Field Survey,2015

Table 4: Identification of Development Plan for Islampur Union

| Short Term | Mid Term | Long Term |
|---|---|--|
| <ul style="list-style-type: none"> Establishment of Hat-Bazar Development of Hospital Removal of Terrorism | <ul style="list-style-type: none"> Development of Transportation Facilities Demand for Electricity Line Development of Sanitation Facilities | <ul style="list-style-type: none"> Creation of Employment Demand educational institution |

(Source: Field Survey,2015)

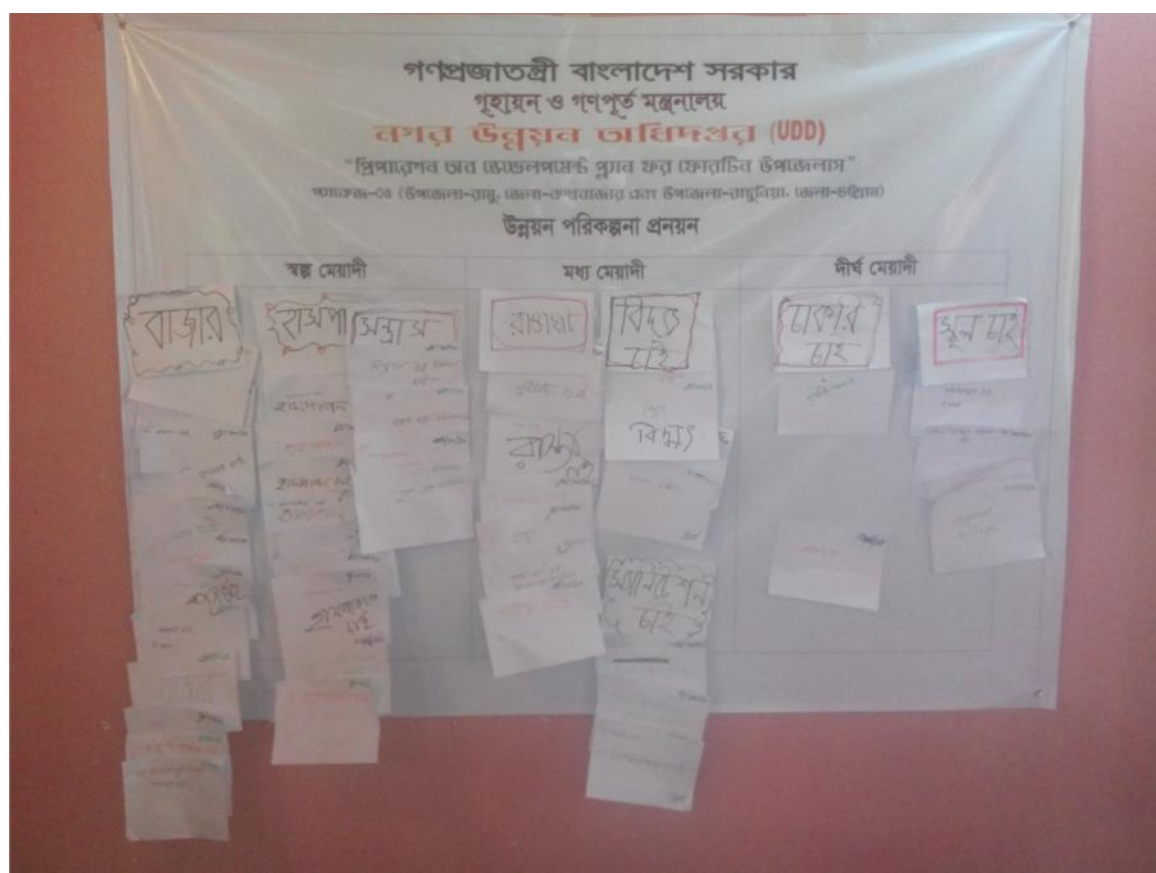


Figure 8: Identification of Demand in Preparation of Development Plan for 20 years
Source: Field Survey,2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazilla, Cox's Bazar & Rangunia Upazilla, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A
Facilitator: Md. Abdur Razzak Azad
Co-Facilitator: Rakeeb Askari
Logistics: Mehedi Alam
Rapporteur: K. M. Risaduzzaman
Time: 10.00 a.m. to 1.30 p.m.
Date: 04.10.2010
Venue: DaksinRajanagar Union Parishad
Name of Union: 14 No. DaksinRajanagar
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 4, 2015 at DaksinRajanagar Union Parishad where 29 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (TOP) have been applied for this project which will fulfill our project goal.

1. STUDY AREA PROFILE

DaksinRajanagar Union under the administrative jurisdiction of RanguniaUpazila in Chittagong District has an area of 20.01 km². The boundary of the study area is stated below:

North: On the north the study area is followed by Rajanagar and Islampur.

South: On the south the study area follows Lalanagar Union.

East: On the east the boundary of the study area is beside by Hosnabad Union

West: On the west the study area runs along the boundary of Rajanagar and Parua Union.



Figure1: Participants attending in the PRA Session **Source:** Field Survey, 2015

Table 1: Physiographic & Demographic Information of DaksinRajanagar Union

| AT A GLANCE | |
|----------------------------------|------------------------------|
| Features/ Characteristics | Remarks |
| Population | 22760 |
| No of Village | 06 |
| Hat- Bazar | 2 |
| Literacy Rate | 65% |
| Educational Institutions | Govt. Primary School-06 |
| | Non- Govt. Primary School-01 |
| | Secondary school-02 |
| | Dakhil Madrasha-05 |
| Important Religious Institutions | 06 |

2. STEPS OF PRA APPROACH

There were 21 participants in PRA Session of DaksinRajanagar Union. The participants were included UP chairman and ward members (3 male and 2 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Journalist, Surveyor, Student, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. The facilitator lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

After interpretation of the purpose of Development Project for 20 years, the schedule of PRA Session was explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has been shown to the participants to locate the problems/potentials side which has spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were requested to dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

- [illegible]

Source: Field Survey, 2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- River Erosion
- Early Marriage,
- Dowry,
- Unemployment,
- No UP Building,
- Land related disputes,
- No college,
- No hospital,
- Transportation Problem (lack of bridge),
- Risky Educational Institution,
- Agricultural crops are spoiled,
- Lack of tube well,
- Lack of hat bazaar,
- Lack of veterinary treatment,
- Problem of residence,
- No bank

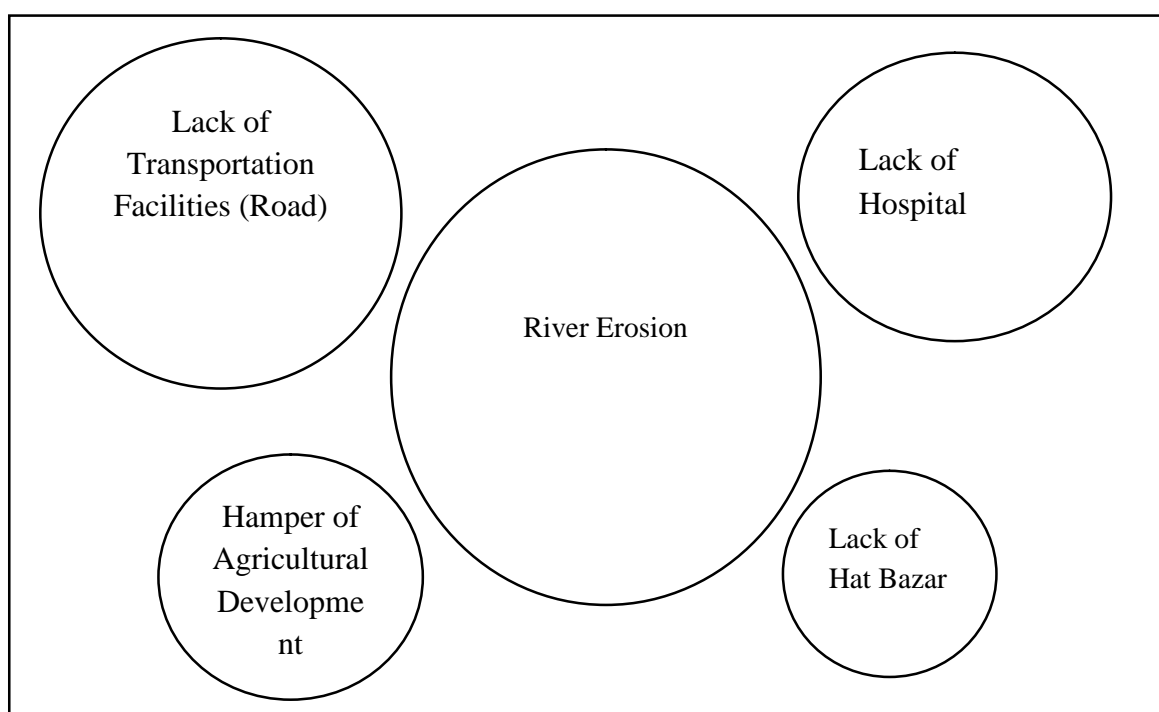


Figure 4: Venn diagram for Problems Prioritization

3.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Lots of cultivable land,
- Hat Bazar
- Hill and forest,
- Historical Palace,
- Brick Industry,
- Extraction of land,
- Remittance,
- Small Industry (Pottery),
- Poultry Industry,

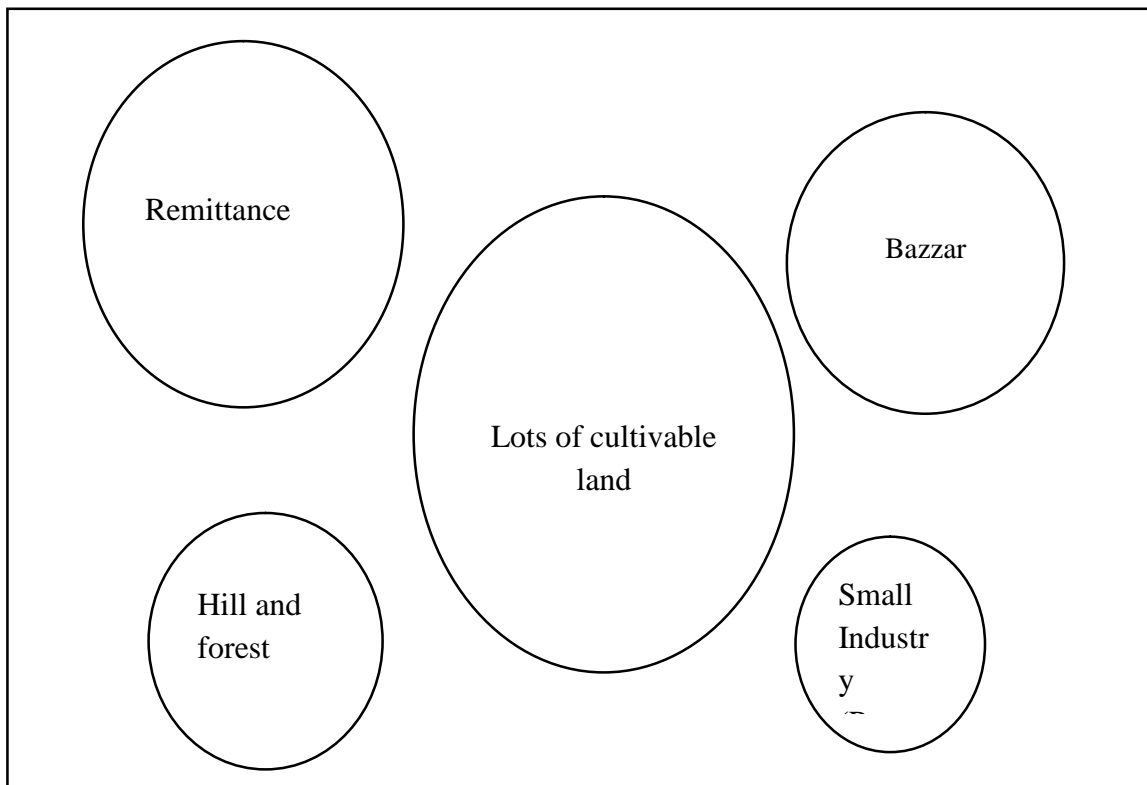


Figure 5: Venn diagram for Potentials Prioritization **Source:** Field Survey, 2015



Figure 6: Problem Identification **Figure 7:** Potential Identification

Source: Field Survey, 2015

Source: Field Survey, 2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|--|--|---|
| 1. River Erosion | <ul style="list-style-type: none"> Flash flood due to hilly water, Illegal extraction of sand | <ul style="list-style-type: none"> Agricultural land are spoiled, Damage of road, | <ul style="list-style-type: none"> Sufficient human resource, Raw materials(brick, soil, sand) |
| 2. Communication (Road) | <ul style="list-style-type: none"> Damage of road due to flash flood. River Erosion Bureaucratic Complexity | <ul style="list-style-type: none"> Hamper the marketing of the agricultural products, Hamper of education. | <ul style="list-style-type: none"> Sufficient human resource, Land |
| 3. Lack of hospital | <ul style="list-style-type: none"> Lack of govt. help | <ul style="list-style-type: none"> Patient die on the way to hospital, Patient do not get proper treatment | <ul style="list-style-type: none"> Sufficient human resource, Land. |
| 4. Hamper of agricultural production | <ul style="list-style-type: none"> Flood, Irrigation problem, Hybrid seed, Good fertilizer | <ul style="list-style-type: none"> Decrease in agricultural production, Poor farmer become more poor | <ul style="list-style-type: none"> Sufficient human resource, Land. |
| 5.Undeveloped Bazar | <ul style="list-style-type: none"> Lack of govt. help Drainage Problem | <ul style="list-style-type: none"> Hamper in business, Economical loss | <ul style="list-style-type: none"> Manpower |

| <p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার গৃহায়ন ও গণপূর্ত মন্ত্রণালয় বঙ্গবন্ধু উন্নয়ন অধিদপ্তর (UDD) "প্রিয়দেশের জন্য জোড়ালপত্রটি রাখুন যত্নে ফেরতটি উপভোগ্য" স্বাক্ষর-০৫ (ইউনিয়ন-১) ডি.এ. বাজার, ১০০ উপজেলা-গোবিন্দা, জেলা-চাঁদপুর সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই</p> | | | |
|--|--|--|------------------|
| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সক্ষমতা |
| ১। সড়ক জটিলতা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা |
| ২। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা |
| ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা |
| ৪। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা |
| ৫। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা ২। সড়ক দুর্ঘটনা ৩। সড়ক দুর্ঘটনা | ১। সড়ক দুর্ঘটনা |

Figure 8: Cause, Impact and Potentials

Source: Field Survey, 2015

5. TECHNOLOGY OF PARTICIPATION (TOP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in "Development plan for 20 years" which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, DaksinRajanagar Union

| Demand | Remarks |
|---------------------------------------|---|
| Removal of Load shedding | Load shedding hamper education, industry. |
| Development of educational facilities | Short of school and college hamper education |
| Development of Agriculture | Good irrigation system is needed, Protection of agricultural land from flood. |
| Removal of unemployment | Industrialization should be increased |
| Removal of river erosion | Embankment and Guide wall is demanded |
| Veterinary Hospital | Proper treatment of livestock should be ensured |
| Prevention of early marriage | Early marriage should be prevented by implementing law strictly |
| Prevention of Dowry system | Dowry system should be prevented by implementing law strictly |
| Development of the transportation | Development of the roads, bridge and culverts by making pavement of all roads and guide wall where canals, river or ponds are situated beside the road. |
| | Demand Bank, Development Vocational Education, Empowerment of Women, Prevention of Women and Child violation |

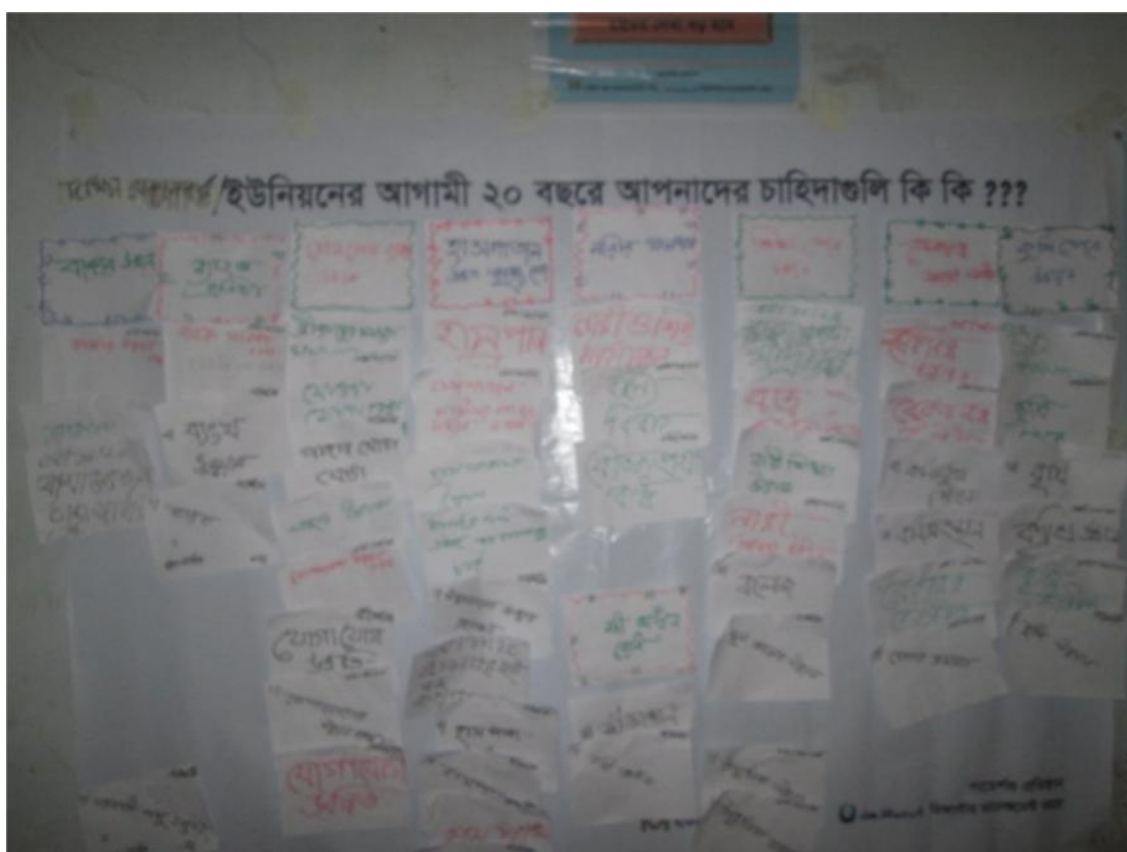


Figure 9: Demand of People for Development Plan **Source:** Field Survey,2015

Table 4: Identification of Demand in Preparation of Development Plan for 20 years

| Short Term | Mid Term | Long Term |
|---|--|--|
| <ul style="list-style-type: none"> • Removal of Load shedding • Development of educational facilities • Development of Transportation Facilities • Development of Agriculture | <ul style="list-style-type: none"> • Removal of unemployment • Development Vocational Education • Removal of river erosion • Veterinary Hospital | <ul style="list-style-type: none"> • Demand Bank • Empowerment of Women • Prevention of Women and Child violation • Prevention of early marriage • Prevention of Dowry system |

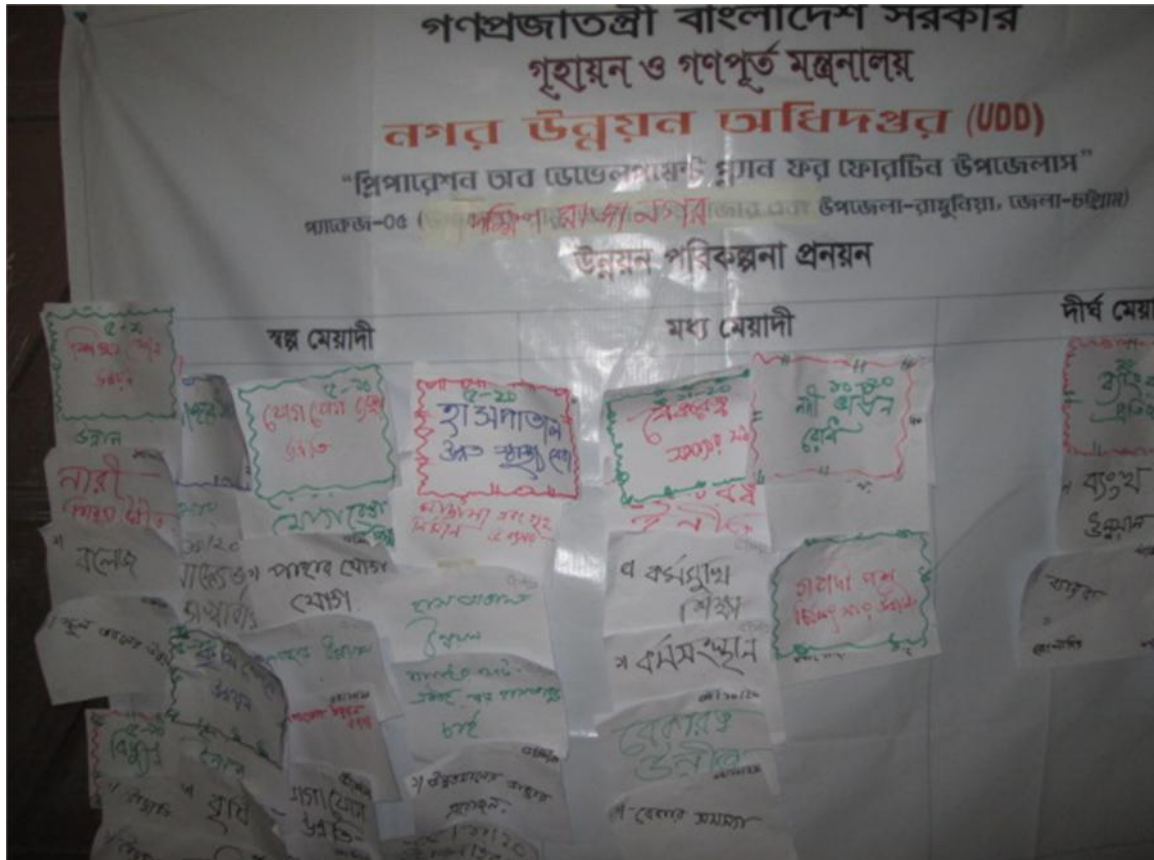


Figure 10: Demand of People for Development PlanSource: Field Survey,2015

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazilla, Cox's Bazar & Rangunia Upazilla, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A
Team Leader: Md. Abdur Razzak Azad
Co-Facilitator: Rakeeb Askari
Logistics: Mehedi Alam
Rapporteur: K. M. Risaduzzaman
Time: 10.00 a.m. to 1.30 p.m.
Date: 08.10.2010
Venue: Lalanagar Union Parishad
Name of Union: 15 No. Lalanagar
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 07, 2015 at Lalanagar Union Parishad where 38 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have been applied for this project which will fulfill our project goal.

2. Study Area Profile

Lalanagar Union under the administrative jurisdiction of Rangunia Upazilla in Chittagong has an area of 10.10 km². The boundary of the study area is stated below:

North: On the north the study area is followed by South Rajanagar Union,

South: On the south the study area follows Hosnabad Union.

East: On the east the study area is surrounded by Kaptai, Rangamati.

West: On the west of the study area there are Kawkhali, Rangamati.



Plate1: Image of Participants

Source: Field Survey,2015

Table 1: Physiographic & Demographic Information of Lalanagar Union

| AT A GLANCE | |
|----------------------------------|-------------------------|
| Features/ Characteristics | Remarks |
| Population | Total-14545 |
| No of Village | 08 |
| Hat- Bazar | 01 |
| Literacy Rate | 79.29% |
| Educational Institutions | Govt. Primary School-06 |
| | High school-02 |
| | Madrasha- 02 |
| | College-01 |
| Important Religious Institutions | Mosque- 40 |
| | Temple- 05 |
| | Graveyard- 48 |
| Bank | 02 |

(Source: Field Survey,2015)

3. STEPS OF PRA APPROACH

There were 38 participants in PRA Session of Lalanagar Union. The participants were included UP chairman and ward members (7 male and 1 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Journalist, Surveyor, Student, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

After saying the purpose of Development Project for 20 years, the schedule of PRA Session was explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has been shown to the participants to locate the problems/potentials side which has spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the

participants were requested to dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (TOP).

| অংশগ্রহণকারীর শ্রেণি | উপস্থিত | অবুপস্থিত |
|--|---------|-----------|
| ইউনিট চেয়ারম্যান | ✓ | |
| স্টাফ মেম্বর | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (পুরুষ) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (মহিলা) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (মহিলা) | ✓ | |
| ওয়ার্ড মেম্বর/কাউন্সিলর (মহিলা) | ✓ | |
| শিক্ষক / ক্রীড়াবিদ | ✓ | |
| ইমাম/ধর্মীয় নেতা | ✓ | |
| ব্যবসায়ী | ✓ | |
| কৃষক/প্রমিস | ✓ | |
| এনজিও/সিবিও/ক্লাব প্রতিনিধি | ✓ | |
| ডাক্তার | | ✓ |
| ইঞ্জিনিয়ার | | ✓ |
| সাংবাদিক | | ✓ |
| স্থানীয় গণ্যমান্য/প্রশাসনিক কর্মকর্তা | ✓ | |

Figure 1: Attendance Sheet of Participants **Source:** Field Survey,2015

4. PRA TECHNIQUE

4.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.

- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

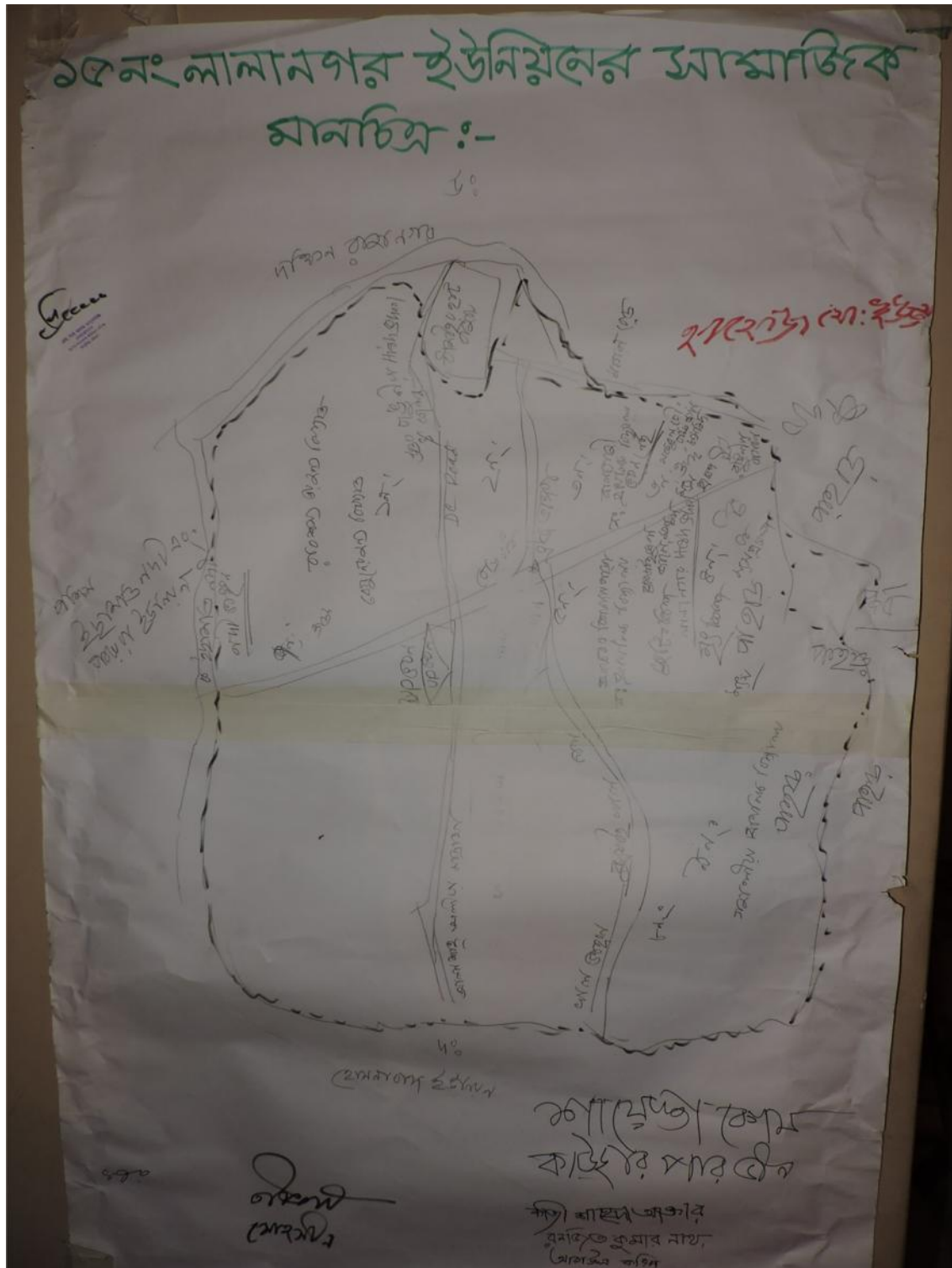


Figure 2: Social Map of Lalanagar Union Source: Field Survey, 2015

4.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Lack of Electricity line and Load shedding(4,7,9 no ward)
- River erosion (4,7,9 no ward),
- Transportation problem (road and bridge break due to pond erosion, river erosion -4,7,9 no ward)
- No gas line,
- Corruption of police,
- Environment Pollution due to brick industry,
- Lack of residence and sheltering due to river erosion,
- In migration (9 no ward)
- Marketing of agricultural products is hampered,
- Lack of agricultural equipments,
- Repairmen of road,
- Sand from the river spoil the agricultural land ,decrease in production(4 no ward)
- Lack of cooperation in the religious institutions,
- Health problem (No hospital)
- No veterinary hospital
- No drain for irrigation,
- Lack of Educational institutions (primary school),
- Lack of repairmen of the playground
- No UP building,
- Lack of infrastructure in educational institutions,
- Human violence (Both male and female),
- No hat bazaar,
- No cold storage

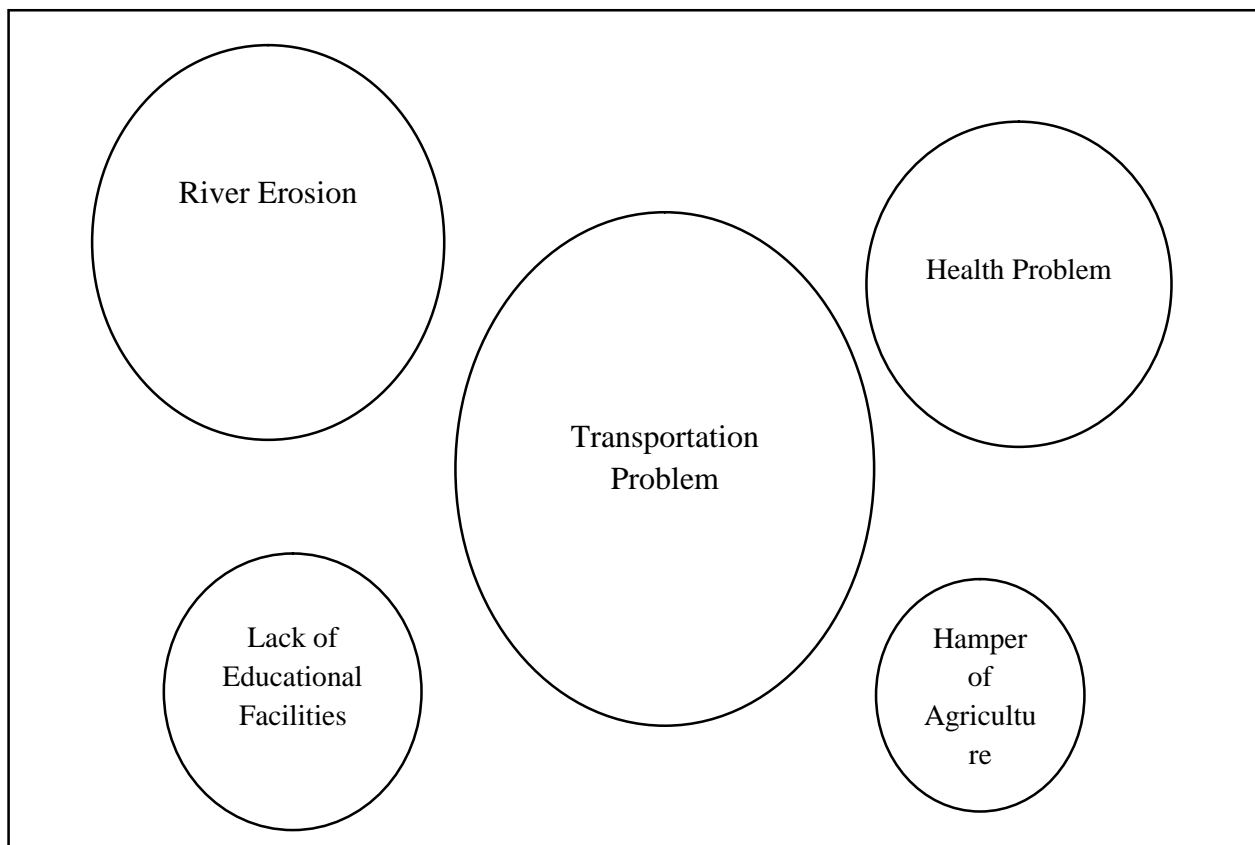


Figure 3: Venn diagram for Problems Prioritization **Source:** Field Survey,2015

4.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Forestation,
- Livestock,
- Agricultural land and Products,
- Fisheries,
- Remittances,
- Cultivation in the Hill
- Small industry (Pottery and others),
- Working People
- Fishermen

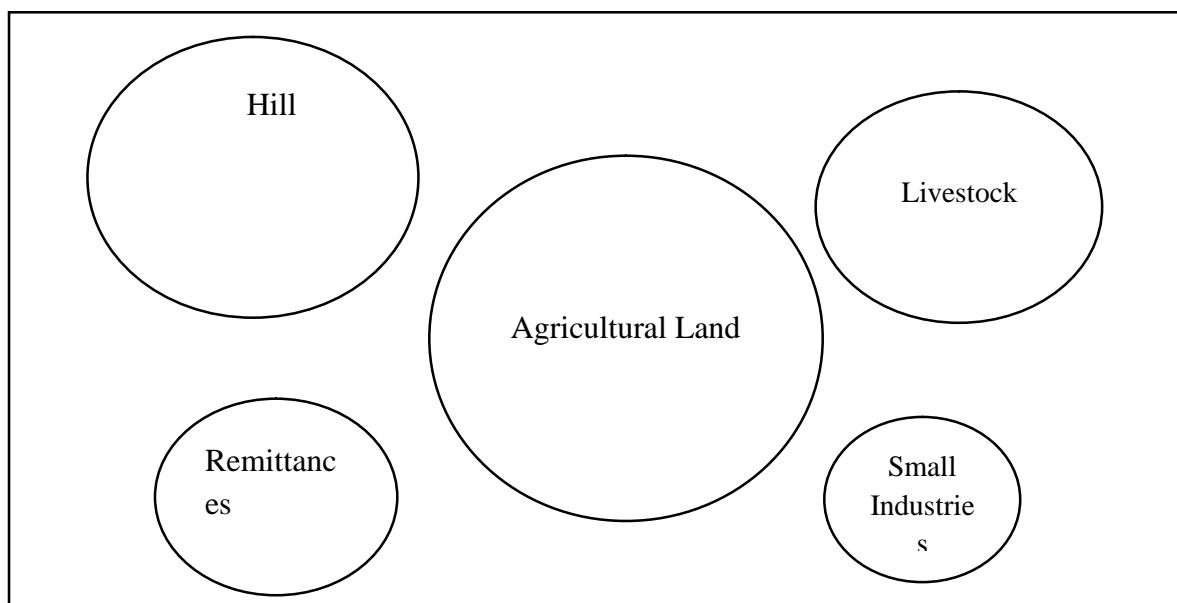


Figure 4: Venn diagram for Potentials Prioritization **Source:** Field Survey,2015

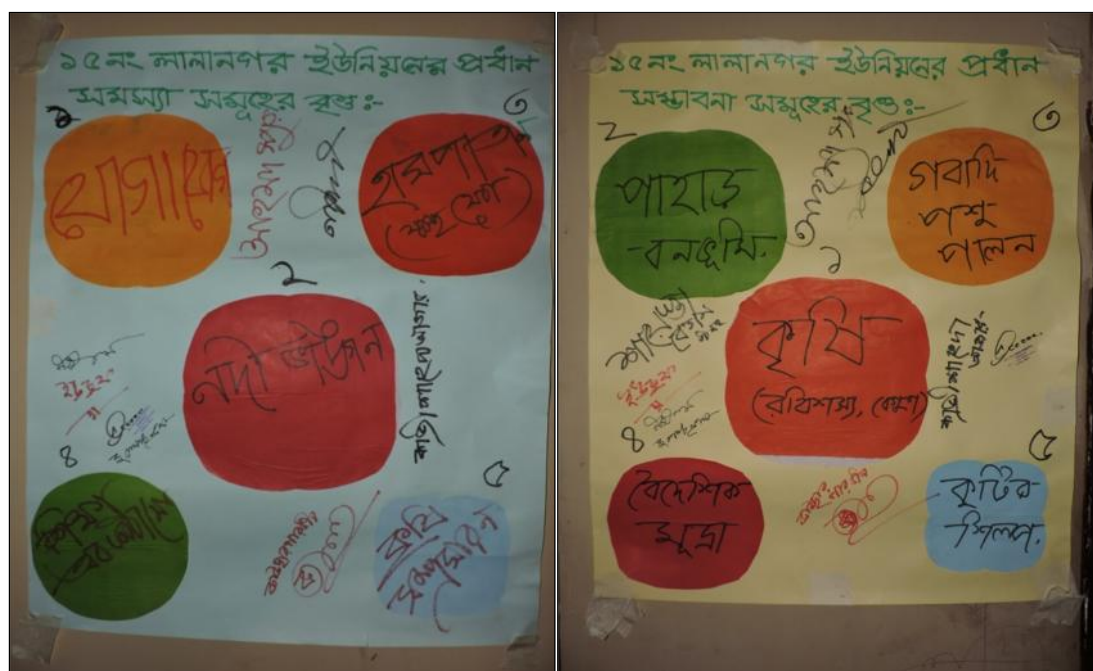


Figure 5: Problem Identification **Figure 6:** Potential Identification

Source: Field Survey,2015

Source: Field Survey,2015

4.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|---|---|---|
| 1. Lack of transportation Facilities | <ul style="list-style-type: none"> • River Erosion, • Lack of bridge and culvert, • Natural disaster, • Encroachment of the roads | <ul style="list-style-type: none"> • Hamper the marketing of the agricultural products and price increases, • Difficulty in going to school, • Hamper of the health facilities | <ul style="list-style-type: none"> • Sufficient human resource, • Raw materials (brick and sand) • Sufficient land |
| 2. River Erosion | <ul style="list-style-type: none"> • Flash flood due to hilly water flow,, • Water flow of the Kaptai lake, • Water flow of the Lusai hill | <ul style="list-style-type: none"> • Break the houses, • Break the road , spoil the agricultural land, • Fishes of the pond are floated | <ul style="list-style-type: none"> • Sufficient human resource, • Raw materials (brick and sand) • Proper leader. |
| 3. Lack of Hospital | <ul style="list-style-type: none"> • Bureaucratic complexity, • Insufficient land • Insufficient budget | <ul style="list-style-type: none"> • Pregnant die on the way to hospital, • Poor people deprived of medical treatment in due time | <ul style="list-style-type: none"> • Sufficient human resource |
| 4. Lack of educational institution | <ul style="list-style-type: none"> • Weak transportation problem, • Lack of Budget, • Risky school building, • Illegal practice of Political Power • Poverty of students | <ul style="list-style-type: none"> • Drop out of students • Hamper education | <ul style="list-style-type: none"> • Sufficient land • Every student goes to school |
| 5. Undeveloped Agriculture | <ul style="list-style-type: none"> • Lack of subsidy in agriculture, • Marketing problem, • High price of the pesticides, fertilizer etc. | <ul style="list-style-type: none"> • Hamper the agricultural production • Unemployment | <ul style="list-style-type: none"> • Lots of agricultural land, • Fertile land |

(Source: Field Survey,2015)

গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন ডায়নিয়ট্র (UDD)
“স্বিপারোপন ওয় ডেভেলপমেন্ট প্রগত যত ফেরাচিত উপজেলার”
স্বাধীনতা-১০০ উল্লিখিত ১০০ জন (নিম্নলিখিত ওয় উপজেলার-আমুনিয়া, জেলা-চট্টগ্রাম)
সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই

| সিদ্ধি সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সম্ভবতা |
|----------------------|---|---|--|
| ১. খোয়াখোয়া সমস্যা | খোয়াখোয়া-১০০ জন ১০০ জন, ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন, ১০০ জন | খোয়াখোয়া-১০০ জন ১০০ জন, ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন, ১০০ জন | ১০০ জন, ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন, ১০০ জন |
| ২. নদী প্রকল্প | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন |
| ৩. হাট/বাজার (নদী) | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন |
| ৪. শিশু-বিকাশ | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন |
| ৫. স্থানীয় সমস্যা | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন | ১০০ জন, ১০০ জন ১০০ জন, ১০০ জন |

Figure 7: Cause, Impact and Potentials **Source:** Field Survey, 2015

4.5 TECHNOLOGY OF PARTICIPATION (TOP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Lalanagar Union

| Demand | Remarks |
|------------------------------------|--|
| Demand for Electricity | <ul style="list-style-type: none"> • Electricity in the union should be increased, • It will influence education, agriculture etc. |
| Development of transportation | <ul style="list-style-type: none"> • Brick / pitch road are demanded, • Demand for wide road. • Repairmen of road, |
| Increasing educational institution | <ul style="list-style-type: none"> • Demand for college, • Demand for school • Repairmen of the old school building, |
| Removal of river erosion | <ul style="list-style-type: none"> • Dredging of channel is needed. • Embankment and Guide wall is demanded |
| Development of medical facilities | <ul style="list-style-type: none"> • Health facilities should be increased to fulfill the existing demand |
| Demand for UP building | <ul style="list-style-type: none"> • The UP building is old enough to be rejected |
| Demand for brick drain | <ul style="list-style-type: none"> • Good drainage system will make a great change in the whole transportation system reducing the water logging to a great extent. |
| Demand for Gas | <ul style="list-style-type: none"> • Provision of gas line will decrease the pressure on the wood from the hill and reduce the deforestation. |
| Miscellaneous | Human violation, gender equity |

(Source: Field Survey,2015)



Figure 8: Demand of People for Development Plan **Source:** Field Survey,2015

Table 4: Identification of Development Plan for Lalanagar Union

| Short Term | Mid Term | Long Term |
|--------------------------|------------------------------------|------------------------|
| Removal of river erosion | Development of transportation | Demand for Electricity |
| Demand for Gas | Demand for UP building | Gender Equity |
| Human violation | Increasing educational institution | |
| Demand for brick drain | Development of medical facilities | |



Figure 9: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

5. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more comprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam
Co-Facilitator: Md. Walid Reza
Logistics: Saiful Islam
Rapporteur: Md. Kawsar Uddin
Time: 3.00 p.m. to 6.30 p.m.
Date: 08.10.2015
Venue: Naogaon Primary School
Name of Union: Ward No. 1, Rangunia Pourashava.
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 8, 2015 at Chondroghona Kadamtali Union Parishad where 23 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.



Plate 1: Image of Participants



Source: Field Survey, 2015

2. RANGUNIA POURASHAVA

**Table 1: Physiographic & Demographic Information of Rangunia Pourashava
AT A GLANCE**

| Features/ Characteristics | Remarks |
|----------------------------------|--|
| Establishment of Paurashava | 04-07-2000 |
| Category | "B" Class Paurashava |
| Area | 8 km ² |
| No. of Ward | 09 |
| Population | 53035 |
| Male | 27244 |
| Female | 25789 |
| No. of Voter | Male- 9367 Female- 8467 |
| Literacy Rate | 70% |
| Educational Institutions | Primary School-12 High School-05 Girl's High School-01 Satellite School-02 College-02 Girl's College-01 University College-01 Madrasha-02 Vocational Institutions-01 Others -07 |
| No. of Holdings | Residential & Commercial-4373 Mixed Government-38 Industry- 04 Villages-20 |
| Transportation Facilities | Bituminous Carpeting Road-39.2 km Pucca Road-10.2 km Semi Pucca Road- 1 km Katcha Road- 11.1 km |
| Health Facilities | Government Hospital-01 Satellite Clinic-01 |
| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Rangunia Pourashava)

3. STUDY AREA PROFILE

Rangunia Paurashava, Ward No.1 under the administrative jurisdiction of Rangunia Upazila in Chittagong District has population of 3329 and household of 645. The boundary of the study area is stated below:

North: On the north the study area is follows by Ward No.-09, Pomra Union

South: On the south the study area follows 2 No. Ward

East: On the east the boundary of the study area is beside by 3 No. Ward

West: On the west the study area runs along the boundary of Ward No.-08, Pomra Union.

4. STEPS OF PRA APPROACH

There were 23 participants in PRA Session of Rangunia Paurashava, Ward No.1. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 3.00 pm to 6.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP)

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has shown to the participants to locate the problems/potentials sides which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

5. PRA TECHNIQUE

5.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

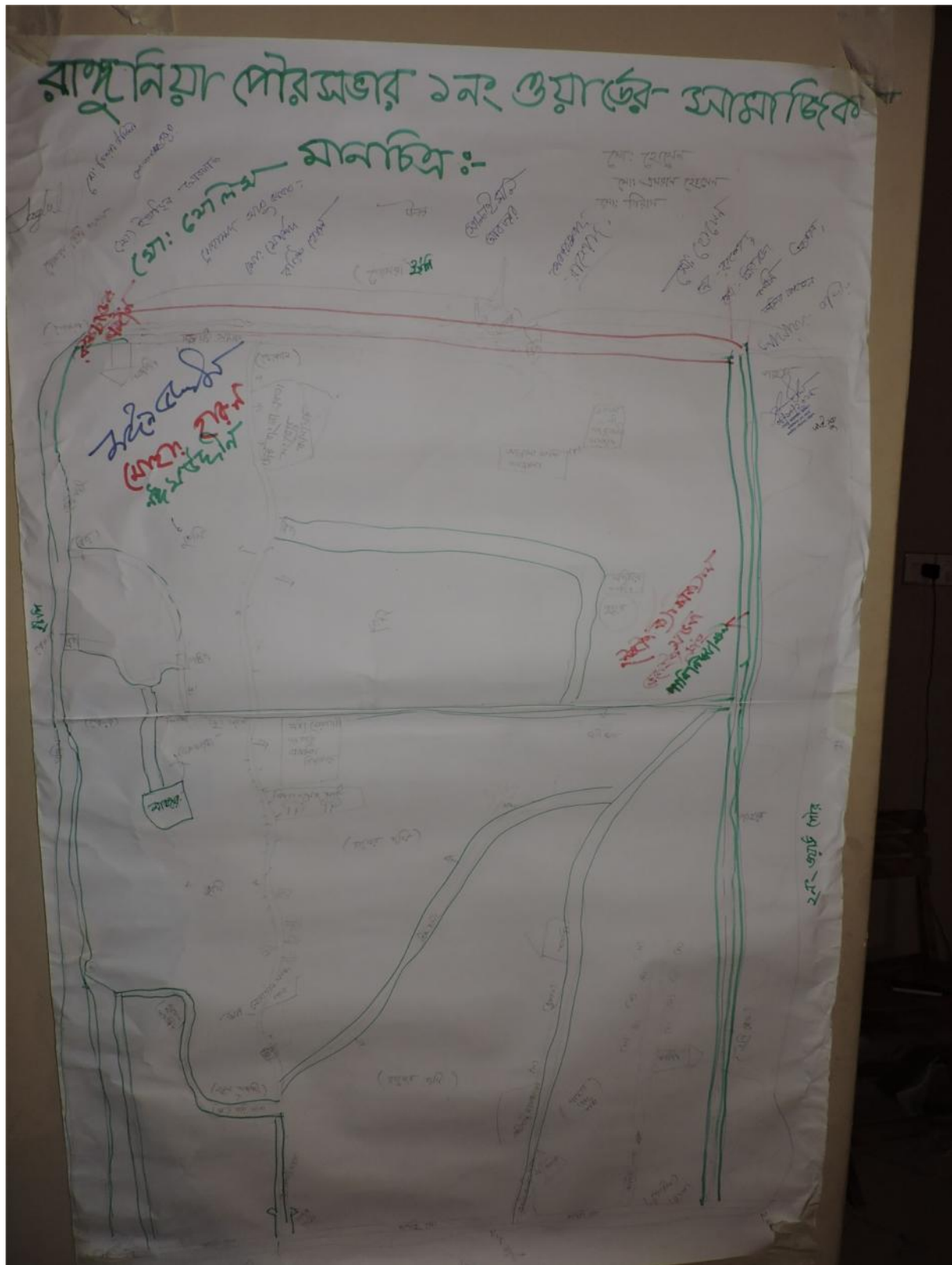


Figure 1: Social Map

Source: Field Survey, 2015

5.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Flash flood due to hill
- Lack of drainage system
- Sanitation problem in hilly areas.
- Bad transportation condition such as broken road & insufficient road in some areas.
- Lack of guide wall along the road side.
- Bad signal in mobile network/ internet.
- Landslide.
- Lack of adequate health facilities such as community clinic.
- Lack of educational institutions and facilities such as high school.
- Well-developed irrigation problem.
- Lack of maintenance work in religious infrastructure such as mosque, grave yard.
- Impact of load shedding
- Lack of security provision
- No cyclone shelter
- Water logging
- No Gas connection

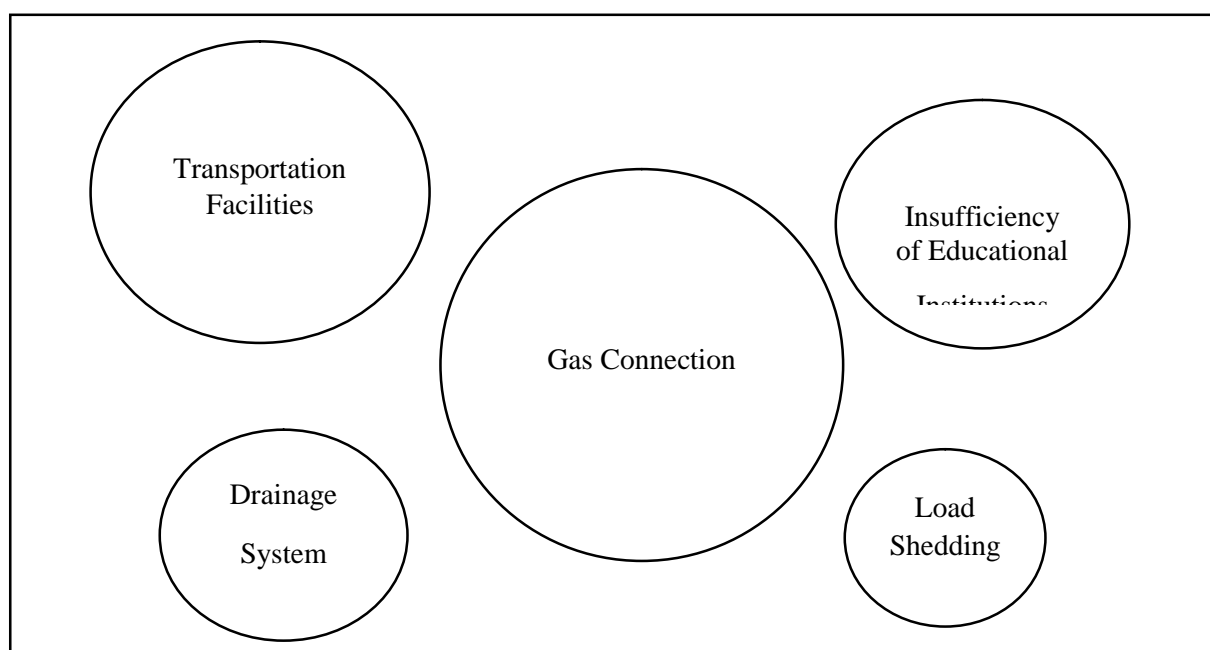


Figure 2: Venn diagram for Problems Prioritization **Source:** Field Survey,2015

5.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land
- Hilly area
- Forestation
- Inter connecting road

- Fish cultivation
- Poultry farm
- Active human power
- Remittance
- Small handicrafts industries known as Tukri
- EPZ
- in Aziz Nagar (proposed)

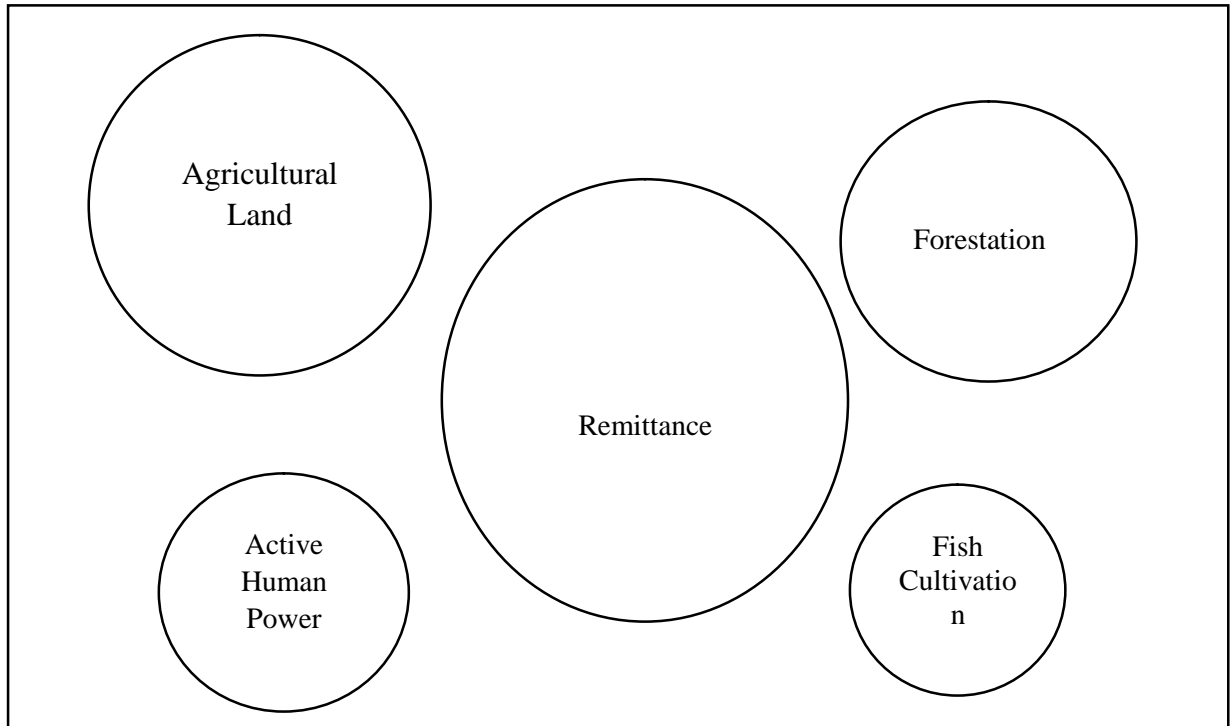


Figure 3: Venn diagram for Potentials Prioritization **Source:** Field Survey, 2015



Figure 4: Problem Identification



Figure 5: Potential Identification

5.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|---|--|---|
| 1. Gas Connection | <ul style="list-style-type: none"> No gas connection. Application not granted by the concerned authority. Bureaucratic complexity. | <ul style="list-style-type: none"> Increasing the cost for cooking Reducing the forest area. Environment pollution. | Gas line has gone through this area. |
| 2. Lack of Transportation Facilities | <ul style="list-style-type: none"> Flash flood due to hill Insufficiency of Budget. | <ul style="list-style-type: none"> Transportation problem in going to school, college. Agricultural products cannot transport in due time. Patient cannot get emergency services. | <ul style="list-style-type: none"> Sufficient land Eagerly Local participation of people. |
| 3. Lack of Educational Facilities | <ul style="list-style-type: none"> Insufficiency of land for constructing high school. Bureaucratic complexity. | <ul style="list-style-type: none"> Decreasing the literacy rate. Increasing the Drop out students. Increasing the unemployed people. | Naogaon primary school can be extended to high school. |
| 4. Drainage Facilities | <ul style="list-style-type: none"> Lack of dredging. Flash flood due to hill Bureaucratic complexity. | <ul style="list-style-type: none"> Hampering Agricultural land. Arising transportation problem. Deploying the homestead. | <ul style="list-style-type: none"> Local land or Khas land Existing canal can be used. |
| 5. Load shedding | <ul style="list-style-type: none"> Illegal electricity connection Callousness or irresponsibility of Rural Electrification Board (REB) Different electricity connection poles cause load shedding. | <ul style="list-style-type: none"> Hampering the irrigation in agriculture. Badly impact on students. Hampering Tukri industrialization. | In nearby areas, one electricity connection presents. |

(Source: Field Survey,2015)

Table 3: Demand of People for Development Plan for 20 Years, Ward No. -01

| Demand | Remarks |
|---|--|
| Development of Health facilities | <ul style="list-style-type: none">• Development of health facilities.• Assurance of hospital |
| Gas Connection | They have to seek alternative sources such as gas cylinder, wood etc. which demand high economic cost, so gas connection is necessary. |
| Provision of Transportation facilities | <ul style="list-style-type: none">• Development of Road• Construction or reconstruction of bridge or culvert. |
| Provision of Recreational facilities | <ul style="list-style-type: none">• Provide the play ground• Recreational center such as park• Community/Cultural Center• Provision of library in ward wise. |
| Social Development | <ul style="list-style-type: none">• Insure free from drug addiction• Stop eve teasing• Halt the Bureaucratic complexity |
| Provision of Educational Institutions & Proper Facilities | <ul style="list-style-type: none">• Provision of Vocational training Center• Provision of High school, Girl's high school.• Provision of Madrasha, Religious Institutions.• Increasing the literacy rate and development of educated society |
| Miscellaneous | <ul style="list-style-type: none">• Provision of Sheltering Center• Development of Socialization.• Assurance of Model Ward• Provision of CCTV camera in entrance.• Free from corruption in ward• Provision of computer training center.• Remove the unemployment.• High frequency mobile network. |

(Source: Field Survey,2015)

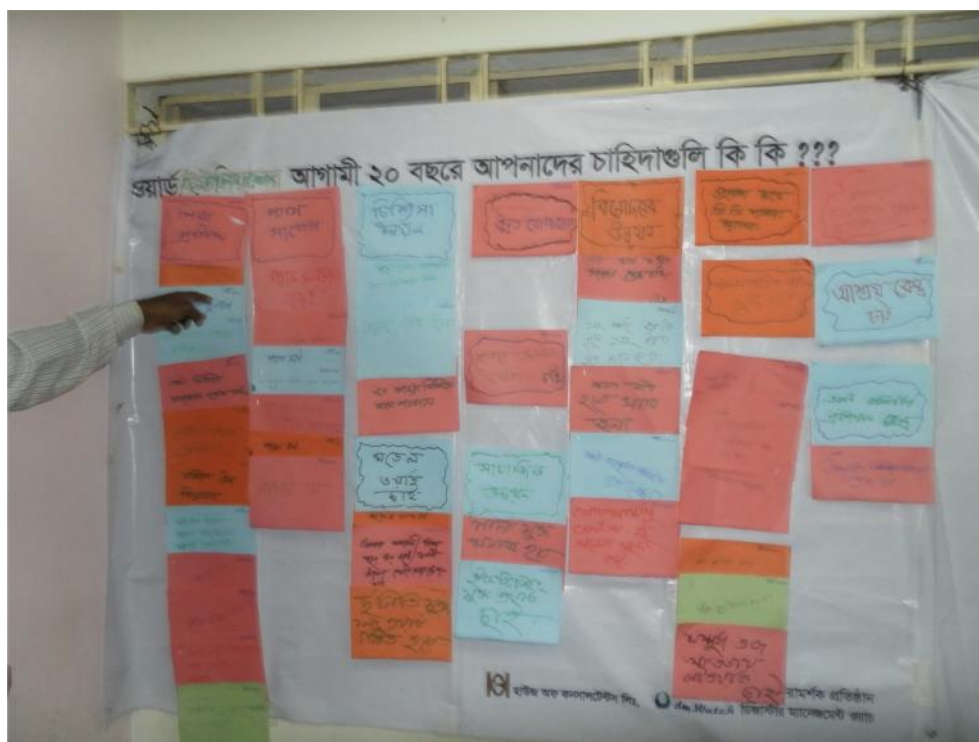


Figure 7: Demand of People for Development Plan **Source:** Field Survey,2015

Table 4: Identification of Development Plan for Ward No. -01

| Short term | Midterm | Long term |
|---|--|---|
| <ul style="list-style-type: none"> • Gas Connection • Provision of Transportation facilities • Provision of Sheltering Center • Provision of Educational Institutions & Proper Facilities • Social Development • Halt the Bureaucratic complexity • Provision of computer training center. | <ul style="list-style-type: none"> • Development of Health facilities • Provision of Recreational facilities | <ul style="list-style-type: none"> • Assurance of Model Ward • Remove the unemployment. • Free from corruption in ward |

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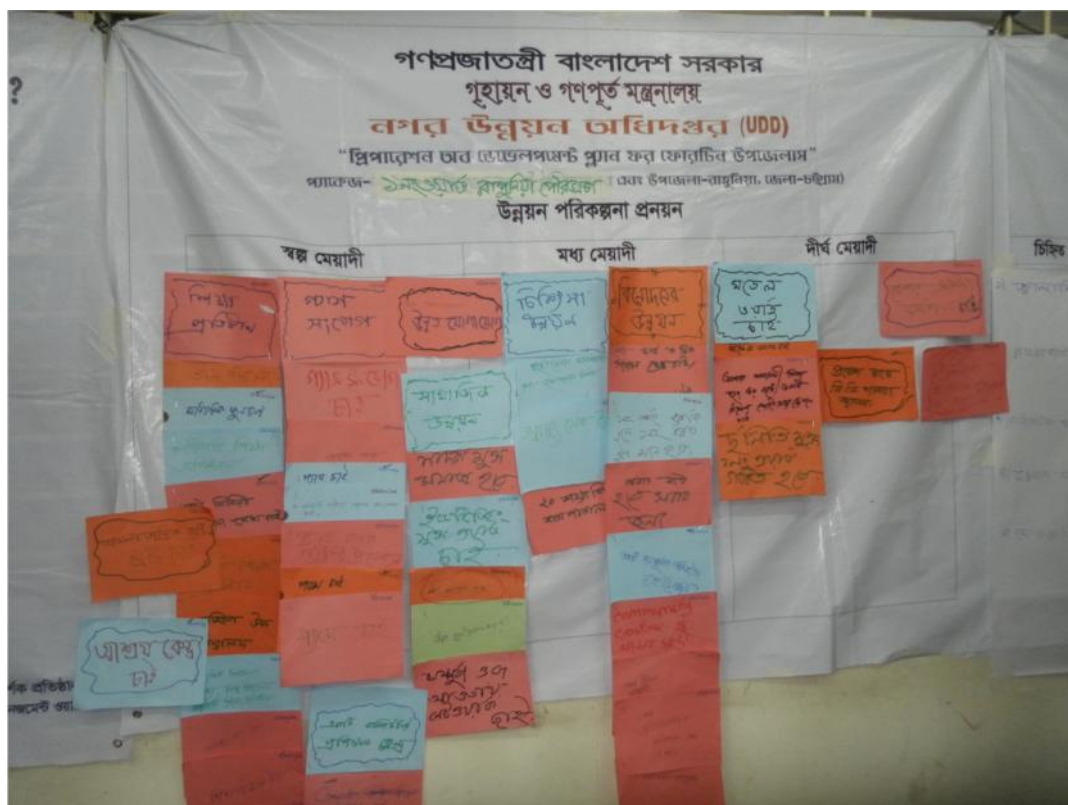


Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more comprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

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PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam & Abdur Razzaque Azad
Co-Facilitator: RakeebAskari, Md. Walid Reza
Logistics: Saiful Islam, MD. Mehedi Alam
Rapporteur: Md. Kawsar Uddin & K.M Risaduzzaman
Time: 3.00 p.m. to 6.30 p.m.
Date: 04.10.2015
Venue: Dakshin Noagaon Government Primary School
Name of Union: Ward No. 2, Rangunia Pourashava.
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

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| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Rangunia Pourashava)

3. STUDY AREA PROFILE

Rangunia Paurashava, Ward No. 2 under the administrative jurisdiction of Rangunia Upazila in Chittagong District has a population of 2497 and households of 476. The boundary of the study area is stated below:

North: On the north the study area is follows by Kaptai Road.

South: On the south the study area follows Karnafulli River

East: On the east the boundary of the study area is beside by Karnafulli River and Chondroghona Kadamtali Union.

West: On the west the study area runs along the boundary of Katakhalī Sluice Gate.



Plate 1: Image of Participants

Source: Field Survey, 2015

4. STEPS OF PRA APPROACH

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| Sl. No. | নাম | ঠিকানা | ফোন নম্বর |
|---------|----------------|--------------------------|-----------|
| ০১ | মুহাম্মদ হোসেন | ১২, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ০২ | মুহাম্মদ আলী | ১৩, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ০৩ | মুহাম্মদ হোসেন | ১৪, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ০৪ | মুহাম্মদ আলী | ১৫, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ০৫ | মুহাম্মদ হোসেন | ১৬, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ০৬ | মুহাম্মদ আলী | ১৭, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ০৭ | মুহাম্মদ হোসেন | ১৮, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ০৮ | মুহাম্মদ আলী | ১৯, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ০৯ | মুহাম্মদ হোসেন | ২০, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১০ | মুহাম্মদ আলী | ২১, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১১ | মুহাম্মদ হোসেন | ২২, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১২ | মুহাম্মদ আলী | ২৩, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১৩ | মুহাম্মদ হোসেন | ২৪, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১৪ | মুহাম্মদ আলী | ২৫, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১৫ | মুহাম্মদ হোসেন | ২৬, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১৬ | মুহাম্মদ আলী | ২৭, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১৭ | মুহাম্মদ হোসেন | ২৮, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১৮ | মুহাম্মদ আলী | ২৯, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ১৯ | মুহাম্মদ হোসেন | ৩০, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২০ | মুহাম্মদ আলী | ৩১, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২১ | মুহাম্মদ হোসেন | ৩২, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২২ | মুহাম্মদ আলী | ৩৩, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২৩ | মুহাম্মদ হোসেন | ৩৪, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২৪ | মুহাম্মদ আলী | ৩৫, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২৫ | মুহাম্মদ হোসেন | ৩৬, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২৬ | মুহাম্মদ আলী | ৩৭, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২৭ | মুহাম্মদ হোসেন | ৩৮, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২৮ | মুহাম্মদ আলী | ৩৯, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |
| ২৯ | মুহাম্মদ হোসেন | ৪০, বঙ্গবন্ধু রোড, রংপুর | ০১৭১৭১১১১ |

Figure 1: Attendance Sheet of Participants

Source: Field Survey, 2015

5. PRA TECHNIQUE

5.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

5.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Lack of transportation facilities (Jele Para, Uttar Para, Batasa nagar, Dakshin Noagaon, Chos para and Jaladas para Sarak)
- Insufficiency of water supply
- Lack of Sanitation System
- Lack of Drainage system
- Lack of Irrigation in agriculture
- Lack of gas connection
- River erosion
- Lack of educational institution (High school)
- Insufficiency of Community clinic
- Shortage of Road light
- Weak of conservancy management
- Shortage of save drinking water
- Repair shortage of religious institution
- Load shedding
- Hill cutting
- Lack of Library/Science Laboratory
- Unemployment
- Lack of Burning ghat
- Lack of hatBazar
- Repairing the Boundary wall of grave yard
- Lack of Ward Councilor office

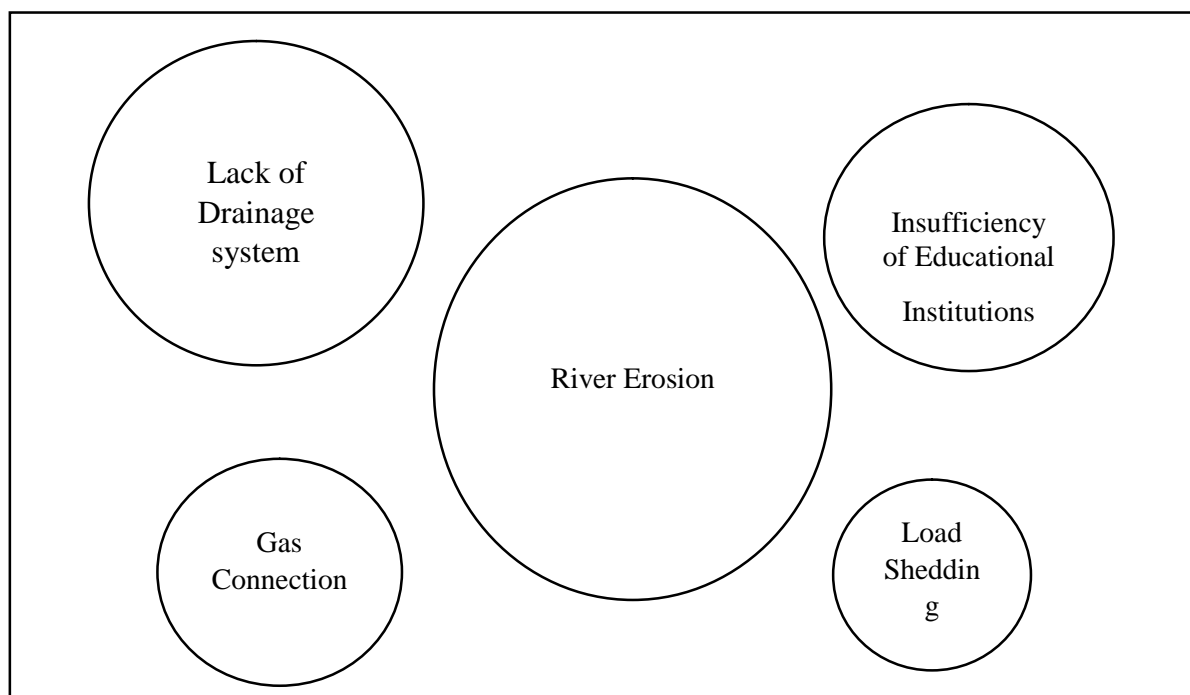


Figure 3: Venn diagram for Problems Prioritization

Source: Field Survey, 2015

5.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Mills and industries (Plastic, Melamine and Jute)
- Remittance
- Agricultural land
- Fish cultivation
- Small and Cottage Industries
- Educated and affective human power.
- Livestock Rearing
- Poultry

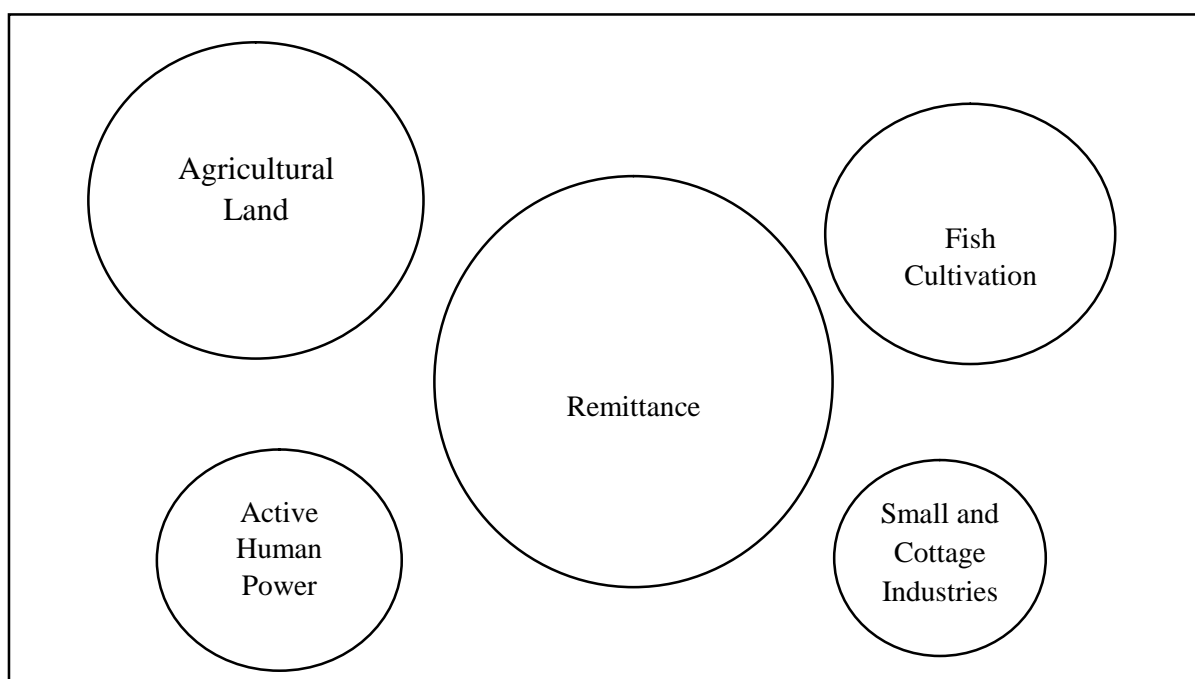


Figure 4: Venn diagram for Potentials Prioritization

Source: Field Survey, 2015

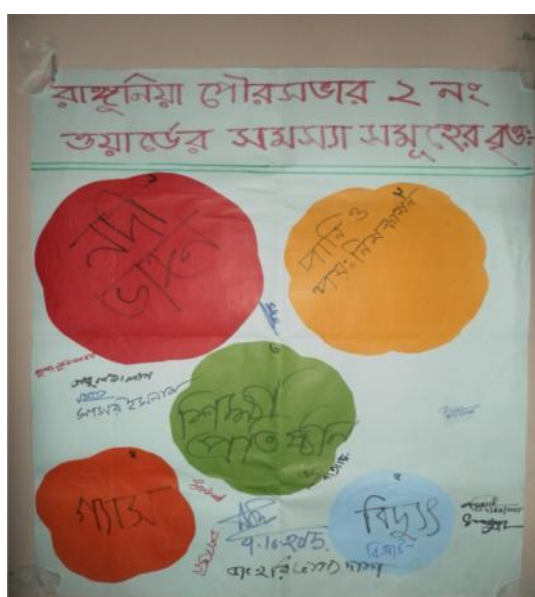


Figure 5: Problem Identification

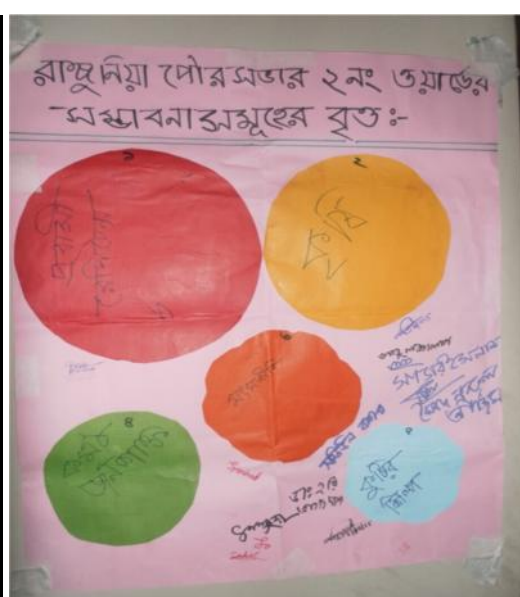


Figure 6: Potential Identification

5.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|-----------------------------------|--|--|--|
| 1. River erosion | <ul style="list-style-type: none"> Excessive water from Kaptai lake. Reducing deepness of river. Flash flood due to hill | <ul style="list-style-type: none"> Banishing Homestead. Loosing agricultural land. Losing the infrastructure at the bank of river | <ul style="list-style-type: none"> People are willing to work as volunteer. Sufficient Manpower. |
| 2. Lack of Drainage system | <ul style="list-style-type: none"> Lack of drainage system Insufficiency of Budget. | <ul style="list-style-type: none"> Increasing the water logging Spreading different waterborne diseases. | <ul style="list-style-type: none"> Sufficient land Eagerly Local participation of people. |
| 3. Lack of Educational Facilities | <ul style="list-style-type: none"> Insufficiency of land for constructing high school. Bureaucratic complexity. Lack of entrepreneur. | <ul style="list-style-type: none"> Decreasing the literacy rate. Increasing the educational cost. | Sufficient hilly areas to establish educational institutions |
| 4. Gas Connection | <ul style="list-style-type: none"> Bureaucratic complexity. | <ul style="list-style-type: none"> Industrialization cannot be grown. Increasing the fueling cost for cooking | In nearby areas, gas connection is available. |
| 5. Load shedding | <ul style="list-style-type: none"> Complexity of Electricity connection Callousness or irresponsibility of Rural Electrification Board (REB) | <ul style="list-style-type: none"> Badly impact on students. Hampering the small industries. | People participation |

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
পুষ্টি ও গণপুষ্টি মন্ত্রণালয়
কম্পিউটার জরিপ (১০০)
"প্রিয়তমের জন্য (কোম্পানির) পুষ্টি ও গণপুষ্টি উন্নয়ন"
 সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই

| ক্রমিক সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সম্ভাব্যতা |
|--------------------|--|--|--|
| ১। পরিবেশ | • পরিবেশের অবস্থা • পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা |
| ২। পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা |
| ৩। পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা |
| ৪। পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা | • পরিবেশের অবস্থা • পরিবেশের অবস্থা |

Figure 7: Cause, Impact and Potentials

Source: Field Survey, 2015

5.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in "Development plan for 20 years" which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Ward No. -02

| Demand | Remarks |
|----------------------------------|---|
| Prevention of Childhood marriage | Ensure awareness to stop childhood marriage. |
| Provision of Gas connection | <ul style="list-style-type: none"> • Demand gas connection. • Solve problem of gas. |
| Provision of Playground | They want sufficient play ground for mental growth. |
| Prevention of River erosion | <ul style="list-style-type: none"> • Stop river erosion. • Take project to prevent river erosion. |
| Development of Drainages system | <ul style="list-style-type: none"> • Construction of New drain. • Re-construction drain • Development of Road side drain |
| Solution of Electricity problem | <ul style="list-style-type: none"> • Reduce load shedding. • Solve all problem of electricity. |
| Development of Health facilities | <ul style="list-style-type: none"> • Need everyone emergency safe health services. • Creation of sufficient Gov. hospital, Community Clinic • Provision of Ambulance. |
| Miscellaneous | <ul style="list-style-type: none"> • Establishment of religious Institutions • Development of Educational institutions • Taking steps to export manpower • Establishment of Industry • Reducing unemployment • Stop Terrorism and corruption • Assurance of Digital Ward |

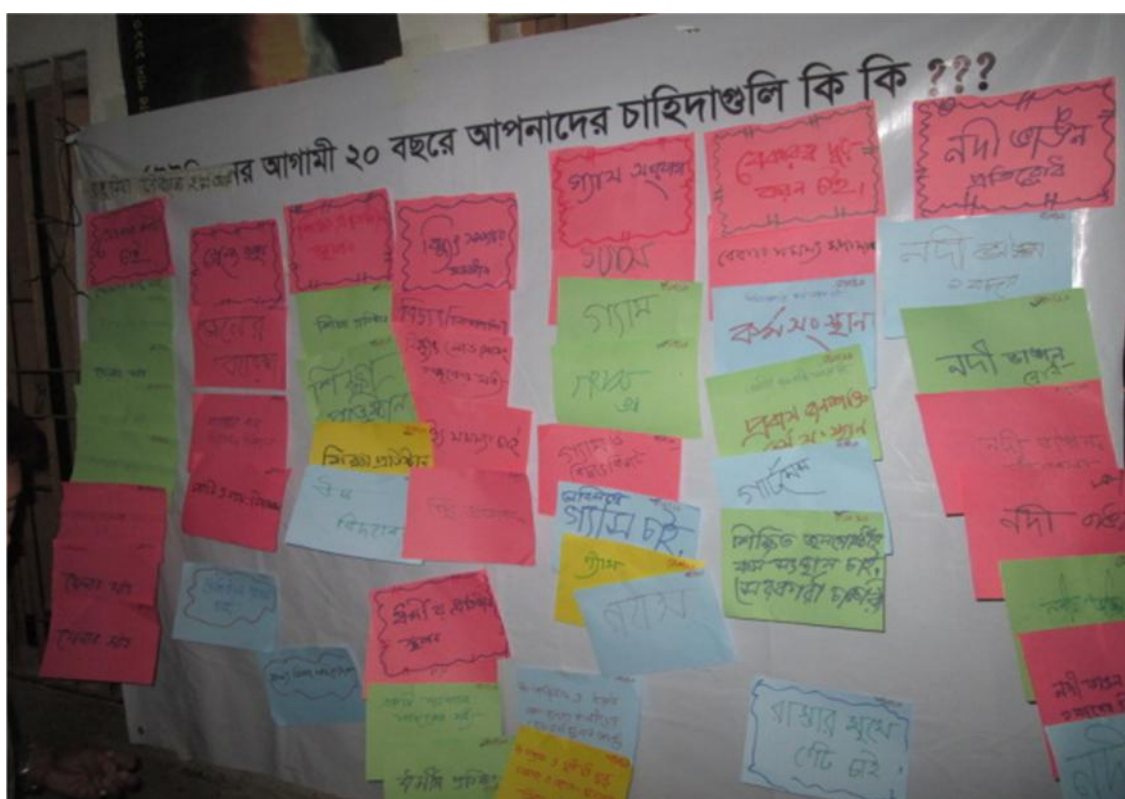


Figure 8: Demand of People for Development Plan

Source: Field Survey, 201

Table 4: Identification of Development Plan for Ward No. -02

| Short term | Midterm | Long term |
|---|---|--|
| <ul style="list-style-type: none"> • Prevention of Childhood marriage • Provision of Gas connection • Provision of Playground • Prevention of River erosion • Development of Drainages system • Solution of Electricity problem • Development of Health facilities • Establishment of religious Institutions • Development of Educational institutions | <ul style="list-style-type: none"> • Reducing unemployment • Establishment of Industry • Taking steps to export manpower | <ul style="list-style-type: none"> • Assurance of Digital Ward • Stop Terrorism and corruption |



Figure 9: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A
Facilitator: Md. Abdul Razzak Azad
Co-Facilitator: Md. Walid Reza
Logistics: Saiful Islam
Rapporteur: Md. Kawsar Uddin
Time: 10.00 a.m. to 1.30 p.m.
Date: 13.10.2015
Venue: Rangunia Club
Name of Union: Ward No. 3, Rangunia Pourashava.
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rapid Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 13, 2015 at Ward No. 3, Rangunia Pourashava where 29 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.



Plate 1: Image of Participants



Source: Field Survey, 2015

2. RANGUNIA POURASHAVA

**Table 1: Physiographic & Demographic Information of Rangunia Pourashava
AT A GLANCE**

| Features/ Characteristics | Remarks |
|-----------------------------|--|
| Establishment of Paurashava | 04-07-2000 |
| Category | "B" Class Paurashava |
| Area | 8 km ² |
| No. of Ward | 09 |
| Population | 53035 |
| Male | 27244 |
| Female | 25789 |
| No. of Voter | Male- 9367 Female- 8467 |
| Literacy Rate | 70% |
| Educational Institutions | Primary School-12 High School-05 Girl's High School-01 Satellite School-02 College-02 Girl's College-01 University College-01 Madrasha-02 Vocational Institutions-01 Others -07 |
| No. of Holdings | Residential & Commercial-4373 Mixed Government-38 Industry- 04 Villages-20 |
| Transportation Facilities | Bituminous Carpeting Road-39.2 km Pucca Road-10.2 km Semi Pucca Road- 1 km Katcha Road- 11.1 km |
| Health Facilities | Government Hospital-01 Satellite Clinic-01 |
| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Rangunia Pourashava)

3. STUDY AREA PROFILE

Rangunia Paurashava, Ward No. 3 under the administrative jurisdiction of Rangunia Upazila in Chittagong District has a population of 5625 and households of 1151. The boundary of the study area is stated below:

North: On the north the study area is follows by Uttar Rangunia.

South: On the south the study area follows by Kaptai Road.

East: On the east the boundary of the study area is beside by Ward No.-07.

West: On the west the study area runs along the boundary of Ghumai Bill.

4. STEPS OF PRA APPROACH

There were 29 participants in PRA Session of Rangunia Paurashava, Ward No.3. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.00 am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP)

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has shown to the participants to locate the problems/potentials sides which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

5. PRA TECHNIQUE

5.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
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- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

5.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Bad transportation condition (Poor maintenance of road, lack of sufficient space)
- Insufficiency of street light
- River Erosion
- Lack of drainage system
- Lack of educational institutions (high school)
- Existence of Poverty
- No provision of guide wall
- No provision of dumping site or solid waste management
- No provision of water supply in households
- Lack of pure drinking water
- Unemployment problem
- Electricity connection problem
- No provision of recreational facilities such as community park
- Poor maintenance of religious institutions (Temple, Grave yard, Crematory)
- Flash flood due to hill
- Lack of Sanitation facilities
- Lack of repairing of bridge or culvert
- Landslide
- Existence of Eve teasing
- Informal settlement or illegal settlement in Khas land
- No provision of play ground
- Poor condition of security service
- Problem in rehabilitation program like insufficiency of money.
- Lack of health facilities such as poor maintenance system, insufficiency of adaptable doctors
- Insufficiency of Budget
- Water logging
- No provision of Gas facilities

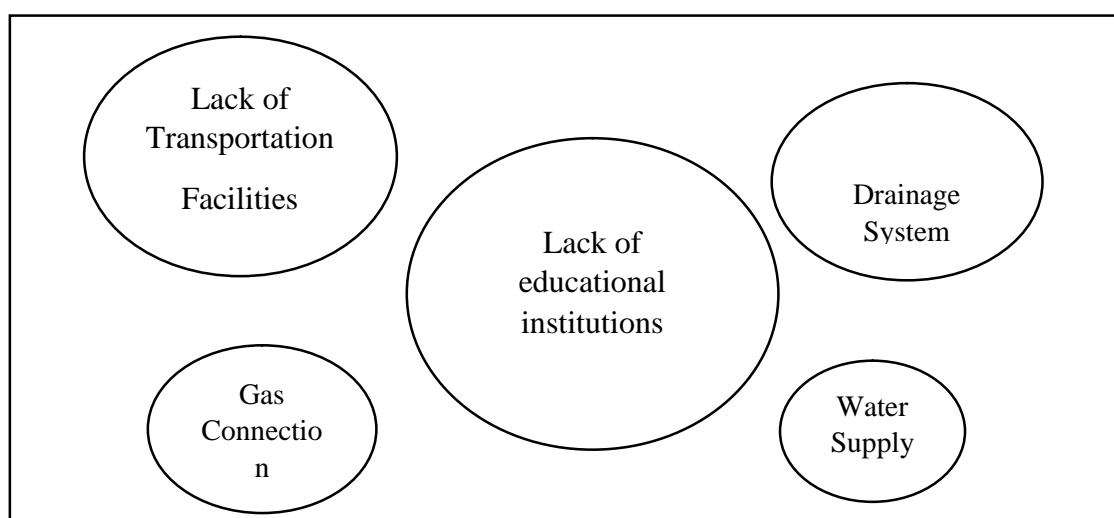


Figure 2: Venn diagram for Problems Prioritization

Source: Field Survey, 2015

5.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land (Robin crops, Paddy, Vegetables, Ginger, Turmeric)
- Forestation
- Poultry farm
- Upazila Parishad
- Paurashava Building
- Educated & Active human power
- Livestock rearing
- Community Center
- Bank
- Remittance
- Business (Bamboo, Banana, Ginger)
- Intake plant of Heat Electricity Power plant

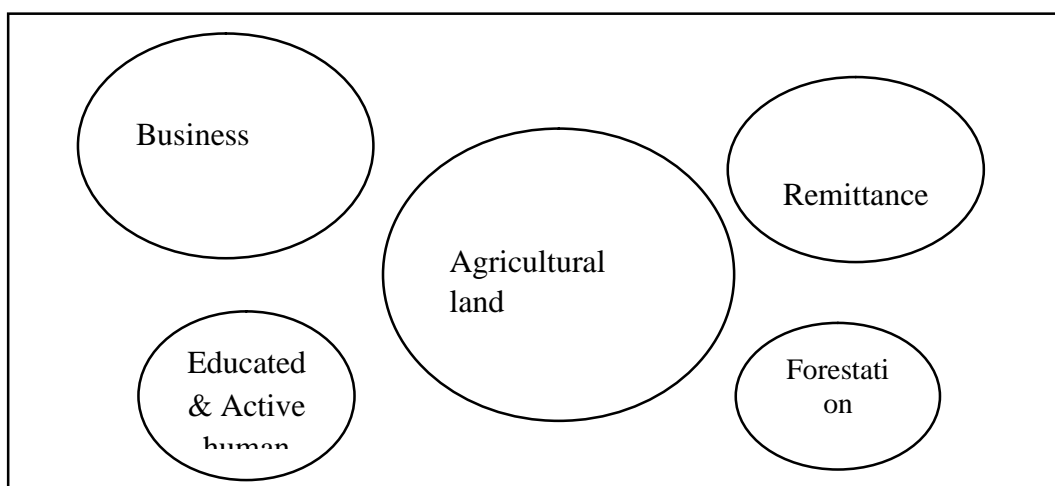


Figure 3: Venn diagram for Potentials Prioritization

Source: Field Survey, 2015

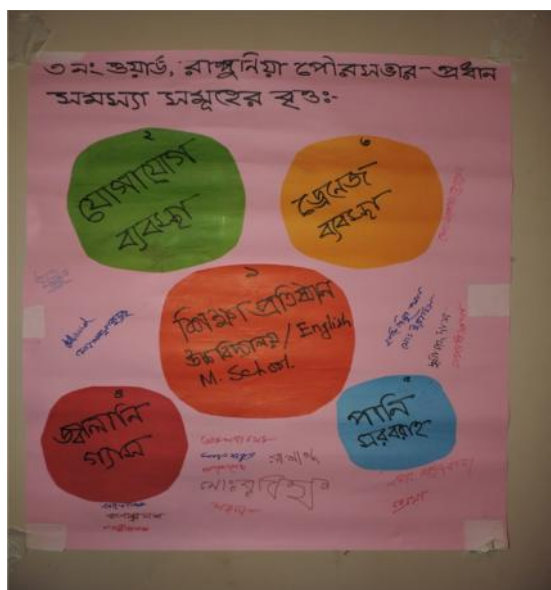


Figure 4: Problem Identification

Source: Field Survey, 2015

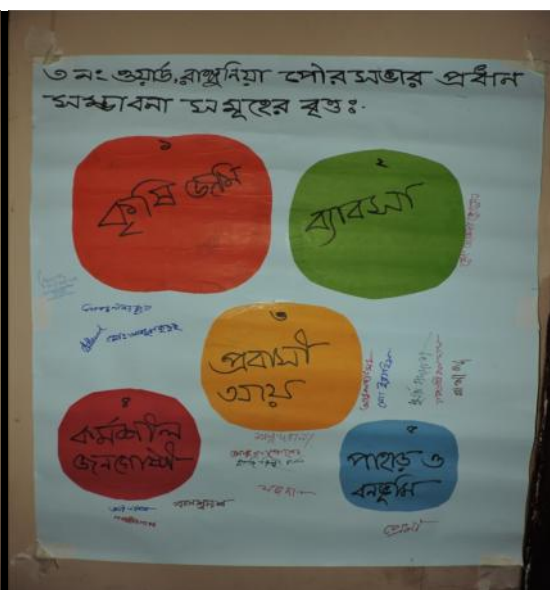


Figure 5: Potential Identification

Source: Field Survey, 2015

5.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|---|---|---|
| 1. Lack of Educational Institutions | <ul style="list-style-type: none"> No sufficient amount of land No entrepreneur | <ul style="list-style-type: none"> Increasing cost in educational sector Having problem in transportation of long distance | People participation |
| 2. Lack of Transportation Facilities | <ul style="list-style-type: none"> Flash flood due to hill. No provision of Drain No provision of Guide wall | <ul style="list-style-type: none"> Increasing transportation cost Decreasing other development works due to this basic need | <ul style="list-style-type: none"> Sufficient land Active human power |
| 3. Lack of Drainage Facilities | <ul style="list-style-type: none"> Lack of drainage system. Improper traffic ways. Insufficiency of Budget. | <ul style="list-style-type: none"> Increasing people sufferings Damaging road early | <ul style="list-style-type: none"> Sufficient land Active human power |
| 4. Gas Connection | <ul style="list-style-type: none"> Bureaucratic complexity Lack of people participation | <ul style="list-style-type: none"> Increasing the fueling cost for cooking Occurring the deforestation Environment pollution | Gas line is available in nearby wards |
| 5. Lack of Water Supply System | <ul style="list-style-type: none"> No provision of Water pump No government initiation No budget for water supply provisions | <ul style="list-style-type: none"> Suffering increases for drinking water Facing problem in cooking | Karnafuli River |

(Source: Field Survey, 2015)

“প্রিয়প্রাচ্যেব চাত ডেভেলপমেন্ট প্রণালি ফর ফোরটানি উপজেলায়”
পার্বত্য ও নং ওয়ার্ড বাস্তুনিষ্ঠা পৌরসভা উপজেলা-রাঙ্গাবিয়া (জিলা-চট্টগ্রাম)
সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই

| সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সক্ষমতা |
|------------|----------|------------|------------------|
| → | → | → | → |
| → | → | → | → |
| → | → | → | → |
| → | → | → | → |
| → | → | → | → |

Figure 6: Cause, Impact and Potentials

Source: Field Survey, 2015

5.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
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- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, Ward-03

| Demand | Remarks |
|---|---|
| Provision of Gas Connection | They have urged gas connection as early as possible. |
| Provision of Transportation facilities | <ul style="list-style-type: none">• Development of Road• Construction or reconstruction of road• Widening the road• Construction of bridge or culvert• Have to carpeting the road |
| Removing Unemployment Problem | They want work for all and have to provision of sufficient work space. |
| Development of Religious Institutions | <ul style="list-style-type: none">• Provision of crematory• Provision of Temple• Provision of Grave yard |
| Provision of Educational Institutions & Proper Facilities | <ul style="list-style-type: none">• Provision of High school, Girl's high school.• Provision of English Medium School |
| Provision of Drainage facilities | <ul style="list-style-type: none">• Establishment of Drainage system• Provide drainage along the roadside |
| Development of Health facilities | <ul style="list-style-type: none">• Development of health facilities.• Assurance of proper health facilities• Development of Government Hospital |
| Miscellaneous | <ul style="list-style-type: none">• Development of Industrialization• Provision of pure drinking water• Provision of play ground• Take steps for halting drug products• Development of proper sanitation• Provision of street light• Provision of Public toilet |

(Source: Field Survey,2015)

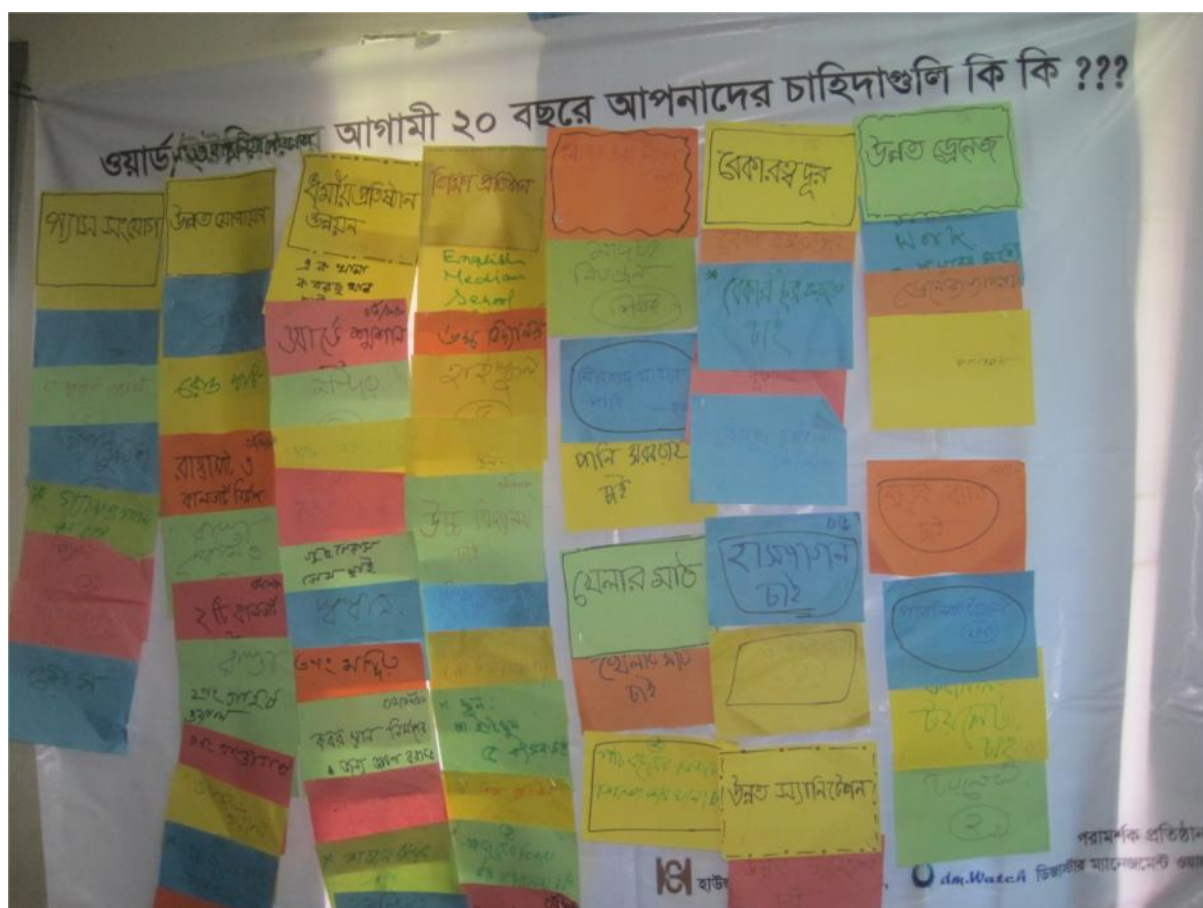


Figure 7: Demand of People for Development Plan Source: Field Survey, 2015

Table 4: Identification of Development Plan for Ward No.-03

| Short term | Midterm | Long term |
|--|--|---|
| <ul style="list-style-type: none"> Provision of Public toilet Provision of street light Development of Health facilities Development of Industrialization Development of Industrialization Provision of Educational Institutions & Proper Facilities | <ul style="list-style-type: none"> Development of Religious Institutions Provision of Drainage facilities Provision of Gas Connection | <ul style="list-style-type: none"> Take steps for halting drug products Remove the unemployment problem |



Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazilla Cox's Bazar & Rangunia Upazilla, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam
Co-Facilitator: Rakeeb Askari
Logistics: Mehedi Alam
Rapporteur: K. M. Risaduzzaman
Time: 10.00 a.m. to 1.30 p.m.
Date: 11.10.2010
Venue: 4 No. Ward, Rangunia Paurashava
Name of Union: 4 No. Ward, Rangunia Paurashava
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 11, 2015 at 4 No. Ward, Rangunia Paurashava where 38 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (TOP) have been applied for this project which will fulfill our project goal.

2. RANGUNIA POURASHAVA

Table 1: Physiographic & Demographic Information of Rangunia Pourashava

| AT A GLANCE | |
|----------------------------------|--|
| Features/ Characteristics | Remarks |
| Establishment of Paurashava | 04-07-2000 |
| Category | "B" Class Paurashava |
| Area | 8 km ² |
| No. of Ward | 09 |
| Population | 53035 |
| Male | 27244 |
| Female | 25789 |
| No. of Voter | Male- 9367 Female- 8467 |
| Literacy Rate | 70% |
| Educational Institutions | Primary School-12 High School-05 Girl's High School-01 Satellite School-02 College-02 Girl's College-01 University College-01 Madrasha-02 Vocational Institutions-01 Others -07 |
| No. of Holdings | Residential & Commercial-4373 Mixed Government-38 Industry- 04 Villages-20 |
| Transportation Facilities | Bituminous Carpeting Road-39.2 km Pucca Road-10.2 km Semi Pucca Road- 1 km Katcha Road- 11.1 km |
| Health Facilities | Government Hospital-01 Satellite Clinic-01 |
| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Rangunia Pourashava)

3. STUDY AREA PROFILE

Rangunia Paurashava, Ward No.-04 under the administrative jurisdiction of Rangunia Upazilla in Chittagong has a population of 2967 and households of 595. The boundary of the study area is stated below:

North: On the north the study area is followed by 5 No. Ward,

South: On the south the study area is surrounded by Karnafuli River.

East: On the east the study area is surrounded by Ichamati River& Ward No.-08.

West: On the west of the study area issurrounded by Karnafuli River.



Plate1: Image of Participants



Source: Field Survey,2015

4. STEPS OF PRA APPROACH

There were 22 participants in PRA Session of 4 no ward, Rangunia Paurashava . The participants were included Paurashava mayor, councilor and other elite persons such as Teacher, Farmer, Freedom fighter, Imam, Businessmen, Social worker, Political leader, Student, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

After saying the purpose of Development Project for 20 years, the schedule of PRA Session was explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has been shown to the participants to locate the problems/potentials side which has spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were requested to dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (TOP).



Figure 2: Social Map of 4 no ward, Rangunia Paurashava

Source: Field Survey, 2015

5.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- River erosion (Ichamati, Ichakhali and Karnafulli River)
- Bad transportation system (Sri sri Ichamati Mandir sorok, Dip para sorok, Barua sorok, DC road, Nur ali sorok)
- Room insufficiency of classroom with respect to the student number,
- Lack of secondary school,
- Encroachment of agricultural land by the govt. project of Solar panel,
- Social disputes (Eve teasing, Drug addiction etc.)
- Poverty,
- Unplanned government rehabilitation program (Guccho Gram)

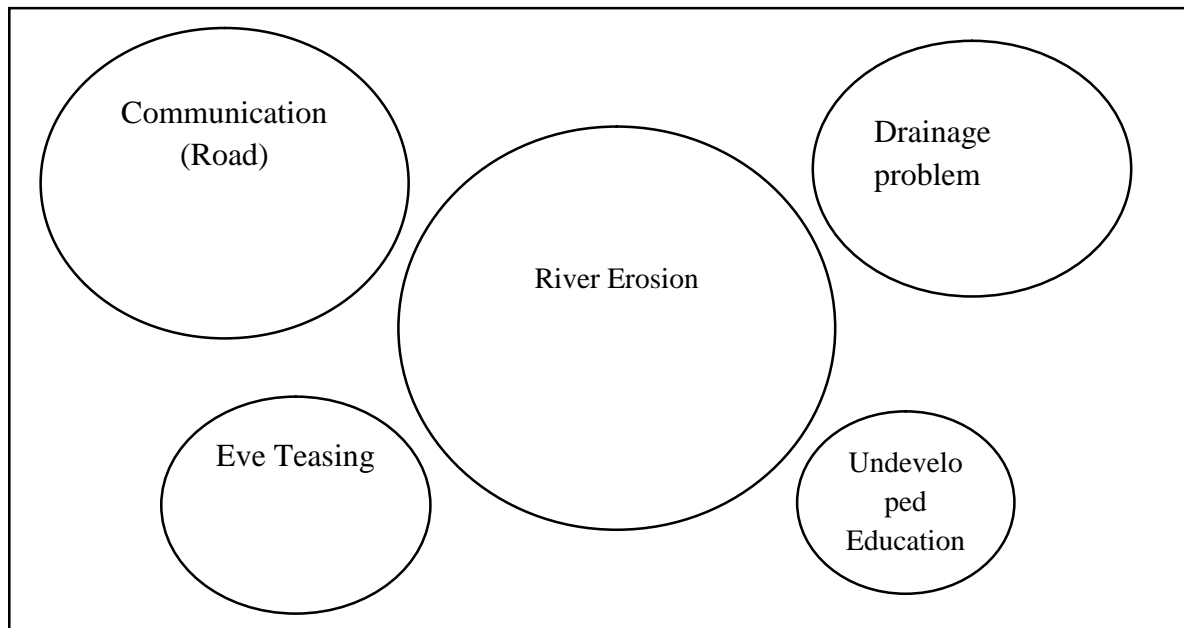


Figure 3: Venn diagram for Problems Prioritization

5.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land (3crops land, fertile)
- Fisheries (Ichakhali, Ichamati and Karnafulli river)
- Tourism,
- Remittance,
- Literate People,
- Working people,
- Business

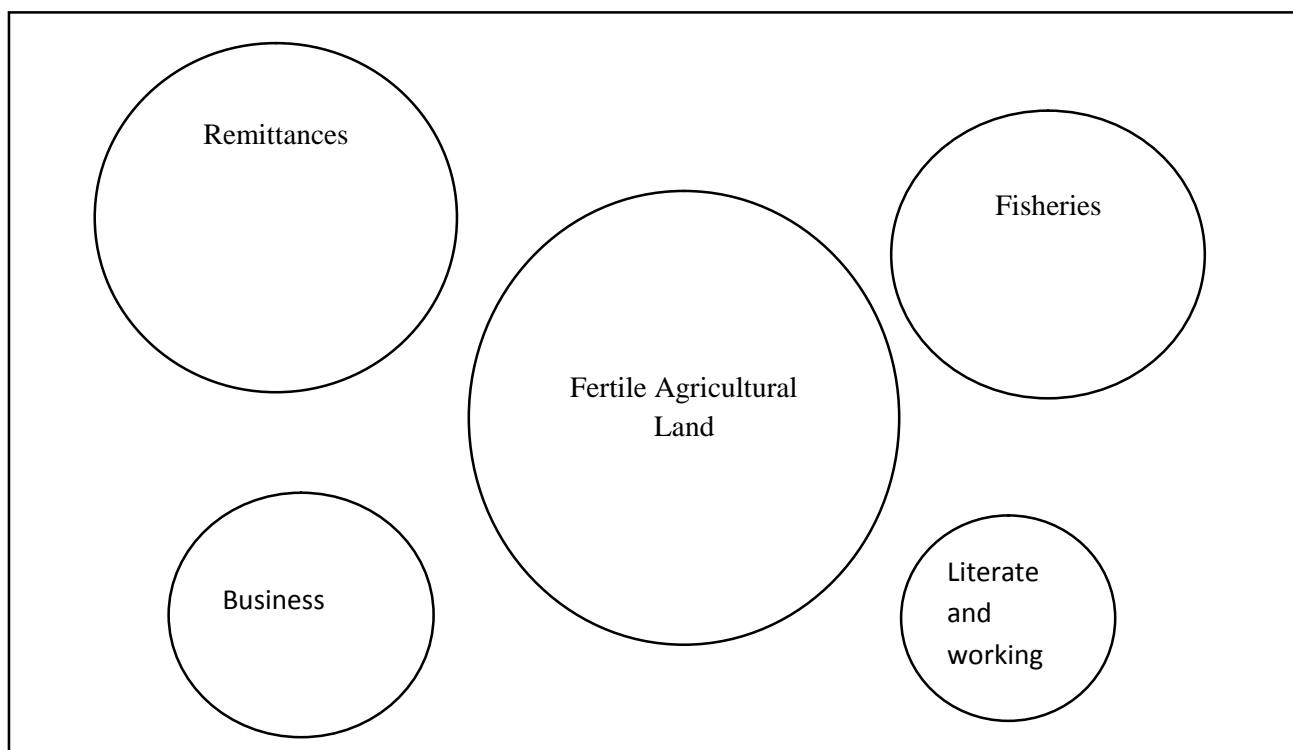


Figure 4: Venn diagram for Potentials Prioritization

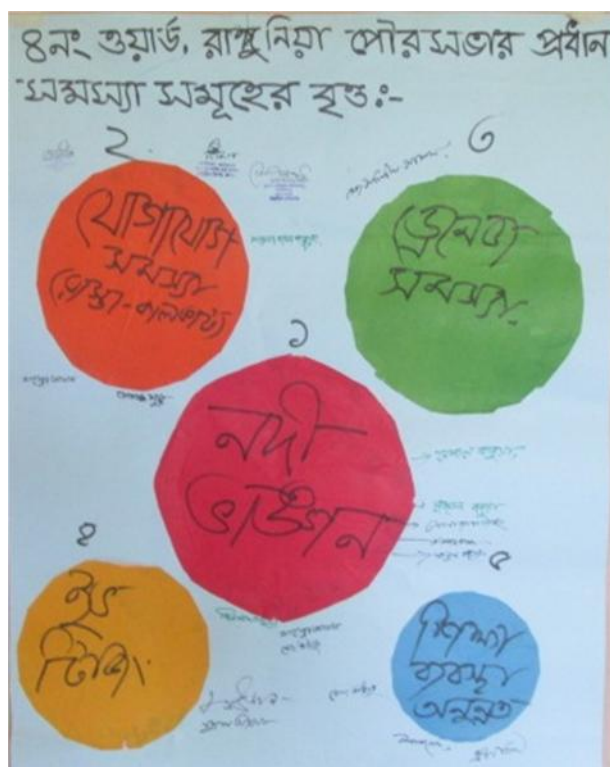


Figure 5: Problem Identification

Source: Field Survey, 2015

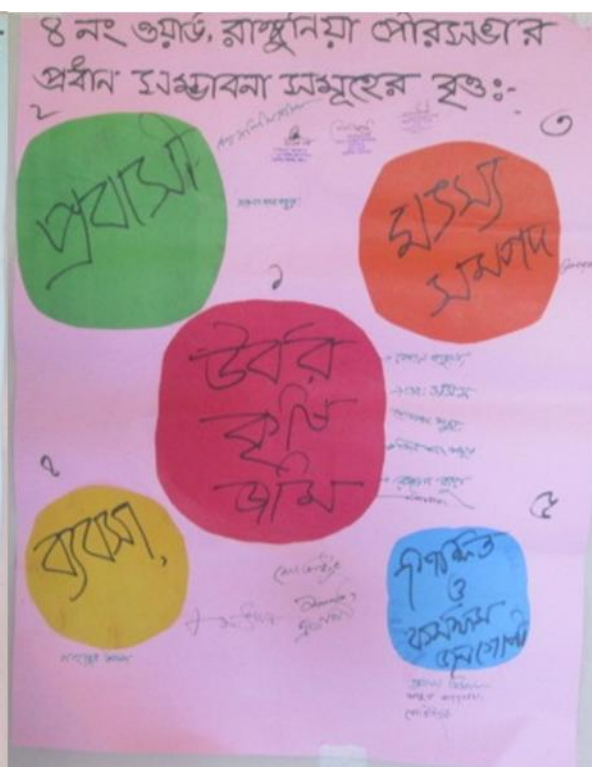


Figure 6: Potential Identification

Source: Field Survey, 2015

5.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 1: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|-------------------------------------|--|--|--|
| 1. River Erosion | <ul style="list-style-type: none"> • ,Water flow of Kaptai Lake, • Heavy rainfall • Sand collection from the canal | <ul style="list-style-type: none"> • Damage of houses,roads etc. • Hamper education • Hamper medical facilities | <ul style="list-style-type: none"> • Manpower • Raw material (Brick, sand, soil) • Land |
| 2. Weak Transportation (Road) | <ul style="list-style-type: none"> • Damage of road and culvert due to flash flood. • Pond erosion, • Lack of repairmen | <ul style="list-style-type: none"> • Students faces difficulties in going to school, • Patients die every now and then on the way to hospital, • Hamper agriculture | <ul style="list-style-type: none"> • Sufficient human resource, • Raw materials (brick and sand) |
| 3. Drainage Problem | <ul style="list-style-type: none"> • Insufficient amount of drains • Illegal encroachment through unplanned residences | <ul style="list-style-type: none"> • Hamper of agricultural products • Roads are broken | <ul style="list-style-type: none"> • Sufficient human resource, • Raw materials (brick and sand) |
| 4. Social devaluation (Eve teasing) | <ul style="list-style-type: none"> • Literate youth • Carelessness of the guardians • Weak administrative system | <ul style="list-style-type: none"> • Hamper education system • Women suffer from insecurity | <ul style="list-style-type: none"> • Mass support, • Social unity |
| 5. Undeveloped Education system | <ul style="list-style-type: none"> • Lack of educational institution, • Insufficient class room in primary school • Lack of qualified teacher | <ul style="list-style-type: none"> • Hamper education • Insecure educational institution, • Drop out of the students | <ul style="list-style-type: none"> • Mass support, • Raw materials (brick and sand) • Vertical expansion of the school building |

(Source: Field Survey,2015)

5.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minute.

- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20)

Table 2: Demand of People for Development Plan for 20 Years, 4 No. Ward, Rangunia Paurashava

| Demand | Remarks |
|--|---|
| Development of transportation system | <ul style="list-style-type: none"> • Repairmen of the roads, • Pucca road is needed, • Guide wall beside ponds is needed |
| Removal of river erosion | <ul style="list-style-type: none"> • Embankment and Guide wall is demanded |
| Development of drainage system | <ul style="list-style-type: none"> • Sufficient drains are needed to reduce water logging and road damage during rainy season. • Drain should be beside the roads |
| Removal of poverty | <ul style="list-style-type: none"> • Demand employment to eradicate poverty |
| Development of educational institution | <ul style="list-style-type: none"> • Capacity of the school should be increased, • Repairmen of educational institution • New school are needed |
| Demand for Electricity Line | <ul style="list-style-type: none"> • Expansion of electricity line |
| Development of Medical facilities | <ul style="list-style-type: none"> • Health facilities should be increased to fulfill the existing demand |
| | <ul style="list-style-type: none"> • |
| Development of irrigation | <ul style="list-style-type: none"> • Budget for good irrigation system, • Good Irrigation system can accelerate the agricultural development |
| Miscellaneous | Good environment for business, removal of drug addiction, political influence free society, proper arrangement for fish collection, Vocational training center, prevention of encroachment on the agricultural land by residential building |

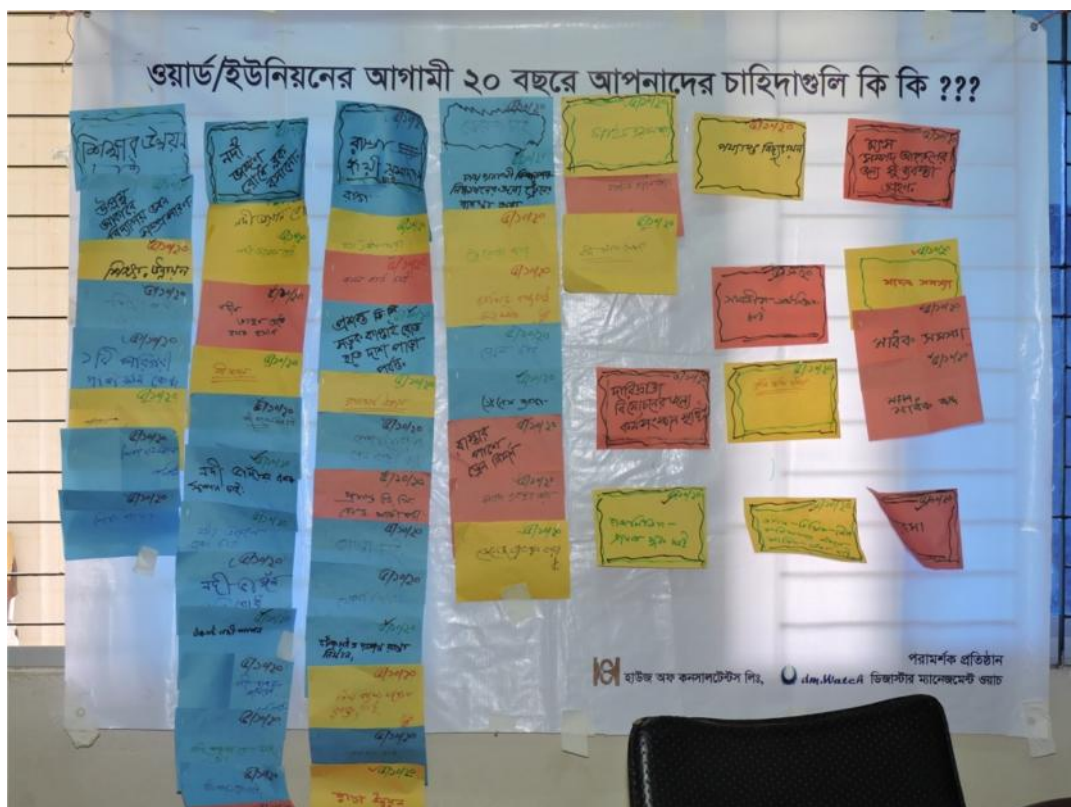


Figure7: Demand of People for Development Plan

Table 3: Identification of Development Plan for 4 No Ward, Rangunia Paurashava

| Short Term | Mid Term | Long Term |
|---|--|---|
| <ul style="list-style-type: none"> • Development of drainage system • River erosion free union • Development of Medical facilities • Vocational training center | <ul style="list-style-type: none"> • Development of Medical facilities • Good transportation system • demand for fire service • Development educational institution • prevention of encroachment on the agricultural land by residential building | <ul style="list-style-type: none"> • Removal of poverty • Development of irrigation • proper arrangement for fish collection • Demand for Electricity Line • political influence free society • Good environment for business |

(Source: Field Survey,2015)



Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more comprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazilla Cox's Bazar & Rangunia Upazilla, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Abdur Razzaque Azad
Co-Facilitator: Rakeeb Askari
Logistics: Mehedi Alam
Rapporteur: K. M. Risaduzzaman
Time: 10.00 a.m. to 1.30 p.m.
Date: 06.10.2010
Venue: Rangunia Paurashava Building
Name of Union: 5 No ward, Rangunia Paurashava
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 06, 2015 at 5 no ward, Rangunia Paurashava, where 38 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (TOP) have been applied for this project which will fulfill our project goal.

2. RANGUNIA POURASHAVA

Table 1: Physiographic & Demographic Information of Rangunia Pourashava

| AT A GLANCE | |
|----------------------------------|--|
| Features/ Characteristics | Remarks |
| Establishment of Paurashava | 04-07-2000 |
| Category | "B" Class Paurashava |
| Area | 8 km ² |
| No. of Ward | 09 |
| Population | 53035 |
| Male | 27244 |
| Female | 25789 |
| No. of Voter | Male- 9367 Female- 8467 |
| Literacy Rate | 70% |
| Educational Institutions | Primary School-12 High School-05 Girl's High School-01 Satellite School-02 College-02 Girl's College-01 University College-01 Madrasha-02 Vocational Institutions-01 Others -07 |
| No. of Holdings | Residential & Commercial-4373 Mixed Government-38 Industry- 04 Villages-20 |
| Transportation Facilities | Bituminous Carpeting Road-39.2 km Pucca Road-10.2 km Semi Pucca Road- 1 km Katcha Road- 11.1 km |
| Health Facilities | Government Hospital-01 Satellite Clinic-01 |
| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Rangunia Pourashava)

3. STUDY AREA PROFILE

Rangunia Paurashava, Ward No-05 under the administrative jurisdiction of Rangunia Upazilla in Chittagong has a population 3019 and household of 597. The boundary of the study area is stated below:

North: On the north the study area is followed by Parua Union

South: On the south the study area follows 4 No.Ward,

East: On the east the study area is surrounded by 6 No. Ward

West: On the west of the study area there is 3 No. Ward.



Plate 1: Image of Participants

Source: Field Survey,2015

4. STEPS OF PRA APPROACH

There were 16 participants in PRA Session of 5 no. ward, Rangunia Paurashava. The participants were included councilor and other elite persons such as Teacher, Farmer, Freedom fighter, Imam, Businessmen, Social worker, Political leader, Student, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

After saying the purpose of Development Project for 20 years, the schedule of PRA Session was explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has been shown to the participants to locate the problems/potentials side which has spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were requested to dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (TOP).

5.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Drainage Problem(No Drain),
- Weak Transportation System (Muddy road and Damaged bridge)
- Lack of Idgah,
- River erosion (Ichamati River – Soudagor Para, Sonaichori, Jolodas Para, Borua Para, Joldash Para and Ichakhali River- Soudagor Para)
- Lack of sanitation facilities,
- No Gas line,
- Insufficient Educational Institution(No High School, Madrasha or College in the union)
- Insufficient medical facilities (No Hospital),
- Low rate of literacy,
- No guide wall beside Ichamati River
- No Central Temple in the Union

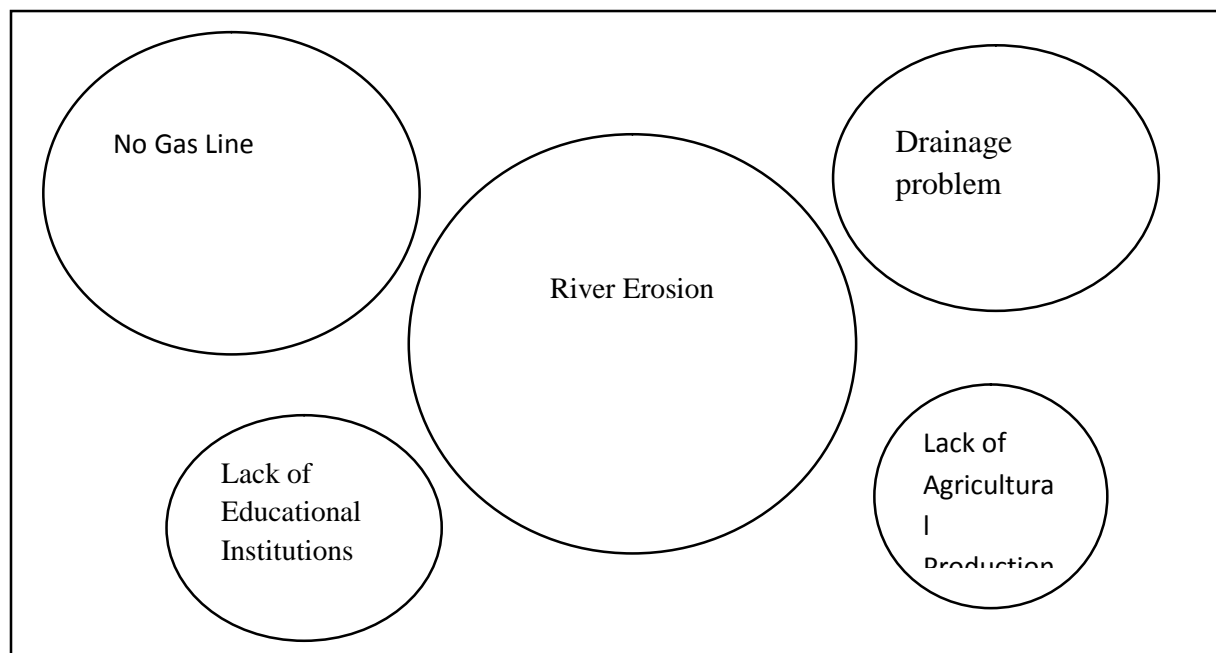


Figure 3: Venn diagram for Problems Prioritization **Source:** Field Survey,2015

5.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Religious and Tourism Place at Sonaichori (Temple and Pagoda)
- Ichamati River,
- Proper Leader,
- Remittances,
- Agricultural Land,
- Hill,
- Literate and employable people,
- Tourism,
- Fisheries

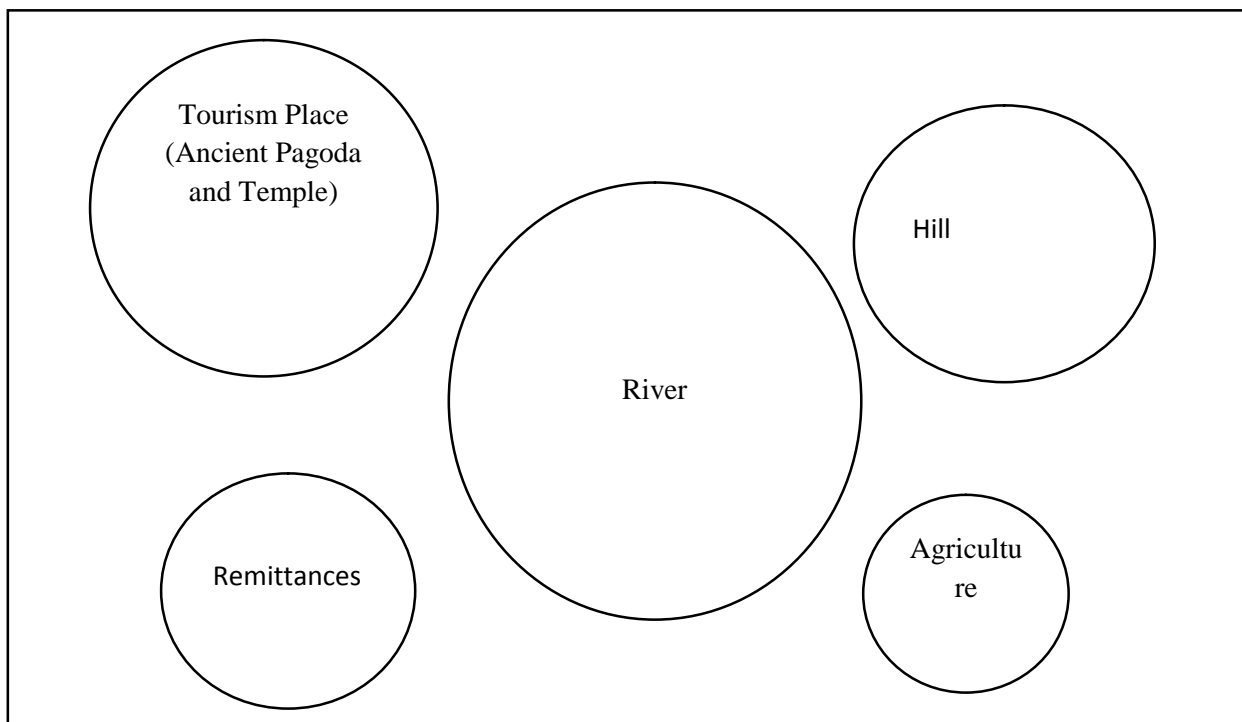


Figure 4: Venn diagram for Potentials Prioritization

Source: Field Survey,2015

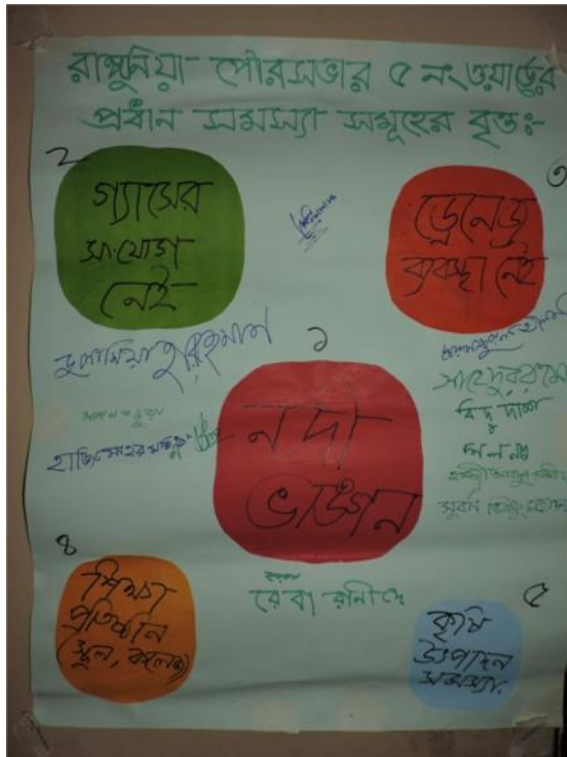


Figure 5: Problem Identification

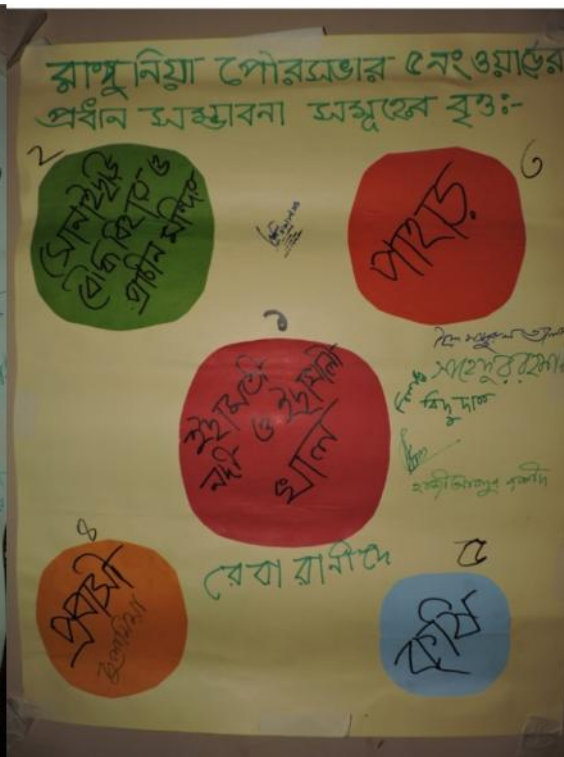


Figure 6: Potential Identification

5.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|-------------------------------------|---|---|--|
| 1. River Erosion | <ul style="list-style-type: none"> Illegal Sand collection from the channel , Flash flood due to hilly water, | <ul style="list-style-type: none"> Damage of roads, bridges etc, Damage of houses, Damage of Mosque, Temple etc, | <ul style="list-style-type: none"> Manpower |
| 2. No Gas Line | <ul style="list-style-type: none"> Temporary postpone by the govt. | <ul style="list-style-type: none"> Deforestation, Higher cost of fuel | <ul style="list-style-type: none"> Gas line is available in few houses of the ward. |
| 3. Drainage Problem | <ul style="list-style-type: none"> No drain in the union | <ul style="list-style-type: none"> Environmental Pollution, Lack of Irrigation | <ul style="list-style-type: none"> Sufficient amount of land Manpower |
| 4. Lack of Educational Institutions | <ul style="list-style-type: none"> Bureaucratic Complexity, | <ul style="list-style-type: none"> Number of dropped out students is increasing | <ul style="list-style-type: none"> Mass support, Manpower |
| 5. Lack of Agricultural Production | <ul style="list-style-type: none"> Lack of necessary equipments, Flood, River Erosion | <ul style="list-style-type: none"> Future Agriculture is on threat, Economical Loss | <ul style="list-style-type: none"> Lots up cultivable land |

(Source: Field Survey,2015)

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর (UDO)
 “প্রিপ্রাটেশন অব ডেভেলপমেন্ট প্ল্যান ফর ফোরটিভ উপজেলায়”
 প্রকল্প-০৫ নৌমুখী: রাষ্ট্রপতি: ১৯৮৬-৮৭ ও ১৯৮৭-৮৮ উপজেলা-চাঁদপুর, ঢাকা-১১০০

সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই

| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাব্য সমাধান |
|--|-------------------------------------|---|---------------------------|
| ১. নদী ওষ্ঠান | - নদী তল - বাধা উৎপাদন (প্রদূষণ) | - বর্ষাবর্ষে উজ্জ্বল - মূল মাটির ক্ষতি - খনিজ মাটি - বাধা মাটি ক্ষতি | জনস্বাস্থ্য |
| ২. গ্যাসের মাধ্যমে | অবকাঠি/মাধ্যম ও/বা অপারেশন | ওজন/বর্ষে বর্ষে শিল্প/মাধ্যম | পরিষ্কার/মাধ্যম মাধ্যম |
| ৩. (ড্রেনেজ) ব্যবস্থা নেই | গম্বুজ/বাধা/মাধ্যম ও/বা | পরিষ্কার/মাধ্যম মাধ্যম | জনস্বাস্থ্য/মাধ্যম |
| ৪. শিল্প/প্রাথমিক/মাধ্যম (মাধ্যম, মাধ্যম) | অবকাঠি/মাধ্যম ও/বা | ওজন/বর্ষে বর্ষে মাধ্যম | পরিষ্কার/মাধ্যম মাধ্যম |
| ৫. কৃষি/মাধ্যম/মাধ্যম | অবকাঠি/মাধ্যম ও/বা | ওজন/বর্ষে বর্ষে মাধ্যম | পরিষ্কার/মাধ্যম মাধ্যম |

Figure 7: Cause, Impact and Potentials

Source: Field Survey, 2015

5.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, 5 no ward, Rangunia Paurashava

| Demand | Remarks |
|--|--|
| Infrastructural Development of transportation system | <ul style="list-style-type: none"> • Demand for a bridge on the Ichakhali River • Pucca road is needed, • Development of the transportation system will accelerate the economic development of the union. |
| Infrastructural Development of Education System | <ul style="list-style-type: none"> • New school (Primary and Secondary) are needed |
| Removal of river erosion | <ul style="list-style-type: none"> • Embankment and Guide wall is demanded, • Planned excavation of river is important to reduce river erosion. |
| Development of drainage system | <ul style="list-style-type: none"> • Sufficient drains are needed to reduce water logging and road damage during rainy season. |
| Development of the Religious Institutions | <ul style="list-style-type: none"> • Mosques and Temples need repairmen, • An Idgaon is needed in the union |
| Demand for Gas Line | <ul style="list-style-type: none"> • Gas line is needed to make daily life easy, • Provision of Gas will reduce the fuel cost in a great extent. |
| Development of Electricity System | <ul style="list-style-type: none"> • Reduction in load shedding is needed for overall development, |
| Development of Fisheries | <ul style="list-style-type: none"> • Demand for project for fisheries |
| Development of Forest | <ul style="list-style-type: none"> • Cooperation from the government is highly needed • Forestation beside the Ichakhali river is very much important to reduce the river erosion. |
| Demand for Safe Drinking Water | <ul style="list-style-type: none"> • The tube well water of the ward contains Iron since most of them are shallow ones. So, deep tube wells are needed to ensure the safety of the drinking water. |
| Development of Dairy Farm | <ul style="list-style-type: none"> • Development project for dairy firm is demanded to create employment, • Entrepreneur is needed either govt. or non govt.side |
| Govt. Patronization on Agriculture | <ul style="list-style-type: none"> • The farmers of the ward need govt. help to increase the yielding of the crops. |

(Source: Field Survey,2015)



Figure 9: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (RamuUpazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team A
Facilitator: Md. Abdul Razzak Azad
Co-Facilitator: Md. Walid Reza
Logistics: Saiful Islam
Rapporteur: Md. Kawsar Uddin
Time: 10.00 a.m. to 1.30 p.m.
Date: 11.10.2015
Venue: Rangunia Club
Name of Union: Ward No. 6, Rangunia Pourashava.
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rapid Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 11, 2015 at Ward No. 6, Rangunia Pourashava where 25 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.

2. RANGUNIA POURASHAVA

**Table 1: Physiographic & Demographic Information of Rangunia Pourashava
AT A GLANCE**

| Features/ Characteristics | Remarks |
|----------------------------------|--|
| Establishment of Paurashava | 04-07-2000 |
| Category | "B" Class Paurashava |
| Area | 8 km ² |
| No. of Ward | 09 |
| Population | 53035 |
| Male | 27244 |
| Female | 25789 |
| No. of Voter | Male- 9367 Female- 8467 |
| Literacy Rate | 70% |
| Educational Institutions | Primary School-12 High School-05 Girl's High School-01 Satellite School-02 College-02 Girl's College-01 University College-01 Madrasha-02 Vocational Institutions-01 Others -07 |
| No. of Holdings | Residential & Commercial-4373 Mixed Government-38 Industry- 04 Villages-20 |
| Transportation Facilities | Bituminous Carpeting Road-39.2 km Pucca Road-10.2 km Semi Pucca Road- 1 km Katcha Road- 11.1 km |
| Health Facilities | Government Hospital-01 Satellite Clinic-01 |
| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Rangunia Pourashava)

3. STUDY AREA PROFILE

Rangunia Paurashava, Ward No. 6 under the administrative jurisdiction of Rangunia Upazila in Chittagong District has a population of 3094 and household of 647. The boundary of the study area is stated below:

North: On the north the study area is follows by Shonirbhor Rangunia Union.

South: On the south the study area follows Ichamati River.

East: On the east the boundary of the study area is beside by DC Road.

West: On the west the study area runs along the boundary of Ichamati River.



Plate 1: Image of Participants

Source: Field Survey, 2015

4. STEPS OF PRA APPROACH

There were 25 participants in PRA Session of Rangunia Paurashava, Ward No.1. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.00 am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP)

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has shown to the participants to locate the problems/potentials sides which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

5.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Bad transportation condition
- River Erosion
- Lack of drainage system
- Lack of Sanitation facilities
- Lack of Irrigation facilities in agriculture
- No agriculture consultants center
- Impact of Load shedding
- Lack of work for unemployed people
- No provision of street light
- Unplanned extraction of sand from river
- Lack of health facilities
- Insufficiency of Budget
- Water logging
- Bureaucratic complexity
- Gas Connection problem

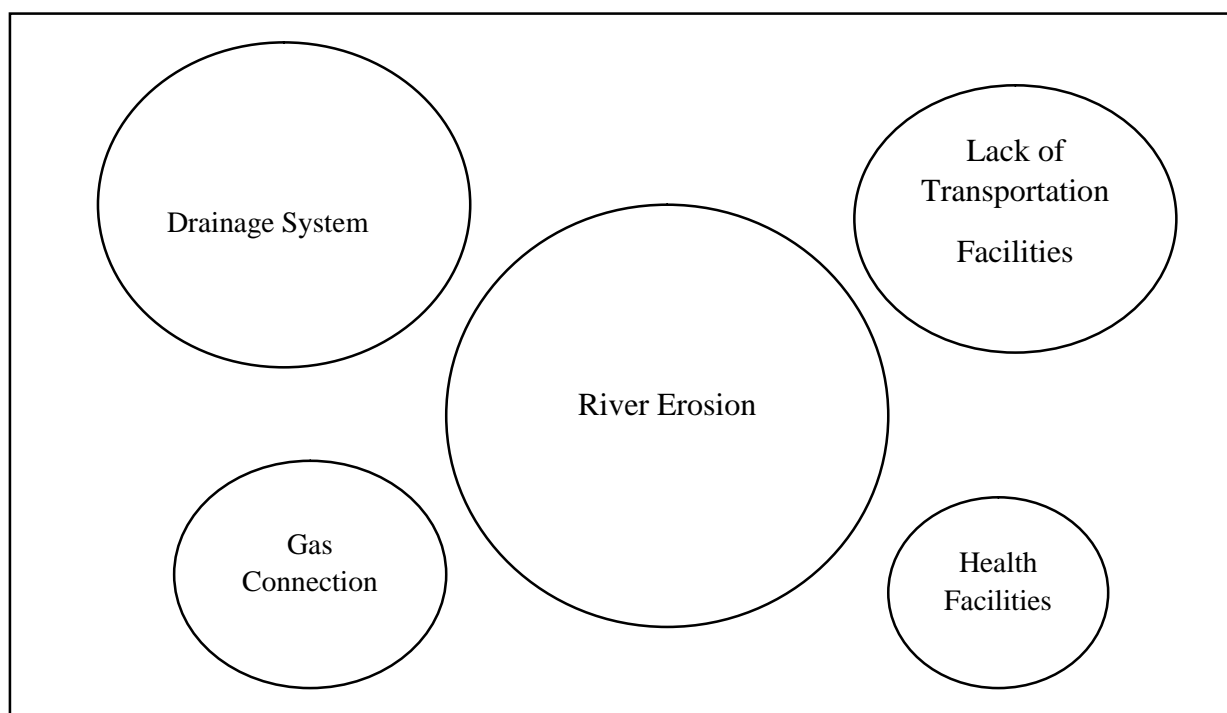


Figure3: Venn diagram for Problems Prioritization

Source: Field Survey,2015

5.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land (Paddy)
- Educational Institutions basically school, college
- Shanti Niketan Sweet Business
- River (Isamati)

- Poultry farm
- Educated & Active human power
- Remittance
- Cultivation of Robi Crops

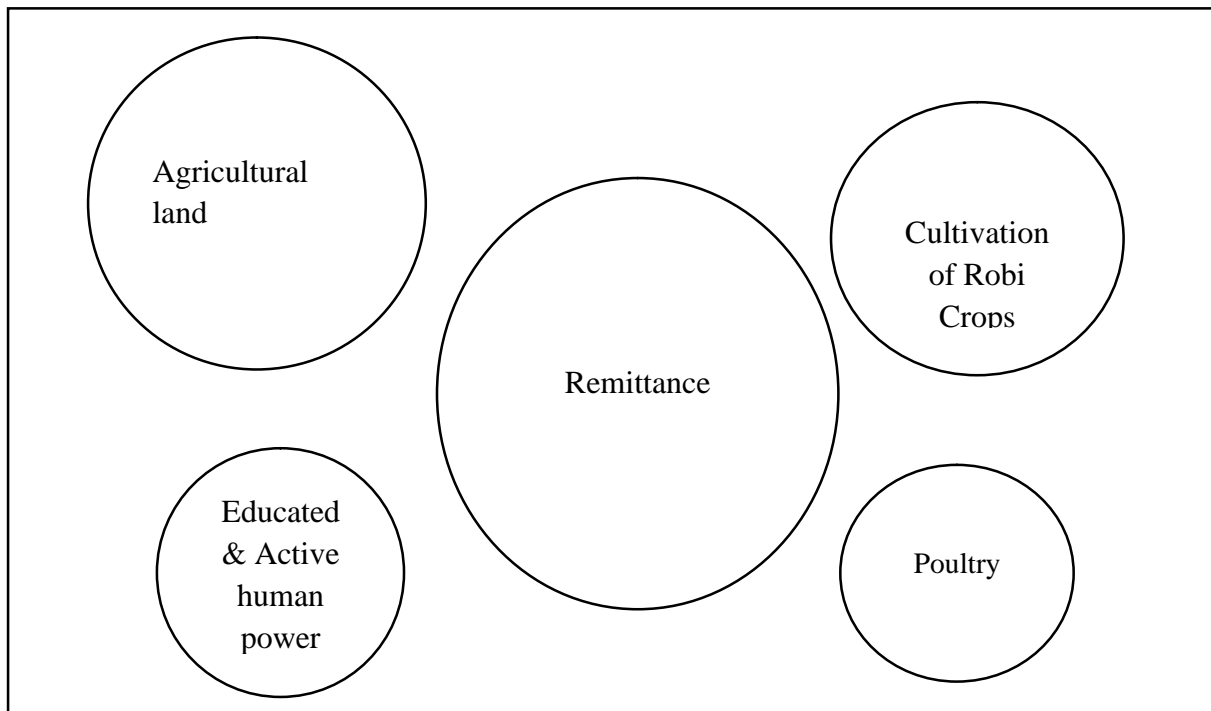


Figure4: Venn diagram for Potentials Prioritization

Source: Field Survey,2015



Figure 5: Problem Identification

Source: Field Survey,2015

Figure 6: Potential Identification

Source: Field Survey,2015

5.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|--|---|--|
| 1. River Erosion | <ul style="list-style-type: none"> Flash flood due to hill Unplanned sand extraction from river | <ul style="list-style-type: none"> Banishing Homestead. Loosing agricultural land. | River erosion steps have been taken by ministry. |
| 2. Drainage Facilities | <ul style="list-style-type: none"> Unplanned infrastructure Insufficiency of drainage system | <ul style="list-style-type: none"> Damaging the road due to water logging. Discharged water from sewer clogs in road | <ul style="list-style-type: none"> Sufficient land Active human power |
| 3. Lack of Transportation Facilities | <ul style="list-style-type: none"> Lack of seriousness of concerned authority Driving Bulky or heavy loaded transport Damaging road due to water logging. | <ul style="list-style-type: none"> Transportation problem for students. Patients face difficulties. | <ul style="list-style-type: none"> Sufficient land Existing road but construction is needed. |
| 4. Gas Connection | <ul style="list-style-type: none"> Bureaucratic complexity Long distance from the gas service line Insufficiency of budget | <ul style="list-style-type: none"> Increasing the fueling cost cooking Occurring the deforestation Environment pollution | Gas line has passed through the ward |
| 5. Lack of health facilities | <ul style="list-style-type: none"> No provision of Hospital Health facilities hamper due to bad transportation system. | <ul style="list-style-type: none"> Poor family cannot get health facilities. People have to move Upazila Health Complex. | Local land or Khas land |

(Source: Field Survey,2015)

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন আধিদপ্তর (UDD)
“প্রিপারেশন অব ডেভেলপমেন্ট প্লান ফর ফোরটিভ উপজেলাস”
প্রকল্প ৬ নং ওয়ার্ড রাষ্ট্র নিয়ন্ত্রিত উপজেলা-বামুনিয়া, জেলা-চাঁদপুর
সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই

| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সম্ভাব্যতা |
|----------------------------|--|---|---|
| ১। নদী প্রাঙ্গণ → | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল |
| ২। পানি নিষ্কাশন/ড্রেনেজ → | <ul style="list-style-type: none"> আবহাওয়া/বন্যপ্রাণী/জল/জল/জল আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল |
| ৩। প্রাঙ্গণ/প্রাঙ্গণ → | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল |
| ৪। জল/জল/জল → | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল |
| ৫। মাটি/মাটি/মাটি → | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল | <ul style="list-style-type: none"> পানীয়-নদী ও তার প্রাঙ্গণ আবহাওয়া/বন্যপ্রাণী/জল/জল/জল |

Figure 7: Cause, Impact and Potentials

Source: Field Survey, 2015

5.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table3: Demand of People for Development Plan for 20 Years, Ward No.-06

| Demand | Remarks |
|--|--|
| Provision of Gas Connection | They have urged gas connection as early as possible. |
| Provision of Transportation facilities | <ul style="list-style-type: none"> • Development of Road • Construction or reconstruction of road • Widening the road |
| Prevention of River Erosion | <ul style="list-style-type: none"> • Taking steps for navigation of the Isamati River. • Ban the sand extraction from river |
| Provision of Drainage facilities | <ul style="list-style-type: none"> • Establishment of Drainage system • Provide drainage along the roadside |
| Development of Health facilities | <ul style="list-style-type: none"> • Development of health facilities. • Assurance of proper health facilities • Development of Government Hospital |
| Miscellaneous | <ul style="list-style-type: none"> • Remove the unemployment problem • Want a cremation place |

(Source: Field Survey,2015)

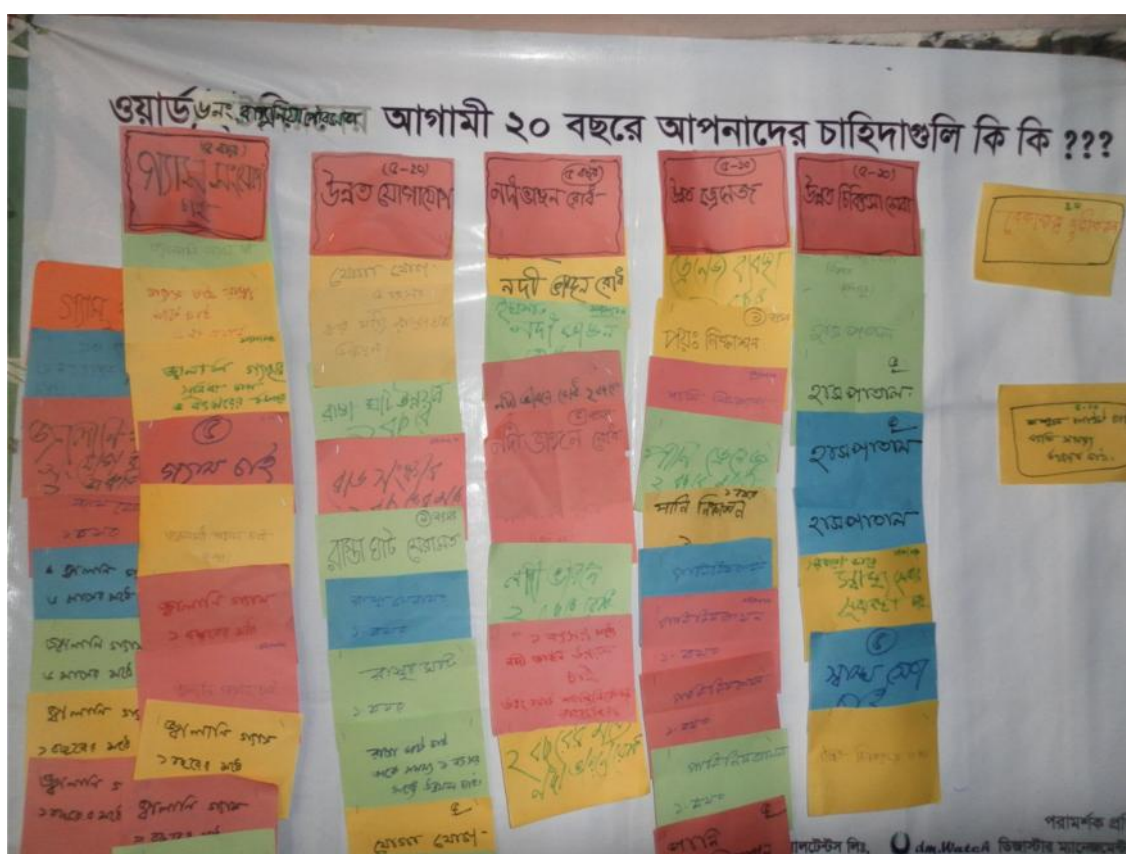


Figure 8: Demand of People for Development Plan Source: Field Survey,2015

Table4: Identification of Development Plan for Ward No.-06

| Short term | Midterm | Long term |
|--|--|---|
| <ul style="list-style-type: none"> • Prevention of River Erosion • Provision of Gas Connection | <ul style="list-style-type: none"> • Provision of Drainage Facilities • Development of Health facilities • Want a cremation place | <ul style="list-style-type: none"> • Provision of Transportation facilities • Remove the unemployment problem |

(Source: Field Survey,2015)

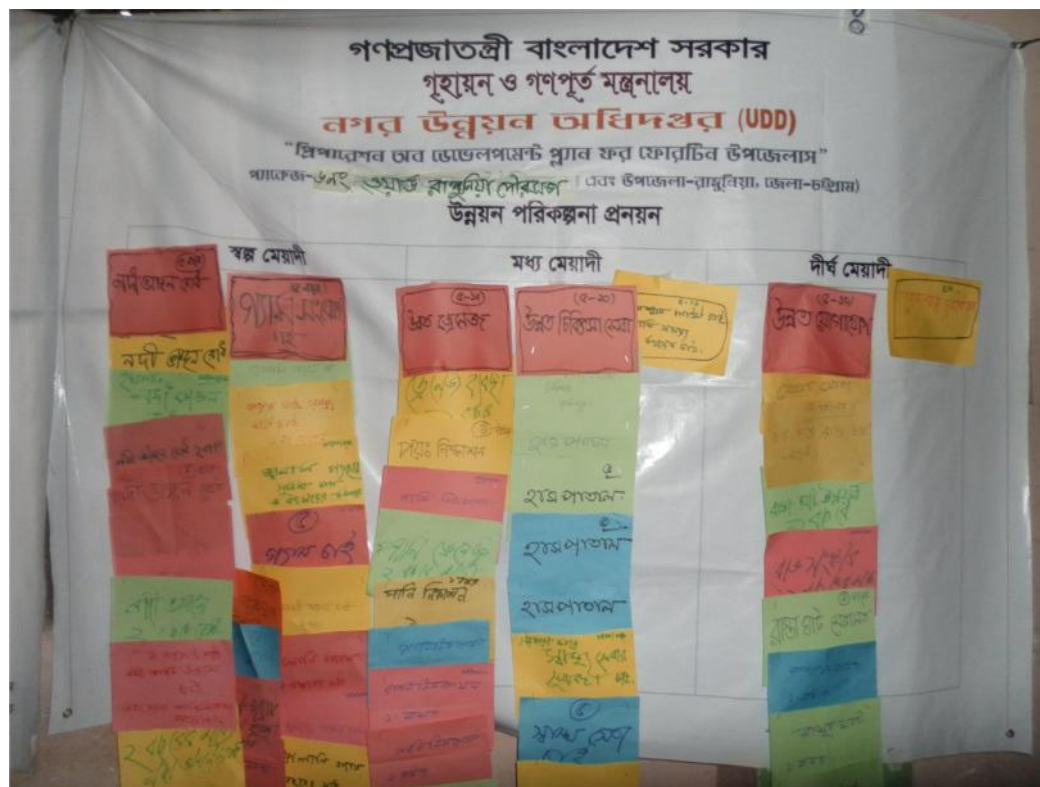


Figure 5.8: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey,2015

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more comprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazilla Cox's Bazar & Rangunia Upazilla, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B

Facilitator: Abdur Razzaque Azad

Co-Facilitator: Rakeeb Askari

Logistics: Mehedi Alam

Rapporteur: K. M. Risaduzzaman (Urban Planner)

Time: 10.00 a.m. to 1.30 p.m.

Date: 14.10.2010

Venue: 4 no ward, Rangunia Paurashava

Name of Union: Ward No. 7, Rangunia Paurashava

Name of Upazila: Rangunia

District: Chittagong

1. INTRODUCTION

Participatory Rural Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 14, 2015 at 7no ward, Rangunia Paurashava where 38 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (TOP) have been applied for this project which will fulfill our project goal.

2. RANGUNIA POURASHAVA

Table 1: Physiographic & Demographic Information of Rangunia Pourashava

| AT A GLANCE | |
|----------------------------------|--|
| Features/ Characteristics | Remarks |
| Establishment of Paurashava | 04-07-2000 |
| Category | "B" Class Paurashava |
| Area | 8 km ² |
| No. of Ward | 09 |
| Population | 53035 |
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| Literacy Rate | 70% |
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| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Rangunia Pourashava)

3. STUDY AREA PROFILE

Rangunia Paurashava, Ward No.-07 under the administrative jurisdiction of Rangunia Upazilla in Chittagong has a population of 3971 and household of 809. The boundary of the study area is stated below:

North: On the north the study area is followed by 6 No. Ward,

South: On the south the study area follows 8 No. Ward,

East: On the east the study area is surrounded by 3 No. Ward,

West: On the west of the study area there is 4 No. Ward.



Plate 1: Image of Participants

Source: Field Survey, 2015

4. STEPS OF PRA APPROACH

There were 20 participants in PRA Session of 4 no ward, Rangunia Paurashava. The participants were included councilor and other elite persons such as Teacher, Farmer, Freedom fighter, Imam, Businessmen, Social worker, Political leader, Student, Entrepreneur and Local people etc. PRA was lasted from 10.15 am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP) were done sequentially.

After saying the purpose of Development Project for 20 years, the schedule of PRA Session was explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has been shown to the participants to locate the problems/potentials side which has spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were requested to dream for 20

years where the dreams will be categorized in this part known as Technology of Participation (TOP).

5. PRA TECHNIQUE

5.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

5.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Drainage Problem,
- Lack of Transportation Facilities (Narrow road, insufficient road, Old bridge)
- River erosion (Ichamati)
- Lack of sanitation facilities,
- Water Logging,
- Load Shedding,
- No Gas line,
- Insufficient Educational Institution,
- Lack of recreational place (lack of playground)
- Insufficient medical facilities,
- No office for ward councilor,
- Lack of street light ,
- Lack of waste management,
- Lack of irrigation facilities

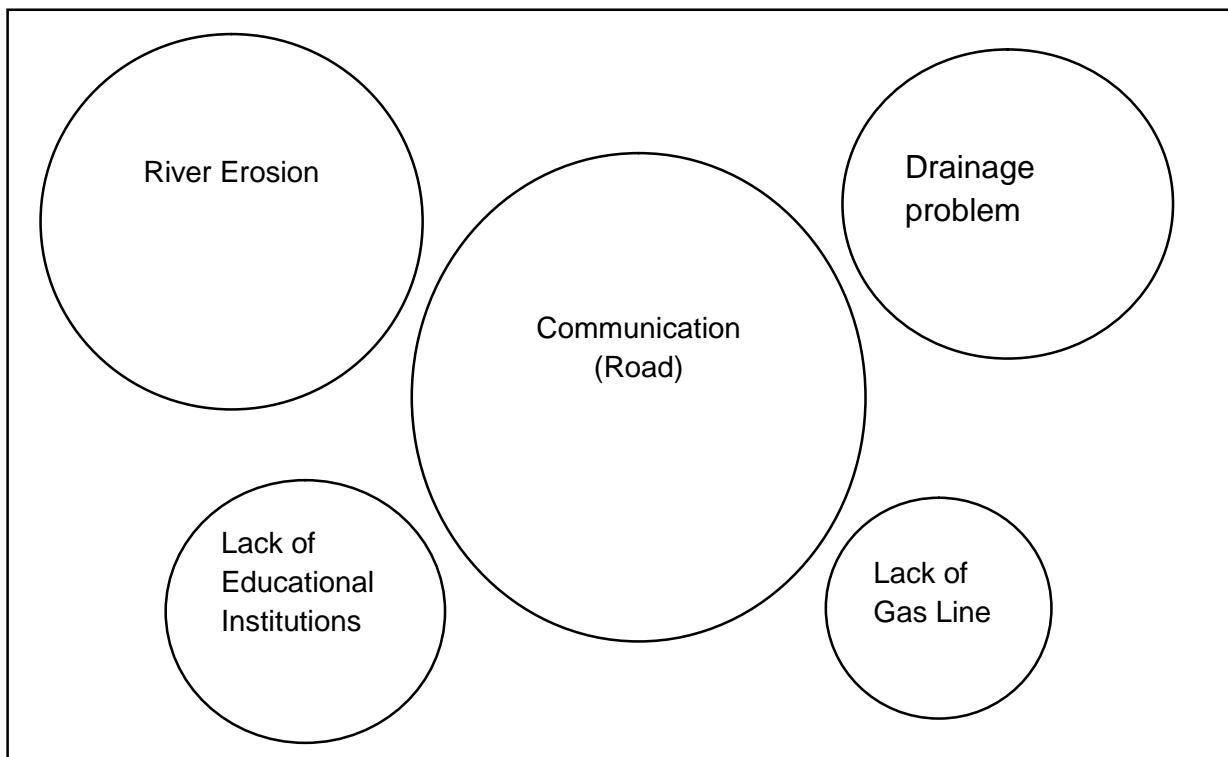


Figure 2: Venn diagram for Problems Prioritization **Source:** Field Survey,2015

5.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural Land (Paddy and Robi crops)
- Fisheries,
- Livestock,
- Poultry Industry,
- Human resource,
- Remittance,
- Literate People,
- Sufficient land for Residence

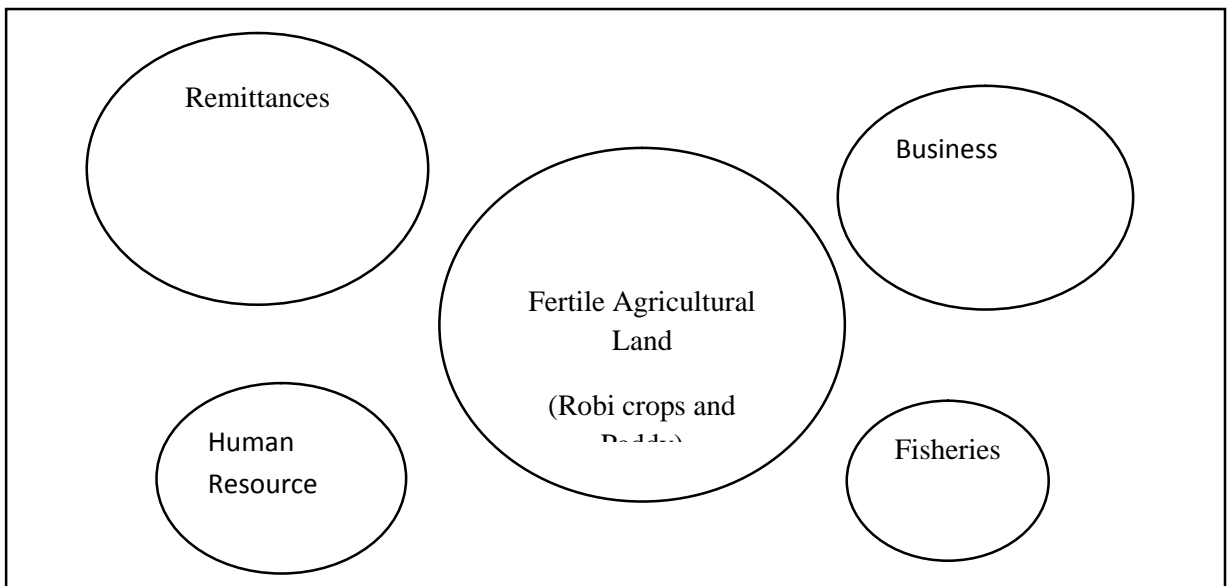


Figure 3: Venn diagram for Potentials Prioritization

Source: Field Survey,2015

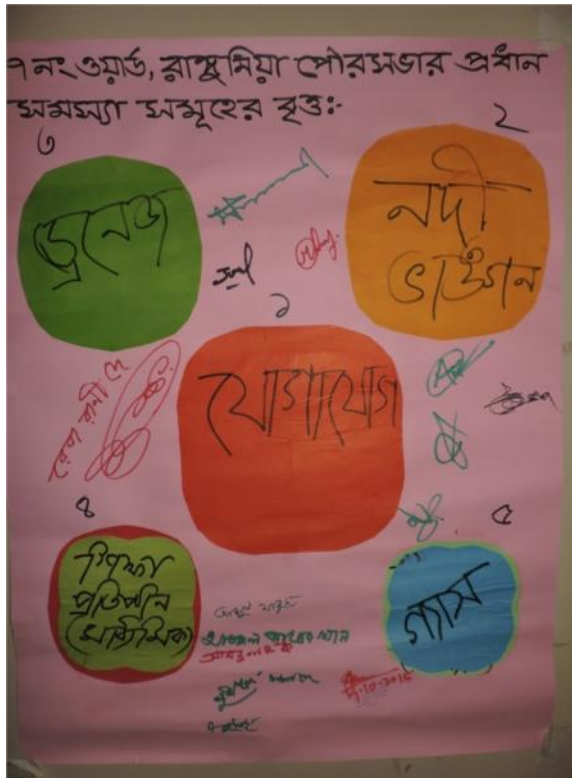


Figure 4: Problem Identification
Source: Field Survey, 2015

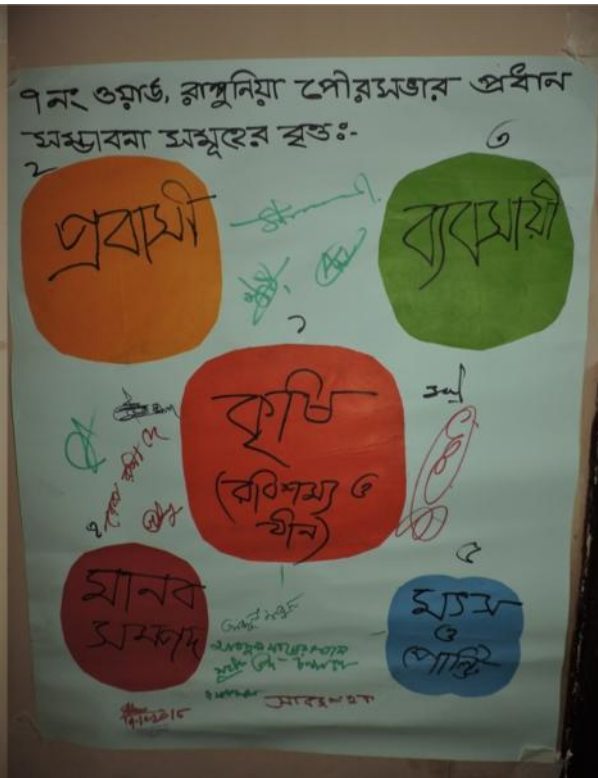


Figure 5: Potential Identification

5.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|-------------------------------|---|--|--|
| 1. Weak Transportation (Road) | <ul style="list-style-type: none"> Damage of road Old Bridge, Narrow road Corruption of the contractors | <ul style="list-style-type: none"> Vehicle transporting raw materials cannot enter the union, The transport cost is increasing | <ul style="list-style-type: none"> Income of Paurasava, Human resource, Raw Materials |
| 2. River Erosion | <ul style="list-style-type: none"> Water flow of river, Sedimentation of river bed, Sand collection from the channel, Flash flood due to hilly water, | <ul style="list-style-type: none"> Damage of houses, increase of homeless people, Crops are spoiled | <ul style="list-style-type: none"> Manpower Raw material (Brick, sand, soil) |
| 3. Drainage Problem | <ul style="list-style-type: none"> No drain in the union | <ul style="list-style-type: none"> Hamper of Agricultural Development, Water logging | <ul style="list-style-type: none"> Sufficient amount of land |

| Identified Problems | Causes | Impact | Potentials/Probability |
|-------------------------------------|--|---|--|
| 4. Lack of Educational Institutions | <ul style="list-style-type: none"> Bureaucratic Complexity, Lack of Budget, Lack of land, Lack of entrepreneur | <ul style="list-style-type: none"> Hamper education | <ul style="list-style-type: none"> Mass support, Manpower |
| 5. No Gas Line | <ul style="list-style-type: none"> Bureaucratic Complexity | <ul style="list-style-type: none"> Deforestation, Higher cost of fuel | <ul style="list-style-type: none"> Gas line is available in few houses of the ward. |

(Source: Field Survey,2015)

| <p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার গৃহায়ন ও গণপূর্ত মন্ত্রণালয় নগর উন্নয়ন অধিদপ্তর (UDD) “প্রিপ্রাকারিত অব ডেভেলপমেন্ট প্ল্যান ফর ফোরটিথ উপজেলাস” প্রকল্প-০৫ ৭ নং পৌর ওয়ার্ড এবং উপজেলা-রাঙ্গাবিয়া, জেলা-চাঁদমা সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই</p> | | | |
|---|--|--|---|
| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সমস্যা |
| ১. বোম্বাডেস সমস্যা | <ul style="list-style-type: none"> বোম্বাডেস মত, পয়সা মূল্যবোধ মালিকানা অথবা অধিকার নিয়ে মালিকানা নিয়ে গণপূর্ত বোম্বাডেস এবং অধিকার নিয়ে কর্তৃপক্ষ দ্বারা | <ul style="list-style-type: none"> বোম্বাডেস প্রকল্প মত পয়সা মালিকানা নিয়ে বোম্বাডেস মত | <ul style="list-style-type: none"> বোম্বাডেস এবং বোম্বাডেস মত |
| ২. নদী ও জল | <ul style="list-style-type: none"> নদী মত নদী মত বোম্বাডেস এবং | <ul style="list-style-type: none"> মত-বোম্বাডেস মত বোম্বাডেস মত | <ul style="list-style-type: none"> বোম্বাডেস এবং |
| ৩. পরিবহন সমস্যা | <ul style="list-style-type: none"> বোম্বাডেস | <ul style="list-style-type: none"> বোম্বাডেস এবং | <ul style="list-style-type: none"> বোম্বাডেস এবং |
| ৪. শিক্ষা প্রতিষ্ঠান | <ul style="list-style-type: none"> আমলপত্রিক মত বোম্বাডেস এবং বোম্বাডেস এবং | <ul style="list-style-type: none"> বোম্বাডেস মত | <ul style="list-style-type: none"> বোম্বাডেস এবং |
| ৫. গ্যাস মত | <ul style="list-style-type: none"> আমলপত্রিক মত | <ul style="list-style-type: none"> বোম্বাডেস মত | <ul style="list-style-type: none"> বোম্বাডেস এবং |

Figure 6: Cause, Impact and Potentials

Source: Field Survey,2015

5.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minute.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream is categorized with the discussion of the participants and provides a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table 3: Demand of People for Development Plan for 20 Years, 7 No. Ward, Rangunia Paurashava

| Demand | Remarks |
|--|---|
| Infrastructural Development of transportation system | <ul style="list-style-type: none"> • Repairmen of the roads, • Pucca road is needed, • Development of the roads will accelerate the overall development of the transportation. |
| Removal of river erosion | <ul style="list-style-type: none"> • Embankment and Guide wall is demanded • Illegal collection of sand should be controlled strictly |
| Development of Dairy Farm | <ul style="list-style-type: none"> • Development project for dairy firm is demanded to create employment, • Entrepreneur is needed either govt. or non govt. side |
| Development of drainage system | <ul style="list-style-type: none"> • Sufficient drains are needed to reduce water logging and road damage during rainy season. • Concrete drains are needed to reduce the damage of the roads. |
| Development of Residence | <ul style="list-style-type: none"> • Lots of people are homeless due to river erosion and living a pathetic life in temporary houses in govt. khas land. These people should be provided with permanent residences. |
| Demand for Gas Line | <ul style="list-style-type: none"> • Gas line is needed to make daily life easy, • Provision of Gas will reduce the fuel cost in a great extent. |
| Development of Fisheries | <ul style="list-style-type: none"> • Demand for project for fisheries |
| Infrastructural Development of Education System | <ul style="list-style-type: none"> • Repairmen of educational institution • New school are needed |
| Development of Electricity System | <ul style="list-style-type: none"> • Reduction in load shedding is needed for overall development, • Streetlight is needed |
| Development of Medical facilities | <ul style="list-style-type: none"> • Medical facilities should be ensured for every ward, • All kinds of treatment should be ensured in the community clinic, • Health facilities should be increased to fulfill the existing demand |
| Development of Forest | <ul style="list-style-type: none"> • Cooperation from the government is highly needed |
| Office for Ward Councilor | <ul style="list-style-type: none"> • An office for the Ward Councilor is needed to increase the performance of the councilor |
| Miscellaneous | Development of Sanitation system, Development of Agricultural Production, Development of the Irrigation system, Demand for Playground. |



Figure 7: Demand of People for Development Plan **Source:** Field Survey, 2015

Table 5.2: Identification of Development Plan for 7 No. Ward, Rangunia Paurashava

| Short Term | Mid Term | Long Term |
|--|---|--|
| <ul style="list-style-type: none"> • Infrastructural Development of transportation system • Infrastructural Development of Education System • Development of Fisheries • Development of Dairy Farm • Development of drainage system | <ul style="list-style-type: none"> • Development of drainage system • Development of Forest • Development of Residence | <ul style="list-style-type: none"> • Demand for Playground • Office for Ward Councilor |

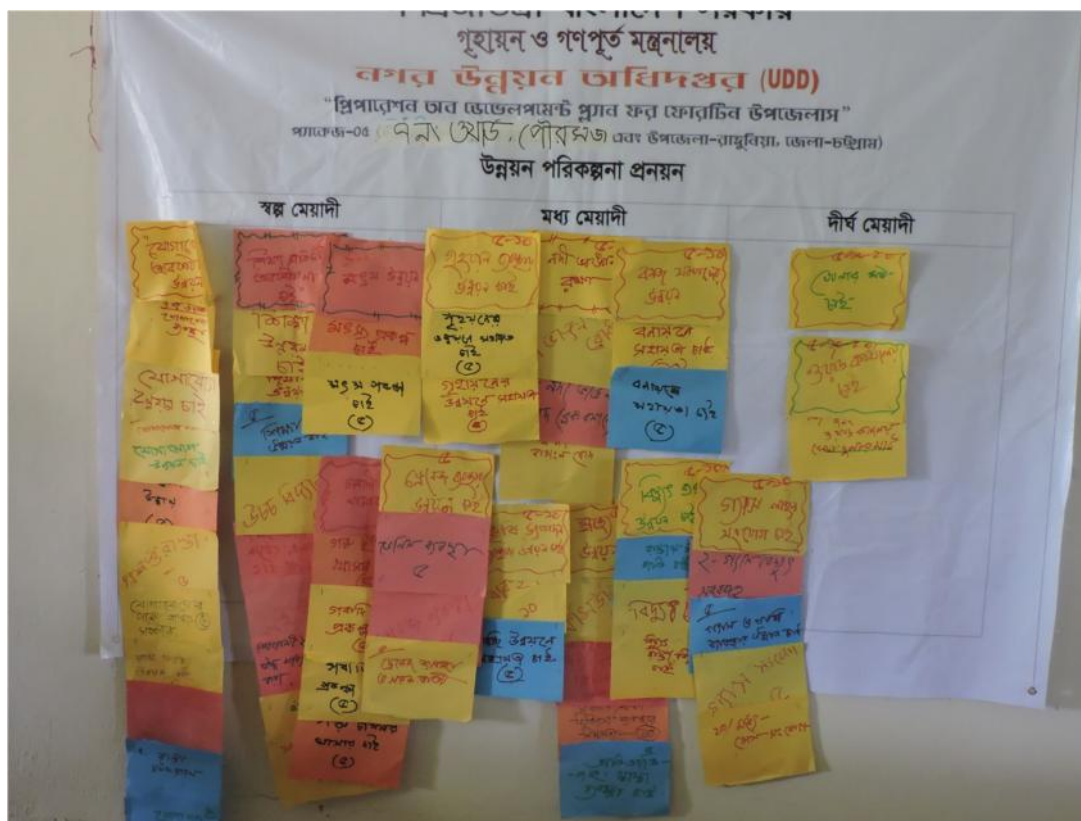


Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
Ministry of Housing & Public Works
Urban Development Directorate (UDD)**

**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (RamuUpazila, Cox's Bazar & Rangunia Upazila, and Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B
Facilitator: Md. Shahidul Islam
Co-Facilitator: Md. Walid Reza
Logistics: Saiful Islam
Rapporteur: Md. Kawsar Uddin
Time: 10.00 a.m. to 1.30 p.m.
Date: 10.10.2015
Venue: Rangunia Pourashava
Name of Union: Ward No. 8, Rangunia Pourashava.
Name of Upazila: Rangunia
District: Chittagong

1. INTRODUCTION

Participatory Rapid Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 10, 2015 at Ward No. 8, Rangunia Pourashava where 20 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, Technology of Participation (ToP) have applied for this project which will fulfill our project goal.

2. RANGUNIA POURASHAVA

Table 1: Physiographic & Demographic Information of Rangunia Pourashava

| AT A GLANCE | |
|----------------------------------|--|
| Features/ Characteristics | Remarks |
| Establishment of Paurashava | 04-07-2000 |
| Category | "B" Class Paurashava |
| Area | 8 km ² |
| No. of Ward | 09 |
| Population | 53035 |
| Male | 27244 |
| Female | 25789 |
| No. of Voter | Male- 9367 Female- 8467 |
| Literacy Rate | 70% |
| Educational Institutions | Primary School-12 High School-05 Girl's High School-01 Satellite School-02 College-02 Girl's College-01 University College-01 Madrasha-02 Vocational Institutions-01 Others -07 |
| No. of Holdings | Residential & Commercial-4373 Mixed Government-38 Industry- 04 Villages-20 |
| Transportation Facilities | Bituminous Carpeting Road-39.2 km Pucca Road-10.2 km Semi Pucca Road- 1 km Katcha Road- 11.1 km |
| Health Facilities | Government Hospital-01 Satellite Clinic-01 |
| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Rangunia Pourashava)

3. STUDY AREA PROFILE

Rangunia Paurashava, Ward No. 8 under the administrative jurisdiction of Rangunia Upazila in Chittagong District has a population of 4968 and household of 1013. The boundary of the study area is stated below:

North: On the north the study area is follows by Kurmai Khal,

South: On the south the study area follows Sundari Khal,

East: On the east the boundary of the study area is beside by Sundari Khal,

West: On the west the study area runs along the boundary of Ichamati Khal.



Plate-1: Image of Participants

Source: Field Survey, 2015

4. STEPS OF PRA APPROACH

There were 20 participants in PRA Session of Rangunia Paurashava, Ward No.1. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.00 am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (ToP)

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has shown to the participants to locate the problems/potentials sides which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).



Figure 2: Social Map of Rangunia Paurashava, Ward No.8

Source: Field Survey, 2015

5.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- Lack of drainage system
- Sanitation problem
- Poor transport condition such as broken road & culvert
- No provision of solid waste management
- No street light
- Lack of guide wall along the road side
- No provision for public toilet
- Flash flood due to excessive water from Kaptai Water Electricity Plant
- Impact of prejudice
- Insufficiency of Budget
- River Erosion
- No provision of footpath along the main road
- Lack of provision for drinking water
- Lack of correct measurement for road
- Unplanned market (Rowajar hat)
- Electricity connection problem
- Lack of security provision
- Lack of frequently internet provision
- Water logging
- No provision for Recreational Facilities such as community clinic & public library
- Unplanned Residential growth

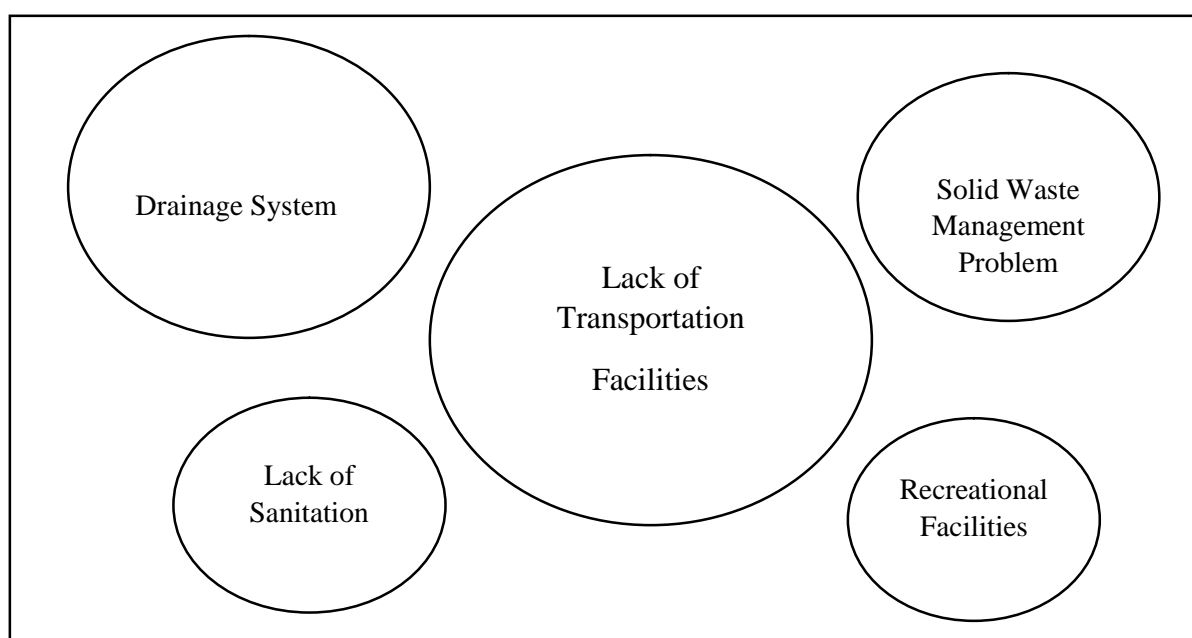


Figure-3: Venn diagram for Problems Prioritization

Source: Field Survey, 2015

5.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Agricultural land
- Fish cultivation
- Sand Extraction
- Hat bazaar namely Rowajar hat
- Educational Institutions
- Fire Service
- Rangunia Thana
- Cultivation of Vegetables
- Poultry farm
- Educated & Active human power
- Remittance
- Main center of Rangunia

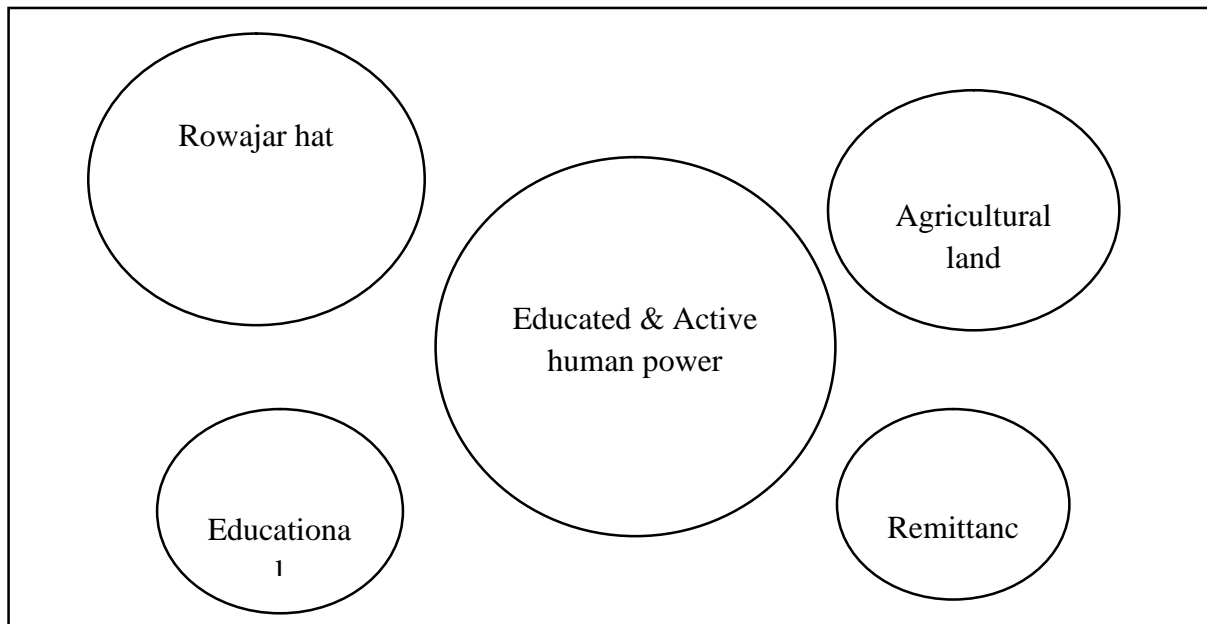


Figure4: Venn diagram for Potentials Prioritization **Source:** Field Survey, 2015

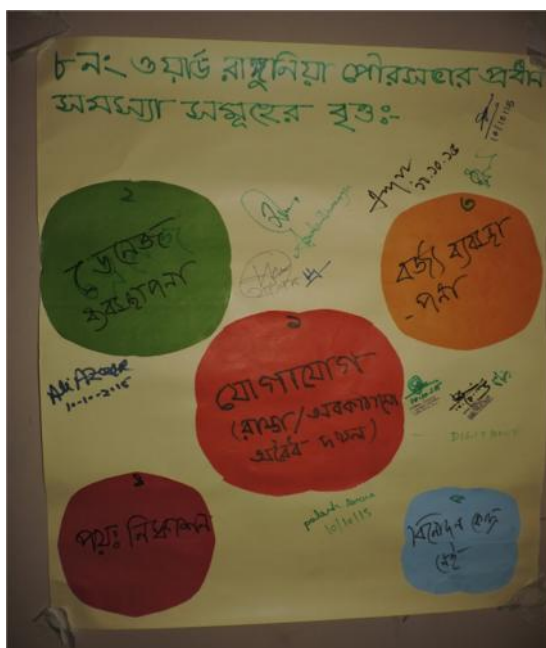


Figure 5: Problem Identification

Source: Field Survey,2015

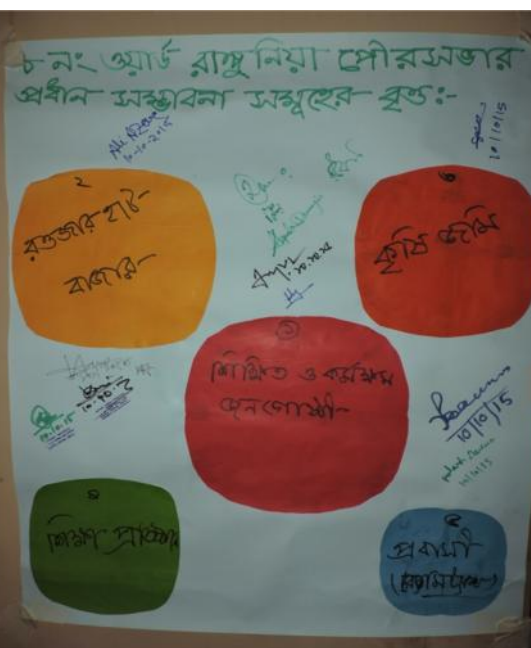


Figure 6: Potential Identification

Source: Field Survey,2015

5.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/Probability |
|--------------------------------------|--|---|---|
| 1. Lack of Transportation Facilities | <ul style="list-style-type: none"> • Encroachment of road. • Narrow road • Lack of guide wall along the road • Insufficiency of Budget • Unplanned infrastructural growth | <ul style="list-style-type: none"> • Transportation problem in going to school, college. • Agricultural products cannot transport in due time. • Patient cannot get emergency services • Fire service or other fundamental services cannot be provided. | <ul style="list-style-type: none"> • Sufficient land • Eagerly • Local donor • Active human power |
| 2. Drainage Facilities | <ul style="list-style-type: none"> • Lack of drainage in 90% areas. • Bureaucratic complexity. • Insufficiency of Budget. | <ul style="list-style-type: none"> • Water logging • Damaging the road • Discharged water from sewer clogs in road | <ul style="list-style-type: none"> • Sufficient land • Eagerly Local participation of people. |
| 3. Lack of Solid Waste Management | <ul style="list-style-type: none"> • Lack of people awareness • No provision for dumping site. | <ul style="list-style-type: none"> • People throw their waste in open land • Environment pollution • Clogging the drain | Hilly fallow areas where waste can be dumped |
| 4. Sanitation Problem | <ul style="list-style-type: none"> • Lack of Public toilet • Lack of sanitation system in religious places | <ul style="list-style-type: none"> • Environment pollution • Increasing Open defecation | Local land or Khas land |
| 5. Lack of Recreational facilities | <ul style="list-style-type: none"> • No provision for play ground • No provision for community center • No provision for Public Library | <ul style="list-style-type: none"> • Hampering the mental growth • Increasing the drug addiction • People are habituated with western culture | Local land or Khas land |

(Source: Field Survey,2015)

“প্রিপারেশন অব ডেভেলপমেন্ট প্লান ফর ফোরটিভ উইলিংনেস”
 প্রকল্প: **চাঁদাই কান্টনমেন্ট রাস্তা নিউজ পৌরসভা** উপজেলা-চাঁদাই, জেলা-চাঁদাই

| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাব্য/সম্ভবতা |
|-----------------------------|---|---|--|
| যোগাযোগ → | <ul style="list-style-type: none"> * রাস্তা ঘাট আছেই এখন. * অনুরূপ অবকাঠামো, যেমনটা প্রার্থিত— * নির্মাণ কাজে অনিয়মিত ও অপব্যয় বরাদ্দ * পরিবহন বিধান কমে * ফেরী ব্যবস্থা নিষ্পত্ত * মালিক-কাজ নেই | <ul style="list-style-type: none"> * যোগাযোগ নেই * যোগাযোগ দুর্বল-কাজ নেই * যোগাযোগ দুর্বল-কাজ নেই * যোগাযোগ দুর্বল-কাজ নেই | <ul style="list-style-type: none"> * সমস্যা-কাজ নেই * সমস্যা-কাজ নেই * সমস্যা-কাজ নেই |
| অন্য ব্যবস্থাপনা → ১০% (নে) | <ul style="list-style-type: none"> * বরাদ্দ নেই * অসম্মানজনক-কাজ নেই | <ul style="list-style-type: none"> * রাস্তা নেই * রাস্তা নেই * রাস্তা নেই | <ul style="list-style-type: none"> * সমস্যা-কাজ নেই * সমস্যা-কাজ নেই |
| বর্জ্য ব্যবস্থাপনা → | <ul style="list-style-type: none"> * যোগাযোগ নেই * যোগাযোগ নেই * যোগাযোগ নেই * যোগাযোগ নেই | <ul style="list-style-type: none"> * যোগাযোগ নেই * যোগাযোগ নেই * যোগাযোগ নেই | <ul style="list-style-type: none"> * সমস্যা-কাজ নেই * সমস্যা-কাজ নেই |
| পয়ঃ নিষ্কাশন → | <ul style="list-style-type: none"> * পানি জমাট নেই * পানি জমাট নেই * পানি জমাট নেই | <ul style="list-style-type: none"> * পানি জমাট নেই * পানি জমাট নেই * পানি জমাট নেই | <ul style="list-style-type: none"> * সমস্যা-কাজ নেই * সমস্যা-কাজ নেই |

Figure 7: Cause, Impact and Potentials Source: Field Survey, 2015

5.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 5 years), Midterm (5-10) and Long term (10-20).

Table3: Demand of People for Development Plan for 20 Years, Ward No. 08

| Demand | Remarks |
|--|--|
| Provision of Drainage Facilities | <ul style="list-style-type: none"> • Establishment of Drainage system • Provide drainage along the roadside |
| Provision of Solid Waste Management Site | They have to throw their waste haphazardly in open land, so they have urged for a dumping site. |
| Provision of Street light | They want street light provision along the road side as it is the center of the Rangunia. |
| Provision of Transportation facilities | <ul style="list-style-type: none"> • Development of Road • Construction or reconstruction of road • Free from encroachment along the road side • Widening the road |
| Provision of Recreational facilities | They have faced proper mental growth for lacking of cultural center, play ground. |
| Establishment of Model Ward | <ul style="list-style-type: none"> • Ensure urbanization • To see as a Town |
| Miscellaneous | <ul style="list-style-type: none"> • Assurance of sufficient budget • Provision of Education facilities for the poor • Improvement of Rowajar hat • Want a cremation place • Free from Mosquitoes • No biasness in pourashava • Ensure habilitation for all • High frequency mobile network and 3G or 4G network • Provision of E-service |

(Source: Field Survey,2015)



Figure 9: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

**Government of the People's Republic of Bangladesh
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**PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
Package 05- (Ramu Upazila, Cox's Bazar & Rangunia Upazila, Chittagong)**

PRA DOCUMENTATION

Conducted By: Team B

Facilitator: Md. Shahidul Islam

Co-Facilitator: Md. Walid Reza

Logistics: Saiful Islam

Rapporteur: Md. Kawsar Uddin

Time: 10.00 a.m. to 1.30 p.m.

Date: 14.10.2015

Venue: Rangunia Paurashava

Name of Word: Ward No. 9, Rangunia Pourashava.

Name of Upazila: Rangunia

District: Chittagong

1. INTRODUCTION

Participatory Rapid Appraisal (PRA) method is applied for the rural people to enhance and analyze their knowledge of life and conditions, to plan and act and to monitor and evaluate. The role of the outsider is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation. A PRA Approach was held on October 14, 2015 at Rangunia Pourashaba 09 No Word Parishad where 22 participants were present. Among the PRA techniques, the viable PRA techniques such as Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram, and Technology of Participation (TOP) have applied for this project which will fulfill our project goal.

2. RANGUNIA POURASHAVA

Table 1: Physiographic & Demographic Information of Rangunia Pourashava

| AT A GLANCE | |
|----------------------------------|--|
| Features/ Characteristics | Remarks |
| Establishment of Paurashava | 04-07-2000 |
| Category | "B" Class Paurashava |
| Area | 8 km ² |
| No. of Ward | 09 |
| Population | 53035 |
| Male | 27244 |
| Female | 25789 |
| No. of Voter | Male- 9367 Female- 8467 |
| Literacy Rate | 70% |
| Educational Institutions | Primary School-12 High School-05 Girl's High School-01 Satellite School-02 College-02 Girl's College-01 University College-01 Madrasha-02 Vocational Institutions-01 Others -07 |
| No. of Holdings | Residential & Commercial-4373 Mixed Government-38 Industry- 04 Villages-20 |
| Transportation Facilities | Bituminous Carpeting Road-39.2 km Pucca Road-10.2 km Semi Pucca Road- 1 km Katcha Road- 11.1 km |
| Health Facilities | Government Hospital-01 Satellite Clinic-01 |
| No. of Hat Bazar | 04 |
| Paurashava Market | No |
| Bus Terminal | No |
| No. of Public Toilet | 12 |
| Street Light | 324 |
| Religious Infrastructure | Mosque- 46 Temple- 19 Pagoda- 12 |

(Source: Rangunia Pourashava)

3. STUDY AREA PROFILE

Rangunia Paurashava, Ward No. 9 under the administrative jurisdiction of Rangunia Upazila in Chittagong District has a population of 3171 and household of 614. The boundary of the study area is stated below:

North: On the north the study area is follows by 8 No. Ward,

South: On the south the study area follows Mariomnagar Union,

East: On the east the boundary of the study area is beside by Mariomnagar Union,

West: On the west the study area runs along the boundary of 4 No. Ward.



Plate 1: Image of Participants

Source: Field Survey, 2015

4. STEPS OF PRA APPROACH

There were 22 participants in PRA Session of Rangunia Pourashava 09 No Word. The participants were included UP chairman and 9 ward members (9 male and 3 female members) and secretary and other elite persons such as Teacher, Farmer, Imam, Businessmen, Social worker, Political leader, Surveyor, Student, Driver, Entrepreneur and Local people etc. PRA was lasted from 10.15am to 1.30 pm. Two facilitators by turn lead the session to facilitate the whole group session. While the participants are associated with Social Mapping, Identification of Problems & Potentials, Cause Effect Diagram and at last Technology of Participation (TOP).

After saying the purpose of Development Project for 20 years, the schedule of PRA Session is explained by the facilitator and the participants have identified the problems and potentials of the jurisdiction area using Venn diagram and Cause Effect Diagram. Besides this Task, two or three persons from the group were selected to draw the Social Map of the union and other participants were involved to find out the Problems & Potentials and Cause Effect Diagram on the basis of problems. When these two tasks were finished, the map has shown to the participants to locate the problems/potentials side which have spatial implication to the map. After they were done with mapping, problem and potential identification is further updated by Venn diagram and Cause Effect Diagram. At last, the participants were told to see dream for 20 years where the dreams will be categorized in this part known as Technology of Participation (ToP).

5. PRA TECHNIQUE

5.1 Social Mapping

Social Mapping can be used as an effective ice breaking exercise as well as a tool to investigate the knowledge of the people about their own locality, their resources and their spatial distribution. To prepare the social map following steps were followed.

- First we have selected two or three persons for preparation of social map who know well about their area.
- We try to explain the purpose of the exercise to the participants. Request them to start off with drawing boundary demarcation and the prominent physical features of their locality.
- Identify valuable resources such as School, Hospital, Road, Market, Government Office, etc.
- To represent a central and important landmark.
- Watching the process alertly. Finding out the main problems and resource areas in the areas from the discussions take note in detail as much as possible.
- Once the mapping is over, ask some people to check the map and identify the problem areas.
- Ensure that everyone has access to the resources they need
- Avoid duplication of services and resources
- Enhance services
- Identify flexible funding strategies
- Cultivate new partnerships and relationships

5.2 Identification of Problems

The participants were asked to inform the problems most in their locality which will give a total scenario about their demanding areas. This approach was done by hearing every point and with the discussion from the participants. The pointed/ faced problems are sought out in A2 paper sheet which is shown to all and from the list of problems 5 major problems are identified through Venn diagram. The following problems are identified:

- River erosion
- Poor transport condition
- No street light
- Poor maintenance of religious institutions (Temple, Grave yard, Crematory)
- Lack of drainage system
- Lack of recreational Place (no playground in the whole 9 No word)
- No connection of gas line
- Electricity Connection Problem (lack of electric line and load shedding, unplanned electric line)
- Lack of Community center
- Lack of Health facility (no hospital)
- Poor condition of sanitation facilities
- Unemployment
- Lack of safe drinking water
- Lack of guide wall along the roadside

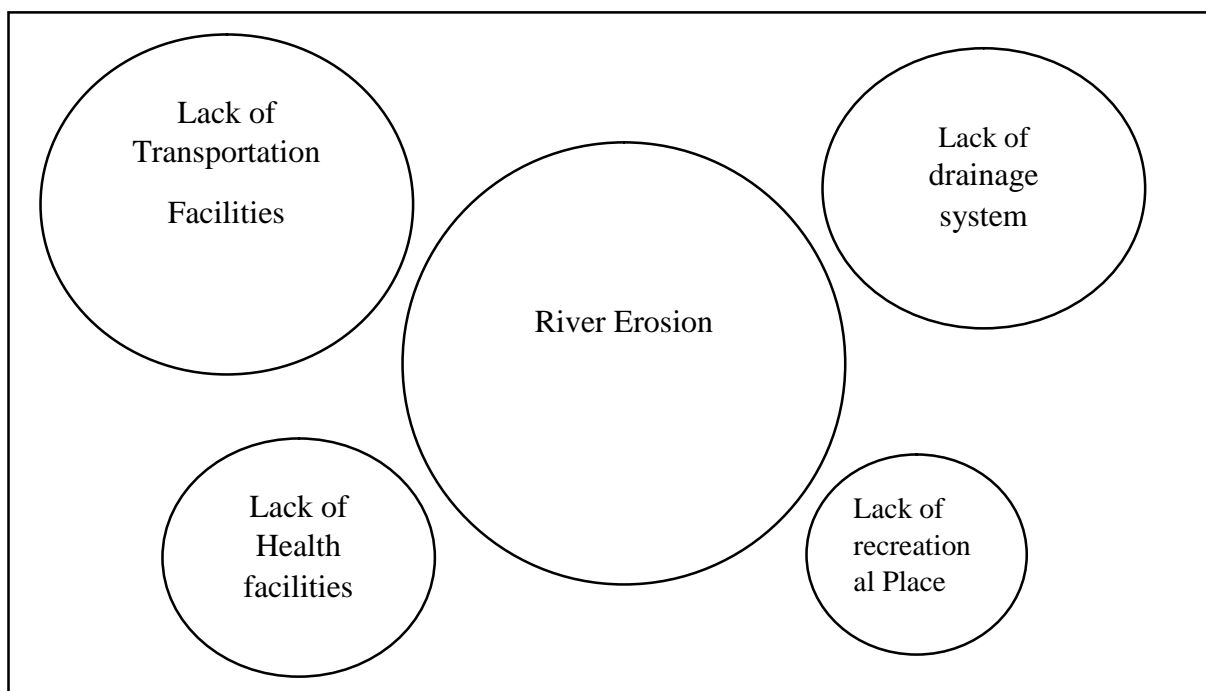


Figure 2: Venn diagram for Problems Prioritization, **Source:** Field Survey, 2015

5.3 Identification of Potentials

After knowing the problems, the next step was to identify the potentials of the respective area according to the previous stage. The sought out potential list is followed as below:

- Educational Institutions
- Agricultural land
- Educated& active human power
- Battle leaf cultivation
- Remittance
- River (Isamati & Shundori)
- Small Business
- Elite person like Dr. Hasan Mahmud M.P.
- Fish cultivation

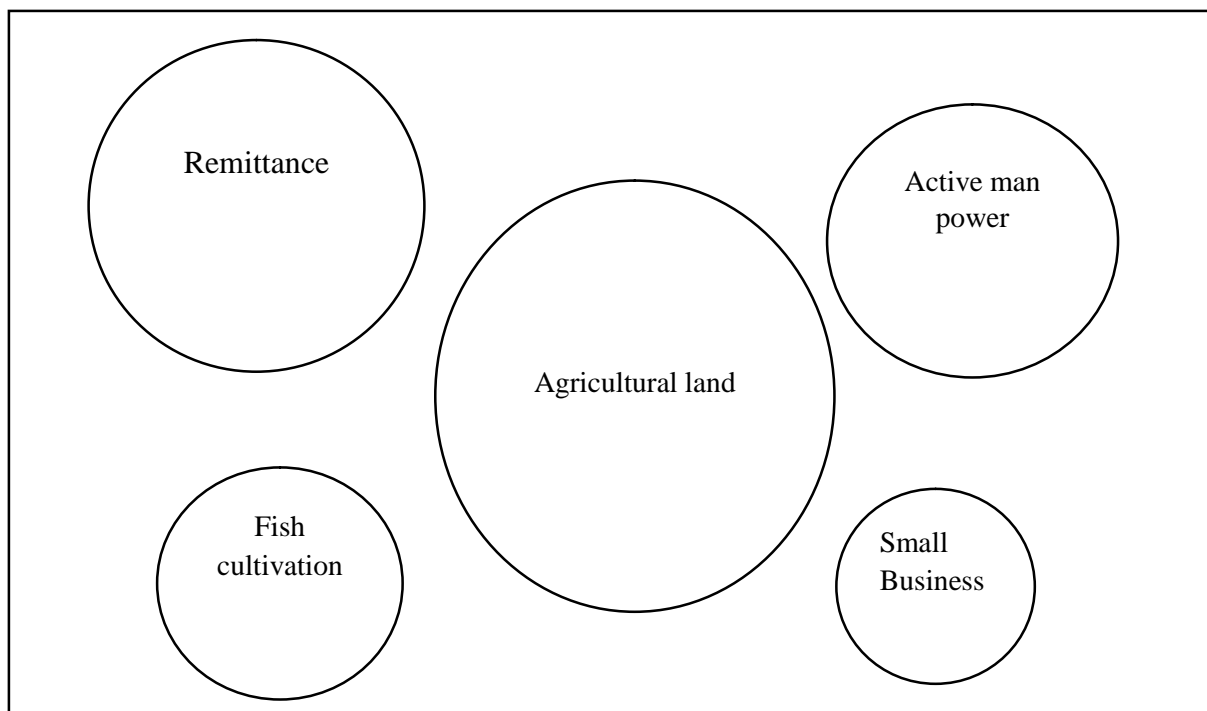


Figure 3: Venn diagram for Potentials Prioritization

Source: Field Survey,2015

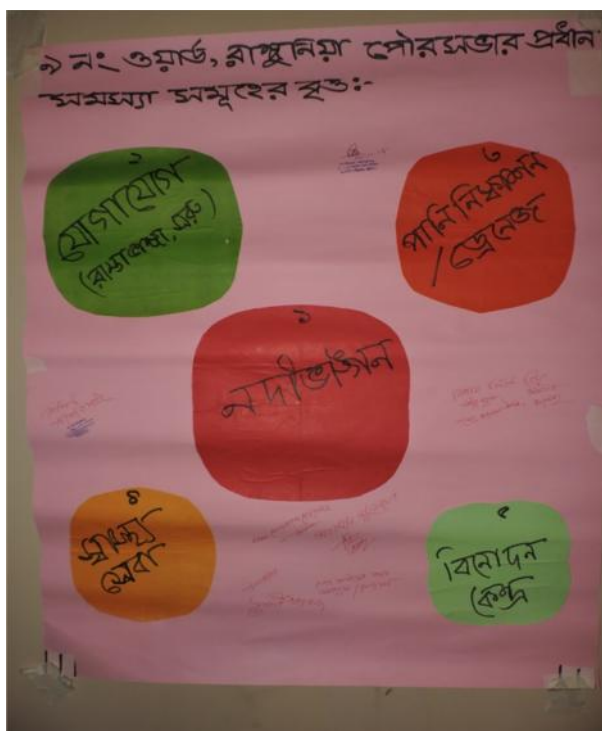


Figure 4: Problem Identification

Source: Field Survey, 2015

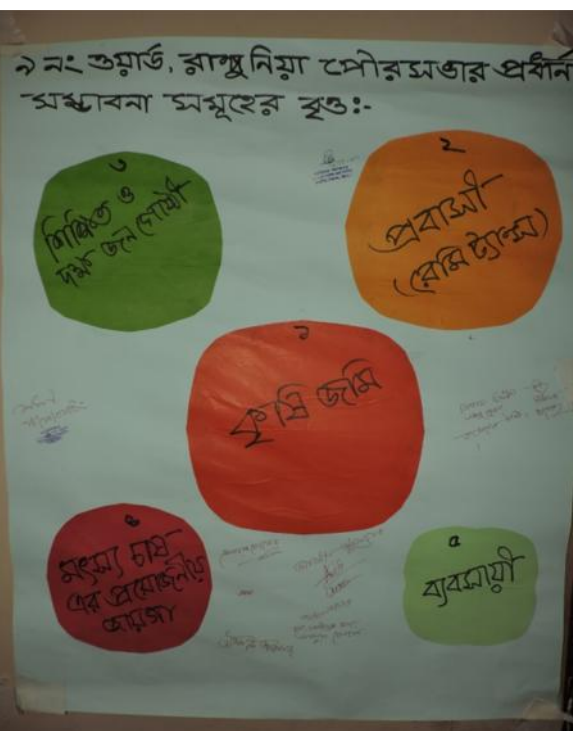


Figure 5: Potential Identification

Source: Field Survey, 2015

5.4 Identification of Prioritized Problems, Cause, Effect, Potentials

Table 2: Identification of Prioritized Problems, Cause, Effect, Potentials

| Identified Problems | Causes | Impact | Potentials/ Probability |
|--|---|--|--|
| 1. River erosion | <ul style="list-style-type: none"> Stream flow of Karnafuli, Isamati, Shundari River. Excessive discharging water from Kaptai Heat Electricity Power Plant. | <ul style="list-style-type: none"> Banishing Homestead. Loosing agricultural land. Increasing habilitation Problem | <ul style="list-style-type: none"> Sufficient space for providing block Active human power Ingredients for developments |
| 2. Infrastructure of Transportation facilities | <ul style="list-style-type: none"> Poor condition road facilities & narrow road No drainage system Lack of new road | <ul style="list-style-type: none"> People cannot get emergency services such as Health, Fire service etc. Hampering of education | <ul style="list-style-type: none"> Existing road which needed improvement. Sufficient human source. |
| 3. Lack of Drainage system | <ul style="list-style-type: none"> Lack of drainage system Insufficiency of Budget. | <ul style="list-style-type: none"> Water logging Bad impact on transportation | <ul style="list-style-type: none"> Active human power People's cordially involvement |

| Identified Problems | Causes | Impact | Potentials/Probability |
|------------------------------------|---|--|---|
| 4. Lack of Health care facilities | <ul style="list-style-type: none"> No doctor in Gov. Community clinic. No provision Hospital | <ul style="list-style-type: none"> People cannot get proper healthy service. People have to move in long distance Not possible to provide emergency services. | Sufficient land. |
| 5. Lack of Recreational Facilities | <ul style="list-style-type: none"> No provision for play ground No provision for community center | <ul style="list-style-type: none"> Hampering the mental growth Increasing the drug addiction | <ul style="list-style-type: none"> Khas land available Local donor to give a hand |

(Source: Field Survey, 2015)

| <p>গণপ্রজাতন্ত্রী বাংলাদেশ সরকার গৃহায়ন ও গণপূর্ত মন্ত্রণালয় নগর উন্নয়ন আধিদপ্তর (UDD) "প্রিয়ারেপ অব ডেভেলপমেন্ট প্রায় ফর ফোরটিউ উপজেলায়" পার্বত্য (১) নং ওয়ার্ড পল্লী নিয়া পৌরসভা উপজেলা-চাঁদপুর, জেলা-চাঁদপুর সমস্যা, কারণ, প্রভাব ও সম্ভাবনা যাচাই</p> | | | |
|--|--|--|--|
| চিহ্নিত সমস্যাসমূহ | কারণসমূহ | প্রভাবসমূহ | সম্ভাবনা/সক্ষমতা |
| ১. নদী/খাল/চৌধুরী নদীতে সাহায্য দেওয়া | <ul style="list-style-type: none"> কর্কট/ছোট/বড় নদীতে সাহায্য দেওয়া কর্কট/ছোট/বড় নদীতে সাহায্য দেওয়া | <ul style="list-style-type: none"> নদী/খাল/চৌধুরী নদীতে সাহায্য দেওয়া নদী/খাল/চৌধুরী নদীতে সাহায্য দেওয়া | <ul style="list-style-type: none"> নদী/খাল/চৌধুরী নদীতে সাহায্য দেওয়া নদী/খাল/চৌধুরী নদীতে সাহায্য দেওয়া |
| ২. মাটির ক্ষয় ও বন্যার প্রভাব | <ul style="list-style-type: none"> মাটির ক্ষয় ও বন্যার প্রভাব মাটির ক্ষয় ও বন্যার প্রভাব | <ul style="list-style-type: none"> মাটির ক্ষয় ও বন্যার প্রভাব মাটির ক্ষয় ও বন্যার প্রভাব | <ul style="list-style-type: none"> মাটির ক্ষয় ও বন্যার প্রভাব মাটির ক্ষয় ও বন্যার প্রভাব |
| ৩. পানির দূষণ/পানি অভাব | <ul style="list-style-type: none"> পানির দূষণ/পানি অভাব পানির দূষণ/পানি অভাব | <ul style="list-style-type: none"> পানির দূষণ/পানি অভাব পানির দূষণ/পানি অভাব | <ul style="list-style-type: none"> পানির দূষণ/পানি অভাব পানির দূষণ/পানি অভাব |
| ৪. মাটির দূষণ/মাটির অভাব | <ul style="list-style-type: none"> মাটির দূষণ/মাটির অভাব মাটির দূষণ/মাটির অভাব | <ul style="list-style-type: none"> মাটির দূষণ/মাটির অভাব মাটির দূষণ/মাটির অভাব | <ul style="list-style-type: none"> মাটির দূষণ/মাটির অভাব মাটির দূষণ/মাটির অভাব |
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| ১০. মাটির দূষণ/মাটির অভাব | <ul style="list-style-type: none"> মাটির দূষণ/মাটির অভাব মাটির দূষণ/মাটির অভাব | <ul style="list-style-type: none"> মাটির দূষণ/মাটির অভাব মাটির দূষণ/মাটির অভাব | <ul style="list-style-type: none"> মাটির দূষণ/মাটির অভাব মাটির দূষণ/মাটির অভাব |

Figure 6: Cause, Impact and Potentials

Source: Field Survey, 2015

5.5 TECHNOLOGY OF PARTICIPATION (ToP)

In the last phase, the people involvement is very important which will have great impact in the Development Plan for 20 years. This approach is done by the following ways:

- People were asked to dream/think for 20 years within 1 minutes.
- The facilitators provided pages for writing their dreams within 3 words and identify their desired time period besides their dream.
- After the collection of dreams, the collected dream are categorized with the discussion of the participants and provide a title name for the categorized list.
- Each dream is listed according to the category in “Development plan for 20 years” which is visible to all.
- At last, the categorized dream were attributed/sited in three phases of development namely Short term (within 0-5 years), Midterm (5-10) and Long term (10-20).

Table3: Demand of People for Development Plan for 20 Years, Rangunia Pourashava, Word No. 09

| Demand | Remarks |
|--|--|
| Development of Health facilities | <ul style="list-style-type: none">• Creation of sufficient Gov. hospital, Community Clinic• Provision of Ambulance |
| Development of Drainages system | <ul style="list-style-type: none">• Construction of New drain.• Re-construction drain• Development of Road side drain |
| Prevention of River Erosion | Proper steps have to be made to regulate the Isamati, Karnafuli & S hundari river. |
| Provision of Transportation facilities | <ul style="list-style-type: none">• Development of Road• Construction or reconstruction of road• Provision of guide wall• Widening the road• ToP the heavy transport on local areas |
| Development of Religious Institutions | <ul style="list-style-type: none">• Provision of crematory• Provision of Temple• Provision of Grave yard |
| Provision of Gas Connection | They have urged gas connection as early as possible. |
| Miscellaneous | <ul style="list-style-type: none">• Provision of Community Clinic• Assurance of proper sanitation• Controlling the Drugs and Terrorists• Development of Ward Commissioner Office• Take steps to eradicate mosquitoes |

(Source: Field Survey, 2015)



Figure 7: Demand of People for Development Plan **Source: Field Survey,201**

Table-4: Identification of Development Plan for Rangunia Pourashava, Word No. 09

| Short term | Midterm | Long term |
|---|--|--------------------------------------|
| Development of Health facilities | Development of Religious Institutions | Prevention of River Erosion |
| Development of Drainages system | Provision of Community Clinic | Assurance of proper sanitation |
| Provision of Gas Connection | Provision of Transportation facilities | Controlling the Drugs and Terrorists |
| Development of Ward Commissioner Office | | Take steps to eradicate mosquitoes |

(Source: Field Survey,2015)

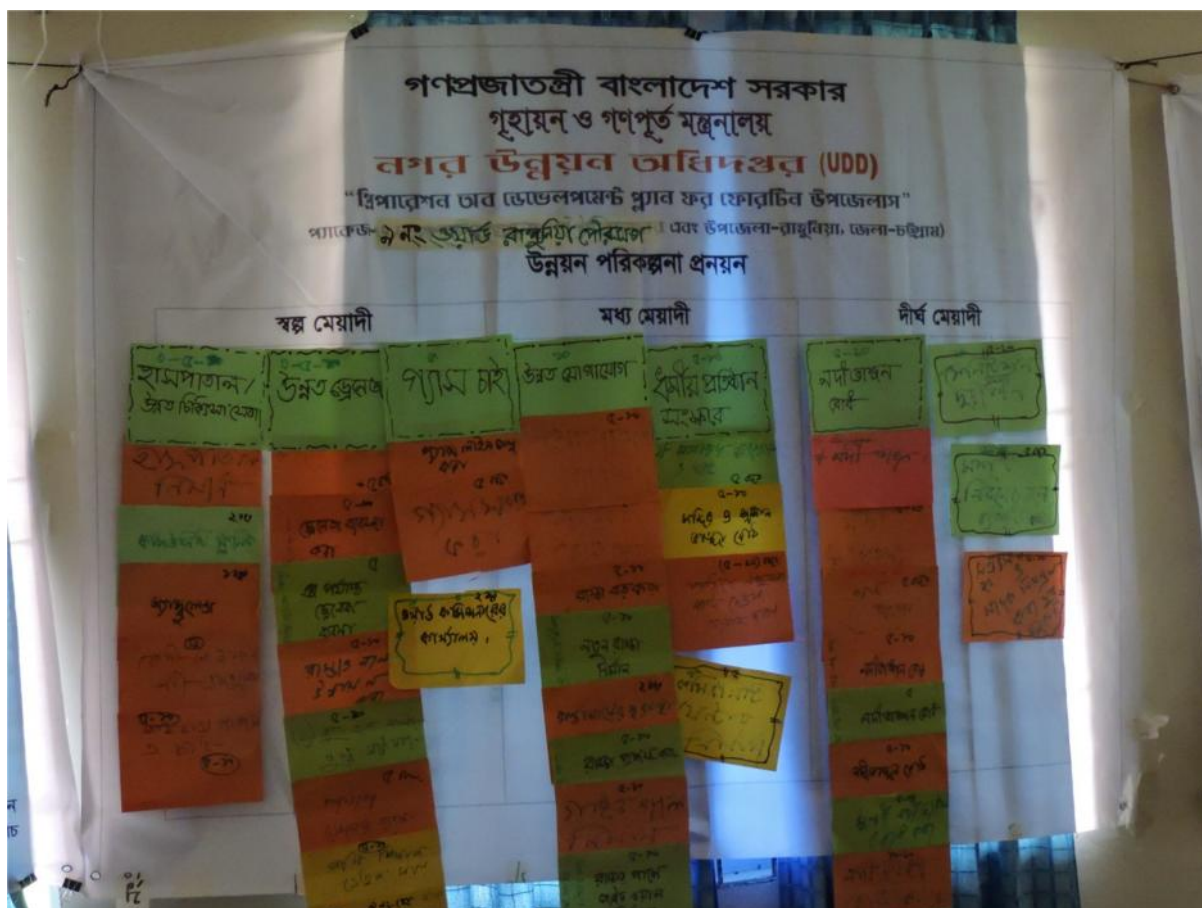


Figure 8: Identification of Demand in Preparation of Development Plan for 20 years

Source: Field Survey, 2015

6. CONCLUSION

In this study, the present scenario for the Preparation of Development Plan is explored by using Participatory Rural Appraisal (PRA) method. Several participatory tools have been used to ensure the active participation of village people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities to identify problems, potentials and demands. It helps to identify the vulnerable group and the reasons behind the deprivation. By this study, different kinds of problems have come out in a more reprehensive way. By the active participation of people they want their demand to be fulfilled and government initiation.

Annexure-III

List of Study Team

Two teams were formed in order to accomplish the entire study namely Team A and Team B. Teams were trained, guided and supervised by Social Expert (Md. Bayazid Hasan) of package-5 of this project. Composition of each team is given below.

Team A

Table 1 Formation of Team A

| Designation | Number | Name |
|-----------------------------|--------|---------------------------------------|
| Facilitator | 01 | Mr. Abdul Razzak Azad (Sociologist) |
| Co-Facilitator | 01 | Mr. Rakib Askari |
| Rapporteur | 01 | Mohammad Kawsar Uddin (Urban Planner) |
| Supporting/Logistic Officer | 01 | Mr. Walid Reza |

(Source: PRA, 2016)

Team B

Table 2 Formation of Team B

| Designation | Number | Name |
|-----------------------------|--------|------------------------------------|
| Facilitator | 01 | Mr. Shahidul Isalm (Sociologist) |
| Co-Facilitator | 01 | Mr. Saiful Isalm |
| Rapporteur | 01 | K. M. Risaduzzaman (Urban Planner) |
| Supporting/Logistic Officer | 01 | Mr. Mehedi Alam |

(Source: PRA, 2016)



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas

Package 05:

**Ramu Upazila, District: Cox's Bazar &
Rangunia Upazila, District: Chittagong**

FINAL SURVEY REPORT

Socio-Economic Survey of Rangunia Upazila

June 2016

Joint venture of
 **HOUSE OF CONSULTANTS LIMITED (HCL)**
and
 **dm. Watch** Disaster Management Watch (dm. Watch)

Executive Summary

Rangunia Upazila is situated under Chittagong District. It is bounded by Kawkhali Upazila of Rangamati on the North; Chandanaish, Patiya and Boalkhali on the South; Kaptai, Rajasthali and Bandarban Sadar Upazila on the East; and Raozan and Kawkhali Upazila on the West.


Urban Development Directorate, Ministry of Housing and Public works, Government of the People's Republic of Bangladesh had planned to prepare development plan for fourteen Upazilas throughout Bangladesh under "Preparation of Development Plan for Fourteen Upazilas. Package 05 includes Ramu Upazila under Cox's Bazar District and Rangunia Upazila under Chittagong District. Rangunia was one of the 14 selected upazilas for preparation of development plan.

Current socio-economic study was conducted under this development plan. The overall objective of this study was to map the socio economic status of the population residing Rangunia Upazila.

A total of 1100 participants were interviewed in this study aged 20-60 years. Among them, 82% were male and 18% were female. Highest numbers of participants among them were students, which is 29.3% (311). The second highest occupation was housewife. For educational qualification, 12.2% participants never went to school, 21.8% participants participated in primary or less than primary education and only 1.3% participants studied up to Honor's/equivalent level of education. Most of them found living in Kacha house (57.3%) and 74.6% participants mentioned that they lived in their own land. Despite of participant's living condition, 95.4% participants of total 1100 had their own latrine at house.

On the other hand, migration ration was found high in terms of both in-country and overseas migration. 93.1% household head came to Rangunia through migration. Government health facility, family planning, community clinic, private hospital, police box, park, playground, secondary school, high school, college, madrasa, club/gymnasium, cinema hall, bus stand, library, grave yard, eidgah, public toilet, various religious center etc were found available at Rangunia. Despite of these broad facilities, participants mentioned about some problems like- transportation, broken road, waste management, load shedding etc.

For, income earning activities, 35.7% participants mentioned about agricultural activities as main source of income. 17.9% participants also mentioned about remittance as well. At last we asked for their suggestion about further development activities and they emphasized on road construction/repair, employment creation, and health facilities and on educational facilities.



Md. Bayazid Hasan
Social Expert

Abbreviation/Acronyms

| | |
|-----|-------------------------------|
| BDT | Bangladesh Taka |
| GoB | Government of Bangladesh |
| HDI | Human Development Index |
| HBB | Herring Bone Bond |
| HH | Household |
| PDB | Power Development Board |
| REB | Rural Electrification Board) |
| UDD | Urban Development Directorate |
| SDG | Sustainable Development Goal |

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Chapter 1 Introduction

1.1 Background

Bangladesh has achieved remarkable progress in almost every sector. Although, it has made more progress than any other countries alike, but still it's not enough considering huge number of population.

Table 1 Macro-Economic Scenario of Bangladesh

| Indicator | 2009 (Actual) | 2010 (Actual) | 2011 (Actual) | 2012 (Projected) | 2013 (Projected) | 2014 (Projected) | 2015 (Projected) | 2016 (Projected) |
|--|------------------|------------------|------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| GDP growth (%) | 5.7 | 5.8 | 6.3 | 6.7 | 7.0 | 7.2 | 7.6 | 8.0 |
| National savings (% of GDP) | 29.6 | 28.8 | 28.3 | 29.8 | 30.4 | 31.1 | 32.8 | 33.8 |
| Export (% change) | 10.1 | 4.2 | 15.0 | 16.0 | 16.0 | 16.5 | 16.5 | 17.0 |
| Remittance (Billion US\$) | 9.7 | 11.0 | 11.5 | 12.4 | 13.6 | 15.1 | 17.0 | 19.0 |
| Foreign exchange reserve (Billion US\$) | 7.5 | 10.7 | 10.0 | 12.0 | 13.2 | 14.5 | 15.6 | 16.7 |

(Source: Bangladesh Economic Review, 2012)

Bangladesh is a 'least developed country' with deep-ridden and inherited extreme poverty and hunger, growing social and economic disparities, frequent cases of political and civil unrest and the daunting challenge of natural hazards, likely to be further compounded by climate change in the years to come (Institute of Development Studies).

According to the Human Development Index (2010), Bangladesh is one of the countries that made the greatest progress in recent decades, as measured by the Human Development Index (HDI). Bangladesh's HDI has increased by 81 per cent in the past 30 years. Even with such impressive relative gains, Bangladesh remains a country in need of continued and coherent development assistance.

The Monitoring of Employment Survey of Bangladesh 2009 estimated that, 53.7 million from the working-age population (15 years and above) are in the workforce. Among them, 40.2 million are male and 13.5 million are female. Although all relevant indicators of development goals have moved towards post 2015 targets, its socio-economic condition has been uneven.

The socio-economic component of any area or region intends to portray the social and economic structures and incorporate information on basic services, growth and socio-economic environments of the population that exists in locality. Planning for harmonious urban development, whether traffic and transportation, housing, roads, drains, market, open space/parks, health & education etc. These issues also match with the norms and goals of Sustainable Development Goal (SDG). SDG emphasizes on ending poverty (Goal-1), food security (Goal-2), education for all (Goal-4), water & sanitation facilities (Goal-6), resilient & sustainable settlement (Goal-11) and action against climate change outcomes (Goal-13). Government of People's Republic of Bangladesh has also emphasized on the above mentioned areas in its 7th Five Year Plan (FY2016-FY2020). In the backdrop of these issues, the 7th Five Year Plan focuses on three themes:

- GDP growth acceleration, employment generation and rapid poverty reduction
- A broad-based strategy of inclusiveness with a view to empowering every citizen to participate full and benefit from the development process.
- A sustainable development pathway that is resilient to disaster and climate change; entails sustainable use of natural resources; and successfully manages the inevitable urbanization transition

Now, at this stage; a basic assessment of existing socio-economic situation is pre-requisite in order to understand these above mentioned components.



Figure 1 Socio-Economic Structure in Photo

As planned development of Rangunia Upazila was very much desirable and needed considering the growing amount of population and massive urbanization, therefore socio-economic study is needed to identify policies for possible interventions. On that ground, a sample socio-economic survey was carried out in Rangunia Upazila at 1100 households within 15 Unions consisting of 135 wards and Rangunia Paurashava consisting 9 wards. The following descriptions and finding are developed based on that survey and their responses.

1.2 Location and history of the project area

Rangunia Upazila is situated under Chittagong District. It has total area of 410.73 sq km, located in between 22°18' and 22°37' north latitudes and in between 91°58' and 92°08' east longitudes. It is bounded by Kawkhali Upazila of Rangamati on the North; Chandanaish, Patiya and Boalkhali on the South; Kaptai, Rajasthali and Bandarban Sadar Upazila on the East; and Raozan and Kawkhali Upazila on the West.

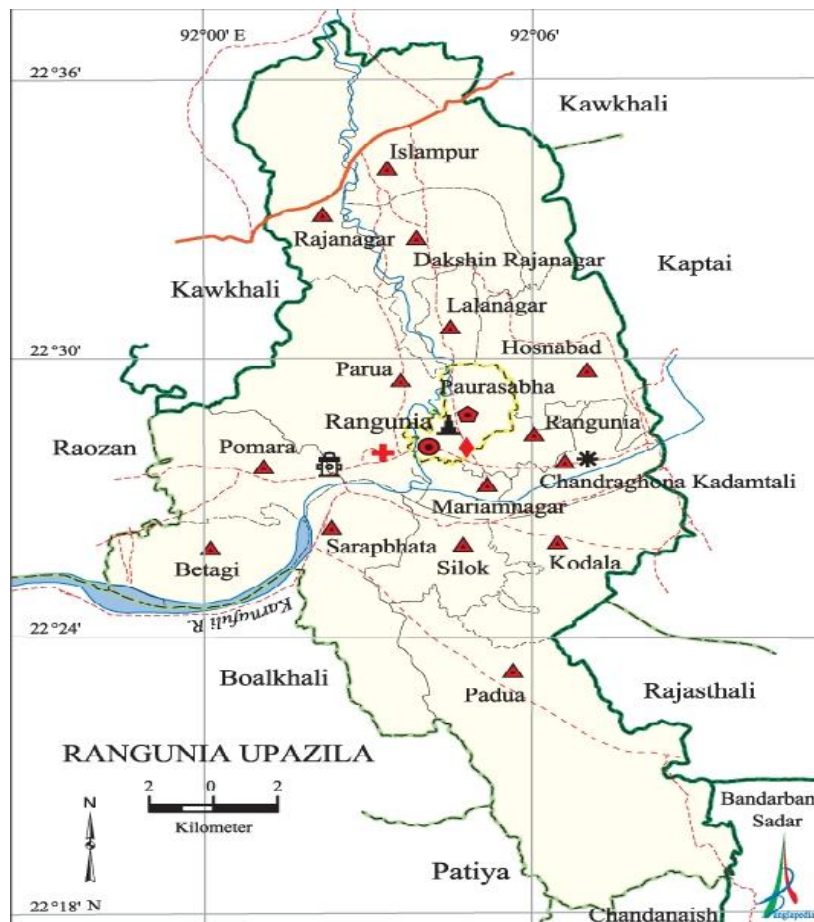


Figure 2 Map of Rangunia Upazila

(Source: Banglapedia)

According to the 2011 Bangladesh census, Rangunia had a population of 450,000. Males constituted 51.9% of the population, and females 48.1%. The population aged 18 or over was 127,825. Rangunia had an average literacy rate of 35.4% (7+ years), against the national average of 32.4%

Administration Rangunia Thana was formed on 24 January 1962 and it was turned into an upazila in 1983. Municipality was formed on 4 July 2000.

1.3 Importance in the regional context

Rangunia is an Upazila of Chittagong District in the Division of Chittagong, Bangladesh. It is one of the most promising and potential tourist spot in Bangladesh. Archaeological heritage and relics of Rangunia include Remnants of the palace Shukbilash (18th century), Ranir Pukur (Raja Hat), Pagla Mama Dargah (19th century), Shahen Shah Dargah (Pomara), Dharma Chakra Vihara (1750), Jagadhatri Mandir, Sree Sree Ramakrishna Mandir (Santiniketan), Shiva Chaturdashi Mandir (Parua), Krishna Mandir (Majumdarkhil), Sagar Dighi (Rajanagar), Mahamuni Buddhist Monastery, Simaghar.

Historical events of Rangunia Upazila include Chakma kings (Shukdev Roy, Sher Daulat Khan, Jan Baksh Khan, Tabbar Khan, Jabbar Khan, Dharam Baksh Khan, Rani Kalindi, Harish Chandra Rai and others) ruled this area since 1757. Chakma King Harish Chandra transferred his capital from Rajanagar of Rangunia to Rangamati in 1874. In 1971 encounters were held between the freedom fighters and the Pakistan army at Ranirhat, Rojarhat and Rangunia. The Pakistan army conducted looting, burning, rape and mass killing in various places of the upazila.

On the other hand, marks of the War of Liberation include Mass grave 2; memorial monument 3 (Rangunia College, Rangunia Ideal Multilateral Pilot High School and Ichakhali).

Main sources of income in Rangunia Upazila include Betel leaf, papaya and vegetables. Natural resources' like Lime stone has been detected in this upazila also.

1.4 Social Information

Rangunia has 15 Union Parishads, 72 Mouzas and 136 villages. According to Population Census-2011, there are about 303998; male 157596, female 146402; Muslim 236474, Hindu 44975, Buddhist 478, Christian 16378 and others 65. Indigenous communities such as Chakma and Marma also belong to this upazila. Population density of Rangunia Upazila in per square kilometer is 825 and average literacy rate is 63.5% in urban areas and 52.2% in rural areas. The following table presents Union wise area, and literacy rate of Rangunia Upazila where socio-economic survey was conducted.

Table 2 Union and Ward (Pourashava) Wise Population of Rangunia Upazila

| Place | Name of UP/No. of ward | Population |
|----------------------------|-------------------------------|-------------------|
| <i>Rangunia Upazila</i> | Islampur | 19044 |
| | Kodala | 18965 |
| | Chandraghona Kadamtoli | 30221 |
| | Daskhin Rajanagar | 17920 |
| | Padua | 35668 |
| | Parua | 14423 |
| | Pomara | 25659 |
| | Betagi | 20510 |
| | Mariamnagar | 18658 |
| | Rangunia | 13354 |
| | Rajanagar | 19172 |
| | Lalanagar | 14545 |
| | Silok | 18009 |
| | Sarapbhata | 25344 |
| | Hosnabad | 14871 |
| <i>Rangunia Paurashava</i> | Ward No-1 | 3329 |
| | Ward No-2 | 2497 |
| | Ward No-3 | 5625 |
| | Ward No-4 | 2967 |
| | Ward No-5 | 3019 |
| | Ward No-6 | 3094 |
| | Ward No-7 | 3971 |
| | Ward No-8 | 4968 |
| | Ward No-9 | 3171 |

(Source: BBS, Population Census-2011, Banglapedia and Rangunia Upazila Website)

Chapter 2 Approach and Methodology

2.1 Study objectives

The overall objective of this study was to map the socio economic status of the population residing Rangunia Upazila.

Specific objectives

The specific objectives of this study were:

- To assess the social services and infrastructure situation in Rangunia.
- To seek information about the livelihood sources, income ratio, expenditure, investment and savings of the inhabitants of Rangunia.
- To identify the basic needs of the area with intensive participatory practices and to suggest some concrete recommendations for development of Rangunia Upazila.

2.2 Scope of work

1. Preparation of five tiers Development Plan, such as- Sub Regional Plan, Structure Plan, Urban Area Plan, Rural Area Plan and Action Area Plan.
2. Preparation of Land use Plan, Traffic and Transportation Management Plan, Drainage and Environmental Plan, Disaster Management Plan, Urban and Rural Area Plan and Action Plans for the project area.

2.3 Sampling

Sample size has been calculated based on the total households of Rangunia Upazila under Chittagong district. According to household census, 2011; total households of Rangunia is 47904. The following statistical formula has been used for determine representative sample for proportions (Cochran, 1963:75) for household survey of Rangunia Upazila

Formula

$$x = (y \div Y) \times X$$

Here,

x= Sample Size for a Union/Ward

X= Total Sample

y= No. of Households of the Union/Ward

Y= Total No. of Households of Upazilla

Example:

Sample size for Chandraghona Kadamtali Union = $(6197 \div 67792) \times 1100 = 100.5531626$ (101 is taken)

Accordingly,

$$X_1 = (y_1 \div Y_1) \times X$$

x_1 = Sample Size for a Village

X_1 = Total Sample for Union /Ward

y_1 = No. of Households of the Village

Y_1 = Total No. of Households of Union /Ward

Example:

Sample size for Adarshagram Village (Under Chandraghona Kadamtali Union) = $(356 \div 6197) \times 101 = 5.802162337$ (6 is taken)

Table 3 Household Distribution for Sampling

| Union/Ward | No. of HH of Union or Ward | No of Households of each Village | Modified Sample Size for Each HH | No. of Interval (HHs) |
|------------|----------------------------|----------------------------------|----------------------------------|-----------------------|
| Ward No-01 | 645 | 10 | 1 | 10 |
| | | 635 | 10 | 64 |
| Ward No-02 | 476 | 358 | 6 | 60 |
| | | 118 | 2 | 59 |
| Ward No-03 | 1151 | 180 | 3 | 60 |
| | | 823 | 14 | 59 |
| | | 148 | 2 | 74 |
| Ward No-04 | 595 | 197 | 4 | 49 |
| | | 326 | 5 | 65 |
| | | 72 | 1 | 72 |
| Ward No-05 | 597 | 597 | | 16 |
| Ward No-06 | 647 | 141 | 2 | 71 |
| | | 261 | 4 | 65 |
| | | 245 | 4 | 61 |
| Ward No-07 | 803 | 237 | 4 | 59 |
| | | 566 | 9 | 63 |
| Ward No-08 | 1013 | 691 | 11 | 63 |
| | | 322 | 5 | 64 |
| Ward No-09 | 614 | 150 | 3 | 50 |
| | | 214 | 3 | 71 |
| | | 114 | 2 | 57 |
| | | 136 | 2 | 68 |
| Betagi | 4108 | 70 | 1 | 70 |
| | | 22 | 1 | 22 |
| | | 195 | 3 | 65 |
| | | 412 | 7 | 59 |
| | | 506 | 8 | 63 |
| | | 338 | 5 | 68 |
| | | 660 | 11 | 60 |
| | | 553 | 9 | 61 |
| | | 246 | 4 | 61 |
| | | 214 | 3 | 71 |

| Union/Ward | No. of HH of Union or Ward | No of Households of each Village | Modified Sample Size for Each HH | No. of Interval (HHs) |
|----------------------------|----------------------------|----------------------------------|----------------------------------|-----------------------|
| Chandraghon a Kadamtali | 6197 | 242 | 4 | 60 |
| | | 266 | 4 | 67 |
| | | 120 | 2 | 60 |
| | | 264 | 4 | 66 |
| | | 356 | 6 | 59 |
| | | 526 | 9 | 58 |
| | | 267 | 4 | 67 |
| | | 403 | 6 | 67 |
| | | 687 | 11 | 62 |
| | | 1301 | 21 | 62 |
| | | 1518 | 25 | 61 |
| | | 261 | 4 | 65 |
| | | 596 | 10 | 60 |
| | | 282 | 5 | 56 |
| | | 786 | 12 | 66 |
| Rajanagar | 3863 | 490 | 8 | 61 |
| | | 460 | 7 | 66 |
| | | 172 | 3 | 57 |
| | | 30 | 1 | 30 |
| | | 13 | 1 | 13 |
| | | 1212 | 20 | 61 |
| | | 115 | 2 | 58 |
| | | 371 | 6 | 62 |
| | | 214 | 3 | 71 |
| | | 27 | 1 | 27 |
| Hosnabad | 2930 | 922 | 15 | 61 |
| | | 30 | 1 | 30 |
| | | 225 | 3 | 75 |
| | | 760 | 12 | 63 |
| | | 259 | 4 | 65 |
| | | 588 | 9 | 65 |
| | | 119 | 2 | 60 |
| | | 1212 | 19 | 64 |
| Islampur | 3104 | 664 | 10 | 66 |
| | | 548 | 9 | 61 |
| | | 23 | 1 | 23 |
| | | 657 | 11 | 60 |
| Kodala | 3642 | 647 | 10 | 65 |
| | | 1456 | 24 | 61 |
| | | 538 | 9 | 60 |
| | | 1001 | 16 | 63 |
| Lalanagar | 3014 | 359 | 6 | 60 |
| | | 292 | 5 | 58 |
| | | 358 | 6 | 60 |
| | | 115 | 2 | 58 |
| | | 339 | 5 | 68 |
| | | 1245 | 20 | 62 |
| | | 120 | 2 | 60 |
| | | 186 | 3 | 62 |
| Mariamnagar | 3542 | 78 | 1 | 78 |
| | | 228 | 4 | 57 |
| | | 383 | 6 | 64 |
| | | 229 | 4 | 57 |

| Union/Ward | No. of HH of Union or Ward | No of Households of each Village | Modified Sample Size for Each HH | No. of Interval (HHs) |
|-------------------|----------------------------|----------------------------------|----------------------------------|-----------------------|
| | | 251 | 4 | 63 |
| | | 209 | 3 | 70 |
| | | 429 | 7 | 61 |
| | | 118 | 2 | 59 |
| | | 180 | 3 | 60 |
| | | 40 | 1 | 40 |
| | | 134 | 2 | 67 |
| | | 234 | 4 | 59 |
| | | 107 | 2 | 54 |
| | | 187 | 3 | 62 |
| | | 213 | 3 | 71 |
| | | 522 | 8 | 65 |
| | | | | |
| Padua | 7687 | 407 | 7 | 58 |
| | | 263 | 4 | 66 |
| | | 283 | 5 | 57 |
| | | 408 | 7 | 58 |
| | | 563 | 9 | 62 |
| | | 1707 | 27 | 63 |
| | | 567 | 9 | 63 |
| | | 239 | 4 | 60 |
| | | 1010 | 16 | 63 |
| | | 717 | 12 | 60 |
| | | 245 | 4 | 61 |
| | | 1158 | 19 | 61 |
| | | 120 | 2 | 60 |
| Parua | 3062 | 293 | 5 | 59 |
| | | 529 | 9 | 59 |
| | | 309 | 5 | 62 |
| | | 210 | 3 | 70 |
| | | 167 | 3 | 56 |
| | | 104 | 2 | 52 |
| | | 71 | 1 | 71 |
| | | 643 | 10 | 64 |
| | | 653 | 11 | 59 |
| | | 83 | 1 | 83 |
| | | | | |
| Pomara | 5124 | 128 | 2 | 64 |
| | | 540 | 9 | 6 |
| | | 502 | 8 | 63 |
| | | 512 | 8 | 64 |
| | | 675 | 11 | 61 |
| | | 1678 | 27 | 62 |
| | | 457 | 8 | 57 |
| | | 632 | 10 | 63 |
| Dakshin Rajanagar | 3546 | 822 | 13 | 63 |
| | | 314 | 5 | 63 |
| | | 815 | 13 | 63 |
| | | 679 | 11 | 62 |
| | | 238 | 4 | 60 |
| | | 678 | 11 | 62 |
| Rangunia | 2478 | 32 | 1 | 32 |
| | | 326 | 5 | 65 |
| | | 440 | 7 | 63 |
| | | 447 | 7 | 64 |
| | | 729 | 12 | 61 |
| | | 319 | 5 | 64 |
| | | 185 | 3 | 62 |

| Union/Ward | No. of HH of Union or Ward | No of Households of each Village | Modified Sample Size for Each HH | No. of Interval (HHs) |
|--------------|----------------------------|----------------------------------|----------------------------------|-----------------------|
| Sarapbhata | 5210 | 318 | 5 | 64 |
| | | 149 | 3 | 50 |
| | | 729 | 12 | 61 |
| | | 477 | 8 | 60 |
| | | 670 | 11 | 61 |
| | | 386 | 6 | 64 |
| | | 738 | 12 | 62 |
| | | 416 | 7 | 59 |
| | | 401 | 6 | 67 |
| | | 419 | 7 | 60 |
| | | 507 | 8 | 63 |
| | | | | |
| Silok | 3744 | 449 | 7 | 64 |
| | | 547 | 9 | 61 |
| | | 481 | 8 | 60 |
| | | 422 | 7 | 60 |
| | | 470 | 7 | 67 |
| | | 657 | 11 | 60 |
| | | 689 | 11 | 63 |
| | | 29 | 1 | 29 |
| Total | 67792 | 67792 | 1100 | |

(Source: Rangunia Sample Size Clustering, Socio-Economic Survey, 2016)

2.4 Tools development

Survey tool was developed following the below steps.

- Literature review
- Identified sectors, indicators and variables
- Draft questionnaire develop and share with project management
- Feedback incorporate and draft finalization
- Pretesting
- Finalization the questionnaire

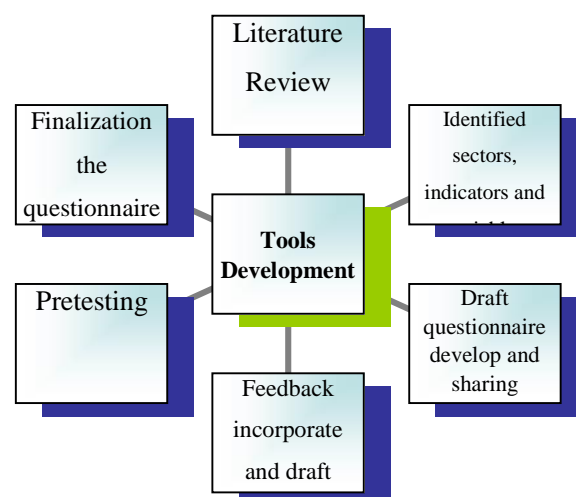


Figure 3 Tools Development Process

2.5 Survey team mobilization

Survey Team mobilization as well as field mobilization has been defined as a capacity building process through which survey team plan, n carry out any tasks. Mobilization increases the participatory decision-making processes by bringing diverse stakeholders to the table. Mobilization also fosters strong relationships between supervisors and enumerators.

Some of the key issues of team mobilization undertaken in this study are discussed below:

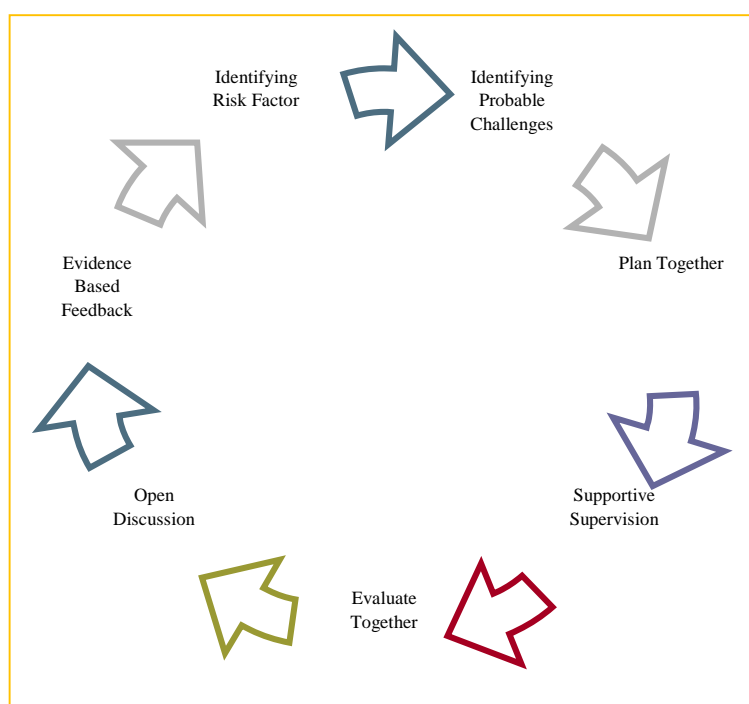


Figure 4 Survey Team Mobilization Process

2.6 Quality control measures

To ensure quality of data, a number of validation checks were conducted during data collection period:

- **Accompany check:** The supervisor reviewed the process of the interview by accompanying the enumerator.
- **Spot check:** The supervisor went back to the respondent and validate or accurate the collected data.
- **Back check:** After data collection had been completed, 5% household were randomly chosen, and then the supervisors went to the field for further investigation.
- **Feedback:** if any inconsistencies was found, then the supervisors discussed the issue with the enumerators.

2.7 Enumerators Recruitment and Orientation

Enumerators were selected based on their prior experience and expertise in conducting survey. Since the quality of data being collected depends critically on the interviewing skills of the enumerators, survey team tried to ensure recruitment of highly experienced field researchers. The survey training/orientation included field test for the enumerators and field supervisors. A comprehensive orientation/training was also organized. The training session included the following:

- Discussion on the objectives and rationale of the study
- Discussion on the quality control mechanisms related to field data collection
- Thorough analysis of the questionnaire
- Making enumerators familiar with the techniques to secure respondents' participation, interviewing techniques, how to handle difficult situations, and probing of responses.

2.8 Limitations of the study

Surveys obtain information by asking people questions. Those questions of a survey questionnaire are designed to measure some topic of interest. Study team wants those measurements to be as reliable and valid as possible, in order to have confidence in the findings. Reliability of data and findings often refers to the extent to which questions evoke reproducible or consistent answers from the respondent. But, these issues and concerns are not always over debate. Every research project has some limitations which is expected to overcome in the following study.

Considering the above mentioned issues and discussion, there are, of course, limitations to this study, the foremost of which is the representativeness of the sample. A challenge of any survey research is finding and recruiting participants from the target population (KAIROS).

Questionnaire Survey is comparatively costly and time consuming. Ideally, to conduct face to face questionnaire survey, enumerators and supervisors are required. Training of enumerators and supervisors is essential. Questionnaire Survey method relies on the tools. Unfortunately, as Chambers and Inglis pointed out that there is a mass of bad practice from people who abuse the methodology by 'rigid, routinized applications' and 'cosmetic' labelling without substance'. Accessing all the community can be a dilemma if the population size is greater considering the number of enumerators, supervisors and time given. The process is lengthy and when done well will continue with numerous exercises over months before collective action may be achieved. Practitioners whilst seeking diversity and participation can raise expectations of the community, a dilemma that has to be balanced when consultation is undertaken.

Questionnaire surveys generally cannot provide strong evidence of cause and effect. Because collected data of surveys on status and perceptions of community people of various socio economic features at the same time. It is very difficult to prove that the reputed risk factor actually causes the problem.

Other constraints to using surveys to gather data:

- Insecurity limiting access to the population of concern
- The lack of time to carry out a survey
- While a survey provides us with quantitative and qualitative data offering insight to various socio economic features; it will not produce the kind of data needed to create a full picture of the state of socio economic profile of a certain area.
- Respondents may not feel encouraged to provide accurate, honest answers
- Respondents may not feel comfortable providing answers that present themselves in an unfavorable manner.
- Respondents may not be fully aware of their reasons for any given answer because of lack of memory on the subject.
- Surveys with closed-ended questions may have a lower validity rate than other question types.
- Data errors due to question non-responses may exist. The number of respondents who choose to respond to a survey question may be different from those who chose not to respond, thus creating bias.
- Survey question answer options could lead to unclear data because certain answer options may be interpreted differently by respondents. For example, the answer option "somewhat agree" may represent different things to different subjects, and have its own meaning to each individual respondent. 'Yes' or 'no' answer options can also be problematic. Respondents may answer "no" if the option "only once" is not available.
- Customized surveys can run the risk of containing certain types of error

Chapter 3

Study Findings

3.1 Basic Demographic Profile of the Household and Population

3.1.1 Age-Sex Pyramid of the Population

In Rangunia, the survey included 1100 household for data collection. For age of the population, responses were initially categorized into six categories during coding session. An age-gender graph, commonly referred to as a population pyramid even though the graph for some cases is not actually a pyramid shape, displays a population's age and sex/gender composition. Horizontal bars represent the numbers or proportions of males and females in each age group, or cohort.

In the following separate population pyramid for both rural and urban area (see *Figure-5 and 6*), the age groups are listed vertically on the left and right. The left side of the pyramid shows the male population for each age group, and the right side shows the female population for each age group. The population is indicated for the male and female sections along the bottom of the pyramid.

Figure-5, which is age-sex pyramid of rural areas; is basically an ageing pyramid and looks like bee-hive shaped. This is an indicator of developed country, where people have higher lifetime and fewer death rates. In middle ages which range between 30 to 50 years, life expectancy of both male and female is kind of similar. Average lifetime is more for male than women. Maximum number of female population belongs to 30-50 years' age category and maximum number of male population belong to 20-30 years' age category.

Figure 6 shows age-sex graph of urban areas. It shows that, number of male and female HH members was type of similar. Highest number of female was from 20-50 years' age range. On the other hand, highest number of male was from 20-30 years' age category.

Age-Sex Pyramid: Rural Area

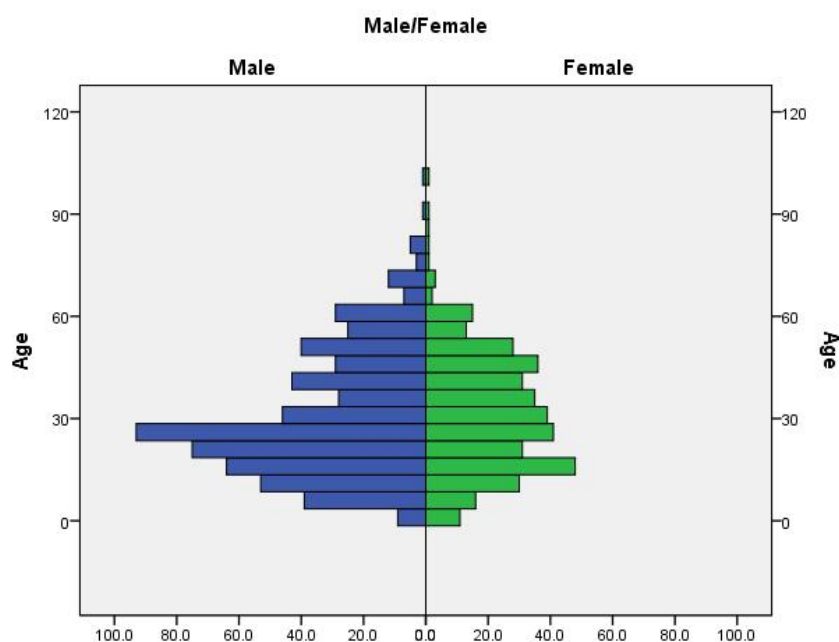


Figure 5 Age-Sex Pyramid of Rural Areas of Rangunia Upazila
(Source: Socio-Economic Survey. 2016)

Age-Sex Pyramid: Urban Area

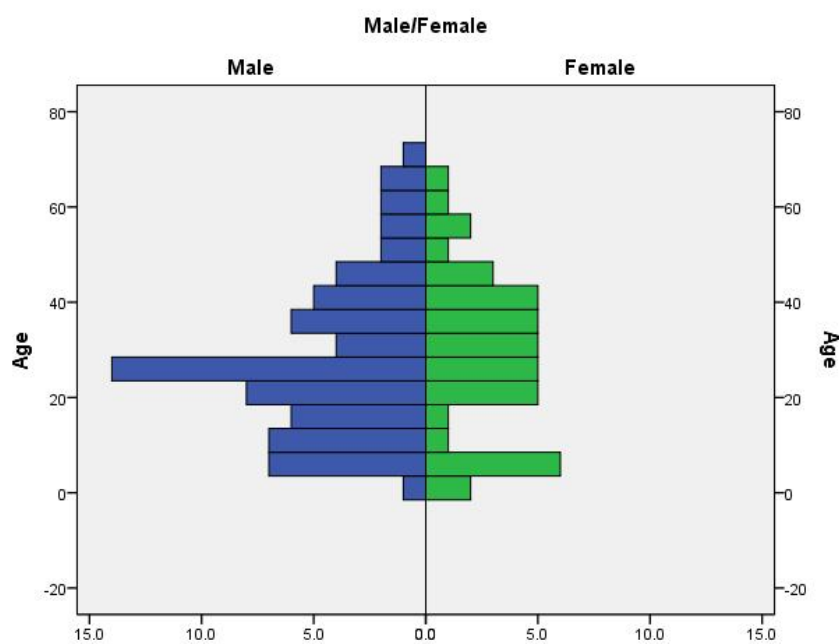


Figure 6 Age-Sex Pyramid of Urban Areas of Rangunia Upazila
(Source: Socio-Economic Survey. 2016)

3.1.2 Education level of the population

There were 10 response categories for HH member's level of education. In urban areas, highest number of HH members was found studied up to secondary/less than secondary, which was 30%; whereas in rural areas, highest percent of population were found within the

same category and the percentage was 35.3% (Please see Figure 7). 1.8% participants from urban areas and 6.3% from rural areas said that their household members were educated, but they couldn't mention the level of education. 17.2% HH Members from rural areas and 21.8% from urban areas studied up to SSC or equivalent level of education. On the other hand, 12.9% HH members from rural areas and 10% from urban areas never participated in any schooling system.

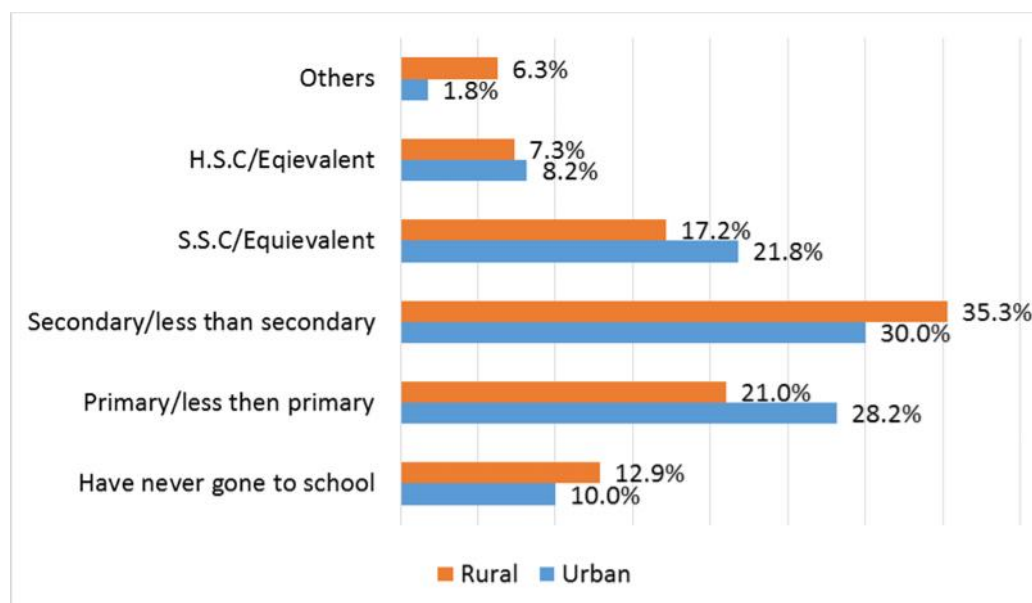


Figure 7 Education Level of the Population of Rangunia Upazila

(Source: Socio-Economic Survey, 2016)

3.1.3 Occupation of the population

Occupation of the HH members was a pre coded question where 13 codes were mentioned. Highest number of population was students in both rural and urban areas. In urban, 33.6% and in rural 28.8% HH members were found studying (Please see Figure 8). Second highest response went to housewife category. 25.6% HH Members from rural areas and 25.7% from urban areas were housewives. 5.5% HH Members from urban areas and 7.2% from rural areas were found involved with agricultural activities somehow. 7.4% urban population and 4.5% rural population was day laborer. Only 1.8% from rural areas and 4.5% from urban areas were in government job. On the other hand, more than 6% HH members from both rural and urban areas were in private job.

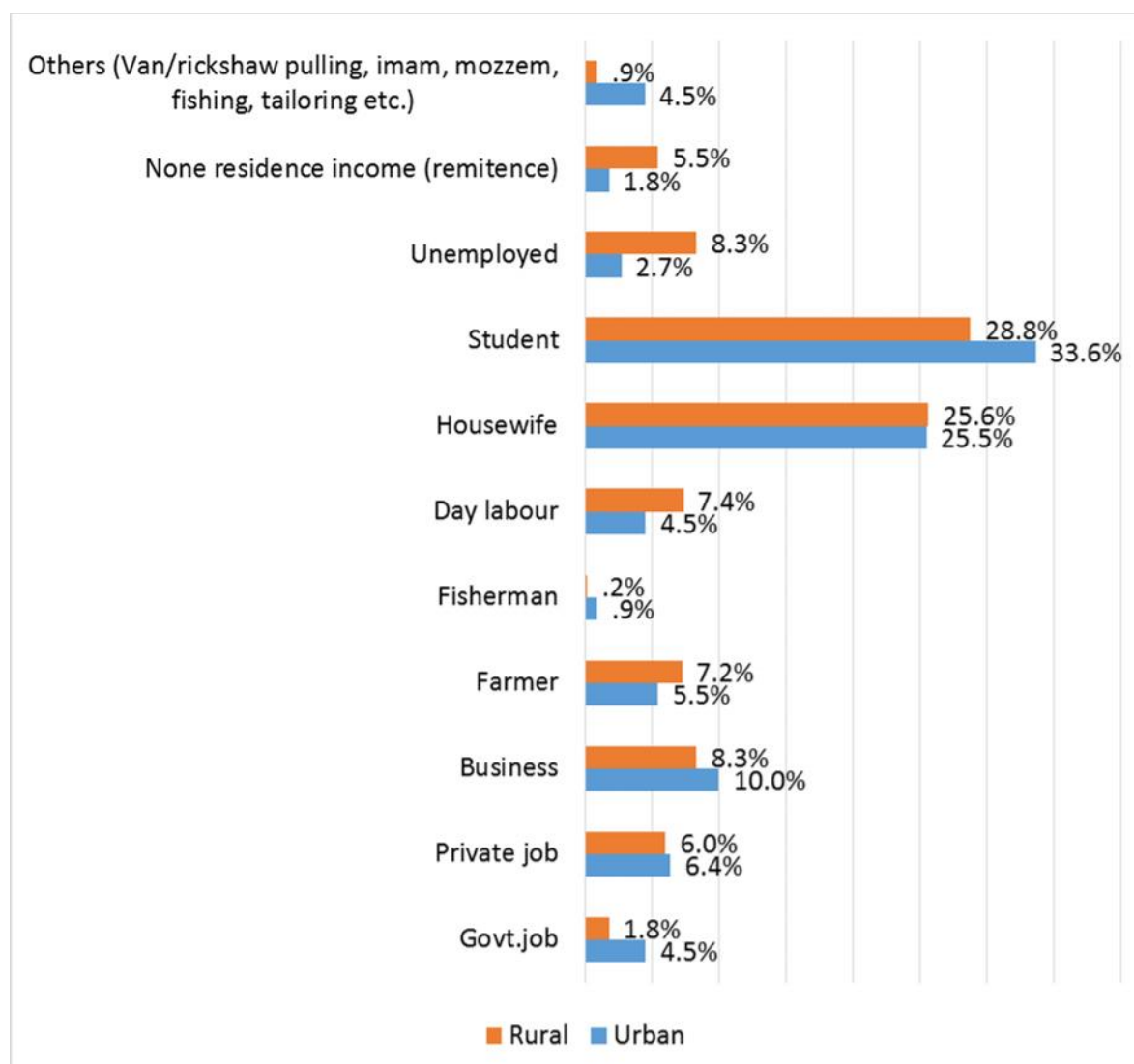


Figure 8 Occupation of the Population of Rangunia Upazila
(Source: Socio-Economic Survey, 2016)

3.1.4 Marital status of the population

This question had five pre coded response category. Among 1100 surveyed HH, 61.9% HH Members from urban areas and 59.5% from rural areas were found married. 40.2% HH Members in rural areas and 37.1% from urban areas were unmarried. Survey didn't find any incidents of separation and divorce in both rural and urban areas (*Please see Figure 9*). Only 0.3% HH members from rural areas and 1% from urban areas were found widowed.

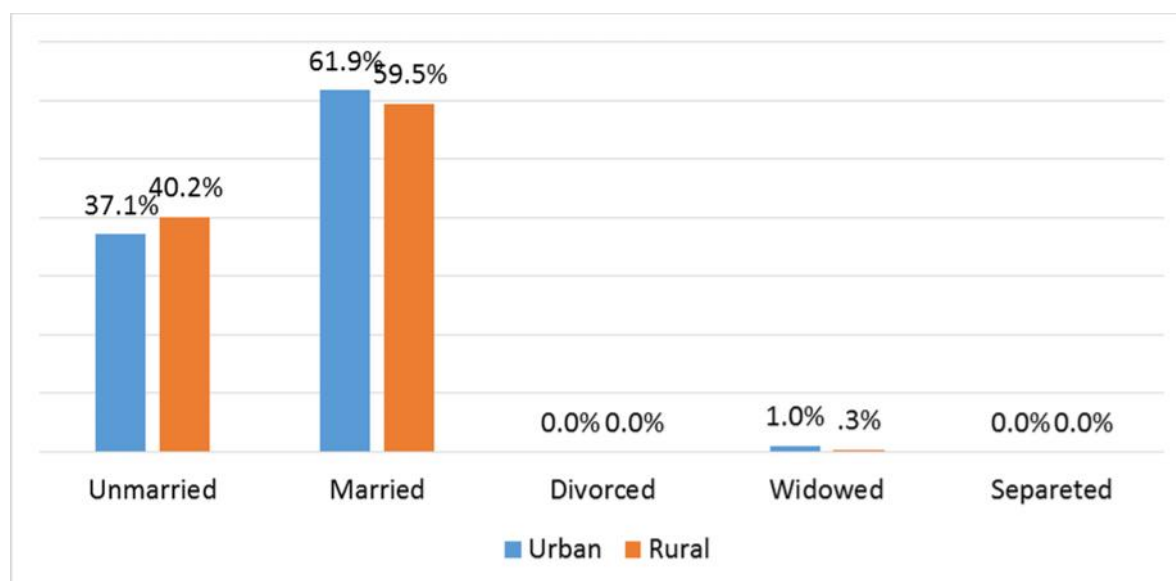


Figure 9 Marital Status of the Population of Rangunia Upazila

(Source: Socio-Economic Survey, 2016)

3.2 Housing pattern and ownership

Highest number of participants of 59.3% lived in kacha house in rural areas (Please see Figure 10) and whereas in urban 39.5%. In urban areas, highest number of participants was found living in semi-paka house; which was 50%. On the other hand 14.8% HH population was found living on paka house in rural areas and 8.8% in urban areas. Lowest frequency found in Jhupri house. In urban areas, only 1.8% people and 3.9% in rural areas were found living in Jhupri house.

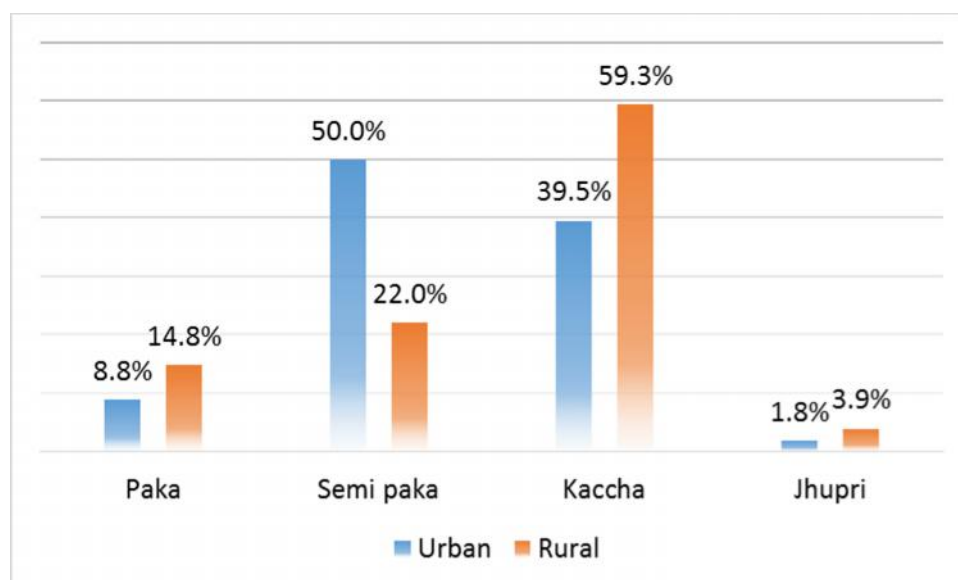


Figure 10 Type of house where the family live within Rangunia Upazila

(Source: Socio-Economic Survey, 2016)

Responses of participants in terms of ownership of land where they lived were quite interesting. 52.6% participants from urban areas and 77.2% participants from rural areas mentioned that, they lived in their own land (Please see Figure 11). On the other hand,

43.9% from urban area and only 17.7% from rural areas said about living in their parental land. No response was recorded in terms of living bank owned house. 0.2% rural population was found living government owned/demesne land. 2.7% rural population and 0.9% urban population were found living in rented house.

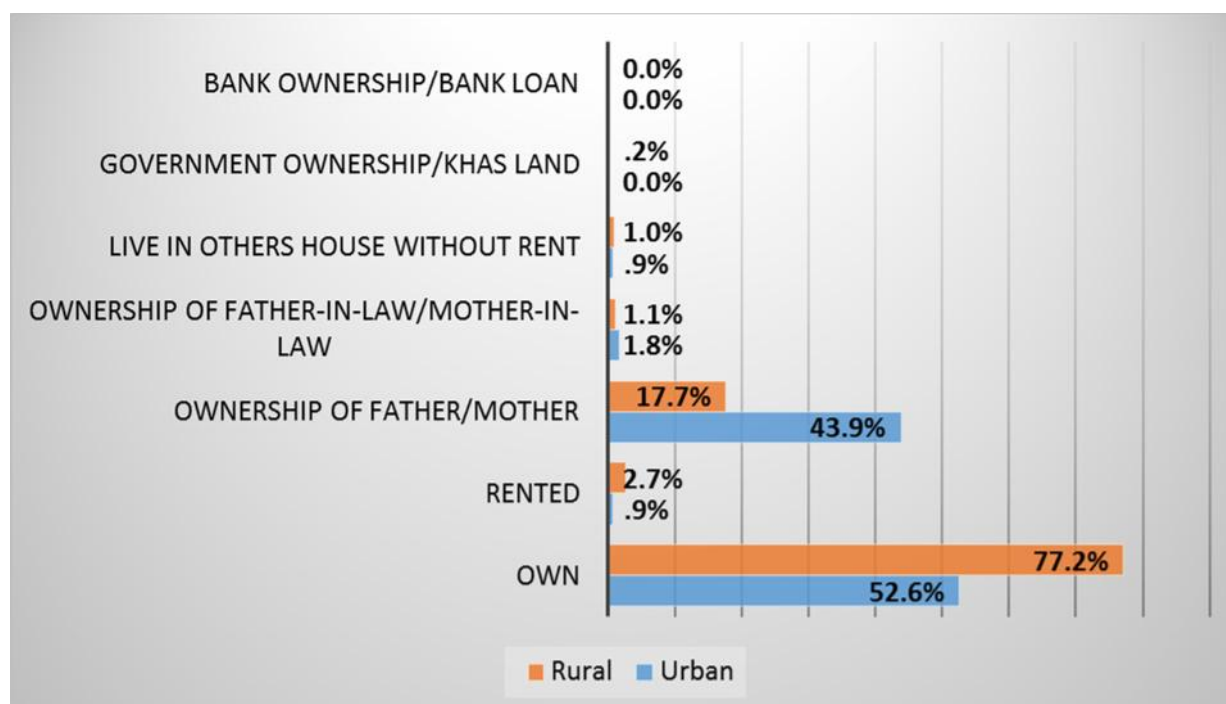
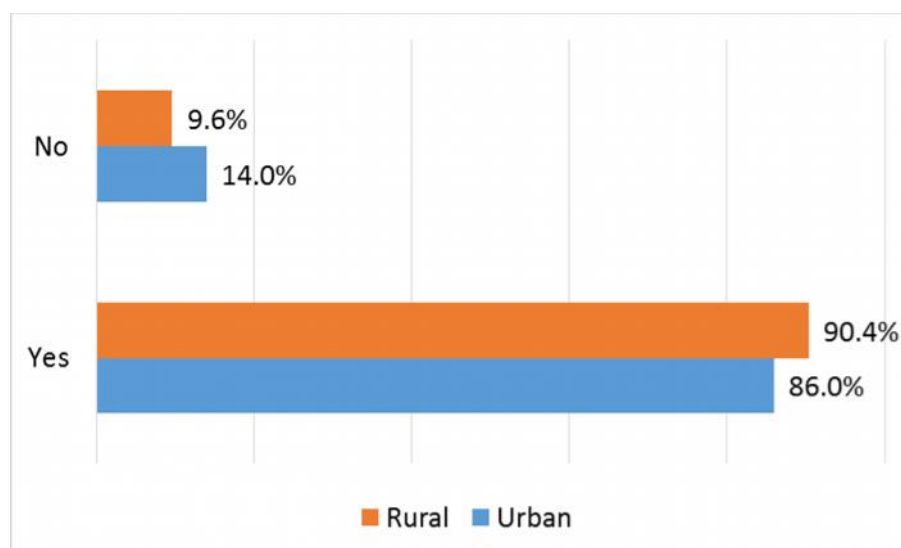


Figure 11 Type of the ownership of the house

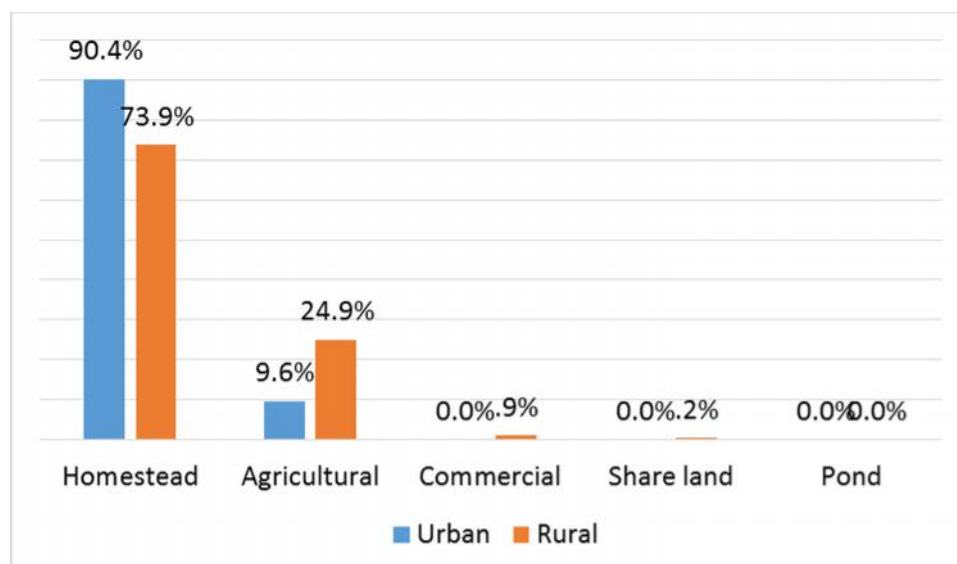
(Source: Socio-Economic Survey, 2016)

3.3 Land ownership and type of land

Land ownership means the legal rights to hold and use of the land. Following the housing pattern, the participants were asked about their ownership of land. 86% from urban areas and 90.4% from rural areas responded positively, which meant they possessed land (*Please see Figure 12*). Then, they were asked about the type of land they owned. Most of the lands in both urban and rural were found used as homestead. 73.9% participants from rural areas and 90.4% from urban areas said about homestead (*Please see Figure 13*). 24.9% rural land and 9.6% urban land was in use for agricultural purposes.

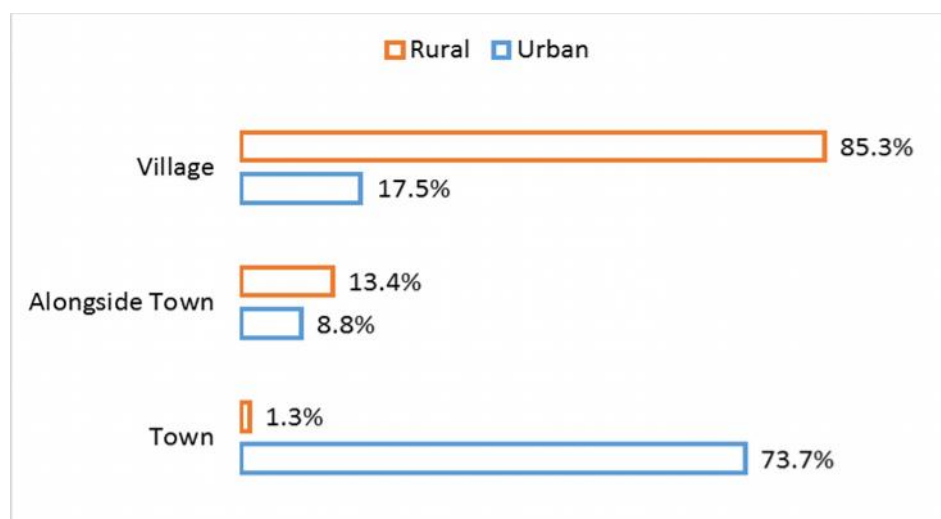
**Figure 12 Land Ownership of Family**

(Source: Socio-Economic Survey, 2016)

**Figure 13 Type of Land**

(Source: Socio-Economic Survey, 2016)

Area or position of land carries a great significance. Because productivity, uses and economic benefits greatly depends of land's position or area. Participants were asked about the area or position of their owned land. For respondent's family of rural areas; 85.3% of lands were in the area of village (*Please see Figure 14*). On the other hand, for urban area's participant's household; 73.7% land was in town area and 17.5% land was in village area.

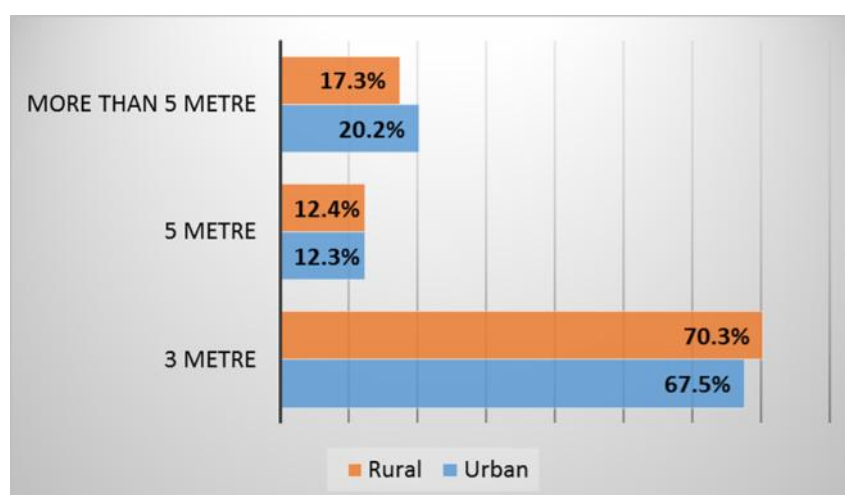
**Figure 14 Area of Land**

(Source: Socio-Economic Survey, 2016)

3.4. Status of basic infrastructure and access

3.4.1 Status of access to road

Existence of road adjacent to house is one of the key components of access to road. Participants were asked to measure a tentative width of the road in front of their house. There were three categories of response under this question. According to, 67.5% participants of urban areas and 70.3% from rural areas; responded that width of the road in front of their house was 3 meter or less (Please See Figure 15). 17.3% participants from rural population and 20.2% from urban area said that, width of the road in front of their house was more than 5 meters.

**Figure 15 Width of the road in front of the House**

(Source: Socio-Economic Survey, 2016)

On the other hand, maximum of 40.7% participants from rural area mentioned about kacha road in front of their house (Please See Figure 16). 33.3% and 30.7% participants from

urban areas mentioned separately about HBB road and kacha road. 27.2% urban population and 13.8% rural population mentioned about the existence of bituminous road.

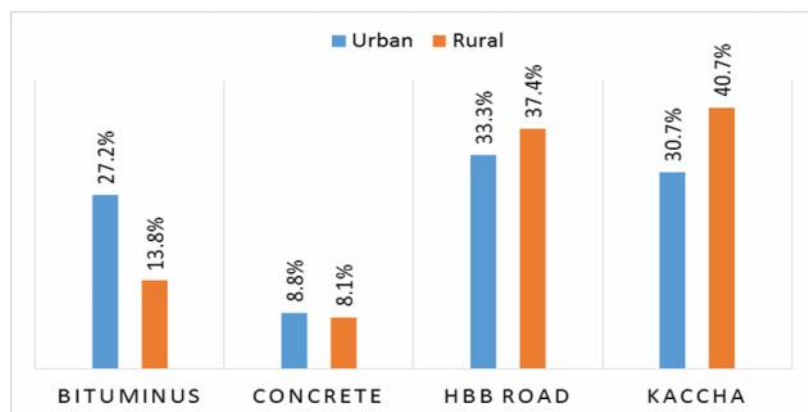


Figure 16 Type of the road in front of the house

(Source: Socio-Economic Survey, 2016)

3.4.2 Distance of main road from household

Following the width and type of road, we asked them about the distance of between main road and house. 35.5% participants from rural areas and 48.2% from urban areas mentioned that, the distance between main road and their house was 50 meters or less (*Please See Figure 17*). 41.7% participants from rural areas and 33.3% from urban areas said that, the distance between main road and their house was 51-100 meters. On the other hand, 22.8% rural population and 18.4% urban population described the distance as more than 100 meters.

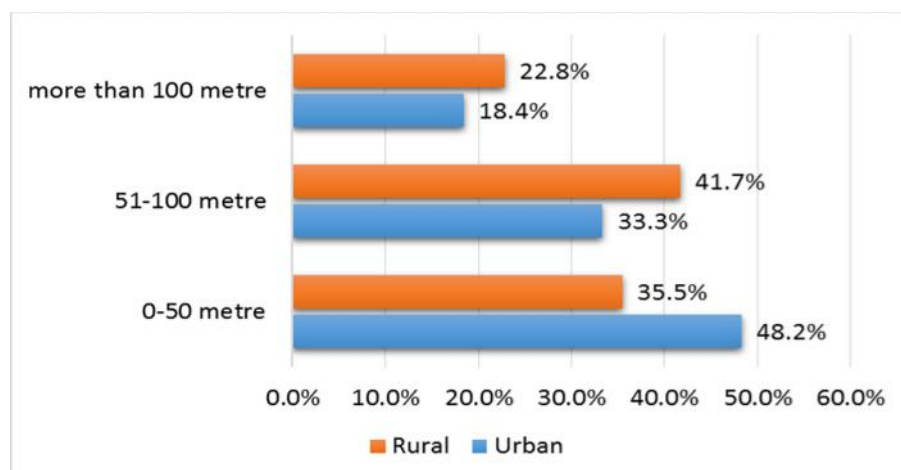


Figure 17 Distance of the main road from house

(Source: Socio-Economic Survey, 2016)

3.4.3 Access and status of drainage system

For drainage facility, 83.3% participants from rural areas and 86% participants from urban areas denied the fact of existence of drainage facility (*Please See Figure 18*). Alternatively, 16.7% from rural areas and 14% from urban areas said that they had access to drainage system. This drainage system included three types of drainage facilities, respectively-

concrete made, brick made and kacha. Among the total number of population from both rural and urban areas who mentioned the existence of facilities; 23.6% rural population and 50% urban population said about concrete made drainage facility (*Please See Figure 19*). 50% urban people and 18.8% rural population mentioned about brick made drainage facility. On the other hand, 57.6% rural people mentioned of kacha/natural drainage facility.

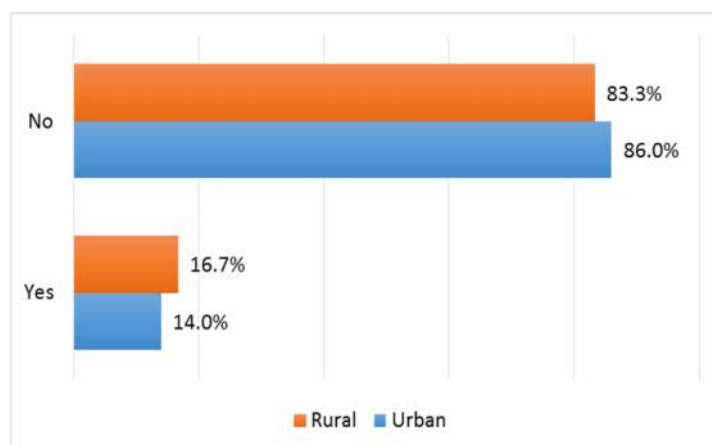


Figure 18 Existence of drainage facilities in Rangunia
(Source: Socio-Economic Survey, 2016)

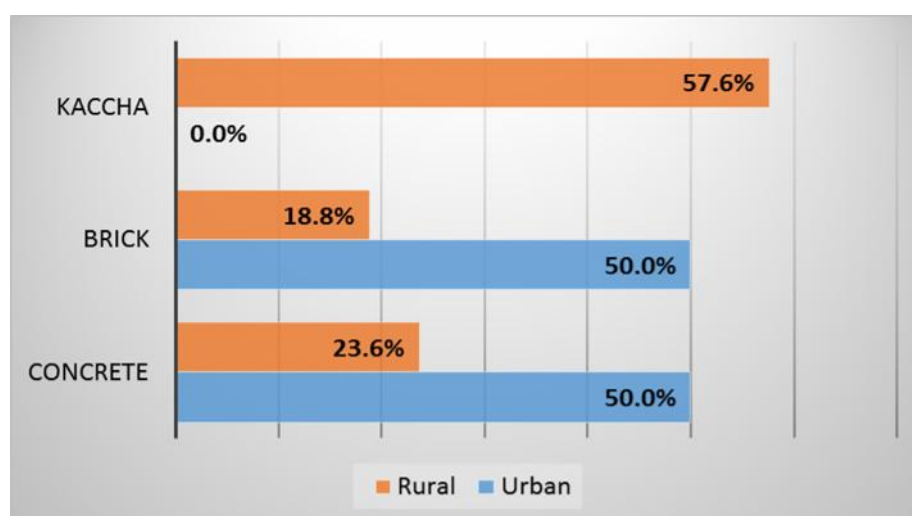


Figure 19 Type of Drainage System in Rangunia
(Source: Socio-Economic Survey, 2016)

The same participants were asked again whether their family had access to drainage facility or not. 81.3% participants from urban areas and 81.2% from rural areas mentioned about their familial access to drainage facilities (*Please See Figure 20*).

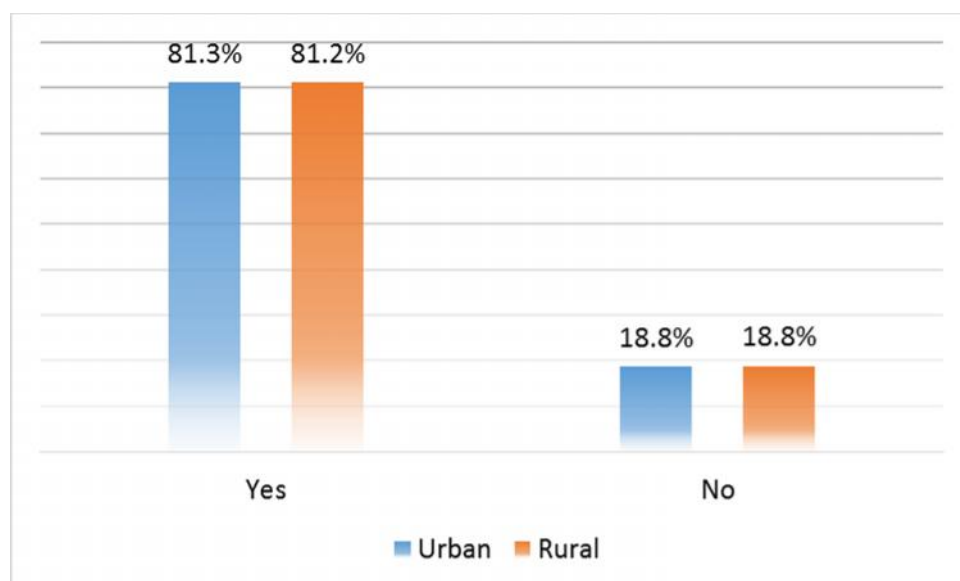


Figure 20 Family's Access to drainage facility

(Source: Socio-Economic Survey, 2016)

At the end of drainage system related section, the participants who said that their family had access to drainage system; were asked to evaluate the present condition of drainage facility. Only 8.7% participants from rural areas and 16.7% from urban areas said that the facilities were good. Reversely, 58.4% rural participants and 31.6% urban participants mentioned the present drainage situation as "not good" (Please See Figure 21). On the other hand; 46.5% participants from urban areas and 28.7% from rural areas described the drainage system as "Narrow". Only 1.3% participants from rural areas described the condition as neither good nor bad".

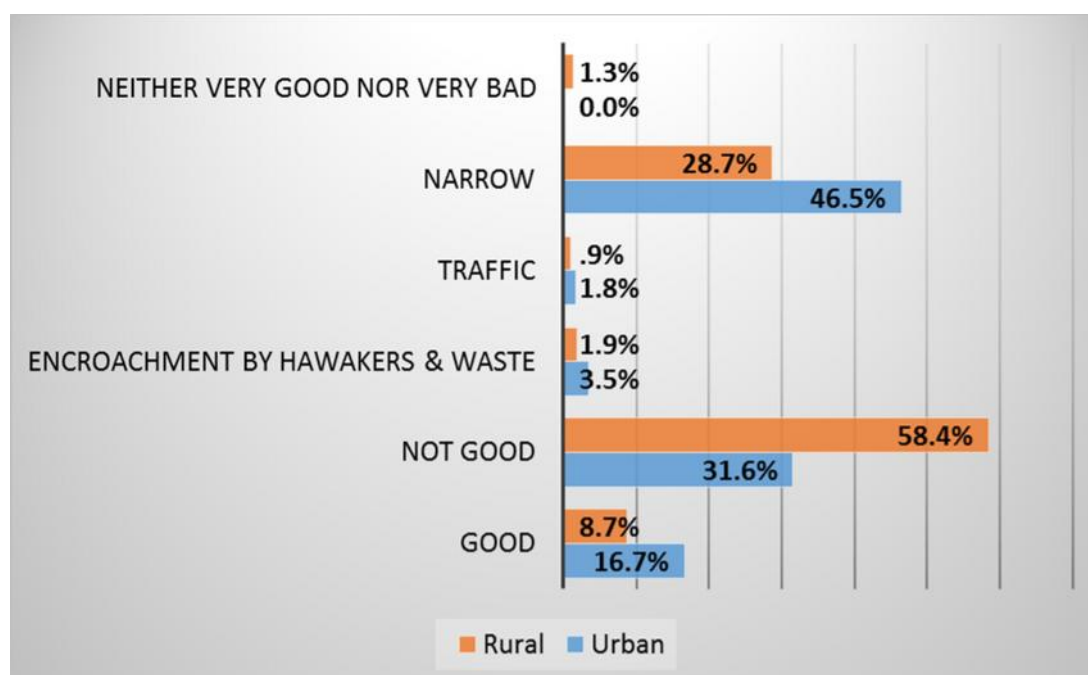


Figure 21 Present situation of drainage system

(Source: Socio-Economic Survey, 2016)

3.4.4 Street Light

Street light is not so common in out of urban areas. Sometimes, there was not sufficient street light in urban areas also. Yet, we asked the participants whether there was any street light or not. 97.5% of rural participants and 33.3% urban participants said there was no street light (Please See Figure 22).

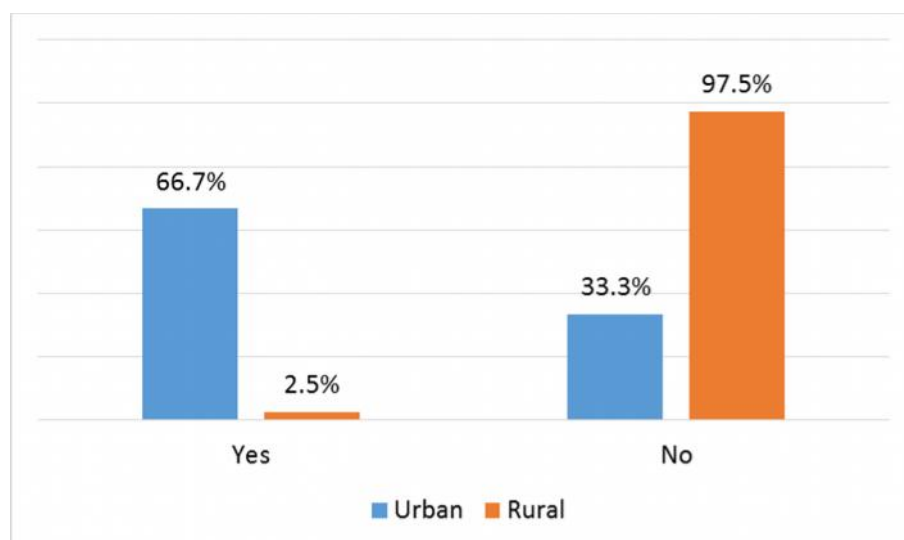


Figure 22 Availability of Street Light in Rangunia

(Source: Socio-Economic Survey, 2016)

3.4.5 Road mark/traffic signal

Road mark or traffic signal is a significant part of road construction. Unfortunately, 96.5% participants from urban areas and 99% from rural areas chose Not Applicable (N/A) option. Only 3.5% urban participants and 1% rural participants mentioned about the availability of road mark/traffic signal (Please See Figure 23). This variable was pre-coded; where respondents had only two options, respectively- availability of road mark/traffic signal in their respective area and if traffic signal/road mark doesn't applicable for their area.

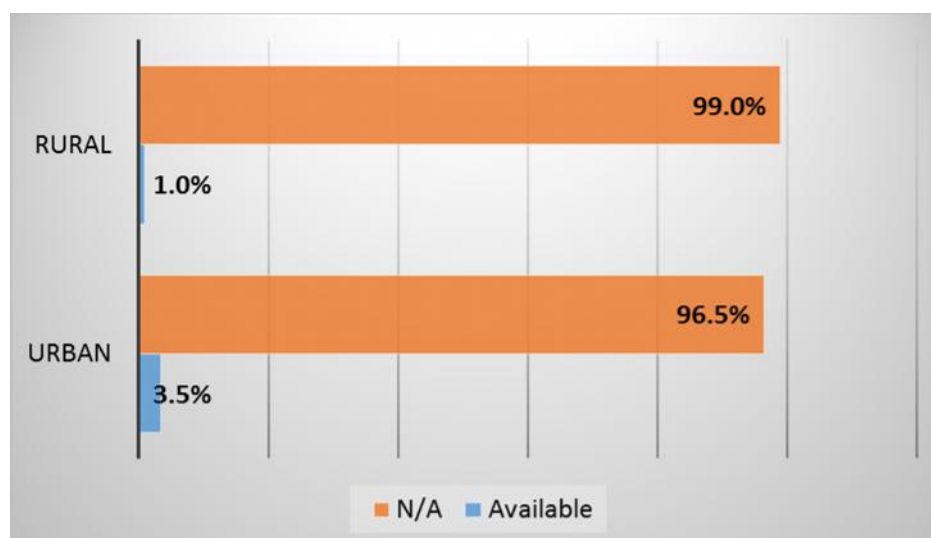


Figure 23 Traffic Signal/Road Marking

(Source: Socio-Economic Survey, 2016)

3.4.6 Condition of the road

Participants were asked to convey their knowledge about present condition of road. Maximum number of 81.3% from rural areas and 77.8% from urban areas described the present road condition as “not good” (Please See Figure 24). 3.2% of rural population described the road condition as “neither very good nor very bad”. 12.3% and 19.4% of rural and urban population opined that, the road condition was good.

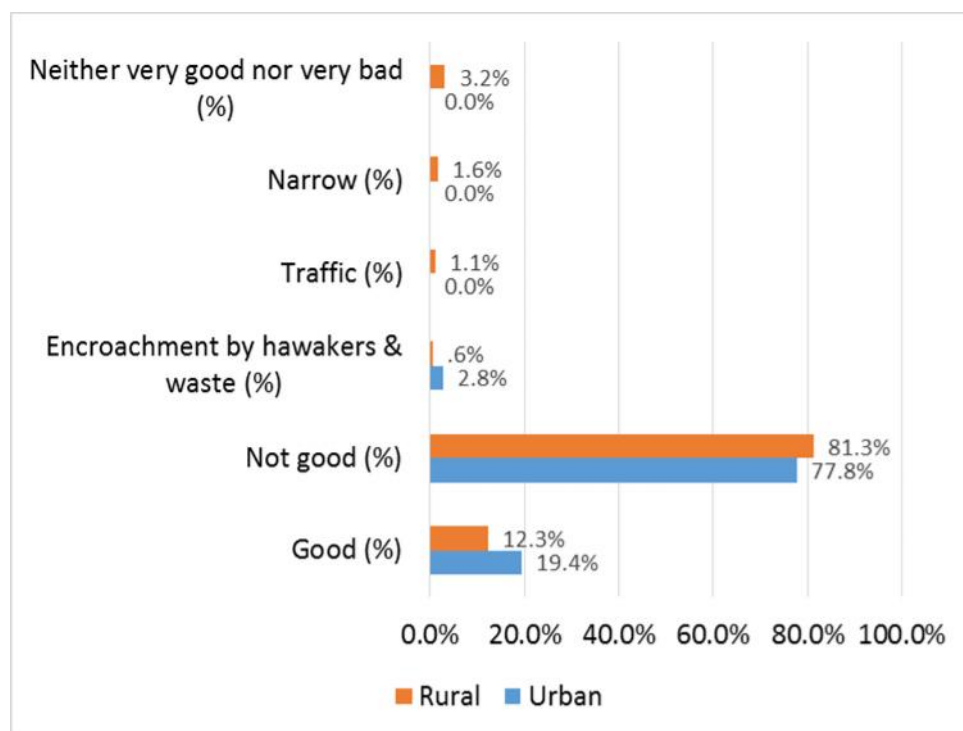


Figure 24 Present situation of road/ Problem

(Source: Socio-Economic Survey, 2016)

3.5 Waste management system of household

Following the present situation of road, we asked the participants about waste management system of household. 70.5% participants (775) said that, there was no waste management system of household (Please see Table 4). Only, 29.5% participants said that there was waste management system for household level. Among the total of participants who said that there was waste management system in their area, only 1 participant (0.3%) mentioned of hole to throw the waste (Please see Figure 25). Maximum 83.8% participants (243) mentioned drain to throw waste. 11.4% participants mentioned about “here and there” for throwing waste. 3.8%, 0.3% and 0.3% of total participants mentioned about river, beside homestead and pond respectively.

Table 4 Availability of waste management system

| Waste Management System | Number | Percent |
|-------------------------|--------|---------|
| Yes | 325 | 29.5 |
| No | 775 | 70.5 |

(Source: Socio-Economic Survey, 2016)

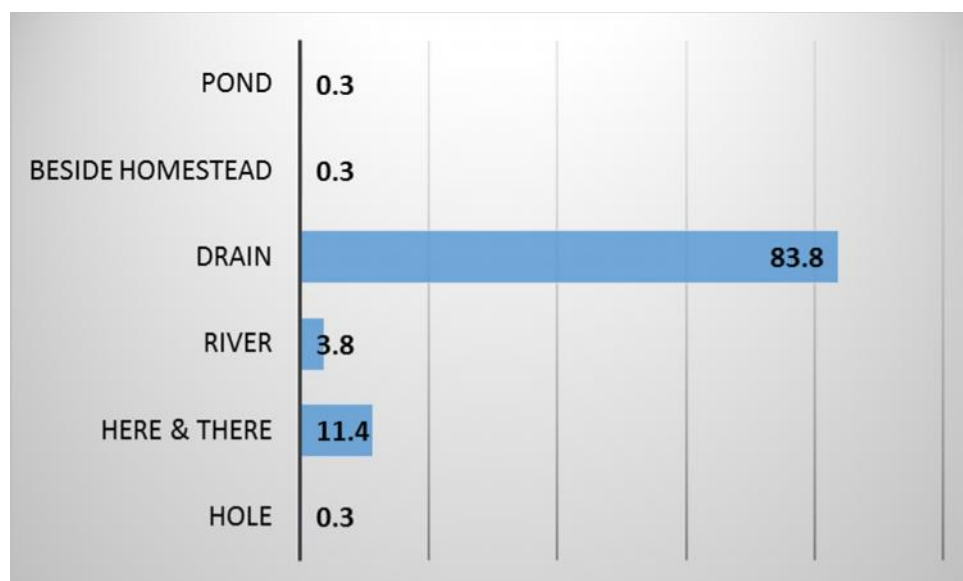


Figure 25 Waste Dumping Place

(Source: Socio-Economic Survey, 2016)

As, waste dumping place is considered as potential source of diseases, so it is generally suggested to maintain reasonable distance between home and waste dumping place. Participants were asked about the distance between their home and waste dumping place. 76% participants said that the distance was ranged from 0 to $\frac{1}{4}$ km. 21.9% participants mentioned the distance was ranged from $\frac{1}{4}$ km to $\frac{1}{2}$ km. The rest 2.1% participants (23) said that the distance between home and waste dumping place was more than $\frac{1}{2}$ km (*Please see Figure 26*).

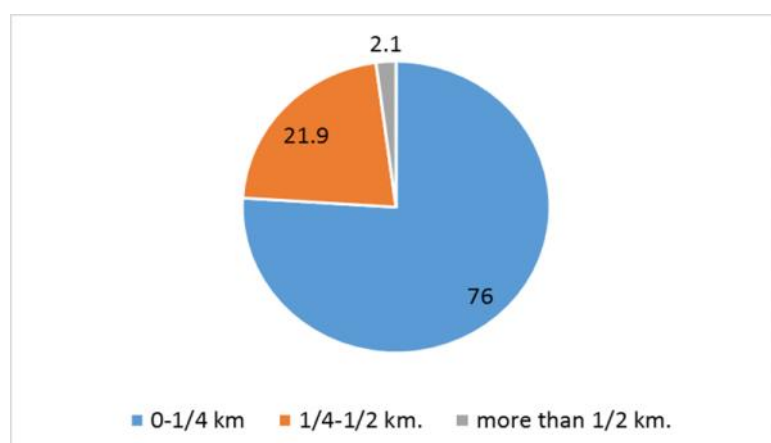


Figure 26 Distance of the place where the waste is thrown

(Source: Socio-Economic Survey, 2016)

3.6 Status of Sanitation

Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and faeces. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. Globally 2.4 billion people live without access to improved sanitation: Almost 1 billion of these people practice open defecation (World Bank). The participants were asked about the status of latrine. 91.2% participants from urban areas and 95.8% from rural areas said yes (*Please see Figure 27*). This means, they had their own latrine at house. On the other hand, 8.8% participants from urban areas and 4.2% from rural areas said that they didn't have any latrine at house.

Among the 91.2% participants from urban areas who said that they had latrine at house; were asked about the type of the latrine (*Please see Figure 28*). 59% said about sanitary latrine, 40% mentioned about using non-sanitary latrine and 1% mentioned of open defecation. On the other hand, for rural areas; 64.3% mentioned about sanitary latrine, 34.3% mentioned of non-sanitary latrine and 1.4% mentioned of open defecation.

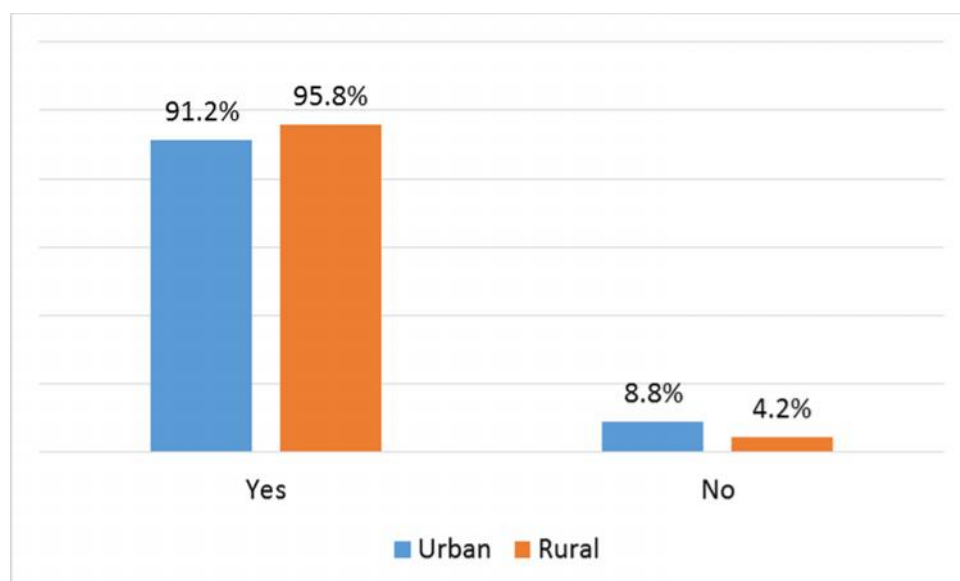


Figure 27 Existence of Latrine in Household of Rangunia
(Source: Socio-Economic Survey, 2016)

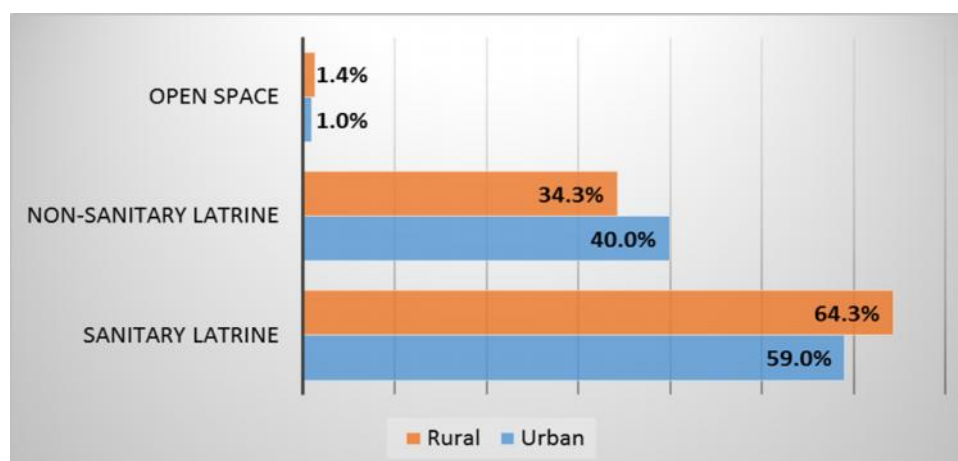


Figure 28 type of the sanitary latrine in the household of Rangunia
(Source: Socio-Economic Survey, 2016)

3.7 Source of electricity

Electricity has become one of the basics of economic development of any country. Now a day, many functions necessary to present day living grind to halt when the supply of electricity stops or if there is no electricity. Electricity has played a huge role to build the present day civilization. There are many form of electricity available in Bangladesh. We asked the participants about the sources of electricity they consumed. 86.5% participants mentioned that they used REB (Rural Electrification Board) supplied electricity. 4.3% participants said that they used PDB's electricity. 2% participants mentioned about generator generated electricity and just 5.6% participants mentioned about no electricity (*Please see Figure 29*).

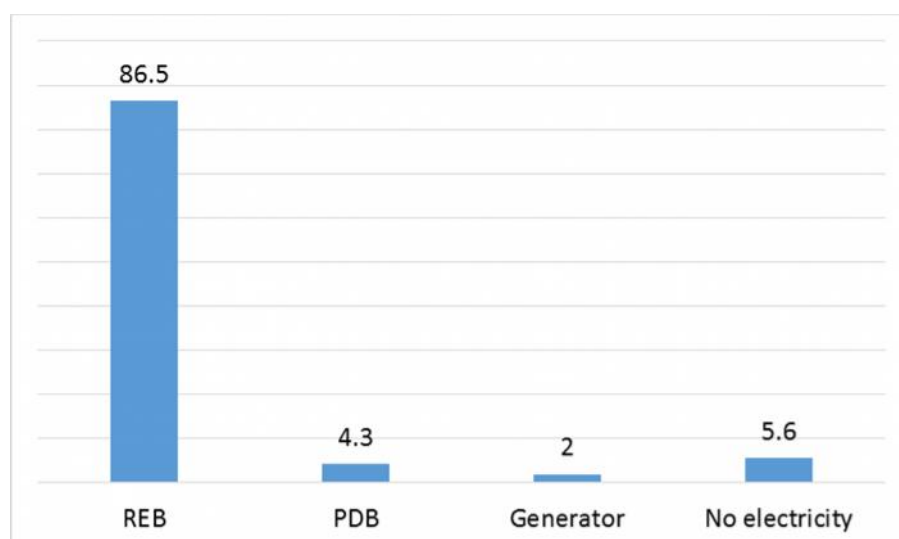


Figure 29 Source of electricity
(Source: Socio-Economic Survey, 2016)

3.8 Source of fuel for cooking

Source of fuel for cooking is one of the key issues in socio economic survey. Most of the participants mentioned about firewood. (Please see Figure 30). 6.5% participants mentioned that, they used cylinder gas. 3.2% participants (35) mentioned that, they used biogas. 0.2% participants (2) mentioned that, they used kerosene. 1.1% and 0.6% participants used respectively electric heater and cow dung as fuel for cooking.

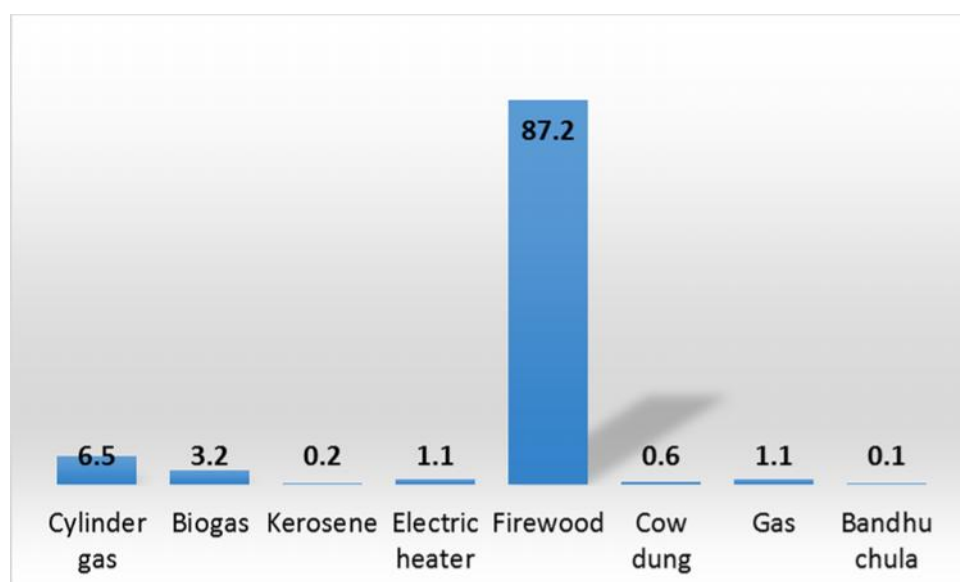


Figure 30 Source of Fuel for cooking

(Source: Socio-Economic Survey, 2016)

3.9 Environmental degradation/pollution

3.9.1 Status of water pollution

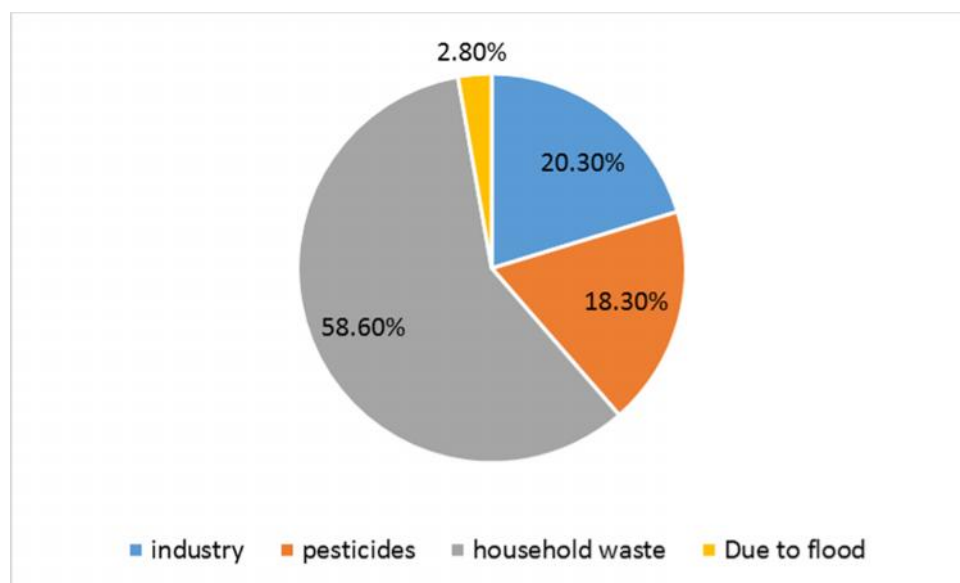
As water pollution is a common phenomenon in Bangladesh, so the survey questionnaire had a question about the occurrence of water pollution in the study areas. Among the total number of 1100 participants, 23.6% which means 260 participants mentioned about surface water pollution. Rest 76.4% participants, which mean 840 participants, rejected the issue of water pollution (Please see Table 5).

Then they were asked to convey their opinion about the reason of surface water pollution. Highest number of 58.6% mentioned about household waste, 20.3% mentioned about industrial discharge into water, 18.3% mentioned about use of pesticides and 2.8% participants mentioned about flood for water pollution (Please see Figure 31).

Table 5 Pollution in Surface Water

| Pollution in Surface Water | Number | Percent |
|----------------------------|--------|---------|
| Yes | 260 | 23.6 |
| No | 840 | 76.4 |

(Source: Socio-Economic Survey, 2016)

**Figure 31 Reason for surface water pollution**

(Source: Socio-Economic Survey, 2016)

3.9.2 Status of land pollution/degradation

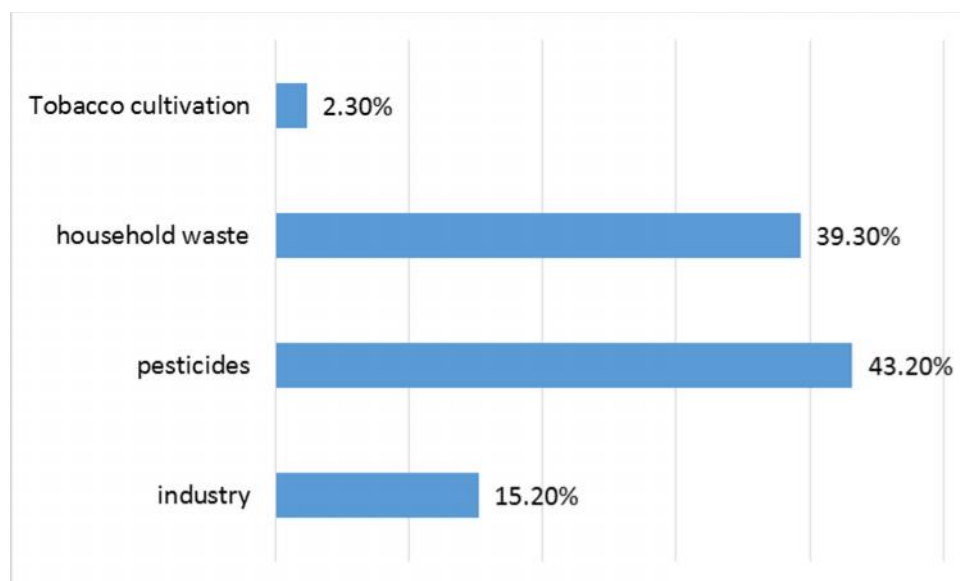
26.6% of participants mentioned about existence of land pollution. Rest 73.4% said there was no land pollution (*Please see Table 6*). A total of seven reasons appeared behind land pollution. Among them highest numbers of participants (43.2%) raised the issue of using pesticides. 15.2% participants mentioned about wastage discharge into water. 39.3% participants mentioned about household waste and 42.3% participants mentioned about tobacco cultivation for land pollution.

Total of seven reasons appeared behind land pollution (*Please see Figure 32*). Among them highest numbers of participants (43.2%) raised the issue of using pesticides. 15.2% participants mentioned about industries. 39.3% participants mentioned about household waste and 2.3% participants mentioned about tobacco cultivation for land pollution.

Table 6 Status of Land Pollution

| Status of Land Pollution | Number | Percent |
|--------------------------|--------|---------|
| Yes | 293 | 26.6 |
| No | 807 | 73.4 |

(Source: Socio-Economic Survey, 2016)

**Figure 32 Reason of Land Pollution**

(Source: Socio-Economic Survey, 2016)

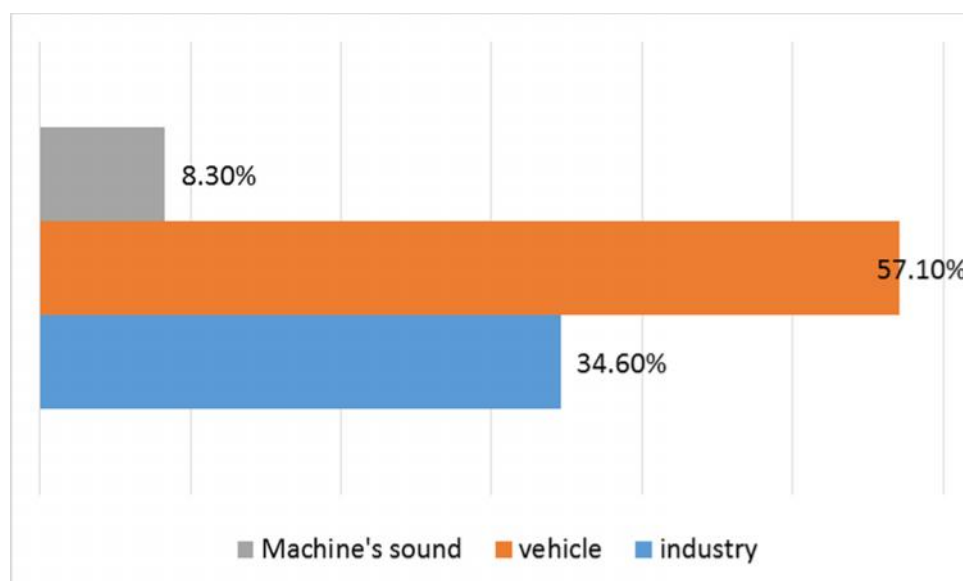
3.9.3 Status of sound pollution

Sound pollution is also a burning problem in Bangladesh. Findings showed little concern about sound problem. Only 12.2% respondents mentioned about the existence of sound pollution (*Please see Table 7*). Rest 87.8% respondents said there was no problem of sound pollution. Among 12.2% respondents who said that there was sound pollution, maximum number of 57.1% respondents mentioned about pollution created by vehicle (*Please see Figure 33*). 34.6% participants mentioned about industry as a potential source for sound pollution and 8.3% participants considered machine's sound for sound pollution.

Table 7 Status of Sound Pollution

| Status of Sound Pollution | Number | Percent |
|---------------------------|--------|---------|
| Yes | 134 | 12.2 |
| No | 966 | 87.8 |

(Source: Socio-Economic Survey, 2016)

**Figure 33 Reason of Sound Pollution**

(Source: Socio-Economic Survey, 2016)

3.9.4 Status of air pollution

For air pollution, Table 8 shows that, 15.4% respondents said yes that there was air pollution. Rest 84.6% said no. This means, most of the respondents didn't support the issue of air pollution. Among 15.4% of respondents who said that there was air pollution, maximum of 45.6% participants mentioned about vehicle as one of the potential sources of air pollution. Second highest reason appeared as industrial discharge as well as industry for air pollution which is 41.8%. Only 3.1% mentioned about household wastage (Please see Figure 34).

Table 8 Status of Air Pollution

| Status of Air Pollution | Percent |
|-------------------------|---------|
| Yes | 15.4 |
| No | 84.6 |

(Source: Socio-Economic Survey, 2016)

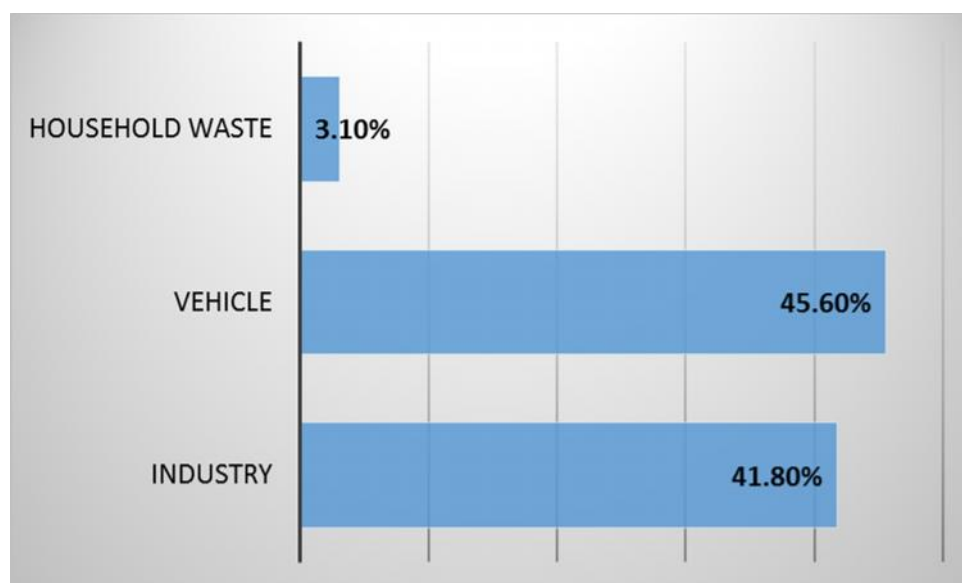


Figure 34 Reason for Air Pollution

(Source: Socio-Economic Survey, 2016)

3.10 Migration pattern

Bangladesh's history is a history of migration. People have been mobile in the Bengal delta region for centuries. Patterns of contemporary labor migration go back to colonial times. Every year, around 500000 Bangladeshis leave the country to work abroad. Bangladesh's economy depends on the emigrants' remittances. Besides, internal migration and forced migration has become a widespread issue of both savior and villain of the national developmental story. Widespread poverty, underemployment and a youthful age structure have all contributed to the predominance of economically motivated international migration from Bangladesh. Internal migration has become both a major policy concern and a subject of a heated public debate in Bangladesh.

Participants were asked about the history of their household head's migration status. Figure 35 shows that, 98.2% HH head of urban areas and 92.5% HH head of rural areas were in migrated.

Migrated portion were asked about their root/past living place. All of the participant's HH head came to Rangunia Upazila from another village of this area/Union (*Please see Figure 36*). On the other hand, for rural HH Head; 43.2% of them came from another village of the same area/union, 5.4% came from another union of this Upazila and 20.3% came from another Upazila of Chittagong district.

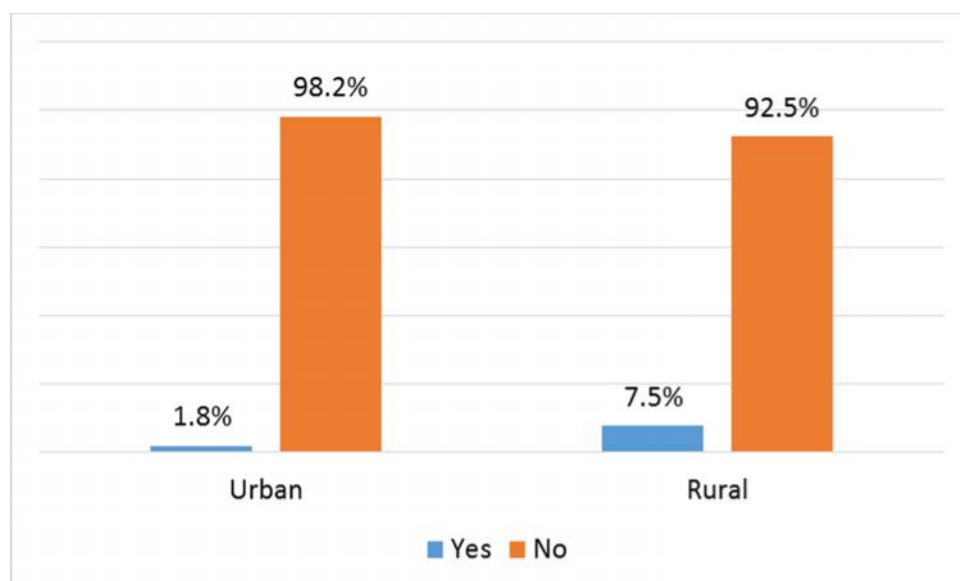


Figure 35 Incidence of HH Head's Migration

(Source: Socio-Economic Survey, 2016)

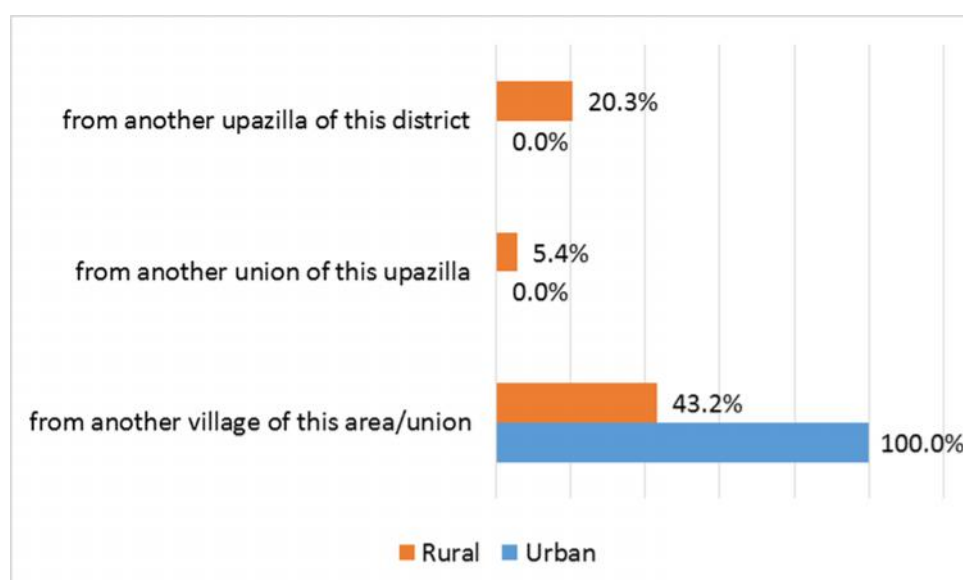


Figure 36 Roots (form where people migrated) of the migrated people

(Source: Socio-Economic Survey, 2016)

As discussed above there many reason behind people's migration. Sometimes, it's about poverty and sometimes it's about natural disaster. Participants were asked to convey their reason of migration. 15% participants mentioned the issue of job placement for their migration status, 12.50% said that the reason was to seek better education for the children (*Please see Figure 37*). 5% participants said that Rangunia had better business prospects and scopes. So, they migrated here. 18.30% participants mentioned that Rangunia had available scopes and opportunities for better job, 15.80% participants mentioned about marital reason for migration and 10.80% HH came to Rangunia because of river erosion.

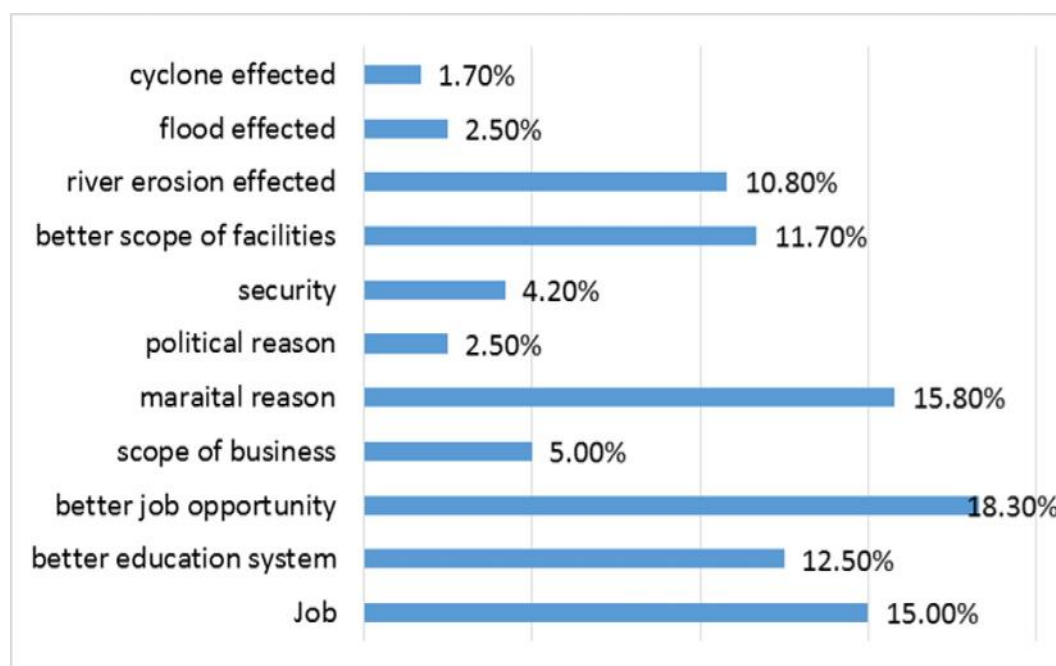


Figure 37 Reason of Migration in Rangunia

(Source: Socio-Economic Survey, 2016)

External Migration or out migration is considered as a potential movement for national economy. In Bangladesh, remittance is now the single largest source of foreign exchange earnings. It also plays a crucial role in alleviating the foreign exchange constraints and supporting the balance of payments, enabling imports of capital goods and materials for industrial development. Apart from this, people also migrate to different part of the countries other than their own area in searching for work. It can be temporary or long term. Sometimes, people start living in that area permanently. Participants of this survey were asked whether there was any incident of external migration within their household. 46.5% participants from urban areas and 46.6 % from rural areas said that, at least one person from their household was outside of their own living area for job (*Please see Figure 38*).

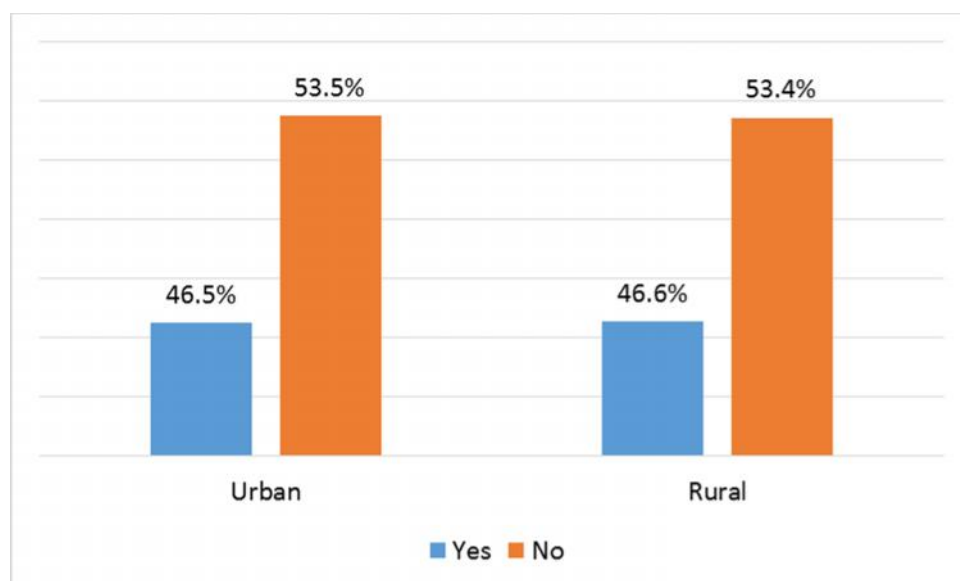


Figure 38 Out-Migration for Job

(Source: Socio-Economic Survey, 2016)

Among this population who said about their HH member's out migration, 19.2% migrated in another Upazila of same or different district (*Please see Figure 39*). 16.5% said that their family member migrated within the same Upazila or District, 7.9% incident of migration happened outside of their own district and in 8.9% cases people migrated in divisional town. Besides, 22.6% migrated to village and 25% migrated abroad. Findings showed that, Rangunia had significant ratio of international migration.

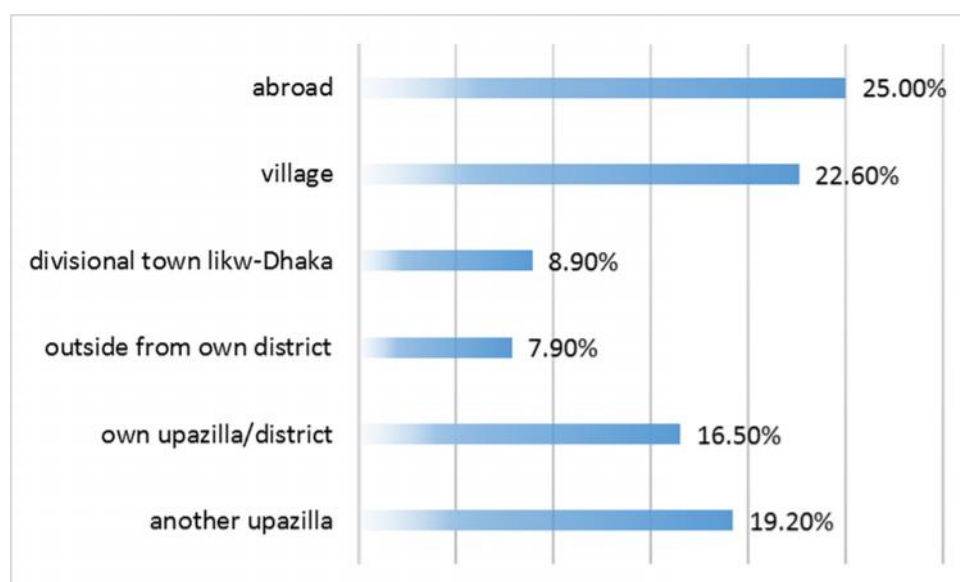


Figure 39 Place to go through Out-Migration

(Source: Socio-Economic Survey, 2016)

Study also found that, a huge portion of people migrated outside of their own area without having any kind of job or work. 89.2% participants agreed to this issue (*Please see Table 9*).

Without employment people mostly go outside of their own Upazila, other Unions of their own Upazila, Outside of the District and Divisional Town. Among this 89.2% incidents of out migration without job; 26.20% went outside of their own Upazila, 42.30% went other Unions of their own Upazila, 19% went outside of their own District and 12.50% went different divisional town (Please see Figure 40).

Table 9 Incidence of Out-migration without Job

| <i>Incidence of out migration without Job</i> | Number | Percent |
|---|--------|---------|
| Yes | 981 | 89.2 |
| No | 119 | 10.8 |

(Source: Socio-Economic Survey, 2016)

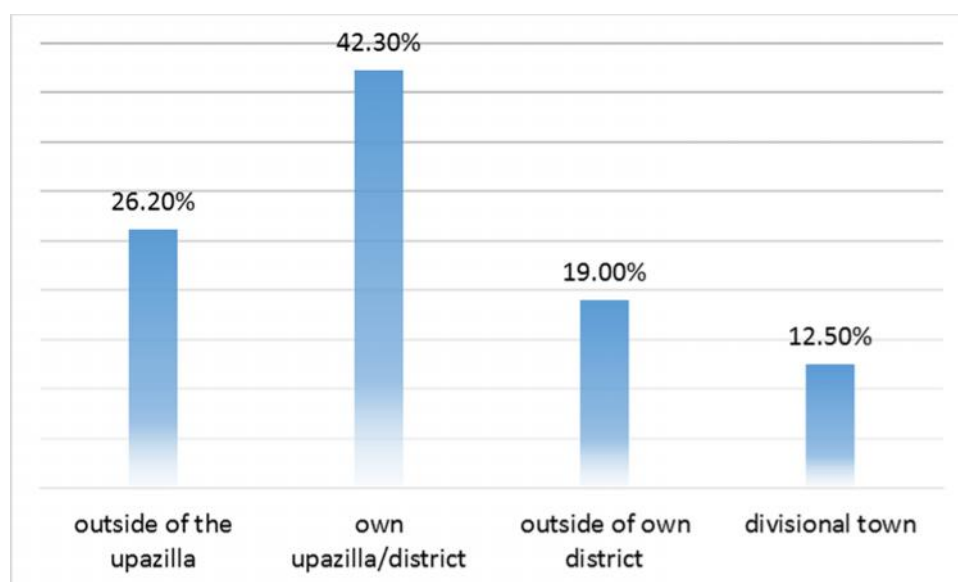


Figure 40 Place for Migration without Employment

(Source: Socio-Economic Survey, 2016)

3.11 Assets of the household

The study intended to calculate Number asset value of household. Responses were organized into eight codes. 4% of urban HH and 4.6% of rural household's asset value was less than 10000 BDT. 38% urban HH and 26.6% urban HH's asset ranged between 10001-30000 BDT (Please see Figure 41). Asset value of only 4% urban and 5.1% rural HH was more than 300000 BDT.

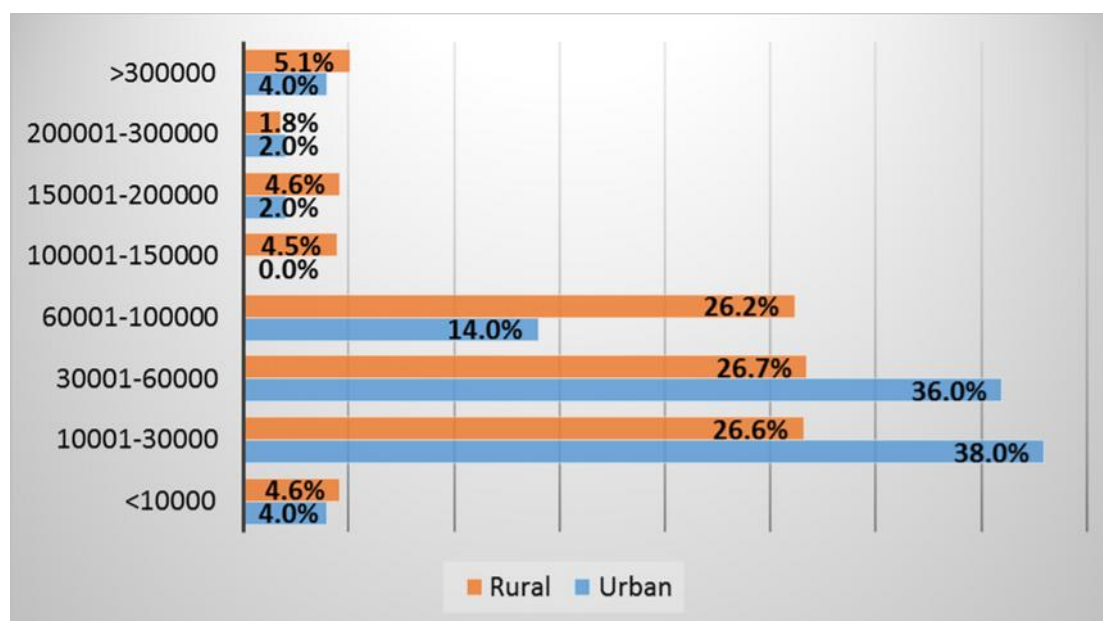


Figure 41 Percentage of Asset value

(Source: Socio-Economic Survey, 2016)

3.12 Household income, expenditure, savings and investment

Respondent's monthly income and expenditure was categorized into 5 codes. In rural areas, maximum number of 42.6% and 48.2% participants said respectively that their HH income and expenditure was ranged between 10001-20000 BDT (See Figure 42). Only 10.4% and 6.1% mentioned about "more than 30000" category as their monthly income and expenditure. For urban areas; maximum number of 46.8% and 48.1% participants said respectively that their HH income and expenditure was ranged between 5001-10000 BDT. Only 1.3% of them mentioned that, their monthly HH income was "more than 30000". None of urban population mentioned about "more than 30000 BDT" category as their monthly expenditure.

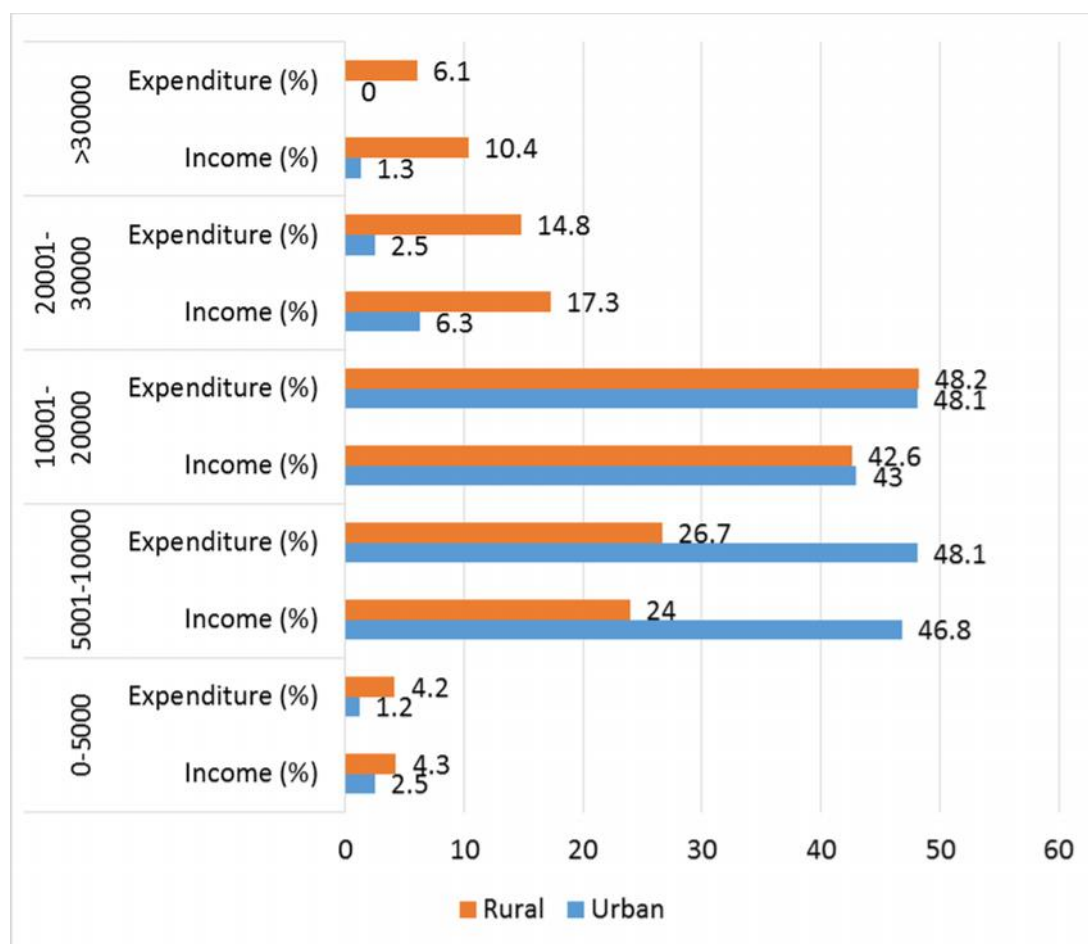
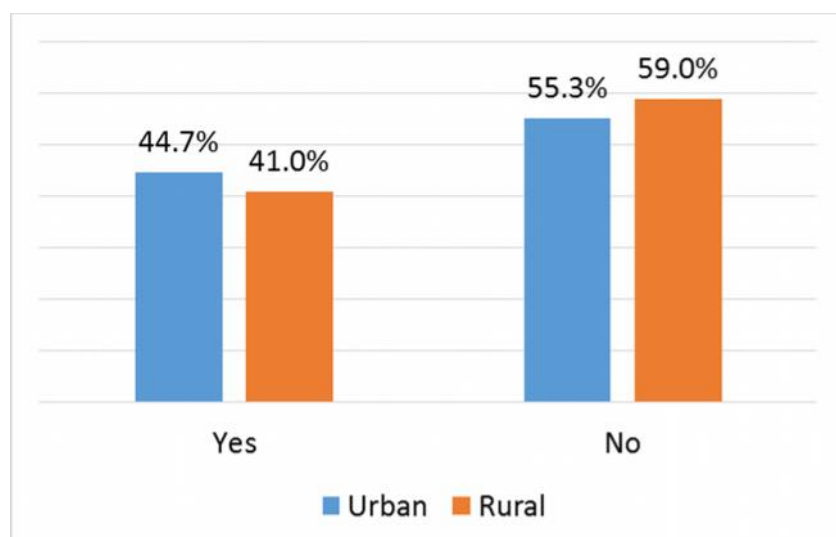


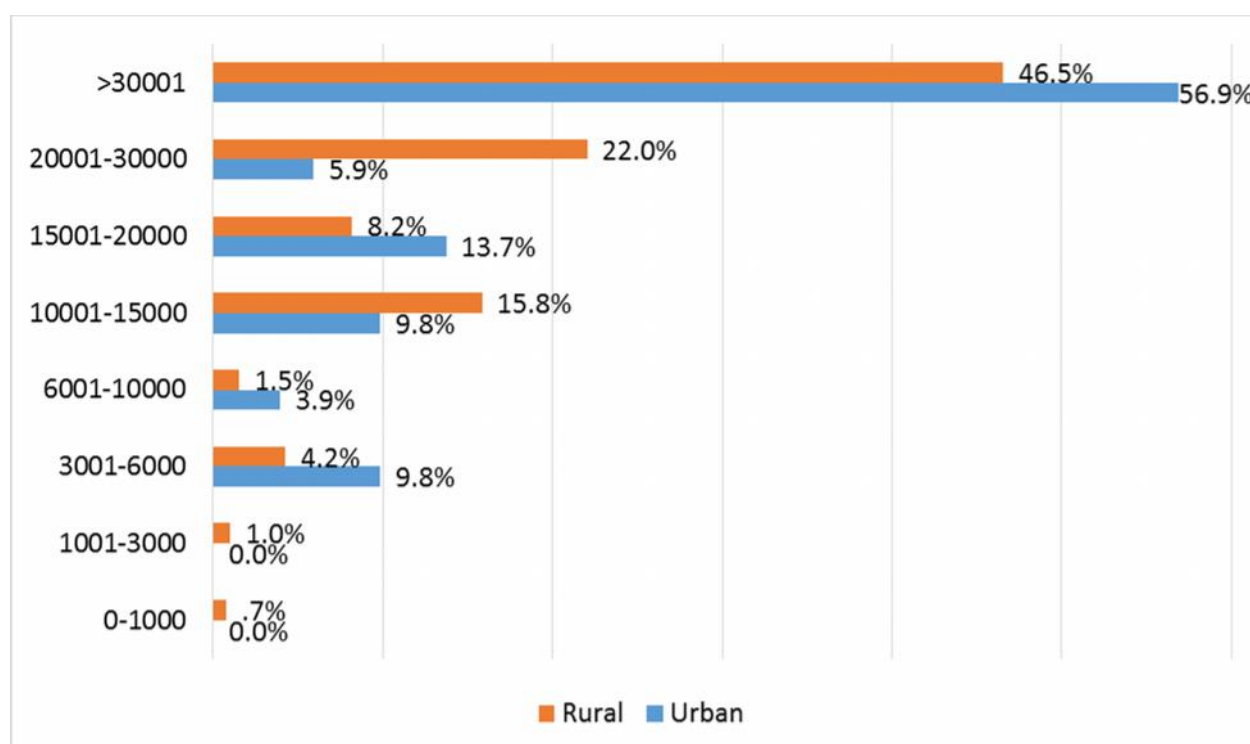
Figure 42 Monthly Income-Expenditure Graph of the Household

(Source: Socio-Economic Survey, 2016)

Savings is one of the core issues in modern economic system in terms of sustainability. Participants were asked to answer whether they had any savings or not and amount of yearly savings. 41% rural participants and 44.7% urban participants said about their HH level practice of savings (*Please see Figure 43*). Among these 41% rural participants and 44.7% urban participants; 9.8% of urban participants and 15.8% rural participants mentioned the range of 10001-15000 BDT as their yearly amount of savings (*Please see Figure 44*). 5.9% urban HH and 22% rural HH were found of saving 20001-30000 BDT yearly. Maximum portion of 56.9% urban HH and 46.5% rural HH mentioned that, their yearly amount of savings was more than 30000 BDT.

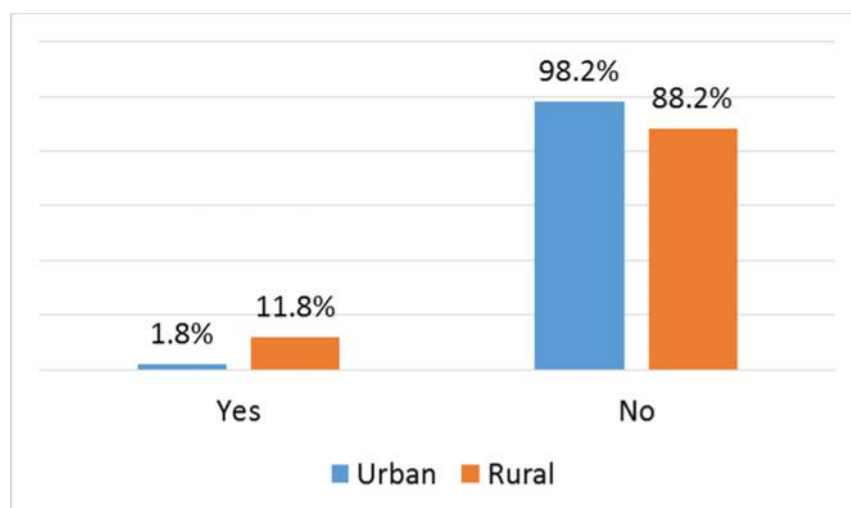
**Figure 43 Practice of Savings**

(Source: Socio-Economic Survey, 2016)

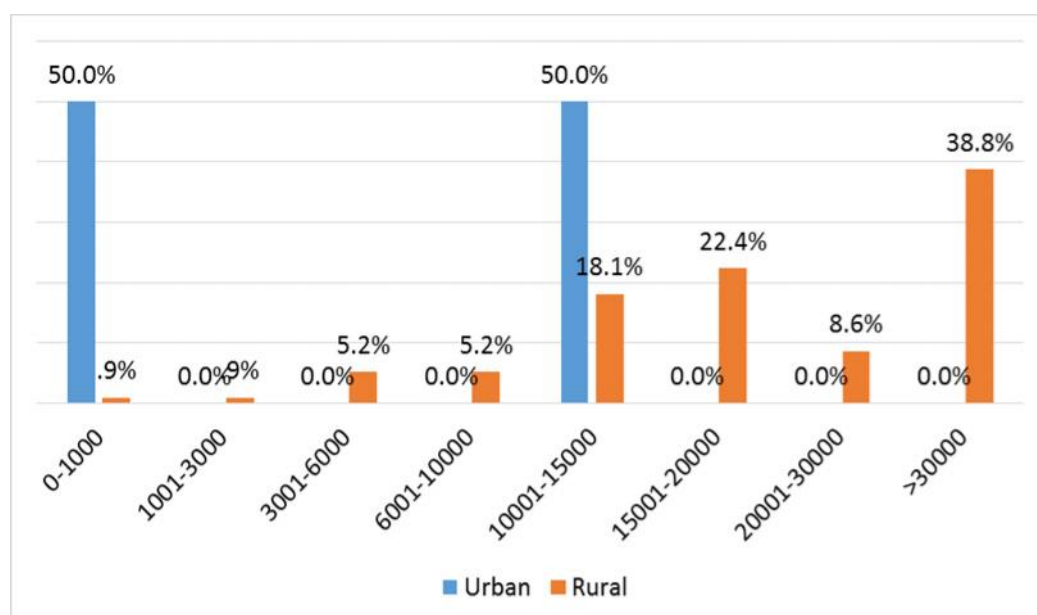
**Figure 44 Yearly amount of Savings**

(Source: Socio-Economic Survey, 2016)

On the other hand, 1.8% urban HH and 11.8% rural HH has the practice of investment (Please see Figure 45). Among this percentage of participants, 0.9% rural HH and 50% urban HH had yearly investment of 0-1000 BDT. 8.6% rural HH had around 20001-30000 BDT investment yearly (Please see Figure 46). Apart from this range, 50% urban HH and 18.1% rural HH had an investment of 10001-15000 BDT. On the other hand, 38.8% rural HH had more than 30000 BDT as yearly investment.

**Figure 45 Practice of Investments**

(Source: Socio-Economic Survey, 2016)

**Figure 46 Yearly Amount of Investment**

(Source: Socio-Economic Survey, 2016)

3.13 Access to infrastructural facilities and service

Infrastructural facilities and services are core issues for any development initiatives. In Bangladesh, there is not enough infrastructural facilities and service considering the amount of population. Especially for health and education sector, there is still huge shortage of infrastructural facilities and services. Socio Economic Survey tried to assess the infrastructural facilities and services from respondent's end of Rangunia Upazila.

The following *Table-10* shows that, 11% respondents of rural area and 77% from urban area mentioned about accessing of government health facility. 21% rural and 13% urban population said about community clinic. For pharmacy, 57% respondents from rural area and 89% from urban area mentioned about people's access. On the other hand for religious

institutions, highest number of respondents from both rural and urban areas mentioned about it. Findings showed lack of recreational options as only 2% respondents from both rural and urban areas mentioned about cinema hall/auditorium. Number of school (both primary and high school) was satisfactory, but still it's not adequate.

Table 10 Accessibility of Infrastructural Facilities/Services of Rangunia Upazila

| SL | Type of facilities/services/ institutes | Accessibility (percent of yes response only) | |
|----|---|--|-------|
| | | Rural | Urban |
| 01 | Govt. Hospital/Clinic (Upazilla/District) | 11 | 77 |
| 02 | Family Welfare Association | 18 | 28 |
| 03 | Community Clinic | 21 | 13 |
| 04 | Private Hospital/ Clinic | 16 | 3 |
| 05 | Pharmacy | 57 | 89 |
| 06 | Community Centre | 18 | 41 |
| 07 | Market | 20 | 30 |
| 08 | Police box | 3 | 1 |
| 09 | Park | 6 | 1 |
| 10 | Field | 27 | 47 |
| 11 | Bank | 17 | 45 |
| 12 | Post-office | 12 | 38 |
| 13 | Fire Service | 13 | 45 |
| 14 | Primary school | 72 | 94 |
| 15 | High school | 40 | 68 |
| 16 | College | 10 | 46 |
| 17 | Degree college /Honors/ Masters/ University | 9 | 46 |
| 18 | Madrassa | 40 | 60 |
| 19 | Gymnasium/Club | 1 | 7 |
| 20 | Cinema hall/Auditorium | 2 | 2 |
| 21 | Kacha bazar | 41 | 45 |
| 22 | Bus stand | 7 | 5 |
| 23 | Library | 16 | 8 |
| 24 | Graveyard/Cremation place | 82 | 91 |
| 25 | Eidgah | 32 | 66 |
| 26 | Mosque/Temple/Pagoda | 83 | 91 |
| 27 | Public toilet | 3 | 4 |
| 28 | Other(detail) | 1 | 0 |

(Source: Socio-Economic Survey, 2016)

3.14 Problems of the area

3.14.1 Transportation Related Problem

One of the key issues was to identify the area specific problems. 63.5% participants (699 participants) mentioned about the existence of transportation problem. Rest 36.5% participants said there was no transportation related problems (See Table-11). After this, all the participants who mentioned about transportation were asked to mention major problems. Around 39.6% participants mentioned that the road was narrow, 13.1% participants mentioned that the road was overflowed and 31.1% mentioned that the road was broken

(See Figure 47). Apart from this, 0.5% participants mentioned about traffic related problems, 6.5% participants mentioned about high fare, 9.2% participants mentioned about insufficient public transports and 0.1% mentioned that they didn't get the transport in time.

Table 11 Existence of Transportation Related Problem

| Existence of Transportation Related Problem | Number | Percent |
|---|--------|---------|
| Yes | 699 | 63.5 |
| No | 401 | 36.5 |

(Source: Socio-Economic Survey, 2016)

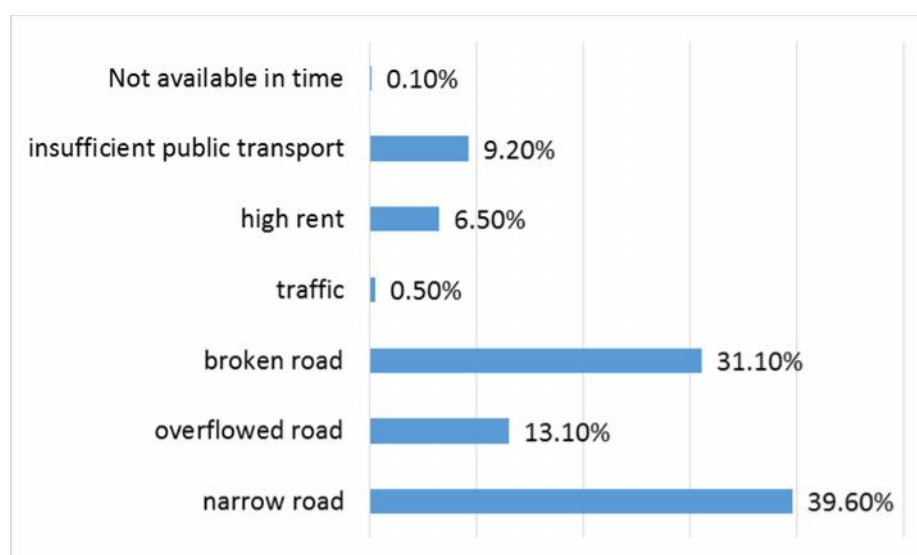


Figure 47 Types of Problems

(Source: Socio-Economic Survey, 2016)

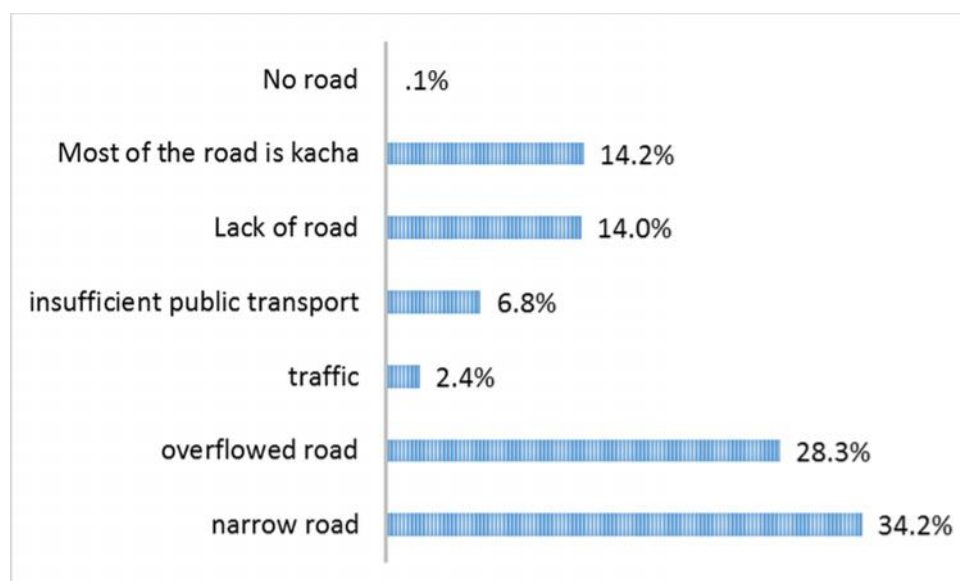
3.14.2 Road Related Problem

Following the discussion of transportation sector in large scale, participants were asked whether there was any problem in road. 76.6% participants said yes (see Table-12). 34.2% participants said that the road was narrow. 28.3% participants mentioned that the road was overflowed and 14.2% participants said most of road is kacha, 14% opined about lack of road and 6.8% mentioned insufficiency of public transport (see Figure-48).

Table 12 Existence of Road Related problem

| Existence of Road Related Problem | Number | Percent |
|-----------------------------------|--------|---------|
| Yes | 843 | 76.5 |
| No | 257 | 23.4 |

(Source: Socio-Economic Survey, 2016)

**Figure 48 Types of Road Related Problems**

(Source: Socio-Economic Survey, 2016)

3.14.3 Waste Management Related Problem

Bangladesh, being a developing country, is predominantly a rural country. Population growth is one of the major concerns. One of the directly related consequences of population growth is the increase in waste generation. With the conventional system, both municipal and rural areas of Bangladesh are generally faced with rapid deterioration of environmental and sanitation condition. Survey tried to capture scenario about problems due to waste management and waste management scenario in Rangunia Upazila. 73.6% participants mentioned that there was waste management related problems in Rangunia. Rest 26.4% participants opined that there was no waste management related problem in their respective area (See Table-13).

Among that participant who said existence of problem of waste management, 50.4% said that there was no waste management system available in that area. 18.9% participants said that existing waste management system was no good. Besides, 30.7% participants opined that existing waste management system/facility was insufficient considering demand (see Figure-49).

Table 13 Existence of Waste Management Related Problems

| Existence of Waste Management Related Problems | Number | Percent |
|--|--------|---------|
| Yes | 810 | 73.6 |
| No | 290 | 26.5 |

(Source: Socio-Economic Survey, 2016)

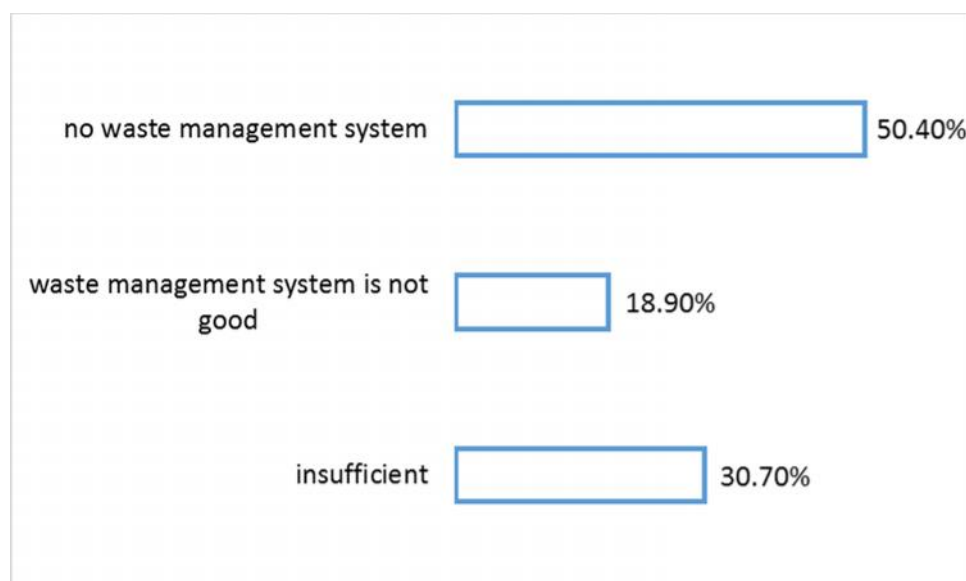


Figure 49 Types of Waste Management Related Problem

(Source: Socio-Economic Survey, 2016)

3.14.4 Electricity Related Problem

Electricity is a major part of any civilization. Bangladesh is not an exception. Current civilization is solely dependent on electricity. Bangladesh government has a vision of electrifying the entire country within 2020. Participants were asked whether there was any electricity related problem in their area or not. 45.5% participants said that there was electricity problem in their area (See Table-14). These 45.5% participants were asked about the types of problems. Among them 46.4% mentioned about too much load shedding and 4.1% said that Rangunia had no national electricity grid line. Besides, 46.4% participants said that very few had electricity facility (see Figure-50)

Table 14 Existence of Electricity Related Problems

| Existence of Electricity Related Problems | Number | Percent |
|---|--------|---------|
| Yes | 501 | 45.5 |
| No | 599 | 54.5 |

(Source: Socio-Economic Survey, 2016)

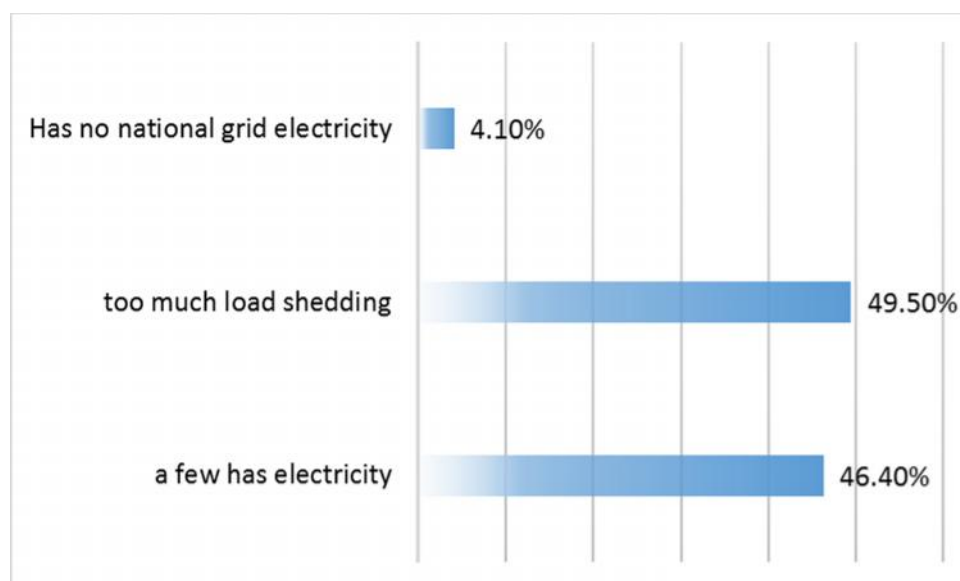


Figure 50 Type of electricity Related Problem

(Source: Socio-Economic Survey, 2016)

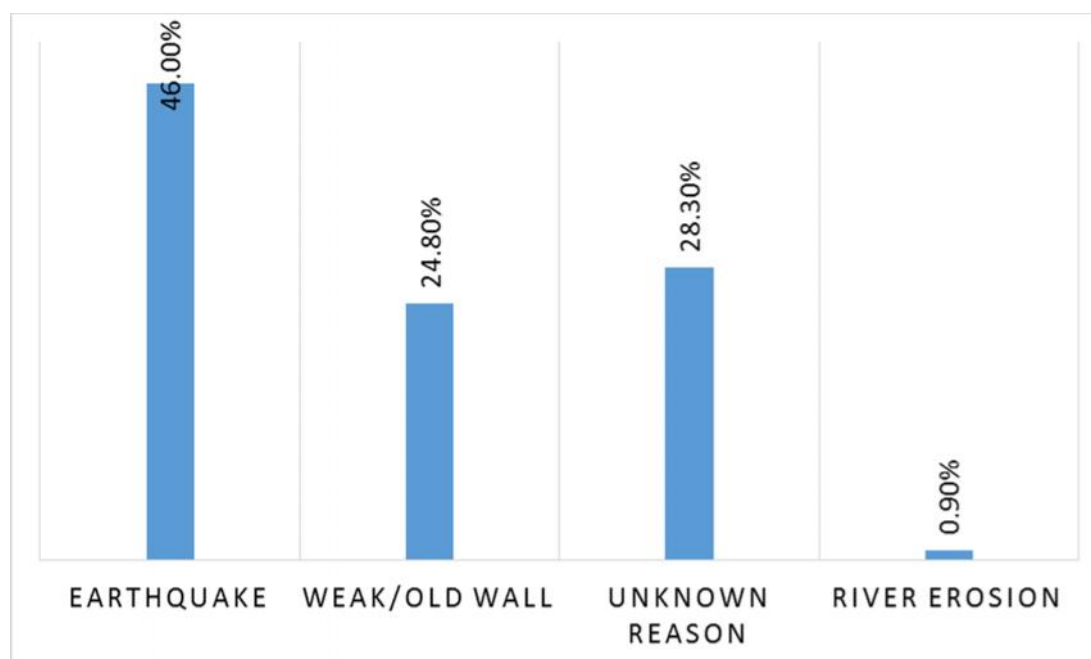
3.14.5 Problems Raised if Wall is Broken

Rangunia has a problem that wall of home falls down or breaks. Respondents were asked whether their wall ever broken down or not. 6.9% participants said that their wall broke down (See Table-15). Following this response, they were asked to inform the reason why wall were broken. 28.3% couldn't mention the reason for breaking of wall. Highest number of participants which was 46% mentioned about earthquake. 24.8% said that the wall was weak/old and 0.9% mentioned about river erosion as the reason behind breaking wall (see Figure-51).

Table 15 Existence of Broken Wall

| Broken Wall | Number | Percent |
|-------------|--------|---------|
| Yes | 76 | 6.9 |
| No | 1024 | 93.1 |

(Source: Socio-Economic Survey, 2016)

**Figure 51 Reason of Broken Wall**

(Source: Socio-Economic Survey, 2016)

3.14.6 Surface Temptation Related Problem

Participants were asked about surface temptation and problems due to surface temptation. 95.2% participants said there was no incident of surface temptation in Rangunia. Only 4.8% said that there was evidence of surface temptation (See Table-16). Among these 4.8% participants; 50% responses came about earthquake as reason 43.9% mentioned about unknown reason. Apart from this, 4.5% participants mentioned that pond wall tempted and 1.5% mentioned the incident of heavy rainfall (see Figure-52).

Table 16 Existence of Surface Temptation

| Existence of Surface Temptation | Number | Percent |
|---------------------------------|--------|---------|
| Yes | 53 | 4.8 |
| No | 1047 | 95.2 |

(Source: Socio-Economic Survey, 2016)

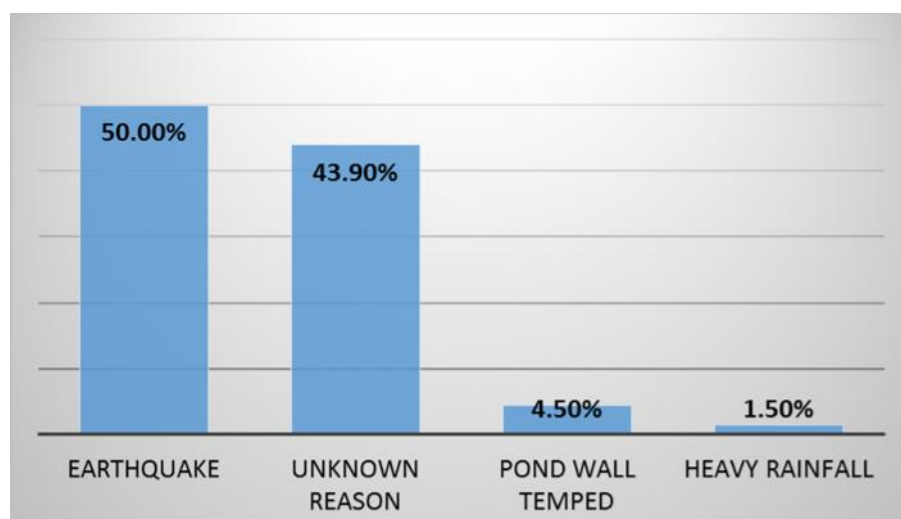


Figure 52 Problems due to surface temptation

(Source: Socio-Economic Survey, 2016)

3.15 Natural disasters, shocks and coping mechanisms

Bangladesh is exposed to threat of hazards resulting from a number of natural disasters and remains classified as one the most vulnerable countries. Majority of the country is affected by cyclone, drought, floods and many other natural disasters. These different forms of disasters also cause huge loss to the country. Participants of this survey were asked whether any natural disaster occurred or not. Only 10.2% participants said that there was natural disaster (See Table-17). Rest 89.8% denied the incident of natural disasters. Although, few kinds of disasters like flood and cyclone has been decreased, but yet country has to consider a huge loss. According to the survey participants, losses include death of family head, waste of working day, destroy of household, loss of animal stead, loss of harvest, monetary loss, loss of land due to river erosion etc (see Figure-53). Only 0.4% participants mentioned about death of household head. 27.1% participants mentioned about waste of working day, 16.8% mentioned of total destroy of household, 11.8% participants mentioned about partial loss of household, 1.9% mentioned of loss of animal stead, 17.6% mentioned of loss of harvest and 1.1% participants mentioned about loss of animal. Apart from this, 21.4% mentioned about monetary losses and 1.9% mentioned about land/resource affected by river erosion.

Table 17 Occurrence of Natural Disaster

| Occurrence of Natural Disaster | Number | Percent |
|--------------------------------|--------|---------|
| Yes | 112 | 10.2 |
| No | 988 | 89.8 |

(Source: Socio-Economic Survey, 2016)

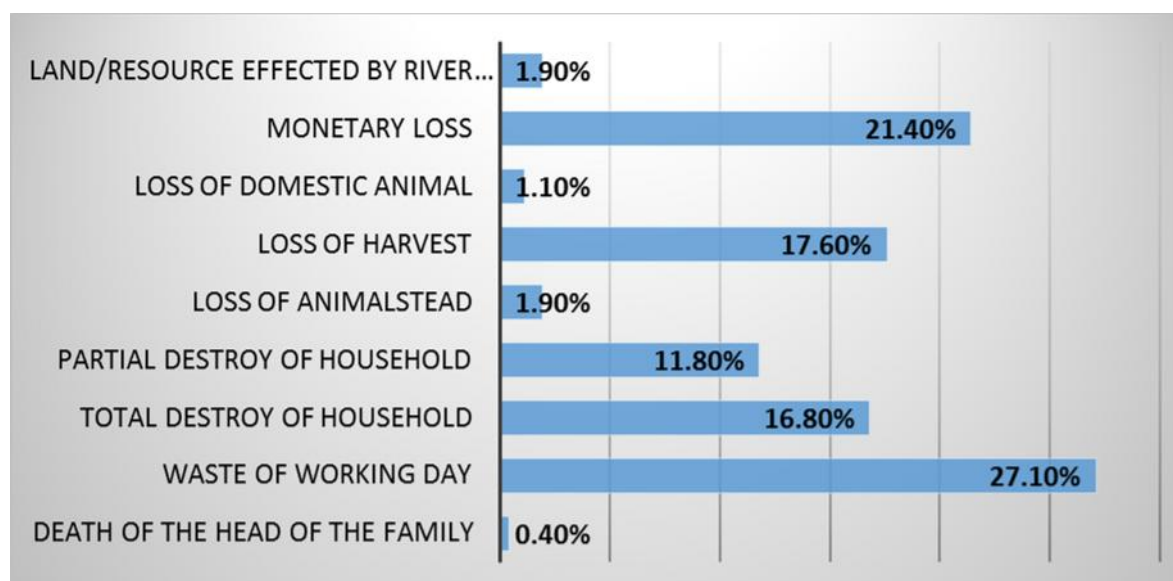


Figure 53 Types of Losses due to disaster

(Source: Socio-Economic Survey, 2016)

Households respond to shocks in different ways. There are also many households who do not have any means of coping to shocks. Sometimes the loss is temporary and sometimes loss lasts a long time. Survey tried to calculate losses in money and in cumulative form.

Among the total 1100 participants in Rangunia Upazila, 89.8% participants didn't consider any types of disasters. Among rest 10.2% of participants who responded positively, 8% never had to consider any losses (*see Figure-54*). Highest number of 14.6% participants had to consider losses of 20000 taka. 2.7% participants considered loss of 1000 taka, 1.5% participants considered loss of 2000 taka, 0.9% participants considered loss of 4000 taka, 7.1% participants considered loss of 10000 taka, 0.9% participants considered loss of 15000 taka, 8.9% participants considered loss of 50000 taka and 0.9% participants considered loss of 200000 taka due to natural and human made disasters

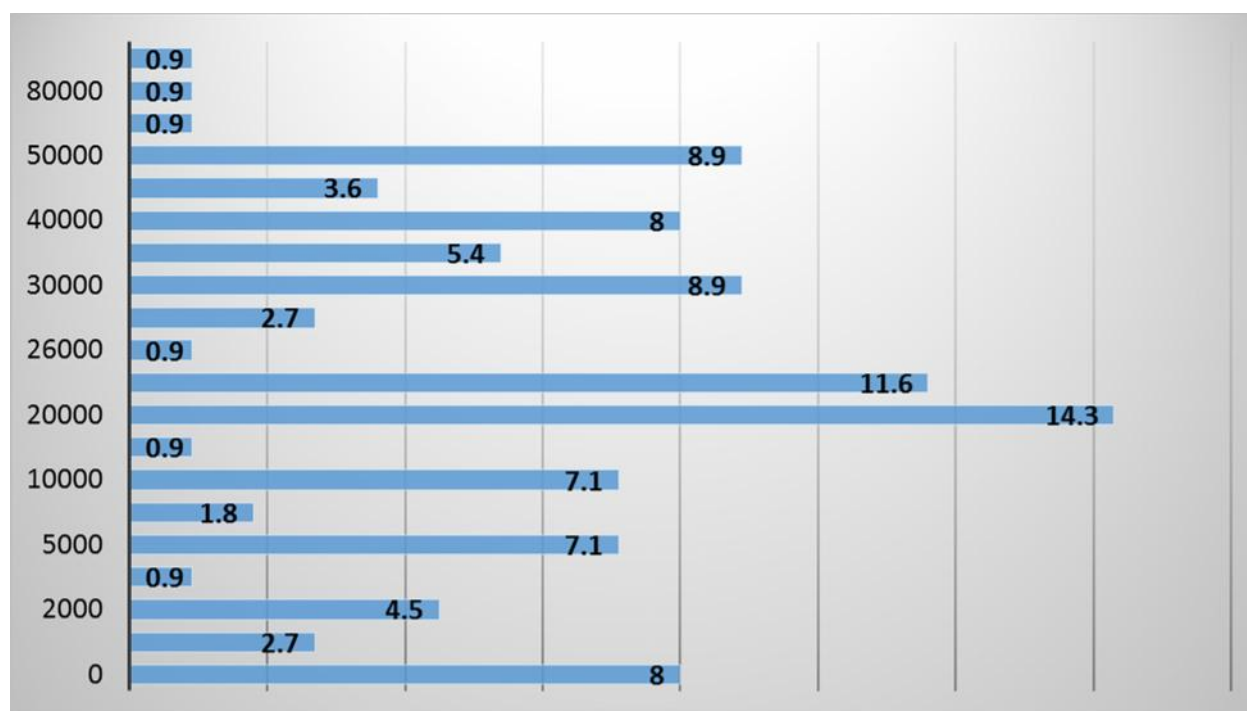


Figure 54 Amount of Loss due to disaster

(Source: Socio-Economic Survey, 2016)

Bangladesh has a long history of natural disasters. Between 1980 and 2008, it experienced 219 natural disasters (ADPC). The geographical location, land characteristics, multiplicity of rivers and the monsoon climate render Bangladesh highly vulnerable to natural hazards. Each year Bangladesh has to consider a huge amount of loss. Well disaster preparedness can reduce the loss. Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters. That is, to predict and, where possible, prevent disasters, mitigate their impact on vulnerable populations, and respond to and effectively cope with their consequences. Disaster preparedness varies from and between countries and geographic position. In this survey, participants mentioned about three types of disaster preparedness where 15% mentioned about raising homeland, 22% mentioned about repairing the house and 63% mentioned about repairing the house (See Table-18).

Table 18 Type of Preparedness

| Type of Preparedness | Percent |
|----------------------|---------|
| raising homeland | 15 |
| repairing of house | 22 |
| Remove salt and land | 63 |

(Source: Socio-Economic Survey, 2016)

After getting types of disaster preparedness according to participants, survey tried to know steps and initiatives towards disaster preparedness (see Figure-55). 13.4% emphasized on the issue of saving money, 6.3% mentioned about taking preparation through

radio/television, 6.3% mentioned about helping each other, 8.2% mentioned about setting up shelter home, 7.3% mentioned about informing DRR team as soon as possible after disasters and 8.2% mentioned about helping the vulnerable people as effective ways towards disaster preparedness. Apart from this, 7.6% mentioned about structural development, 6.2% mentioned about seeking help from volunteer group, 7.4% mentioned about building awareness, 3.4% mentioned about reservation of foods, 6.9% mentioned about preservation of safe water, 7% mentioned about fire service and 11% mentioned of emergency medical services as some effective ways toward disaster preparedness.

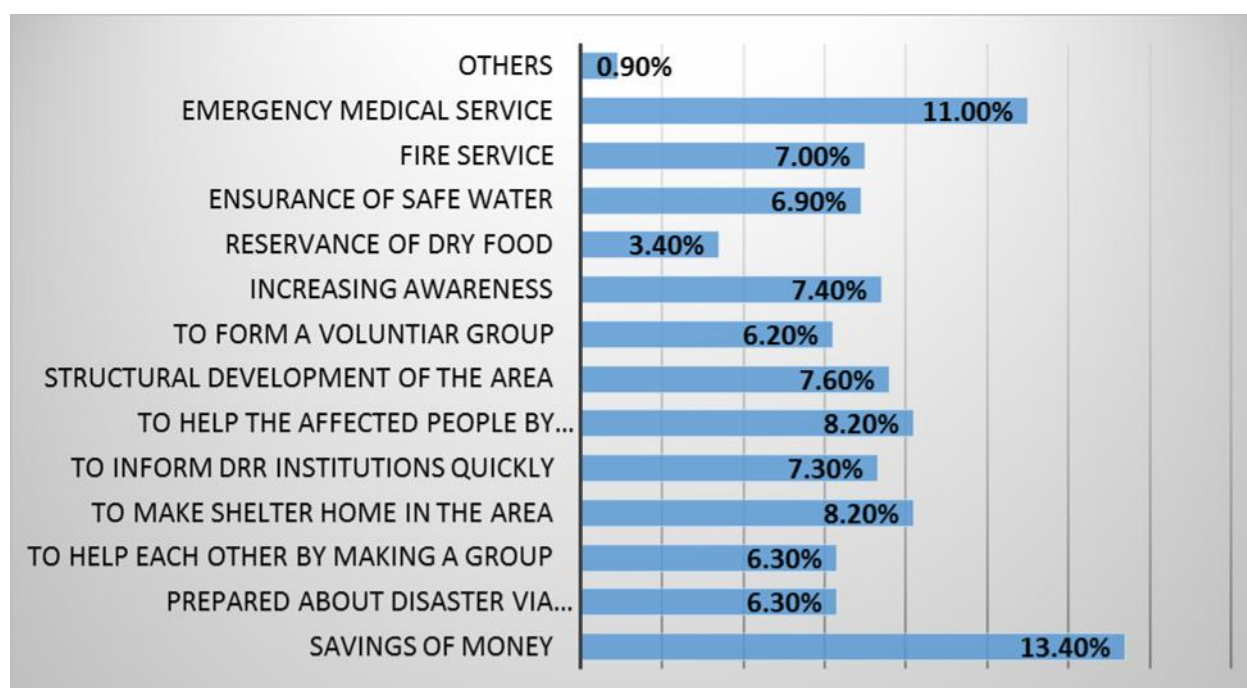


Figure 55 Suggestions about Disaster Preparedness

(Source: Socio-Economic Survey, 2016)

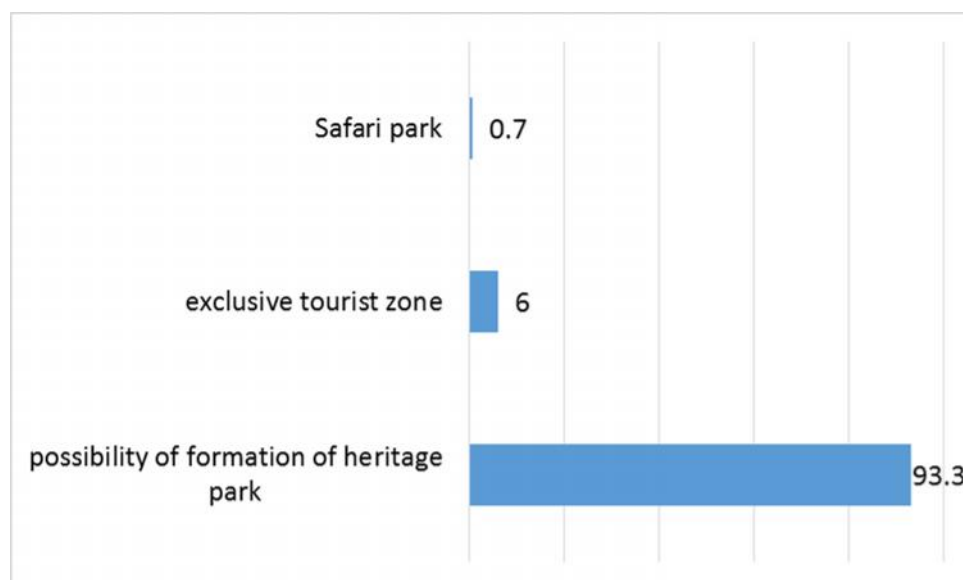
3.16 Perception about scope of tourism

Bangladesh is a land of scenic beauty. The country is blessed with natural beauty which attracts the tourists. It has beautiful beaches as well as the longest beach in the world. Rangunia is one of the promising tourist zones in Bangladesh. The survey questionnaire had a portion related to tourism. Participants were asked whether there was any possibility of tourism in Rangunia. 13.6% participants said yes, which means Rangunia can be a potential tourist spot (See Table-19). These participants were asked about the type of tourist spot Rangunia can be (see Figure-56). 93.3% participants mentioned the possibility of formation of Heritage Park. 6% did not mention any specific feature but described Rangunia as an exclusive future tourist zone. 0.7% mentioned Rangunia as a future safari park.

Table 19 possibility about tourism

| Tourism Possibility | Number | Percent |
|---------------------|--------|---------|
| Yes | 150 | 13.6 |
| No | 950 | 86.4 |

(Source: Socio-Economic Survey, 2016)

**Figure 56 Type of Tourist Zone**

(Source: Socio-Economic Survey, 2016)

Survey tried to grab some potential names as future tourist spots from the participants (See Table-20). 2.7% participants mentioned about Guacchibanna, 0.7% participants mentioned about Padua, 19.3% participants mentioned about Kuroshia, 9.3% participants mentioned about Karnafuli River Side, 4% participants mentioned about hilly areas and 1.3% participants mentioned about Barochalkhola. Apart from these spots, participants also mentioned about Bridge Ghata, Falaharina, Dangar Char, Purbo Khorshed Taluk, Agunia Tea State, Dariar Char, Hatimara, Kayer Dabar Shukh, Kaishar Deba, Boro Awliar Tila etc.

Table 20 Potential Tourist Areas of Rangunia Upazila

| Potential Tourist Areas | Number | Percent |
|-----------------------------|--------|---------|
| Guachibanna | 4 | 2.7 |
| Padua | 1 | 0.7 |
| Khuroshia | 29 | 19.3 |
| Hilly area | 6 | 4 |
| Barochalkhola | 2 | 1.3 |
| Bridge ghata | 9 | 6 |
| Falaharina | 2 | 1.3 |
| Jungle Sarafbhata fatakona | 1 | 0.7 |
| Dangar char | 2 | 1.3 |
| Purbo khorshed taluk | 3 | 2 |
| Agunia tea garden | 3 | 2 |
| Dariar chara | 1 | 0.7 |
| Dakhin purbo radha nagar | 1 | 0.7 |
| Mohammadpur | 1 | 0.7 |
| Road outside bill | 3 | 2 |
| Beside sonargaon school | 1 | 0.7 |
| Hatimara | 2 | 1.3 |
| Kayer dabar shukh | 1 | 0.7 |
| Karnafuly river side | 14 | 9.3 |
| Baro aulia tila | 1 | 0.7 |
| Kaishar deba | 2 | 1.3 |
| Thandachari tea garden | 16 | 10.7 |
| Bhabanchari tea garden | 3 | 2 |
| Bhabanchari beach | 1 | 0.7 |
| Jungle bagabili | 1 | 0.7 |
| Godar park | 3 | 2 |
| Maulubhi tila | 2 | 1.3 |
| Icha moti river side | 3 | 2 |
| Bridge chattar | 2 | 1.3 |
| Champatoli | 9 | 6 |
| Golap bepary hut area | 1 | 0.7 |
| Raza bhuban | 2 | 1.3 |
| Sheikh Javed bin al Nahian | 2 | 1.3 |
| Tin soudia | 3 | 2 |
| Kodala tea garden | 1 | 0.7 |
| Chader tila | 5 | 3.3 |
| Gajaria hill | 2 | 1.3 |
| Pashim sahabdi nagar | 1 | 0.7 |
| Maddha para (paschim para) | 2 | 1.3 |
| Surjogona | 1 | 0.7 |
| Dharmogoda 9 no. Ward | 1 | 0.7 |

(Source: Socio-Economic Survey, 2016)

3.17 Daily trip of household

Participants were asked to list the number of their daily trip. Highest number of participants, which is 79.1%, mentioned about two trips daily. 8.1% participants said about just one trip daily (See Table-21). 0.3% (3) of 1100 participants mentioned about three trips daily and lastly 12.5% participants mentioned about four trips daily.

Table 21 Number of Daily Trips

| Number of Visits | Number | Percent |
|-------------------------|---------------|----------------|
| 1 | 89 | 8.1 |
| 2 | 870 | 79.1 |
| 3 | 3 | 0.3 |
| 4 | 138 | 12.5 |

(Source: Socio-Economic Survey, 2016)

Following the response of number of visit daily where highest number of participants mentioned about just one and two visits daily; most of the participants mentioned about more than 7 km in terms of distance of their daily visit (see Figure-57). 6.2% participants chose the option of 1 km and 22.5% participants chose the range of 1-3 km.

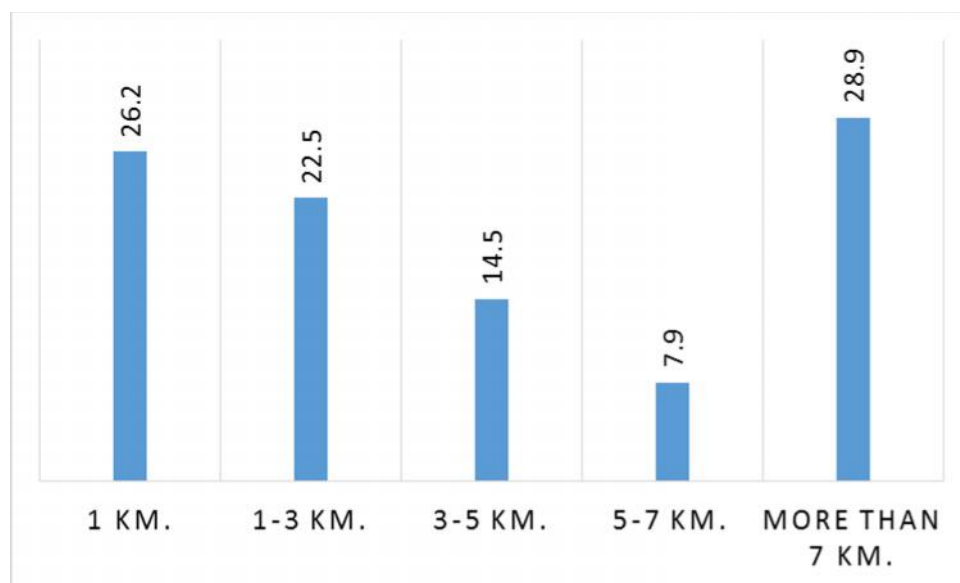


Figure 57 Distance of Visit

(Source: Socio-Economic Survey, 2016)

Number and distance of daily visit varies in terms of purposes (see Figure-58). 3.2% participants said their purpose of visit was job, 3% participants described their visit as education purpose and 1.4% participants mentioned their visit for shopping purpose. For visiting relatives section, 0.4% participants responded and 4.3% mentioned about the purpose of treatment. But, maximum number of 965 participants (87.7%) mentioned about their own home. Just 0.1% visited due to perform prayer.

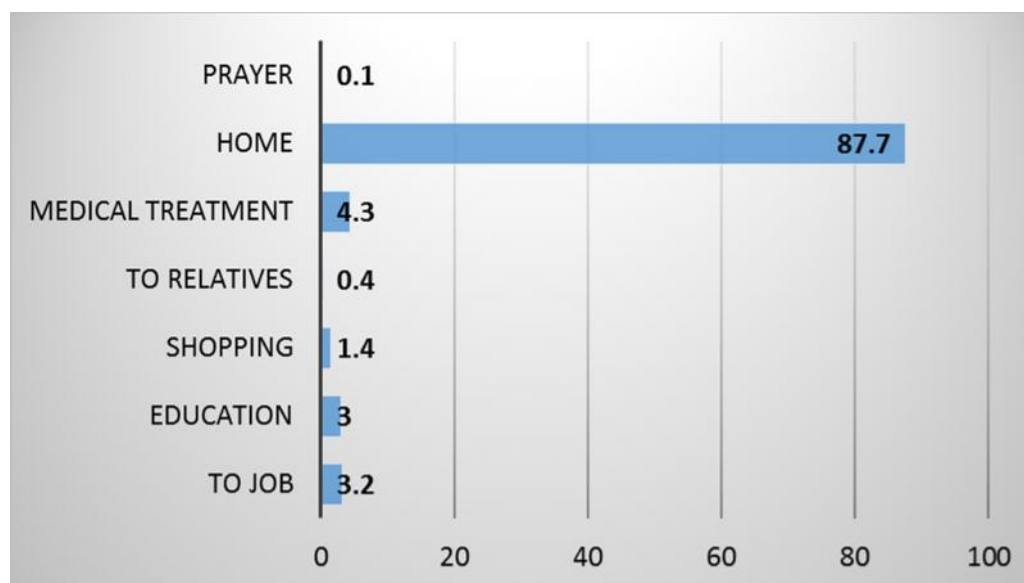
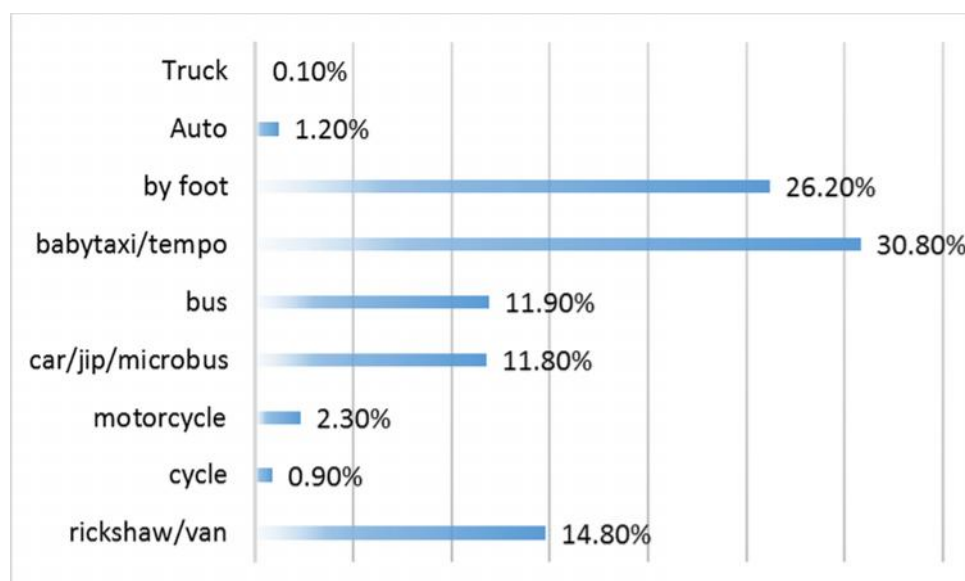


Figure 58 Reason of Visit

(Source: Socio-Economic Survey, 2016)

On the other hand, for mode of their transport, participants mentioned about nine modes (see Figure-59). Highest number of participants (30.8%) said that their mode of transportation was baby taxi/tempoo. Second highest response went to use of foot. 26.20% participants mentioned of using foot. 14.8% participants mentioned about rickshaw/van, 0.9% mentioned about use of cycle, 2.3% mentioned about motorcycle, 11.8% participants mentioned about car/jeep/microbus, and 11.9% mentioned about using bus. Besides, 1.2% mentioned about auto and 0.1% mentioned about truck for mode of transportation.

**Figure 59 Mode of Transport**

(Source: Socio-Economic Survey, 2016)

Following the mode of transport section, participants were asked to identify the problems and limitations of transport sector (see Figure-60). 25.3% participants said that, the road was narrow; 6.5% mentioned about pressure of traffic; 4.3% mentioned that there was no bus stoppage; 5.8% raised the issue of accident and 14.9% mentioned that transport fare was high. Maximum number (29.1%) of participants mentioned about broken road as a huge problem. 13% said no problem with road condition. Besides, 0.3% participants said that there was no alternative road and 0.1% mentioned that there was lack of vehicle. For flood, fear of robbery, elephant/beast related problem and kacha road; 0.1% participants responded in each response category.

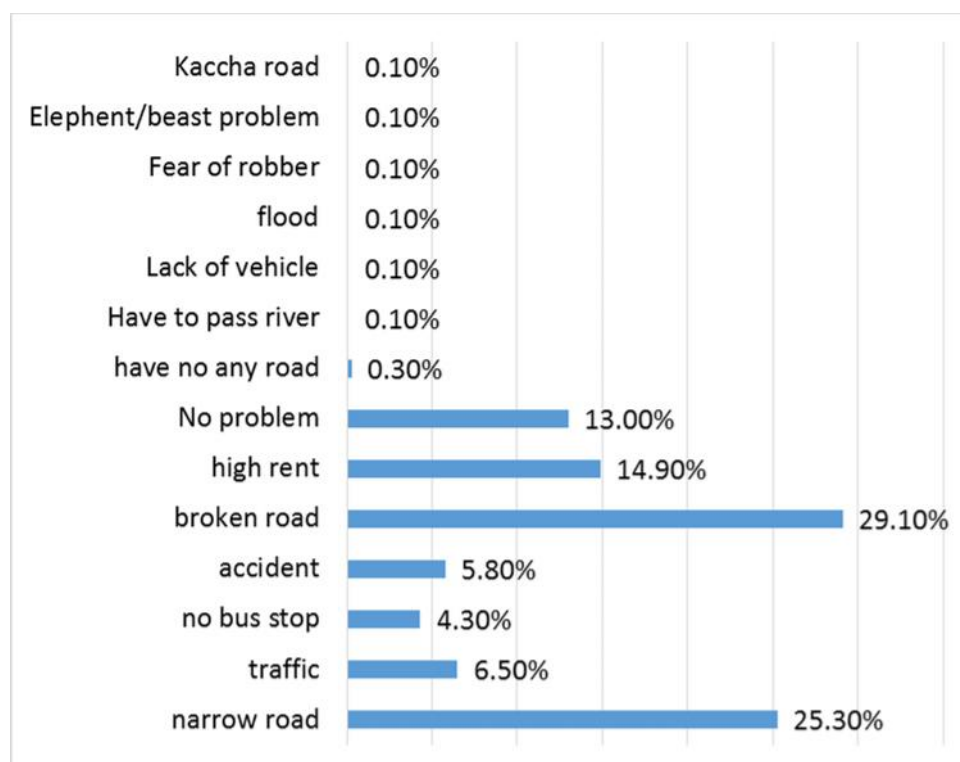


Figure 60 Problems of Transportation

(Source: Socio-Economic Survey, 2016)

3.18 Perception and remarks

3.18.1 Base of economy of this area

Bangladesh has shown remarkable macroeconomic resilience, and its economy has grown steadily over the past five years. Nonetheless, overall progress and activities had been interrupted due to political unrest and violence. According to 2016 Index of Economic Freedom, Economic Freedom Snapshot of Bangladesh is shown below:

- 2016 Economic Freedom Score: 53.3 (down 0.6 point)
- Economic Freedom Status: Mostly Unfree
- Global Ranking: 137th
- Regional Ranking: 29th in the Asia–Pacific Region
- Notable Successes: Management of Public Finance
- Concerns: Rule of Law and Open Markets
- Overall Score Change Since 2012: +0.1

Participants of this survey were asked to convey their opinion about base economy specific to Rangunia (see Figure-61). 17.9% participants mentioned about remittance as their economic base. 35.7% participants mentioned about agricultural activities and 17.1% said that business was their base economy. As it was a pre coded question, participants didn't mention at all about tourism sector and jewelers as the base of Rangunia's economy. 10.2% participants mentioned about service and 10.4% participants mentioned that day labor as the base of their economy. 1% mentioned about fishing as the base economy. 2.3% said

communication system, 2.4% said cow rearing, 1.8% participants mentioned about driving, 0.1% mentioned about construction of farms, 0.1% mentioned about joom cultivation and 0.1% mentioned of earning from river through fishing as base economy of Rangunia.

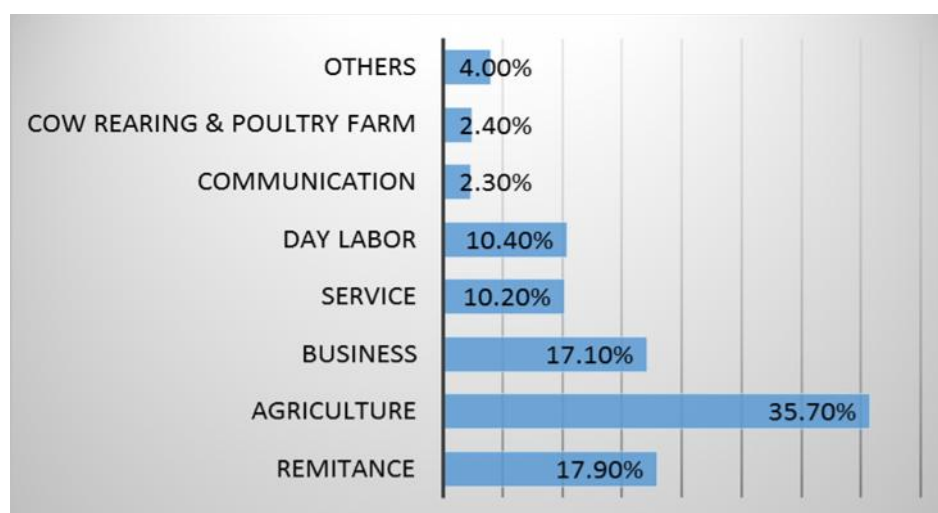


Figure 61 Base Economy of Rangunia Upazila

(Source: Socio-Economic Survey, 2016)

3.18.2 Priority sector for development

Participants of the survey were asked to prioritize areas for development. Highest number of 15.5% mentioned about road repair/develop & construction of new roads. 4% participants mentioned about ensuring electricity for all, 11.1% participants mentioned about improvement of communication, 12.8% mentioned about improving health services, 12.6% mentioned about provision of educational facilities, 7.2% mentioned and improvement of agricultural sector and 6.3% participants mentioned about gas connection. On the other hand, no one mentioned about sanitary latrine and building of port (see Figure-62).

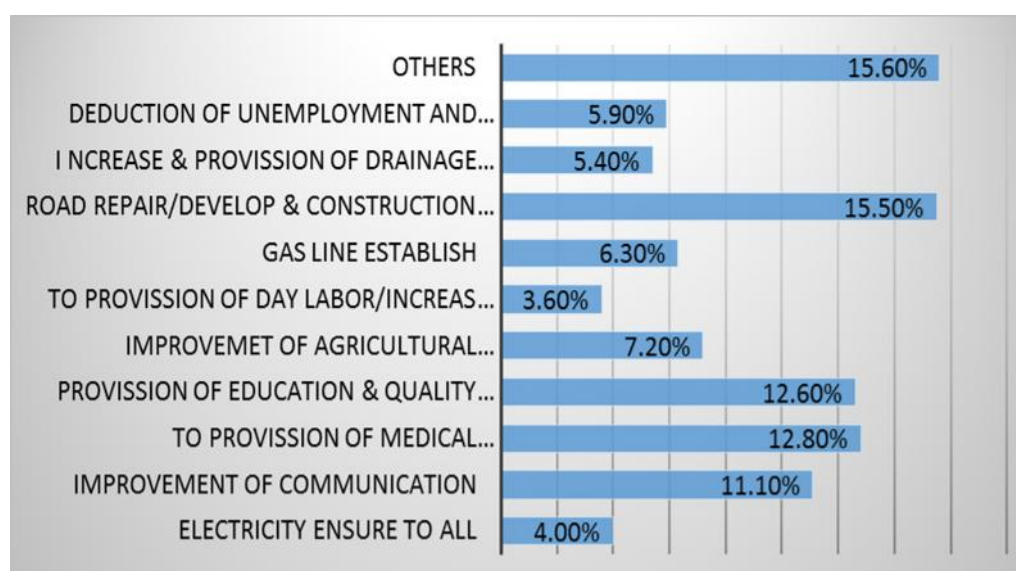


Figure 62 Priority Sector for Development

(Source: Socio-Economic Survey, 2016)

3.18.3 Opinion about overall development of the area

Bangladesh is ranked among the top disaster prone countries in the world. Rangunia is one of most disaster prone areas in Bangladesh. Yet, Bangladesh's development has been kind of ideal for countries alike. Participants of this survey were asked to convey their opinions about overall development of Rangunia (see Figure-63). Highest number of participants (18.9%) mentioned about repair/develop/construction of road. 13.1% mentioned about reduce reducing unemployment and creating adequate employment opportunities. 10.8% participants mentioned about educational advantages, 9% participants mentioned about health related facilities, 9.3% participants mentioned about gas facilities, 7% participants mentioned about development in agriculture sector, 3.6% participants mentioned of sanction of government grant or development grant. None of them mentioned about population reduction. Some other responses were came as overall development like women empowerment, prevention of early marriage, establishment of library, pollution free environment, embankment, digging & widening of canal/river etc.

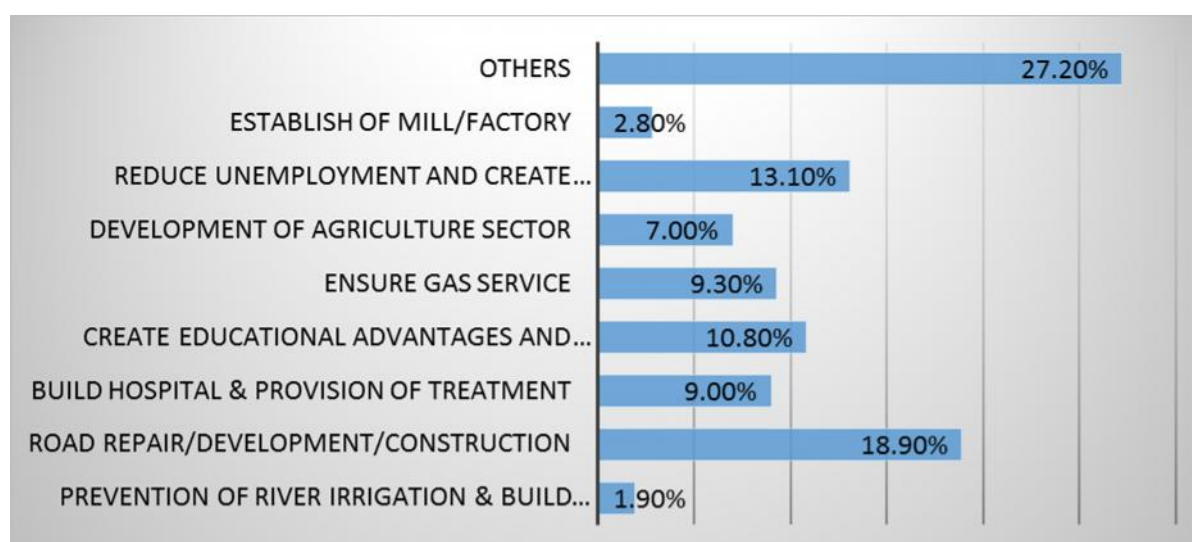


Figure 63 Opinion about overall development of the area

(Source: Socio-Economic Survey, 2016)

Chapter 4

Concluding analysis and Policy Framework

4.1 Concluding analysis

The Socio Economic Survey of Rangunia was limited to around 1100 people from 15 Unions and 9 ward of Rangunia Pourashava. The main objective of a socio-economic survey is to collect, assemble, analyze, interpret and to provide the socio-economic status of the people living in Rangunia Upazila in the district of Chittagong. It is also intended to provide quantitative data inputs that are required for formulation of development plan. The information required are about the people's occupation, available basic infrastructural services & facilities, access to road & transportation, people's housing pattern, land ownership & amount of land owned by per household, water, sanitation, hygiene practice, electricity & gas status, status of various pollution, assets, existing problems of the area, promising potentials of the area, perception of local people about development issues, its geographical features, infrastructures, its advantages and life supporting natural resources, social and cultural aspects etc. It is extremely important to possess comprehensive and document information about the socio-economic and cultural aspects of study population because it provides the basis for preparing a development plan.

The current socio-economic survey was conducted under the project Preparation of Development Plan for Fourteen Upazilas, Package 05- (Ramu Upazila, District-Cox's Bazar, and Rangunia Upazila, District-Chittagong), Government of Bangladesh (GoB). The overall objectives of the survey were to:

- To find out development issues and potential of the upazilla.
- To make a 20 years' development vision for the upazilla (both urban and rural area)
- To prepare a Master Plan in line with the vision for the development;

The development plan for Rangunia Upazila derived from this survey therefore to be based on analysis of selected socio-economic and cultural parameters that highlight the profile of the project population. The themes and areas covered in the survey and the findings are explained principally the demographic profile of the study population, problems faced, potentials & possibilities, occupational status, income from various occupations, economic base, particularly the land ownership status of the families; common property resources; socio cultural issues; developmental intervention in the village by the Govt. and non-governmental organizations etc.

In fruitful survey method, participants shared their ideas on where the project could contribute for future assistance. Suggestions included their valuable perceptions and

opinions about existing problems like water, sanitation, waste management, hygiene, electricity, gas, communication system, infrastructural services etc. Survey also drew information about various sources and its current uses in the society. Socio-economic survey pictured both socio-cultural and economic status of Rangunia Upazilla. The holistic scenario is important to introduce feasible and fruitful development initiatives.

4.2 Recommendations for development planning

In the light of above mentioned findings and socio-economic reality, following recommendations have been prepared after thorough consultation with relevant stakeholders of the study and through desk review. It is hoped that these recommendations would be helpful for Urban Development Directorate, all those individuals, organizations, institutes and line agencies who want to work for the development of Rangunia Upazila.:

- A. Education facilities should make available as Rangunia has a significant number of population dropping out from school before reaching secondary school.
- B. Construction of wide road in the community. This will increase people's access to road.
- C. Significant number of participants mentioned about the existence of Kacha road which decreases road's sustainability. Government should take initiatives to construct concrete or bituminous or HBB road instead of kacha road.
- D. Community should be introduced with improved drainage and waste management system.
- E. Road especially of urban areas, should contain traffic signal and street light.
- F. Rangunia Sadar should bring under 100% water supply and gas coverage. Besides, frequency of load shedding should be decreased.
- G. Government, interest groups, local government and community should take integrated initiatives to reduce various pollution such as water pollution, land pollution, air pollution, sound pollution etc.
- H. Initiatives need to be taken to make the people aware so that they can become interested in savings and investment. Because, survey found low frequency of savings and investment among the study population.
- I. Infrastructural facilities and services are some core issues for any development initiatives. In Bangladesh, there is not enough infrastructural facilities and service considering the amount of population. Authority should consider the number of population before introducing any services or facilities.
- J. Integrated Watershed management for soil erosion control is mandatory to be practiced;

- K. Improvement of livelihoods through promotion of eco-tourism activities at Rangunia.
- L. Increase sustainable use of natural resources (forest, water, agriculture and livestock)
through capacity building and awareness raising activities especially in the female segment of the society;
- M. Improve livelihood of communities through promotion of alternative income generation activities.
- N. Rangunia is highly vulnerable to natural disasters. Survey didn't satisfactory awareness among the people. Awareness raising campaign and cyclone center need to construct.

To carry out these recommendations, coordination among different parties and interest groups all project components is necessary. Greater coordination will help identify areas where activities will overlap and where synergies may arise. Possible strategies and activities need to be developed together to avoid duplicating efforts and to identify target audiences, activities, methodologies and indicators for monitoring and evaluating change. Findings should be compiled in an activity plan for all components.

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www.Disasterready.org

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর

প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৫ (রামু উপজেলা, কক্সবাজার ও রাঙ্গুনিয়া উপজেলা, চট্টগ্রাম)

পারিবার জরিপ প্রশ্নমালা (আর্থ-সামাজিক)

(জরিপ প্রক্রিয়াটি উত্তরদাতার কাছে পরিষ্কারভাবে বর্ণনা করুন এবং তাঁর অনুমতি নিয়ে আরম্ভ করুন। সকল তথ্য শুধুমাত্র সরকারী কাজে ব্যবহার করা হবে। আপনার দেয়া সকল তথ্য গোপন রাখা হবে।)

ক্রমিক: [শুধুমাত্র অফিসিয়াল ব্যবহারের জন্য]

| | | |
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| তথ্য সংগ্রহকারীর নামঃ..... | কোডঃ <input type="text"/> <input type="text"/> | তারিখঃ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> |
| যাচাইকারীর নামঃ..... | কোডঃ <input type="text"/> <input type="text"/> | তারিখঃ <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> |
| স্পট যাচাইকারীর স্বাক্ষর..... | | দিন মাস বছর |
| জেলা :..... | কোডঃ <input type="text"/> | উপজেলাঃ..... <input type="text"/> |
| ইউনিয়ন/পৌরসভাঃ..... <input type="text"/> | গ্রাম:/মহল্লা..... <input type="text"/> | ওয়ার্ড নাম্বারঃ.... <input type="text"/> |
| ঠিকানা (বিস্তারিত) :.....ল্যান্ডমার্ক:..... | | |
| খানাটি কোন ধরনের এলাকায় অবস্থিতঃ <input type="checkbox"/> ১ = শহর, ২=শহরতলী, ৩= গ্রাম | | |

| ক্রম | প্রশ্ন | কোড | কোডের বিবরণ |
|------------------------------|--------------------------|---|-------------------------------|
| ক) উত্তরদাতার প্রাথমিক তথ্যঃ | | | |
| ০১ | উত্তরদাতার নাম :----- | <input type="text"/> <input type="text"/> | সদস্য নম্বর (খ নং প্রশ্ন হতে) |
| ০২ | লিঙ্গ | <input type="text"/> | ১ = পুরুষ, ২ = মহিলা |
| ০৩ | বয়স (পূর্ণ বছরে) | <input type="text"/> <input type="text"/> | |
| ০৪ | উত্তরদাতার মোবাইল নম্বরঃ | <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> | |

খ) পরিবারের সদস্যদের বিবরণ

আপনার পরিবারে বর্তমানে যে সকল সদস্য বসবাস করছেন তাদের নাম বলুন। (যোচাই করুন এবং সকল সদস্যদের নাম লিপিবদ্ধ করুন।)

| সদস্য নম্বর | নাম | বয়স (পূর্ণ বছরে) | মহিলা/ পুরুষ ১=পুরুষ; ২=মহিলা; | যদি বয়স ৫ বছর বা তার অধিক হয় | | (১০ বছর বা তার অধিক বয়সের জন্য [] এর বর্তমান বৈবাহিক অবস্থা |
|----------------|-----|-----------------------------------|--------------------------------------|--------------------------------------|-----------------------------------|--|
| | | | | শিক্ষা [] সর্বোচ্চ কোন ক্লাশ পাশ | [] পেশা | |
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৪. শিক্ষা :

০ = স্কুলে যায়নি/কোন শ্রেণী পাশ নয়
১ = প্রাথমিক/ তার চেয়ে কম
২ = মাধ্যমিক/ এসএসসির কম
৩ = এসএসসি অথবা সমমান
৪ = এইচএসসি অথবা সমমান

৫ = ডিগ্রি/ফাজিল/সমমান
৬ = স্নাতক (সম্মান)/সমমান
৭ = মাস্টার্স/কামিল/সমমান
৮ = শুধুমাত্র ধর্মীয় শিক্ষা
৯ = শিক্ষিত
১০=অন্যান্য (উল্লেখ করুন)

৫.পেশাঃ

০১ = সরকারি চাকরি
০২ = বেসরকারি চাকরি
০৩ = ব্যবসা
০৪ = কৃষক

০৫ = জেলে

০৬ = দিন মজুর
০৭ = গৃহিনী
০৮ = শিক্ষার্থী
০৯ = বেকার
১০ =অন্যান্য (উল্লেখ করুন)

৬. বৈবাহিক অবস্থা :

১ = কখনই বিয়ে করেনি/অবিবাহিত
২ = বিবাহিত (একত্রে বসবাস করছেন)
৩ = তালাকপ্রাপ্ত
৪ = বিধবা/বিপত্নীক
৫ = বিচ্ছিন্ন/পরিত্যক্ত

গ) আবাসন সংক্রান্ত তথ্যঃ

| ক্রঃ নং | প্রশ্ন | কোড | কোড লিস্ট |
|------------|--|--------------------------|---|
| ০১ | পরিবার যে ঘরে বসবাস করে তার ধরণ কি? (প্রধান ঘর কি না) | <input type="checkbox"/> | ১=পাকা, ২= সেমি পাকা, ৩= কাঁচা, ৪=ঝুপড়ি |
| ০২ | আপনার ঘরের মালিকানার ধরণ কি? (প্রধান ঘরের মালিকানা কি না) | <input type="checkbox"/> | ১=নিজে মালিক ৩= বাবা/মায়ের মালিকানা ৫=অন্যের ঘরে বিনা মূল্যে বসবাস ২ = ভাড়াকৃত ৪ = ঋণ্ডর/শ্বাশুড়ির বাড়ি ৬ = অন্যান্য (উল্লেখ করুন) |
| ০৩ | ভাড়াকৃত হলে, মাসিক ভাড়া কত? (বিলসহ) | | (টাকায় লিখুন) |

ঘ) জমির মালিকানা সংক্রান্ত তথ্যঃ

| | | | |
|----|-----------------------------------|-------------------------|---|
| ০১ | আপনার পরিবারের কি নিজস্ব জমি আছে? | | ১ = হ্যাঁ ২ = না <input type="checkbox"/> (না হলে পরের সেকশনে যান) |
| ০২ | জমির ধরণ | জমির পরিমাণ (শতাংশে) | জমির মূল্য (টাকা/শতাংশ) |
| | | | জমির ধরণ ১ = নিচু, ২ = মাঝারি, ৩ = উচু |
| | | ১ | ২ |
| ক | বসত ভিটা | | |
| খ | আবাদি | | |
| | | | |
| | | | |
| গ | বানিজ্যিক | | |
| | | | |
| ঘ | অন্যান্য (উল্লেখ করুন) | | |

ঙ) অবকাঠামো ও সুবিধাদি

১. রাস্তাঃ

| বাড়ীর সম্মুখস্থ রাস্তার প্রস্থ (মিটার) | বাড়ীর সম্মুখস্থ রাস্তার ধরণ | প্রধান রাস্তার সুবিধাদি | | | | |
|---|---------------------------------|------------------------------------|-------|----------------------------|----------------------------------|---------------------------|
| | | বাসা থেকে প্রধান রাস্তার দূরত্ব | ড্রেন | লাইটপোস্ট ১=হ্যাঁ, ২=না | ট্রাফিক সিগন্যাল/ রোড মার্কিং | রাস্তার অবস্থা/ সমস্যা |
| ১ | ২ | ৩ | ৪ | ৫ | ৬ | ৭ |
| | | | | | | |
| | | | | | | |

কোডঃ

১ঃ বাড়ী সম্মুখস্থ রাস্তার প্রস্থ

১ = ৩ মিটার

২ = ৫ মিটার

৩ = ৫ মিটারের উপরে

২ঃ বাড়ী সম্মুখস্থ রাস্তার ধরণ

১ = পিচ ঢালা

২ = সুরকি বিছানো

৩ = ইট বিছানো

8 = काँचा

৫ = অন্যান্য (উল্লেখ করুন)

৩ঃ প্রধান রাস্তার দূরত্ব

১ = ০-৫০ মিটার

২ = ৫১-১০০ মিটার

৩ = ১০০ মিটারের উপরে

୪୫ ଦ୍ଵିତୀୟ

১ = পাকা

2 = কাঁচা

৩ = ত্রি

৬. ট্রাফিক সিগন্যাল/রোড মার্কিং

১ = আছে

২ = নাই

৭ঃ রাস্তার অবস্থা/সমস্যা

১ = অবস্থা ভাল

২ = অবস্থা ভাল নয়

ও = বর্জ্য ও হকার দ্বারা রাস্তা দখল

৪ = যানঘট

୧ = ଅପ୍ରଶସ୍ତ

৬ = অন্যান্য (উল্লেখ করুন)

২) অত্যাৱশ্যকীয় সেৱা সংক্ৰান্ত তথ্যঃ

| প্রশ্ন নং | প্রশ্ন | কোড | কোডের বিবরণ | | | |
|-----------------|--|-------------------------------|---|------|--|---|
| ০১ | আপনার এই এলাকায় কি ড্রেনেজ সুবিধা আছে? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না (না হলে ৮নং প্রশ্নে যান) | | | |
| ০২ | আপনার পরিবার কি ড্রেনেজ সুবিধা পান? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না | | | |
| ০৩ | কি ধরনের ড্রেনেজ ব্যবস্থা? | <input type="checkbox"/> | ১ = কনক্রিট, ২ = ইটের, ৩ = মাটির | | | |
| ০৪ | ড্রেনের অবস্থা কি? | <input type="checkbox"/> | ১ = ভাল, ২ = মোটামুটি, ৩ = খারাপ | | | |
| ০৫ | ড্রেন কি উপচে পড়ে এবং পরিবেশ দূষণ করে? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না | | | |
| ০৬ | ড্রেন কি কোথাও বন্ধ হয়ে যায়? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না | | | |
| ০৭ | আপনার এলাকায় কি জলাবদ্ধতা তৈরি হয়? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না (না হলে ৯নং প্রশ্নে যান) | | | |
| ০৮ | যদি হ্যাঁ হয় এর কারণ এবং সময় কাল | | | | | |
| ক্রমিক নং | কারণ | আছে/ঘটে? ১ = হ্যাঁ, ২ = না | কাল/সিজন (মাসের নাম) হতে পর্যন্ত | সময় | | |
| | | ১ | ২ | ৩ | ৪ | ১: ঘটে/আছে-- না হলে পরের লইনে যান ৫ঃ সময় ১ = পুরো সিজন ২ = সপ্তাহব্যাপী ৩ = কয়েকদিন ৪ = কয়েক ঘন্টা |
| ০১ | ড্রেনেজ সুবিধা না থাকা | ১ ২ | | | | |
| ০২ | অধিক বৃষ্টিপাত | ১ ২ | | | | |
| ০৩ | বন্যার পানি | ১ ২ | | | | |
| ০৪ | সরু ড্রেন | ১ ২ | | | | |
| ০৫ | বন্ধ ড্রেন | ১ ২ | | | | |
| ০৬ | নীচু জমি | ১ ২ | | | | |
| ০৭ | অন্যান্য (-----) | ১ ২ | | | | |
| ০৯ | আপনার এলাকায় বর্জ্য ব্যবস্থাপনা আছে কি? | <input type="checkbox"/> | | | ১ = হ্যাঁ ২ = না | |
| ১০ | আপনার পরিবারের বর্জ্য কোথায় ফেলেন? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> | <input type="checkbox"/> | | ১ = পৌর ডাস্টবিনে ২ = গর্তে ৩ = যেখানে সেখানে ৪ = অন্যান্য (উল্লেখ করুন) | |
| ১১ | বর্জ্য ফেলার স্থানের দূরত্ব | <input type="checkbox"/> | | | ১= ০-১/৪ কি.মি., ২ = ১/৪-১/২ কি.মি. ৩= ১/২ কি.মি. -এর অধিক | |
| ১২ | আপনার পরিবারের কি নিজস্ব পায়খানা আছে? | <input type="checkbox"/> | | | ১ = হ্যাঁ ২ = না (উত্তর না হলে ১৪নং প্রশ্নে যান) | |
| ১৩ | পায়খানা থাকলে তার ধরণ কি? | <input type="checkbox"/> | | | ১ = সেনিটারী লেট্রিন ২ = নন-সেনিটারী লেট্রিন ৩ = খোলা জায়গা | |
| ১৪ | আপনার পরিবারের বিদ্যুতের উৎস কি? | <input type="checkbox"/> | | | ১ = পল্লী বিদ্যুৎ ৪ = বিদ্যুৎ নেই ২ = পিডিবি ৩ = জেনারেটর ৩ = সৌর বিদ্যুৎ ৫ = অন্যান্য (-----) | |
| ১৫ | আপনার পরিবারের রান্নার জ্বালাপীর উৎস কি? | <input type="checkbox"/> | | | ১= সিলিভার গ্যাস ৪=বৈদ্যুতিক হিটার ৭= অন্যান্য (উল্লেখ করুন) ২=বায়োগ্যাস ৫=লাকড়ি/ভূষি ৩= কেরোসিন ৬= গোবর | |
| চ) পরিবেশ দূষণঃ | | | | | | |
| ০১ | আপনার এলাকার ভূ-উপরিভাগের পানি কি দূষিত হচ্ছে? | <input type="checkbox"/> | | | ১ = হ্যাঁ ২ = না | |
| ০২ | যদি হ্যাঁ হয়, কি কারণে পানি দূষিত হচ্ছে? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> | <input type="checkbox"/> | | ১ = শিল্পকারখানার কারণে ৩ = গৃহস্থলির বর্জ্য ২ = রাসায়নিক সার/কীটনাশক ব্যবহারে ৪ = অন্যান্য (উল্লেখ করুন) | |
| ০৩ | আপনার এলাকার জমি কি দূষিত হচ্ছে? | <input type="checkbox"/> | | | ১ = হ্যাঁ ২ = না | |
| ০৪ | যদি হ্যাঁ হয়, কি কারণে জমি দূষিত হচ্ছে? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> | <input type="checkbox"/> | | ১ = শিল্পকারখানার কারণে ৩ = গৃহস্থলির বর্জ্য ২ = রাসায়নিক সার/কীটনাশক ব্যবহারে ৪ = অন্যান্য (উল্লেখ করুন) | |
| ০৫ | আপনার এলাকায় কি শব্দ দূষণ হচ্ছে? | <input type="checkbox"/> | | | ১ = হ্যাঁ ২ = না | |
| ০৬ | যদি হ্যাঁ হয়, কি কারণে শব্দ দূষণ হচ্ছে? | <input type="checkbox"/> | <input type="checkbox"/> | | ১ = শিল্পকারখানার কারণে ২ = যানবাহনের কারণে ৩ = অন্যান্য (উল্লেখ করুন) | |
| ০৭ | আপনার এলাকায় কি বায়ু দূষণ হচ্ছে? | <input type="checkbox"/> | | | ১ = হ্যাঁ ২ = না | |
| ০৮ | যদি হ্যাঁ হয়, কি কারণে বায়ু দূষণ হচ্ছে? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> | <input type="checkbox"/> | | ১ = শিল্পকারখানার কারণে ২ = যানবাহনের কারণে ৩ = অন্যান্য (উল্লেখ করুন) | |

ছ) পরিবারের সদস্যদের অভ্যুৎগমন ও বহিঃগমন সংক্রান্ত তথ্য :

| | | | |
|----|---|---|--|
| ০১ | খানা প্রধানের জন্মস্থান কি এই এলাকায়? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না (উত্তর না হলে নেনং প্রশ্নে যান) |
| ০২ | উত্তর না হলে কোথা থেকে এখানে এসেছেন? | <input type="checkbox"/> | ১ = এই এলাকার/ইউনিয়নের অন্য গ্রাম থেকে(নাম---) ২ = এই উপজেলার অন্য ইউনিয়ন থেকে(নাম-----) ৩ = এই জেলার অন্য উপজেলা থেকে(নাম-----) ৪ = অন্য জেলা থেকে(নাম-----) ৫ = অন্য দেশ থেকে(নাম-----) |
| ০৩ | কত সালে এখানে এসেছেন? | <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> | |
| ০৪ | এই এলাকায় আসার কারণ কি? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | ১ = চাকরি ৯ = নদী ভাঙ্গনে বসত বাড়ি বিলীন এবং জীবন ও জীবিকার অনিশ্চয়তা ২ = ভালো শিক্ষা ব্যবস্থা ১০ = বন্যায় বসত বাড়ি বিলীন এবং জীবন ও জীবিকার অনিশ্চয়তা ৩ = ভালো কাজের সুযোগ ১১ = ঘূর্ণিঝড়ে বসত বাড়ি বিলীন এবং জীবন ও জীবিকার অনিশ্চয়তা ৪ = ব্যবসা/বানিজ্যের সুযোগ ১২ = অন্যান্য (উল্লেখ করুন) ৫ = বৈবাহিক কারণে ৬ = রাজনৈতিক কারণে ৭ = নিরাপত্তা ৮ = সব ধরনের সেবা পাওয়ার সুবিধা |
| ০৫ | আয়মূলক কোনো কাজের উদ্দেশ্যে আপনার পরিবারের সদস্য কি এলাকার বাইরে/দেশের বাইরে যায়? | ১ ২ | ১ = হ্যাঁ ২ = না (না হলে ৭নং প্রশ্নে যান) |
| ০৬ | কোথায় যায়? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | ১ = এই উপজেলার বাইরে অন্য উপজেলায়(নাম-----) ২ = নিজ উপজেলা/জেলা সদরে(নাম-----) ৩ = নিজ জেলার বাইরে (নাম-----) ৪ = বিভাগীয় বড় শহরে যেমন-ঢাকা (নাম-----) ৫ = গ্রামে (নাম-----) ৬ = বিদেশে(নাম-----) ৭ = অন্যান্য (উল্লেখ করুন) |
| ০৭ | আয়ের উদ্দেশ্যে ছাড়া অন্যান্য কারণে (যেমন-কেনাকাটা, চিকিৎসা, শিক্ষা/উচ্চশিক্ষা, বিনোদন ইত্যাদি) আপনার পরিবারের সদস্যরা কি এলাকার বাইরে কোথায়ও যায়? | ১ ২ | ১ = হ্যাঁ ২ = না (উত্তর না হলে পরের সেকশনে যান) |
| ০৮ | কোথায় যায়? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | ১ = এই উপজেলার বাইরে অন্য উপজেলায় ২ = নিজ উপজেলা/জেলা সদরে ৩ = নিজ জেলার বাইরে ৪ = বিভাগীয় বড় শহরে যেমন-ঢাকা ৫ = গ্রামে ৬ = বিদেশে ৭ = অন্যান্য (উল্লেখ করুন) |
| ০৯ | কি উদ্দেশ্যে যায়? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | ১ = কেনাকাটা ২ = চিকিৎসা ৩ = শিক্ষা/উচ্চশিক্ষা ৪ = বিনোদন ৫ = অন্যান্য (উল্লেখ করুন) |

জ) পরিবারের সম্পদ : (সম্পদ সমূহের মোট মূল্য আনতে হবে)

| পরিবারের সম্পদ সমূহ (পশু সম্পদ, যানবাহন, যন্ত্রপাতি, গৃহস্থলির জিনিস, মজুদ ও অন্যান্য) | পরিমাণ | বর্তমান মূল্য (টাকায় লিখুন) |
|--|--------|------------------------------|
|--|--------|------------------------------|

ঝ) পরিবারের মাসিক উপার্জনঃ (খাত অনুযায়ী আনতে হবে এবং সাধারণ মাসের মোট উপার্জন বের করতে হবে)

| | | | |
|----|---|--|----------------|
| ০১ | কৃষি | | (টাকার পরিমাণ) |
| ০২ | ব্যবসা | | |
| ০৩ | চাকরি | | |
| ০৪ | রেমিট্যান্স | | |
| ০৫ | পরিবারের সকল সদস্য এবং সকল উৎস মিলে একটি সাধারণ মাসের উপার্জন কত? | | |

ঞ) পরিবারের মাসিক ব্যয়ঃ

| | | | |
|----|---|--|----------------|
| ০১ | খাদ্য | | (টাকার পরিমাণ) |
| ০২ | পোশাক | | |
| ০৩ | চিকিৎসা | | |
| ০৪ | শিক্ষা | | |
| ০৫ | যাতায়াত | | |
| ০৬ | পরিবারের সকল সদস্য এবং সকল খাত মিলে একটি সাধারণ মাসের ব্যয় কত? | | |

| | | | |
|--|------------------------------------|--------------------------|--|
| ট) পরিবারের সঞ্চয় ও পরিবারের বিনিয়োগঃ | | | |
| ০১ | পরিবারের কোন সঞ্চয় আছে কি? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না (উত্তর না হলে ৩নং প্রশ্নে যান) |
| ০২ | পরিবারের বাৎসরিক সঞ্চয়ের পরিমাণ | | টাকা |
| ঠ) পরিবারের বিনিয়োগঃ | | | |
| ০৩ | পরিবারের কোন বিনিয়োগ আছে কি? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না (উত্তর না হলে পরের সেকশনে যান) |
| ০৪ | পরিবারের বাৎসরিক বিনিয়োগের পরিমাণ | | টাকা |

ড) নাগরিক সেবা/সুবিধা সমূহের প্রাপ্যতা :

| ক্রমিক নং | সুবিধাসমূহ | প্রাপ্যতা ১ = আছে, ২ = নাই (না থাকলে পরের লইনে যান) | আপনারা কি সেখানে যান? ১ = হ্যাঁ, ২ = না | দূরত্ব | যাতায়াত মাধ্যম | সেবার মান |
|---|---|---|---|--------------------------|--|--------------------------|
| | | ১ | ২ | ৩ | ৪ | ৫ |
| ০১ | সরকারী মেডিকেল হাসপাতাল/ ক্লিনিক (উপজেলা/জেলা সদর) | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ০২ | পরিবার কল্যাণ কেন্দ্র | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ০৩ | কমিউনিটি ক্লিনিক | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ০৪ | বেসরকারী হাসপাতাল/ক্লিনিক | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ০৫ | ঔষধের দোকান | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ০৬ | কমিউনিটি সেন্টার | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ০৭ | মার্কেট | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ০৮ | পুলিশবল্ল | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ০৯ | পার্ক | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১০ | খেলার মাঠ | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১১ | ব্যাংক | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১২ | পোস্টঅফিস | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৩ | দমকল বাহিনী | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৪ | প্রাথমিক বিদ্যালয় | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৫ | মাধ্যমিক বিদ্যালয় | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৬ | উচ্চ মাধ্যমিক/কলেজ | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৭ | ডিগ্রী কলেজ/অনার্স/মাস্টার্স কলেজ/বিশ্ববিদ্যালয় | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৮ | মাদ্রাসা | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ১৯ | ব্যায়ামাগার/ক্লাব | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২০ | সিনেমা হল/মিলনায়তন | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২১ | কাঁচা বাজার | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২২ | বাস স্ট্যান্ড | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২৩ | লাইব্রেরী | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২৪ | কবরস্থান/শ্মশান | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২৫ | ঈদগাহ | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২৬ | মসজিদ/মন্দির/মঠ | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২৭ | গণ শৌচাগার | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ২৮ | অন্যান্য (উল্লেখ করুন) | ১ ২ | ১ ২ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ৩. দূরত্ব ১ = পায়ে হাঁটা দূরত্ব (০.৫ কিমি এর নীচে) ২ = ০.৫ কি: মি: ভেতরে ৩ = ০.৫ কি:মি:- ১ কি: মি: ৪ = ১ কি: মি: - ২ কি: মি: ৫ = ২ কি: মি -৩ কি: মি: ৬ = ৩ কি.মি. এর বেশী | | | ৪. যাতায়াত মাধ্যম ১ = পায়ে হেঁটে ২ = বাই-সাইকেলে ৩ = রিক্সা ৪ = বাস ৫ = টেম্পো/ অটোরিক্সা/ নসিমন ৬ = ট্রেন ৭ = নৌকা | | ৫. সেবার মান ১ = ভাল ২ =খুব ভাল ৩ = মোটামুটি ৪ = খারাপ ৫ = খুব খারাপ | |

ঢ) এলাকার সমস্যা সমূহঃ

| ক্র | প্রশ্ন | কোড | কোডের বিবরণ |
|-----|---|--|---|
| ০১ | আপনার এলাকায় কি যানবাহন সম্পর্কিত কোন সমস্যা আছে? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না |
| ০২ | যদি হ্যাঁ হয়, কি ধরনের সমস্যা ? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | ১ = অপ্রসস্থ রাস্তা ২ = রাস্তা প্রাণিত হয় ৩ = রাস্তা মাঝে মাঝে নষ্ট ৪ = যানজট ৫ = বেশী ভাড়া ৬ = গণ পরিবহণ অপ্রতুল ৭ = অন্যান্য (উল্লেখ করুন) |
| ০৩ | আপনার এলাকায় কি রাস্তাঘাট সম্পর্কিত কোন সমস্যা আছে? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না |
| ০৪ | যদি হ্যাঁ হয়, কি ধরনের সমস্যা ? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> | ১ = সরু রাস্তা ২ = রাস্তা প্রাণিত হয় এবং মাঝে মাঝে নষ্ট ৩ = যানজট ৪ = গণ পরিবহণ অপ্রতুল ৫ = রাস্তার অভাব ৬ = বেশির ভাগ রাস্তা কাঁচা ৭ = অন্যান্য (উল্লেখ করুন) |
| ০৫ | আপনার এলাকায় কি বর্জ্য নিক্ষেপণ কোন সমস্যা? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না |
| ০৬ | যদি হ্যাঁ হয়, কি ধরনের সমস্যা ? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> | ১ = যথেষ্ট ডাস্টবিন নেই ২ = বর্জ্য ব্যবস্থাপনা ভাল না ৩ = কোন ব্যবস্থা নেই ৪ = অন্যান্য (উল্লেখ করুন) |
| ০৭ | আপনাদের এলাকায় কি বিদ্যুতের কোন সমস্যা আছে? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না |
| ০৮ | যদি হ্যাঁ হয়, কি ধরনের সমস্যা ? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> | ১ = সবার বিদ্যুত সংযোগ নেই ২ = লোড শেডিং অনেক বেশি ৩ = অন্যান্য (উল্লেখ করুন) |
| ০৯ | আপনার বাড়ীর দেওয়াল কখনো ফেটেছে কিনা? | ১ ২ | ১ = হ্যাঁ ২ = না |
| ১০ | যদি হ্যাঁ হয়, তার কারণ কি? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> | ১ = ভূমিকম্প ২ = দুর্বল/পুরান দেওয়াল ৩ = কারণ অজ্ঞাত ৪ = অন্যান্য (উল্লেখ করুন) |
| ১১ | আপনার এলাকায় কখনো মাটি ডেবে/বসে গেছে কিনা? | ১ ২ | ১ = হ্যাঁ ২ = না |
| ১২ | যদি হ্যাঁ হয়, তার কারণ কি? (একাধিক উত্তর হতে পারে) | <input type="checkbox"/> <input type="checkbox"/> | ১ = ভূমিকম্প ২ = কারণ অজ্ঞাত ৩ = অন্যান্য (উল্লেখ করুন) |
| ১৩ | অন্যান্য (উল্লেখ করুন) | | |

৩) প্রাকৃতিক দুর্যোগ, দুর্যোগে ক্ষতি ও মোকাবেলার জন্য গৃহীত পদক্ষেপ সমূহ

| ক্রঃ নং | দুর্যোগের ধরণ | পতিত হয়েছিল? হ্যাঁ = ১ না = ২ | কি ধরনের ক্ষতি হয়েছিল (একাধিক হতে পারে) | ক্ষতির পরিমাণ (টাকায়) | মোকাবেলায় কি ধরনের পদক্ষেপ নিয়েছিলেন? (একাধিক হতে পারে) |
|---------|-------------------------|-----------------------------------|--|------------------------|--|
| | | ১ | ২ | ৩ | ৪ |
| ০১ | বন্যা | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| ০২ | খরা | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| ০৩ | সাইক্লোন | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| ০৪ | নদী ভাঙ্গণ | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| ০৫ | অতিবৃষ্টি | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| ০৬ | জলাবদ্ধতা | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| ০৭ | ভূমিকম্প/ভূমি/পাহাড় ধস | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |

| ক্রঃ নং | দুর্যোগের ধরণ | পতিত হয়েছিল? হ্যা = ১ না= ২ | কি ধরণের ক্ষতি হয়েছিল (একাধিক হতে পারে) | ক্ষতির পরিমাণ (টাকায়) | মোকাবেলায় কি ধরণের পদক্ষেপ নিয়েছিলেন? (একাধিক হতে পারে) | | | |
|--|------------------------|------------------------------------|--|------------------------|--|--|---|--|
| | | ১ | ২ | ৩ | ৪ | | | |
| ০৮ | ঝড়ো বাতাস | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | | |
| ০৯ | ধুলি ঝড় | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | | |
| ১০ | অগ্নিকান্ড | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | | |
| ১১ | সড়ক দুর্ঘটনা | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | | |
| ১২ | নৌকা/জাহাজডুবি | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | | |
| ১৩ | লবনাক্ততা | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | | |
| ১৪ | অন্যান্য (উল্লেখ করুন) | ১ ২ | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | | |
| ২. প্রভাব/ক্ষতির কোড: ০ = কোন প্রভাব/ক্ষতি হয় নি ১ = খানা সদস্যের মৃত্যু ২ = কার্যদিবস নষ্ট ৩ = ঘরবাড়ি সম্পূর্ণভাবে নষ্ট ৪ = বাড়ির কিছু অংশ নষ্ট ৫ = গোয়াল ঘর নষ্ট | | | ৬ = জমির ফসল নষ্ট ৭ = মুরগি/ গৃহপালিত পশুর ক্ষতি ৮ = আর্থিক ক্ষতি ৯ = জমি/সম্পদ নদীগর্ভে ১০ = অন্যান্য (উল্লেখ করুন) | | ৪. কি ধরনের পদক্ষেপ নিয়েছিলেন: ০ = কোন প্রস্তুতি নেইনি ১ = ঘরের ভিটা উঠু করা ২ = ঘরের খুঁটি মেরামত ৩ = ঘর মেরামত ৪ = শুকনো খাবার জমানো | | ৫ = টাকা জমানো ৬ = সেবাদানকারীদের সাথে যোগাযোগ রাখা ৭ = মোমবাতি/ম্যাচ রাখা ৮ = বালি বা পানি জমা করা ৯ = অন্যান্য (উল্লেখ করুন) | |

৪) দুর্যোগ মোকাবেলায় সবচেয়ে জরুরী কি কি বা কোন কোন পদক্ষেপ গ্রহণ করা উচিত বলে মনে করেন?

- ১ = নগদ অর্থ হাতে রাখা
- ২ = রেডিও/টেলিভিশন/পত্রিকার মাধ্যমে আগে থেকে দুর্যোগেও খবর রাখা
- ৩ = দলগত ভাবে একে অপরের সহযোগিতা করা
- ৪ = এলাকায় আশ্রয় কেন্দ্র তৈরি করা
- ৫ = দুর্যোগ নিবারণকারী সংস্থাসমূহকে দ্রুত খবর দেওয়া
- ৬ = দুর্যোগ-আক্রান্তদের সরকারী/বেসরকারী ভাবে সহযোগিতা প্রদান
- ৭ = এলাকার অবকাঠামোগত উন্নয়ন করা
- ৮ = এলাকায় সেচ্ছাসেবক দল গঠন করা
- ৯ = সচেতনতা বাড়ানো
- ১০ = শুকনো খাবার রাখা
- ১১ = পানীয় জলের নিরাপদ ব্যবস্থা করা
- ১২ = ফায়ার সার্ভিস
- ১৩ = জরুরী চিকিৎসার ব্যবস্থা রাখা
- ১৪ = অন্যান্য (উল্লেখ করুন)

ত) পর্যটন :

| | | | |
|---|---|--|------------------|
| ১ | আপনার এলাকায় পর্যটনের সম্ভাবনা আছে কি? | <input type="checkbox"/> | ১ = হ্যাঁ ২ = না |
| ২ | সম্ভাবনা থাকলে কি ধরণের সম্ভাবনা আছে | ১=হেরিটেজ পার্ক নির্মান করা যাবে ২= এক্সক্লুসিভ টুরিস্ট জোন ৩ = অন্যান্য (উল্লেখ করুন) | |
| ৩ | আপনার এলাকায় পর্যটনের জন্য সম্ভাবনাময় স্থান | স্থানের নাম লিখুন | |

খ. খানা সদস্যদের প্রতিদিনের ভ্রমণ সংক্রান্ত তথ্য :

পরিবারের সদস্যদের ভ্রমণ সংক্রান্ত তথ্যঃ

| ক্রমিক নং | ভ্রমণ নং | ভ্রমণের উৎস (স্থান) | ভ্রমণের গন্তব্য (স্থান) | ভ্রমণের দূরত্ব | ভ্রমণের উদ্দেশ্য | ভ্রমণের সময় | | বাহন | সমস্যা |
|--------------|-------------|------------------------|----------------------------|-------------------|---------------------|--------------|-----|------|--------|
| | | | | | | শুরু | শেষ | | |
| | ১ | ২ | ৩ | ৪ | ৫ | ৬ | ৭ | ৮ | ৯ |
| ০১ | | | | | | | | | |
| ০২ | | | | | | | | | |
| ০৩ | | | | | | | | | |

কোড :

৪ঃ দূরত্ব

- ১ = ১ কি.মি.
- ২ = ১-৩ কি.মি.
- ৩ = ৩-৫ কি.মি.
- ৪ = ৫-৭ কি.মি.
- ৫ = ৭ কি.মি.- এর অধিক

৫ : ভ্রমণের উদ্দেশ্য

- ১ = কর্মস্থলে গমন
- ২ = স্কুল/কলেজ/বিশ্ববিদ্যালয়/শিক্ষা প্রতিষ্ঠান
- ৩ = কেনাকাটা
- ৪ = আনন্দ ভ্রমণ/বিনোদন/খেলাধুলা
- ৫ = আত্মীয় গৃহে গমন
- ৬ = চিকিৎসা
- ৭ = অন্যান্য

৮ : বাহনের নাম

- ১ = রিক্সা/ভ্যান
- ২ = সাইকেল
- ৩ = মোটর সাইকেল
- ৪ = কার/জীপ/মাইক্রোবাস
- ৫ = বাস
- ৬ = বেবীট্যাক্সী/টম্পো
- ৭ = হেঁটে
- ৮ = অন্যান্য (উল্লেখ করুন)

৯ঃ সমস্যা

- ১ = রাস্তা সংকীর্ণ
- ২ = সবসময় যানজট
- ৩ = বাস স্টপেজ নেই
- ৪ = দুর্ঘটনা
- ৫ = মাঝে মাঝে রাস্তা ভাল নেই
- ৬ = ভাড়া বেশি
- ৭ = অন্যান্য (উল্লেখ করুন)

দ) আপনার এলাকার অর্থনৈতিক ভিত্তি কি ?

০১)

০২)

০৩)

ধ) আপনার মতে উন্নয়নের ক্ষেত্রে অগ্রাধিকার উল্লেখ করুনঃ

০১ =

০২ =

০৩=

০৪=

০৫=

ন) এলাকার উন্নয়নের ক্ষেত্রে আপনার সুপারিশ/পরামর্শ সমূহ উল্লেখ করুনঃ

০১ =

০২ =

০৩ =

০৪ =

০৫ =

তথ্য সংগ্রহকারীর সাক্ষর ও তারিখ
উত্তরদাতাকে ধন্যবাদ দিয়ে সাক্ষাতকার শেষ করুন



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas

Package 05:
Ramu Upazila, District: Cox's Bazar &
Rangunia Upazila, District: Chittagong

FINAL SURVEY REPORT **Agricultural Survey** **of** **Rangunia Upazila**

June 2016

Joint venture of
 **HOUSE OF CONSULTANTS LIMITED (HCL)**
and
 **dm.Watch Disaster Management Watch(dm. Watch)**

EXECUTIVE SUMMERY

Rangunia Upazila is vulnerable to natural disasters, such as, drainage congestion, land erosion, drought, erratic rainfall, water logging. These are the main causes of loss of crops and bio-diversity, human lives and properties. The study aims to determine the present scenario of agriculture practices and assessment of the potential sustainable future development of Rangunia Upazila. Both the primary and secondary data were reviewed for preparing the survey report. The proposed Preparation of Development Plan for Fourteen Upazilas, Package 05 is expected to contribute to achieving the objectives of the National Agriculture Policy, Coastal Development Strategy & Coastal Zone Policy and Irrigation related policies.

The Upazila lies under Chittagong Coastal Plain (AEZ-23) and at the Northern-Eastern Hills (AEZ 29) under broad perspective of Agro-ecological Zone. Rangunia Upazila has 15 Unions and 1 Municipality. It has 46 agricultural blocks under DAE.

The highest land area is 11,995 ha, used as double crop and followed by single crop (5,127 ha). The remaining 1,633 ha is used as triple crops in Rangunia Upazila. Other lands are used as forest land 4,819ha, fish cultivation at pond (3,283 ha) and tea garden (725 ha). There are three types of fallow lands under Rangunia Upazila of all 15 Unions and 1 Municipality the highest percentage of land use is double cropped area, followed by single and triple cropped area. The scenario of the existing cropping pattern under Rangunia Upazila predominantly Rice, Vegetables, Pulses, Oilseeds, Spices, Betel Leaf and Orchard based. Rangunia Upazila present cropping pattern area is Boro (HYV/Hybrid) → Fallow→T. Aman (HYV) which is practiced 49% of the Net Cultivable Area (NCA). Fallow→Fallow→T. Aman (HYV) which is practiced 38% of the Net Cultivable Area (NCA). Winter vegetables→summer vegetables→T Aman (HYV). The cropping pattern of Aman (HYV) is covering 3% of the net crop area.

Cropping intensity is an important index of utilization of land. The average cropping intensity under Rangunia Upazila is 181%, which is less than Chittagong district (187%) and national average cropping intensity 190%. The present total cropped area is 31,128 ha of which rice cropped area is 27,250 ha and the rest 3,878 ha is covered by non-rice crops (Vegetables, Pulses, Orchard). The highest land area is used for Boro (HYV/Hybrid) and T. Aman (HYV) rice cultivation. Total crop production is 200,272.7 metric tons of which rice production is 132,661.2 metric tons and non-rice production is 67,611.5 metric tons.

A total of 72 STW and 427 LLP is used for irrigation in Rangunia Upazila. Surface water is available in different Unions. Farmers reported that above 95% of the irrigation canal system is not pucca, which causes wastage of irrigation water. SAAOs and UAO reported that about 95% farmers used power tiller and tractor during land preparation. Majority of the farmers do not use balance dose of chemical fertilizers due to lack of knowledge.

Rice production cost of Boro and Aus are Tk.18.65 and Tk.18.64 per kg, and Aman rice production cost is Tk.17.61 per kg which is less than Boro and Aus. About 81% land of local variety rice and 11% HYV rice and 32% oilseeds area were decreased during the last ten years. Cultivation of vegetables crops is more profitable for Rangunia Upazila. Remarkable increase during the 10 years was occurred in Tuber (133%), Fruits (68%) and Maize (1191%) crops land use. Among the other purposes, significant land use changes were occurred in brick field (400%) followed by fish/shrimp culture (300%) and poultry farms (100%) and housing (36%) respectively. Major problems to crop production in 15 Unions and 1 Municipality under Rangunia Upazila are natural disaster, bad communication and wholesale market and infrastructure, no cold storage, flash flood, less available agricultural input (seeds and fertilizers), pest and diseases and farmers technological knowledge.

Management of coastal salinity resilient, BRRI, BARI, BSRI and BINA are recommended. Drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds, such as BRRI Dhan 47, 53, 55, 61, 67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25, BARI Muatard-11, BARI Potato-22, Sugarcane Ishardi-40 should be widely introduced and encouraged to cultivate. There is a need for soil health improving program for Union farmers. DAE may arrange joint collaborative soil testing and training program for beneficiaries. Financial support needs to be provided to DAE from project.



Dr. Santosh Kumer Sarker
Agricultural Scientist

List of Abbreviations

| | |
|----------------|--|
| AEO | Agriculture Extension Officer |
| AEZ | Agro-Ecological Zone |
| BARI | Bangladesh Agriculture Research Institute |
| BCR | Benefit Cost Ratio |
| BINA | Bangladesh Institute of Nuclear Agriculture |
| BRRI | Bangladesh Rice Research Institute |
| BSRI | Bangladesh Sugarcane Research Institute |
| CC | Climate Change |
| DAE- | Department of Agricultural Extension |
| DTW- | Deep Tube well |
| DS/m | Deci-Siemens/meter |
| FAO | Food and Agricultural Organization |
| GO- | Government Organization |
| HYV- | High Yielding Variety |
| HHS | Household Survey |
| IPM | Integrated Pest Management |
| IPMP | Integrated Pest Management Plan (IPMP) |
| KII- | Key informant Interview |
| LIV | Local Improved Variety |
| LLP | Low Lift Pump |
| NCA | Net Cultivable Area |
| NLUP | National Land Use Policy |
| NWP | National Water Policy |
| P ^H | Negative Logarithm of Hydrogen Ion Concentration |
| SAAO | Sub-Assistant Agricultural Officer |
| SRDI | Soil Resource Development Institute |
| SPSS | Statistical Package for the Social Sciences |
| STW | Shallow Tube Well |
| T. Aman | Transplanted Aman |
| T. Aus | Transplanted Aus |
| ToT | Training of Trainers |
| UAO | Upazila Agricultural Officer |

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Chapter-01

Introduction

1.1 Background of the Study

The land of Rangunia Upazila is intensively used for agriculture, housing and settlements, forest, fisheries and other infra-structural development. These diversified uses of land have been giving financial benefits in one hand but on the other creating many problems in respect of criteria based uses and conflicts among the users. Rangunia Upazilla consists of one Municipality and 15 Unions are devastated almost every year by one or more natural disasters like flash flood, river erosion, tornadoes, tidal surges, salinity, malaria, and deforestation (Please see **Map 1.1**). In spite of having enormous opportunities Rangunia Upazila is also vulnerable to natural disasters like drainage congestion and land erosion, drought, erratic rain fall, water logging which are the main causes of loss of crops and bio-diversity, human lives and properties. Rangunia Upazila has an area of 410.73 sq. km. which is located in between 22°18' and 22°37' North latitudes and in between 91°58' and 92°08' East longitudes. It is bounded by Kawkhali Upazila (Rangamati District) on the North, Chandanaish, Patiya and Boalkhali Upazilas on the south, Kaptai, Rajasthali and Bandarban Sadar Upazilas on the East, Raozan and Kawkhali Upazilas on the West. The main river of this Upazila is Karnafuli including other small rivers; therefore flood happens during rainy season. Besides, due to some areas of this Upazila being very adjacent to the sea there remains the risk of tidal surge almost every year. These vulnerabilities as well as opportunities call for distinctive sustainable land management for proper use of land and other natural resources of the area.

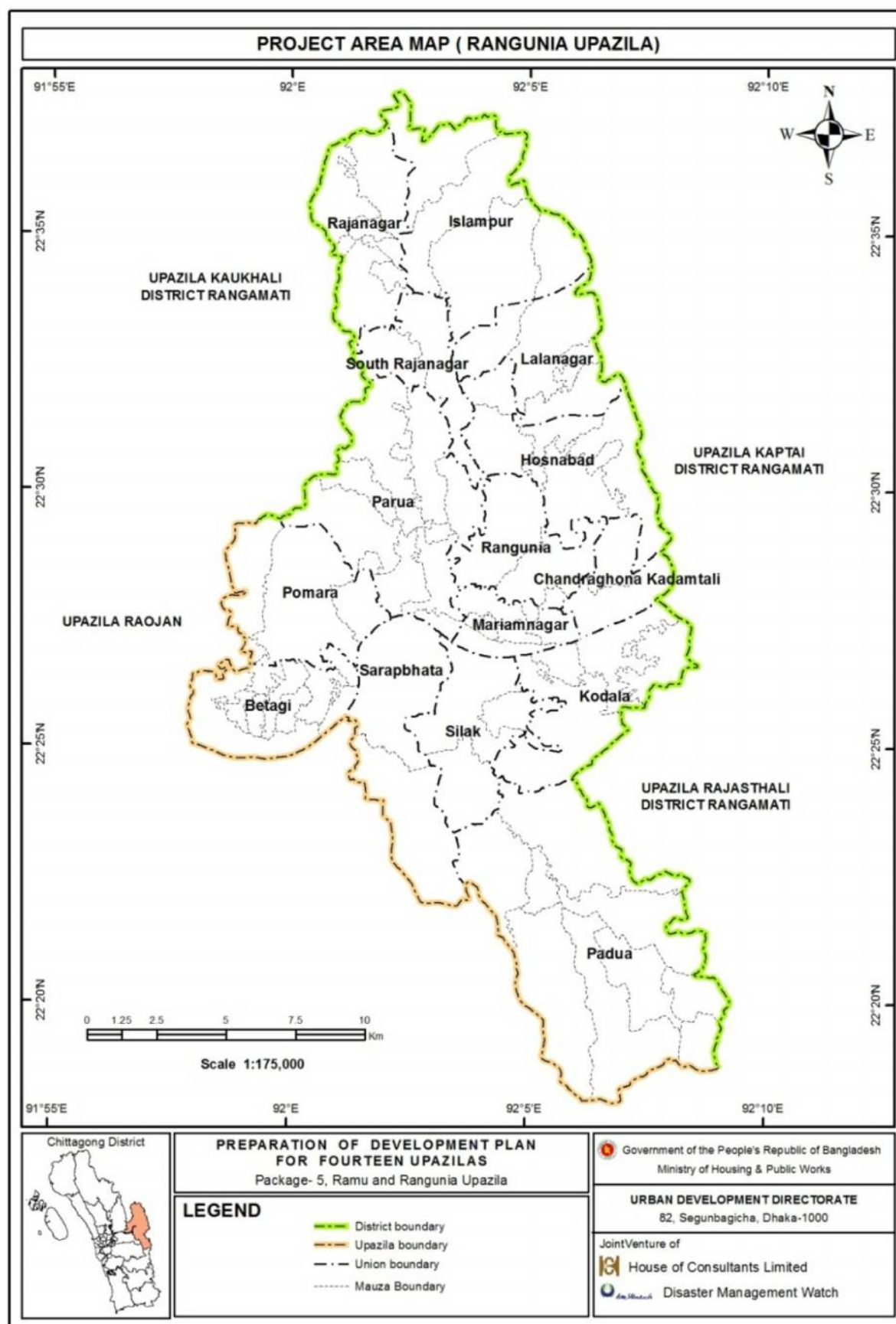
In view of the above mentioned context, a comprehensive study was conducted in all the Unions of Rangunia Upazila to assess present situation of land uses, related problems and potentialities of land for different other uses, and to find out possible coping ways to solve the problems. Therefore, considering all available parameters and characteristics of the area a sustainable land management was considered to develop better crop production.

1.2 Objectives of the Study

The main objective of the study is to assess the present cropping pattern and cropping intensities (single, double and triple crop area), land utilization and flood level. The main study questions are to determine the growth or decline of agricultural land during last ten years (from 2005-2016), and their causes for growth or decline covering a possible quality of existing and future agricultural land for the project area. The study is to determine the present scenario in agriculture practices and assessment of potential sustainable future development of the sector.

1.3 Approach and Methodology

A multi-disciplinary, participatory and interactive method has been followed in carrying out the study. Both primary and secondary data were reviewed. The primary data were collected through KII (Key Informant Interview) and field visit. KII information was collected by used of questionnaire Annex-1. The secondary data were collected and reviewed on land use from DAE Union and Upazila Office documents. KII information was collected from 46 Sub-Assistant Agriculture Officers under 1 Municipality and 15 Unions through interview. Structured and semi-structured questionnaire was used for data collection (Annex-2). Data collection and consolidation occurred simultaneously. Data consolidation activities, such as editing, coding, classifying and data entry into the computer software for analysis were carried out simultaneously. Frequency tables (one, two or multiple ways) were prepared for interpretations and analyses using SPSS, and d-Base for data analysis.



Source: Field Survey, 2016

Map 1.1: Project Area Map of Rangunia Upazila

Chapter-02

Agriculture Relevant Policy Framework

This Chapter presents a review of the national policy, legal, and regulatory framework relevant to the agriculture aspects of the Project.

2.1 National Agriculture Policy, 2013

The National Agriculture Policy, 2013 approved by the Government of Bangladesh, focuses on agriculture production, alleviating poverty through generating jobs and ensuring food security. The Policy outlined 9 (nine) specific objectives. Although the policy does not emphasize the coastal zone separately, all specific objectives are applicable to the agricultural development of coastal zone.

The GoB will pursue programme for agro-ecologically disadvantaged regions in the hilly area, drought-prone area, Barind Tract, char land, haor-baor and coastal belt with appropriate technological support.

To increase water productivity and enhance irrigation efficiency through optimal use of available water resources the GoB will facilitate dissemination of water management technology. Modern irrigation, drainage and water application systems will be introduced for expanding irrigation coverage including difficult or disadvantaged areas i.e. in char, hilly areas, Barind tract, drought-prone and saline areas.

The proposed Preparation of Development Plan for Fourteen Upazilas Package 05 is expected to contribute to achieving the objectives of the agriculture policy.

2.2 Master Plan for Agricultural Development in Southern Region of Bangladesh, 2013

The Master Plan for Agriculture Development in the Southern Region of Bangladesh has been prepared by the Ministry of Agriculture in collaboration with the Ministry of Fisheries & Livestock and Ministry of Water Resources and with technical assistance from the Food and Agriculture Organization of the United Nations (FAO). The Plan covers three hydrological regions- south central, southwest and southeast of the coastal zone covering 14 districts. The objective of the Plan is to provide a road map for integrated agricultural development in the coastal districts of Bangladesh, aiming at sustainable food security, poverty reduction and livelihood development for the poor. The plan particularly focuses on, among others, increasing agricultural production and productivity; improving water management, infrastructure development for surface water irrigation; improving productivity of brackish water shrimp and capture fisheries; and promoting small holder poultry & dairy development. The plan formulated a set of programmes and activities across all branches of agriculture and other related fields. The Plan is for 2013 to 2021.

The proposed Preparation of Development Plan for Fourteen Upazilas Package 05 is expected to contribute to achieving the objectives of the Master Plan for Agriculture Development in the Rangunia Upazila under Southern Region of Bangladesh.

2.3 Coastal Development Strategy, 2006

The Coastal Development Strategy (CDS) focuses on the implementation of the coastal zone policy. The CDS was approved at the second meeting of the Inter-Ministerial Steering Committee on ICZMP held on 13 February 2006. Nine strategic priorities, evolved through a consultation process, guide interventions and investments in the coastal zone:

- Ensuring fresh and safe water availability
- Safety from man-made and natural hazards
- Optimizing the use of coastal lands
- Promoting economic growth emphasizing non-farm rural employment
- Sustainable management of natural resources: taking advantage of untapped and less explored opportunities
- Improving livelihood conditions of people especially women
- Environmental conservation
- Empowerment through knowledge management
- Creating an enabling institutional environment

Proposed interventions under Preparation of Development Plan for Fourteen Upazilas Package 05 are in line with this strategy and support most of the above listed priorities.

2.4 Coastal Zone Policy, 2005

The Government has formulated the Coastal Zone Policy that provides a general guidance to all concerned for the management and development of the coastal zone in a manner so that the coastal people are able to pursue their life and livelihoods within secure and conducive environment.

The coast of Bangladesh is known as a zone of vulnerabilities as well as opportunities. It is prone to natural disasters like cyclone, storm surge and flood. In this regard, for reducing risk, the policy emphasizes the improvement of coastal polders and seeks to enhance safety measures by combining cyclone shelters, multi-purpose embankments, road system and disaster warning system.

The Preparation of Development Plan for Fourteen Upazilas Package 05 addresses some aspects of this Policy particularly those relating to the Rangunia Upazila improvements.

2.5 National Water Management Plan, 2001 (Approved in 2004)

The National Water Management Plan (NWMP) 2001, approved by the National Water Resources Council in 2004, envisions establishing an integrated development, management and use of water resources in Bangladesh over a period of 25 years. WARPO has been assigned to monitor the National Water Management Plan. The major programs in the plan have been organized under 8 (eight) sub-sectoral clusters: (i) Institutional Development, (ii) Enabling Environment, (iii) Main Rivers, (iv) Towns and Rural Areas, (v) Major Cities; (vi) Disaster Management; (vii) Agriculture and Water Management, and (viii) Environment and Aquatic Resources. Each cluster comprises of a number of individual programs, and a total of 84 sub-sectoral programs have been identified and presented in the investment portfolio. Most of the programs are likely to be implemented in coastal areas.

Preparation of Development Plan for Fourteen Upazilas Package 05 has been designed in line with this Plan and addresses its key objectives for the water resource management in the Ramu Upazila under coastal areas.

2.6 The Ground Water Management Ordinance, 1985 (Ordinance No. xxvit of 1985)

This is an Ordinance to manage ground water resources for agricultural production. This Act authorizes the Thana Parishad to grant license for installing tube wells under its jurisdiction. The Thana Parishad may grant the license if the Parishad is satisfied that the installation of the tube well applied to comply with the following points:

- will be beneficial to the areas where it is to be installed, or
- will not have any adverse effect upon the surrounding areas, or
- is otherwise feasible.

Preparation of Development Plan for Fourteen Upazilas Package 05 has been designed in line with this Plan and addresses its key objectives for the ground water management ordinance for Rangunia Upazila.

2.7 National Land Use Policy (MoL, 2001)

The National Land Use Policy enacted in 2001, aims at managing land use effectively to support trends in accelerated urbanization, industrialization and diversification of development activities. The NLUP urges that increasing the land area of the country may not be possible through artificial land reclamation process, which is cost-effective only in the long run. Therefore, land use planning should be based on the existing and available land resources. The policy suggests establishing land data-banks where, among others, information on accreted reverie and coastal chars will be maintained. Among the 28 policy statements of NLUP, the following are relevant to the Ramu Upazila under coastal area:

- forests declared by the Ministry of Environment and Forests will remain as forest lands;
- reclassification of forest lands will be prevented; and
- effective green belts will be created all along the coast.

Preparation of Development Plan for Fourteen Upazilas Package 05 is designed in accordance with this Policy and will comply with the above listed requirements.

2.8 National Water Policy, 1999

Endorsed by the GoB in 1999, the National Water Policy (NWP) aims to provide guidance to the major players in the water sector for ensuring optimal development and management of water. According to the policy, all agencies and departments entrusted with water resource management responsibilities (regulation, planning, construction, operation, and maintenance) are required to enhance environmental amenities and ensure that environmental resources are protected and restored in executing their tasks.

The proposed Preparation of Development Plan for Fourteen Upazilas Package 05 is expected to contribute to achieving the objectives of the national water policy.

2.9 National Integrated Pest Management (IPM) Policy

IPM Action Plan supports a strategy that promotes use of biological or environmental pest control methods and reduces reliance on synthetic chemical pesticides. Agriculture, rural development and health sector projects have to avoid using harmful pesticides. Other pesticides can be used, but only as an element of an Integrated Pest Management Plan (IPMP) that emphasizes environmental and biological controls.

The proposed Preparation of Development Plan for Fourteen Upazilas Package 05 is expected to contribute to achieving the reduces pesticides used in agriculture sector and increases use of other pest control methods under nation

Chapter-03 Present Land Used

3.1 Description of the Present Situation

The Upazila Agro-ecological zone: Land area of Ganges Tidal Floodplain consists of AEZ-23 is 17400 ha and AEZ 29 is 1358 ha. The soils are formed from alluvial sediments and seasonally flooded, poorly drained soil developed in medium textured to fine textured alluvial deposits. Main river is Karnafuli river of Rangunia Upazila including others stream and small rivers. Due to flash flood from different rivers nearest villages flooded and the houses and crops damaged. The soil pH ranges from 6.5-7.5(SRDI 1998 and UAO 2016).

3.2 Upazila and Union Wise Farm Families

Rangunia Upazila has 15 Unions and 1 Municipality. It has 46 agricultural blocks under DAE. Union and category wise farm family under Rangunia Upazila is shown in Table 1. Farm family is categorized according to farmer holding own land. There are five categories of farm family in Bangladesh. These are: landless (0.05-0.50 acre land), marginal (0.51-1.50 acre land), and small (1.51-2.50 acre land), and medium (2.51-7.50 acre land) and larger (above 7.50 acre land). On an average about land less 8623, marginal 17173, small 10078, medium large 4349 farm families and remaining 1057 are larger farmers under Rangunia Upazila. The highest percentage of farm families are marginal farmers (41%) followed by Small (24.00%), landless (21%), medium farmers (11.%) and remaining are larger farmers (Fig-1).

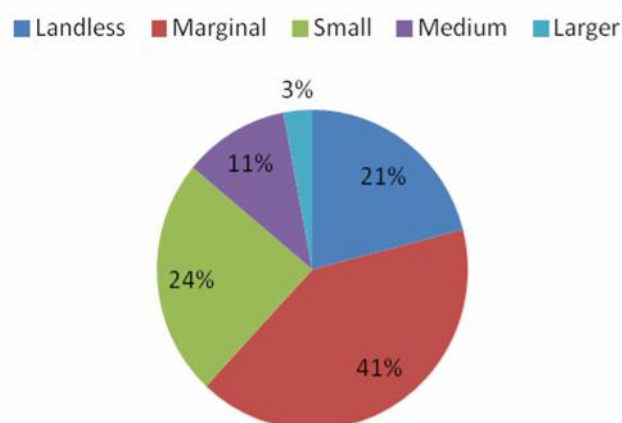


Figure-1: Percentage of Category of Farm Family under Rangunia Upazila
Source: SAO, Rangunia Upazila, DAE, 2016

Table1: Union and Category Wise Farm Family under Rangunia Upazila

| Name of Union | Landless | Marginal | Small | Medium | Larger | Total |
|-----------------|--------------------|---------------------|---------------------|--------------------|-------------------|--------------|
| Rajanagar | 1298(36.61) | 969(27.33) | 728(20.54) | 451(12.72) | 99(2.79) | 3545 |
| Hosnabad | 372(17.00) | 721(32.95) | 630(28.79) | 440 (20.11) | 25(1.14) | 2188 |
| S .Rangunia | 435(18.02) | 813(33.68) | 951(39.40) | 174 (7.21) | 41(1.70) | 2414 |
| Mariamnagar | 425(26.20) | 974(60.05) | 525(32.37) | 181(11.16) | 17(1.05) | 1622 |
| Parua | 870(34.44) | 946(37.45) | 460(18.21) | 220(8.71) | 30(1.19) | 2526 |
| Pomra | 325(16.36) | 1082(54.45) | 400(20.13) | 150(7.55) | 30(1.51) | 1987 |
| Betagi | 400(20.62) | 1100(56.70) | 300(15.46) | 100(5.15) | 40(2.06) | 1940 |
| Sarafbhata | 955(29.78) | 1000(31.18) | 965(30.09) | 195(6.08) | 82(2.56) | 3207 |
| Shilok | 540(26.47) | 450(22.06) | 360(17.65) | 390(19.12) | 90(4.41) | 2040 |
| Padua | 816(15.89) | 3500(68.15) | 1000(19.47) | 600(11.68) | 220(4.28) | 5136 |
| Chandraghona | 275(11.53) | 1500(62.89) | 300(12.58) | 250(10.48) | 60(2.52) | 2385 |
| Kodala | 300(16.30) | 900(48.91) | 400(21.74) | 170(9.24) | 70(3.80) | 1840 |
| Islampur | 675(29.55) | 928(40.63) | 517(22.64) | 101(4.42) | 63(2.76) | 2284 |
| Dakkin Rajanagr | 327(11.61) | 800(28.41) | 1172(41.62) | 452(16.06) | 65(2.31) | 2816 |
| Lalanagar | 410(15.95) | 990(38.52) | 770(29.96) | 325(12.65) | 75(2.92) | 2570 |
| Municipality | 200(13.33) | 500(33.33) | 600(40.00) | 150 (10.00) | 50 (3.33) | 1500 |
| Total | 8623(20.89) | 17173(41.60) | 10078(24.41) | 4349(10.54) | 1057(2.56) | 41280 |

Source: Sub-Assistant Agriculture Officers under Rangunia Upazila, DAE 2016

3.3 Present Agricultural Land Use

3.3.1 Present Upazila Land Use

The scenario of Rangunia Upazila present different land utilized is shown in **Table 2**. Types of lands are 1905 ha high land, 15538 ha medium high land and 1312 ha medium low lands respectively. Rangunia Upazila covers 34016 ha of net cropped area of which about cultivated area is 18755 ha. The highest land area is 11995 ha is used as double crop and followed by single crop of 5127 ha and remaining 1633 ha is used as triple crops under Rangunia Upazila. Other land use: forest land- 4819ha, Fish cultivation pond -3283 ha and Tea garden -725 ha. There are three types of fallow land under Rangunia Upazila. These are Permanent fallow land- 7023 ha, Temporary fallow land -70ha and cultivable fallow land - 100 ha. Percentage of single, double and triple cropped area used in Rangunia Upazila is shown in **Fig 2**. The highest percentage is double cropped area (64%) followed by single crop area (27%) and triple cropped area (9%) under Rangunia Upazila. The cropping intensity of Upazila Rangunia is 181%. Union-wise Present Agriculture Land Use Information and Identified land Zoning of Rangunia Upazila are shown in **Table 3** and **Table 4**.

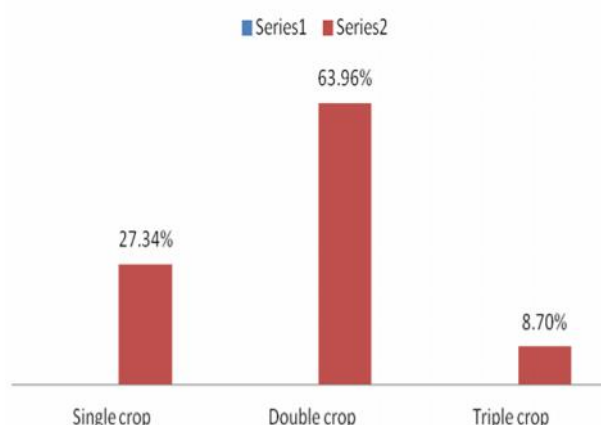


Figure-2: Percentage of single, double and triple cropped area used in Rangunia Upazila
Source: Upazila Agriculture Office, Rangunia, DAE 2016

Table-2: Present Land Use Pattern of Rangunia Upazila

| Sl. No. | Upazila Land use | Total Area (ha) |
|---------|------------------------|-----------------|
| 1. | Cultivable land | 18755 |
| 2. | Single cropped area | 5127 |
| 3. | Double cropped area | 11995 |
| 4. | Triple cropped area | 1633 |
| 5. | Total crops land | 34016 |
| 6. | Cropping Intensity | 181% |
| 7. | Water land | 3283 |
| 8. | Forest land | 4819 |
| 9. | Tea garden | 725 |
| 10. | High land | 1905 |
| 11. | Medium high land | 15538 |
| 12. | Medium low land | 1312 |
| 13. | Permanent fallow land | 7023 |
| 14. | Cultivable Fallow land | 100 |
| 15. | Temporary fallow land | 70 |

Source: Upazila Agriculture Office Rangunia, DAE 2016

Table-3: Union-wise Present Agriculture Land Use Information and Identified land Zoning (Rangunia Upazila)

| Name of Union | Total Area(HA) | NCA (ha) | Land Type (%) NCA | Soil P ^H | Soil Texture | Present land Use (%) | Identified Land Zoning |
|------------------------|----------------|----------|------------------------------------|---------------------|------------------------------|--|--|
| Betagi | 1772 | 780 | HL-10 MHL-70 MLL-20 | 4.4-7.5 | Sandy loam & Silty clay loam | Agriculture=44 Hill Forest=36 River/Canal=8 Settlement=12 | Mixed Agro-Hill Forest Zone |
| Chandraghona Kadamtali | 1123 | 485 | HL-10 MHL-85 MLL-5 | 4.4-6.3 | Sandy loam & Silty clay loam | Agriculture=43 Hill Forest=5 River/Canal=19 Settlement=33 | Mixed-Agro-Fisheries(open water, river & canal) Zone |
| Dakshin Rajanagar | 1878 | 1145 | HL-10 MHL-50 MLL-30 LL-10 | 4.4-7.5 | Sandy loam & Silty clay loam | Agriculture=61 Hill Forest=10 River/Canal=3 Settlement=26 | Agriculture Zone |
| Hosnabad | 2784 | 1280 | HL-10 MHL-65 MLL-25 | 4.4-7.5 | Sandy loam & Silty clay loam | Agriculture=46 Hill Forest=48 River/Canal=1 Settlement=18 | Mixed Agro-Hill Forest Zone |
| Islampur | 3578 | 1180 | HL-10 MHL-40 MLL-40 LL-10 | 4.4-7.5 | Sandy loam & Silty clay loam | Agriculture=33 Hill Forest=34 River/Canal=1 Settlement=16 Unclassified=2 | Mixed Agro-Hill Forest Zone |
| Kodala | 3488 | 965 | HL-5 MHL-55 MLL-25 LL-15 | 4.4-6.0 | Silt loam & Silty clay loam | Agriculture=28 Hill Forest=56 River/Canal=1 Settlement=15 | Mixed Agro-Hill Forest Zone |
| Lalanagar | 623 | 350 | HL-25 MHL-40 MLL-30 LL-5 | 4.5-6.2 | Silt loam & Silty clay loam | Agriculture=56 River/Canal=2 Settlement=42 | Agriculture Zone |
| Mariamnagar | 613 | 150 | HL-15 MHL-50 MLL-30 LL-5 | 4.4-5.4 | Silt loam & Silty clay loam | Agriculture=25 River/Canal=31 Settlement=34 Sand=7 Urban area=2 | Mixed-Agro-Fisheries(open water, river & canal) Zone |
| Padna | 7214 | 2185 | HL-5 MHL-60 MLL-35 | 4.4-7.5 | Sandy loam & Silty clay loam | Agriculture=30 Hill Forest=50 River/Canal=2 Settlement=18 | Mixed Agro-Hill Forest Zone |
| Parua | 3523 | 1290 | HL-25 MHL-45 MLL-30 | 4.4-7.5 | Sandy loam & Silty clay loam | Agriculture=37 Hill Forest=38 River/Canal=3 Settlement=17 Unclassified=5 | Mixed Agro-Hill Forest Zone |
| Pomara | 2148 | 780 | HL-40 MHL-55 MLL-5 | 4.5-6.8 | Sandy loam & Silty clay loam | Agriculture=36 Hill Forest=31 River/Canal=3 Settlement=28 Urban area=2 | Mixed Agro-Hill Forest Zone |
| Rajanagar | 7723 | 1980 | HL-5 MHL-45 MLL-40 LL-10 | 4.5-7.5 | Sandy loam & Silty clay loam | Agriculture=26 Hill Forest=48 River/Canal=1 Settlement=12 Unclassified=14 | Mixed Agro-Hill Forest Zone |
| Rangunia | 1480 | 1405 | HL-40 MHL-35 MLL-25 | 4.4-5.6 | Silt loam & Silty clay loam | Agriculture=95 River/Canal=2 Settlement=2 Urban area=1 | Agriculture Zone |

| Name of Union | Total Area(HA) | NCA (ha) | Land Type (%) NCA | Soil P ^H | Soil Texture | Present land Use (%) | Identified Land Zoning |
|---------------------|----------------|----------|------------------------------------|---------------------|------------------------------|--|-----------------------------|
| Sarapbhata | 2602 | 650 | HL-20 MHL-40 MLL-20 LL-20 | 4.5-7.5 | Sandy loam & Silty clay loam | Agriculture=25 Hill Forest=55 River/Canal=4 Settlement=16 | Mixed Agro-Hill Forest Zone |
| Silok | 1238 | 675 | HL-40 MHL-55 MLL-5 | 4.5-6.8 | Sandy loam & Silty clay loam | Agriculture=54 Hill Forest=22 River/Canal=5 Settlement=19 | Mixed Agro-Hill Forest Zone |
| Rangunia Paurashava | 832 | 465 | HL-15 MHL-45 MLL-40 | 4.5-6.5 | Silt loam & Silty clay loam | Agriculture=56 River/Canal=6 Settlement=36 Urban area=2 | Urban and commercial Zone |

Source: Land Zoning Report of Rangunia Upazila of Chittagong District, August 2011

Table-4: Unions Identified Land Zoning under Rangunia Upazila

| Name of Land Zoning | Name of Union under Land Zoning | Remarks |
|--|---|---|
| 1. Agriculture Zone | Dakshin Rajanagar, Lalanagar and Rangunia | Peoples' opinions are in favor of this zoning |
| 2. Mixed Agro-Fisheries(open water-river, canals etc) Zone | Chandraghona Kadamtali, Mariamnagar | People's opinions are in favor of Agriculture Zoning and also in favor of Protecting the fisheries area. |
| 3. Mixed Agro-Hill Forest Zone | Betagi, Hosnabad, Islampur, Kodala, Padua, Parua, Pomara, Silok, Sarapbhata and Rajanagar | People's opinions are in favor of Agriculture Zoning and also in favor of Protecting the hill forest areas. |
| 4. Urban and commercial Zone | Rangunia Paurashava | Urban development program is a common demand without degrading fertile agricultural land |

Source: Land Zoning Report of Rangunia Upazila of Chittagong District, August 2011

3.3.2 Present Union Wise Land Use

3.3.2.1 Betagi Union Land Use

General Description

Betagi Union is comprised of 17 mouzas having an area of 1772ha of land of which cultivable area is 780 ha (44%). The lands types of this Union are medium highland (70%) followed by medium low land (20%) and high land (10%). The high land inundated by monsoon flooding but the other land are inundated for 2-3 months in the monsoon maximum 120 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ-29). The soil P^H is 4.4-7.5 and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Betagi union dominant land use is agriculture followed by hill forest. Boro(HYV) and T .Aus (HYV) are the main irrigated crops cultivated using water hilly charas (canals). There are six cropping patterns are practiced in Betagi union is shown Table5 union.

Table-5: Present Cropping Patterns of Betagi Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area(ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|---|----------|--------------------------------|------------------------|
| Betagi | 780 | Fallow→Fallow→T.Aman (HYV/LIV) | 80.0 | 10 | 186 |
| | | Vegetables/Ginger/Turmeric/Banana/Sugarcane | 15.0 | 2 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 40.0 | 5 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 195.0 | 25 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV/LIV) | 390.0 | 50 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 60.00 | 8 | |
| | | Total | 780.0 | 100 | |
| Other Land Use | | Hill Forest | 635.0 | 36% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Betagi Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.

- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.
- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.2 Chandraghona Kadamtali Union Land Use

General Description: Chandraghona Kadamtali Union is comprised of 4 mouzas having an area of 1123ha of land of which cultivable area is 485ha (43%). The lands types of this union are medium highland (85%) followed by high land (10%) and medium low land (5%) The high land inundated by monsoon flooding but the other land are inundated for 2-3 months in the monsoon maximum 120 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-6.3and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in this union (Table--.6).The cropping intensity of this union is 186%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-6: Present Cropping Patterns of Chandraghona Kadamtali Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|------------------------|--------------------------|--|-----------|--------------------------------|------------------------|
| Chandraghona Kadamtali | 485 | Fallow→Fallow→T.Aman (HYV/LIV) | 50.0 | 10 | 180 |
| | | Vegetables/Ginger/Turmeric/Banana/ Sugarcane | 25.0 | 5 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 25.0 | 5 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 100.0 | 20 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 265.0 | 55 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 25.00 | 5 | |
| | | Total | 485.0 | 100 | |
| Other Land Use | | Hill Forest | 55.0 | 05% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Chandraghona Kadamtali Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.

- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.
- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.3 Dakshin Rajanagar Union Land Use medium low land (5%)

General Description: Dakshin Rajanagar Union is comprised of 2 mouzas having an area of 1878ha of land of which cultivable area is 1145ha (61%). The lands types of this union are medium highland (50%) followed by medium low land (30%) and high land (10%) and low land(10%).The high land inundated by monsoon flooding but the other land are inundated for 2-3 months in the monsoon maximum 120 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-5.8and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in this union which is shown in Table-7. The cropping intensity of this union is 178%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-7: Present Cropping Patterns of Dakshin Rajanagar Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|-------------------|--------------------------|--|-----------|--------------------------------|------------------------|
| Dakshin Rajanagar | 1145 | Fallow→Fallow→T.Aman (HYV/LIV) | 115.0 | 10 | 178 |
| | | Vegetables/Ginger/Turmeric/Banana/ Sugarcane | 70.0 | 6 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 90.0 | 8 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 185.0 | 16 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 575.0 | 50 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 115.00 | 10 | |
| | | Total | 1145.0 | 100 | |
| Other Land Use | | Hill Forest | 185.0 | 10% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Dakshin Rajanagar Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.

- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in Union.
- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.4 Hosnabad Union Land Use

General Description: Hosnabad Union is comprised of 6 mouzas having an area of 2784ha of land of which cultivable area is 1280ha (46%). The lands types of this union are medium highland (65%) followed by medium low land (25%) and high land (10%) The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 90 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-7.5and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in this union which is shown in Table 8.The cropping intensity of this union is 187%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-8: Present Cropping Patterns of Hosnabad Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|--|-----------|--------------------------------|------------------------|
| Hosnabad | 1280 | Fallow→Fallow→T.Aman (HYV/LIV) | 100.0 | 8 | 187 |
| | | Vegetables/Ginger/Turmeric/Banana/ Sugarcane | 50.0 | 4 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 40.0 | 3 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 385.0 | 30 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 640.0 | 50 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 65.0 | 5 | |
| | | Total | 1280.0 | 100 | |
| Other Land Use | | Hill Forest | 185.0 | 10% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Hosnabad Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.

- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in Union.
- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.5 Islampur Union Land Use

General Description: Islampur Union is comprised of 5 mouzas having an area of 3578ha of land of which cultivable area is 1180ha (33%). The lands types of this union are medium highland (40%) followed by medium high land (40%) and high land (10%) and low land (10%). The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 120 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-7.5and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in this union which is shown in Table9. The cropping intensity of this union is 178%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-9: Present Cropping Patterns of Islampur Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|--|-----------|--------------------------------|------------------------|
| Islampur | 1180 | Fallow→Fallow→T.Aman (HYV/LIV) | 120.0 | 10 | 178 |
| | | Vegetables/Ginger/Turmeric/Banana/ Sugarcane | 70.0 | 6 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 95.0 | 8 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 190.0 | 16 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 590.0 | 50 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 120.0 | 10 | |
| | | Total | 1180.0 | 100 | |
| Other Land Use | | Hill Forest | 1710.0 | 48% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Islampur Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in Union.

- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.6 Kodala Union Land Use

General Description: Kodala union is comprised of 4 mouzas having an area of 3488ha of land of which cultivable area is 965ha (28%). The lands types of this union are medium highland (55%) followed by medium low land (25%) and low land (15%) and high land (5%). The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 90 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-6.0and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in this union which is shown in Table10 The cropping intensity of this union is 145%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-10: Present Cropping Patterns of Kodala Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|--|-----------|--------------------------------|------------------------|
| Kodala | 965 | Fallow→Fallow→T.Aman (HYV/LIV) | 485.0 | 50 | 145 |
| | | Vegetables/Ginger/Turmeric/Banana/ Sugarcane | 40.0 | 4 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 30.0 | 3 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 75.0 | 8 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 290.0 | 30 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 50.0 | 5 | |
| | | Total | 1180.0 | 100 | |
| Other Land Use | | Hill Forest | 1967.0 | 57% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Kodala Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.

- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in Union.
- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.7 Lalanagar Union Land Use

General Description: Lalanagar Union is comprised of 6 mouzas having an area of 623ha of land of which cultivable area is 350ha (56%). The lands types of this union are medium highland (40%) followed by medium low land (30%) and high land (25%) and low land (5%). The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 90 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.5-6.2and soil salinity level ranges from 0-2dS/m(**Land Zoning Report, August 2011**)..

Present Agriculture Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in Lalanagar union which is shown in Table11. The cropping intensity of this union is 187%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-11: Present Cropping Patterns of Lalanagar Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|---|-----------|----------|------------------------|
| Lalanagar | 350 | Fallow→Fallow→T.Aman (HYV/LIV) | 25.0 | 7 | 187 |
| | | Vegetables/Ginger/Turmeric/Banana / Sugarcane | 20.0 | 5 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 10.0 | 3 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 105.0 | 30 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 175.0 | 50 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 20.0 | 5 | |
| | | Total | 350.0 | 100 | |
| Other Land Use | | Tea Garden | 130.0 | | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Lalanagar Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.

- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.8 Mariamnagar Union Land Use

General Description: Mariamnagar union is comprised of 3 mouzas having an area of 613ha of land of which cultivable area is 150ha (25%). The lands types of this union are medium highland (50%) followed by medium low land (30%) and high land (15%) and low land (5%). The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 90 cm depending on land types. This union is covered by Chittagong oastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-5.4and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in Mariamnagar union which is shown in Table12. The cropping intensity of this union is 145%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-12: Present Cropping Patterns of Mariamnagar Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|---------------|--------------------------|--|-----------|----------|------------------------|
| Mariamnagar | 150 | Fallow→Fallow→T.Aman (HYV/LIV) | 75.0 | 50 | 145 |
| | | Vegetables/Ginger/Turmeric/Banana/ Sugarcane | 5.0 | 4 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 5.0 | 3 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 10.0 | 6 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 45.0 | 30 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 10.0 | 7 | |
| | | Total | 150.0 | 100 | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Mariamnagar Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.

- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.
- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.9 Padua Union Land Use

General Description: Padua union is comprised of 10 mouzas having an area of 7214ha of land of which cultivable area is 2185ha (30%). The lands types of this union are medium highland (60%) followed by medium low land (35%) and high land (5%). The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 90 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-7.5and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro(HYV) and T.Aus (HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in Padua union which is shown in Table--13 The cropping intensity of this union is 176%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table -13: Present Cropping Patterns of Padua Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area(ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|--|----------|--------------------------------|------------------------|
| Padua | 2185 | Fallow→Fallow→T.Aman (HYV/LIV) | 435.0 | 20 | 176 |
| | | Vegetables/Ginger/Turmeric/Banana/ Sugarcane | 85.0 | 4 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 45.0 | 2 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 875.0 | 40 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 655.0 | 30 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 90.0 | 4 | |
| | | Total | 2185.0 | 100 | |
| Other land use | | Hill forest | 3592.0 | 50% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Padua Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.

- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05 (Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.10 Parua Union Land Use

General Description: Padua union is comprised of 7 mouzas having an area of 3523ha of land of which cultivable area is 1290ha (37%). The lands types of this union are medium highland (45%) followed by medium low land (30%) and high land (25%). The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 90 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-7.5and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in Parua union which is shown in Table14 The cropping intensity of this union is 171%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table -14: Present Cropping Patterns of Parua Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|---|-----------|--------------------------------|------------------------|
| Parua | 1290 | Fallow→Fallow→T.Aman (HYV/LIV) | 285.0 | 22 | 171 |
| | | Vegetables/Ginger/Turmeric/Banana / Sugarcane | 65.0 | 5 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 25.0 | 2 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 310.0 | 24 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 580.0 | 45 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 25.0 | 2 | |
| | | Total | 1290.0 | 100 | |
| Other land use | | Hill forest | 1340.0 | 38% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Parua Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.

- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP, DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.
- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan- 47,-53,-55,-61,-67 and BRRI Dhan -73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.11 Pomara Union Land Use

General Description: Pomara Union is comprised of 2 mouzas having an area of 2148 ha of land of which cultivable area is 780ha (36%). The lands types of this Union are medium highland (60%) followed by medium low land (20%) and high land (20%). The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon (maximum 90 cm) depending on land types. This Union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.5-7.5 and soil salinity level ranges from 0-2 dS/m (**Land Zoning Report, August 2011**).

Present Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water from hilly charas (canals). The six cropping patterns are practised in Pomara Union which is shown in **Table15**. The cropping intensity of this Union is 171%. Rabi crops cultivated in this Union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, cabbage etc.

Table-15: Present Cropping Patterns of Pomara Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|--|-----------|--------------------------------|------------------------|
| Pomara | 780 | Fallow→Fallow→T.Aman (HYV/LIV) | 80.0 | 10 | 186 |
| | | Vegetables/Ginger/Turmeric/Banana/ Sugarcane | 15.0 | 2 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 40.0 | 25 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 195.0 | 24 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 390.0 | 50 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 60.0 | 8 | |
| | | Total | 780.0 | 100 | |
| Other land use | | Industrial Area | 40.0 | | |
| | | Hill forest | 665 | 31% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Pomara Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.

- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan 47,53,55,61,67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05 (Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.12 Rajanagar Union Land Use

General Description: Rajanagar Union is comprised of 10 mouzas having an area of 7723ha of land of which cultivable area is 1980ha (26%). The lands types of this union are medium highland (45%) followed by medium low land (40%) ,low land (10%) and high land (5%) . The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 90 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.5-7.5 and soil salinity level ranges from 0-2 dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in Rajanagar union which is shown in **Table16**. The cropping intensity of this union is 171%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-16: Present Cropping Patterns of Rajanagar Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area(ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|---|----------|--------------------------------|------------------------|
| Rajanagar | 2185 | Fallow→Fallow→T.Aman (HYV/LIV) | 1095.0 | 50 | 145 |
| | | Vegetables/Ginger/Turmeric/Banana / Sugarcane | 85.0 | 4 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 65.0 | 3 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 175.0 | 8 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 655.0 | 30 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 110.0 | 5 | |
| | | Total | 2185.0 | 100 | |
| Other Land use | | Hill forest | 3675 | 48% of total area of the union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Rajanagar Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.

- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharif-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in Union.
- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize,- potato, pulses and oilseeds. These are BRRI Dhan-47,-53,-55,-61,-67 and BRRI Dhan 73, BINA Dhan -8, BARI Wheat-25, BARI Muatard-11, BARI poato-22, sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05 (Ramu and Rangunia Upazila) is to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.13 Rangunia Union Land Use

General Description: Rangunia union is comprised of 02 mouzas having an area of 1480 ha of land of which cultivable area is 1405ha (95%). The lands types of this union are medium highland (55%) followed by medium low land (25%), low land (15%) and high land (5%). The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 90 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-5.6 and soil salinity level ranges from 0-2dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro (HYV) and T.Aus (HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in Rangunia union which is shown in **Table17**. The cropping intensity of this union is 176%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-17: Present Cropping Patterns of Rangunia Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|---------------|--------------------------|---|-----------|----------|------------------------|
| Rangunia | 1405 | Fallow→Fallow→T.Aman (HYV/LIV) | 280.0 | 20 | 176 |
| | | Vegetables/Ginger/Turmeric/Banana/Sugarcane | 55.0 | 4 | |
| | | Fallow→T. Aus (HYV/LIV)→ T. Aman (HYV/LIV) | 30.0 | 2 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 560.0 | 40 | |
| | | Boro (HYV)→ Fallow→T. Aman(HYV) | 420.0 | 30 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 55.0 | 4 | |
| | | Total | 1405.0 | 100 | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Rangunia Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.

- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan-47,-53,-55,-61,-67 and BRRI Dhan-73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.14 Sarapbhata Union Land Use

General Description: Sarapbhata Union is comprised of 02 mouzas having an area of 2602ha of land of which cultivable area is 650 ha (25%). The lands types of this Union are medium highland (40%) followed by medium low land (20%) ,low land (20%) and high land (20%) . The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 90 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-7.5 and soil salinity level ranges from 0-2 dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro (HYV) and T.Aus (HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in Sarapbhata union which is shown in **Table18**. The cropping intensity of this union is 176%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-18: Present Cropping Patterns of Sarapbhata Union

| Name of Union | Net Cultivable Area (NCA) (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------------|---|-----------|----------------------------|------------------------|
| Sarapbhata | 650 | Fallow→Fallow→T.Aman (HYV/LIV) | 65.0 | 10 | 186 |
| | | Vegetables/Ginger/Turmeric/ Banana/ Sugarcane | 15.0 | 2 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 35.0 | 5 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 165.0 | 25 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 325.0 | 50 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 50.0 | 8 | |
| | | Total | 650.0 | 100 | |
| Other land use | | Hill forest | 1435 | 55% of total area of union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Sarapbhata Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.

- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP, DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.
- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan-47,-53,-55,-61,-67 and BRRI Dhan-73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.15 Silok Union Land Use

General Description: Silok Union is comprised of 02 mouzas having an area of 1238 ha of land of which cultivable area is 675ha (54%). The lands types of this Union are medium highland (55%) followed by high land (40%), and medium low land (5%). The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon (maximum 120 cm) depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.4-7.5 and soil salinity level ranges from 0-2 dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro (HYV) and T.Aus (HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in Silok union which is shown in **Table 19**. The cropping intensity of this Union is 176%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-19: Present Cropping Patterns of Silok Union

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|----------------|--------------------------|---|-----------|----------------------------|------------------------|
| Silok | 675 | Fallow→Fallow→T.Aman (HYV/LIV) | 45.0 | 7 | 187 |
| | | Vegetables/Ginger/Turmeric/Banana/Sugarcane | 35.0 | 5 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 20.0 | 3 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 205.0 | 30 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 335.0 | 50 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 35.0 | 5 | |
| | | Total | 675.0 | 100 | |
| Other land use | | Hill forest | 275 | 22% of total area of union | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Silok Union

- ⇒ Water stagnation, drainage congestion in medium low land, salinity some areas and low organic matter contents in soil.
- ⇒ Barriers of natural water flow and causing drainage congestion due to unplanned construction of housing, markets and infrastructures.
- ⇒ Flash flood from hilly areas which causes loss of agricultural crops.
- ⇒ Vulnerable to Storm surges and cyclone which is damages crops, human lives & properties.
- ⇒ Hill forest and hilly areas cutting by local peoples and different agencies.
- ⇒ Agricultural land reducing due to unplanned construction of houses & settlements, markets, industries and other infrastructure development.
- ⇒ Cultivable land is kept fallow in Kharif-1 season due to risk of flash flood and scarcity of irrigation water and T. Aman is the main crop cultivated in kharf-11 season.
- ⇒ Limited surface water supply and uncertain groundwater for irrigation and, higher cost of LLPs and DTWs in the local markets are problems for intensive irrigation in the area.
- ⇒ Scarcity of both ground and surface irrigation water due to salinity problems in dry season.
- ⇒ Industrial activities, illegal expansion of housing are increasing day by day which responsible for hill cutting and pollution of river and khal.

Recommendations

- ⇒ Excavating new canals and re-excavating all the old canals by making connection to adjacent rivers and khals of the unions which will reduce the drainage congestion and also improve the flash flood problems.
- ⇒ There is an ample opportunity to expand the command area by promoting surface water irrigation, infrastructural development and ensuring timely availability of quality inputs like fertilizers, pesticides and subsidized price for LLP,DTW and Tractor and Harvester etc.
- ⇒ Unplanned and unwanted interventions responsible for land degradation need to be stopped through motivational and awareness building program.
- ⇒ Hill cutting need to be stopped by imposing forest law, land zoning law and other regulatory measures by the concerned authority.
- ⇒ Development of irrigation facilities, proper planned use of land as per its criteria and katcha drainage system need to be converted into pucca drain which will increase the command area and crop production.
- ⇒ Introduce more drought and saline tolerant different crops, improvement of drainage and prevention of intrusion of saline water from the sea will improve the present agricultural situation in union.

- ⇒ BRRI, BARI, BSRI and BINA has recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan-47,-53,-55,-61,-67 and BRRI Dhan -73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, sugarcane Ishardi-40 widely introduce and encouraged to cultivate.
- ⇒ Zoning of land as per its existing uses and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05(Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector.

3.3.2.16 Rangunia Pourashava Land Use

General Description: Rangunia Pourashava is comprised of 9 Wards having an area of 832 ha of land of which cultivable area is 465ha (56%) and the other land of this union is under uses of urban and industries, settlement with homestead forest, river/khals etc. The lands types of this Paurashava are medium highland (45%) followed by medium low land (40%) and high land (40%).. The high lands are not inundated by monsoon flooding but the other lands are inundated for 2-3 months in the monsoon maximum 120 cm depending on land types. This union is covered by Chittagong Coastal Plain (AEZ23) and Northern and Eastern Hills (AEZ29).The soil P^H is 4.5-6.5 and soil salinity level ranges from 0-2 dS/m (**Land Zoning Report, August 2011**).

Present Agriculture Land Use: Boro(HYV) and T.Aus(HYV/LIV) are the main irrigated crops cultivated using water hilly charas (canals). There is six cropping patterns are practiced in Paurashava which is shown in **Table 20**. The cropping intensity of this union is 176%. Rabi crops cultivated in this union are: chili, potato, pulses, felon, beans, onion, vegetables, ladies finger, tomato, Cabbage etc.

Table-20: Present Cropping Patterns of Paurashava

| Name of Union | Net Cultivable Area (ha) | Major Cropping Patterns | Area (ha) | % of NCA | Cropping Intensity (%) |
|---------------|--------------------------|---|-----------|----------|------------------------|
| Paurashava | 465 | Fallow→Fallow→T.Aman (HYV/LIV) | 235.0 | 50 | 245 |
| | | Vegetables/Ginger/Turmeric/Banana/Sugarcane | 20.0 | 4 | |
| | | Fallow→T. Aus(HYV/LIV)→ T. Aman(HYV/LIV) | 15.0 | 3 | |
| | | RC→Fallow→T. Aman(HYV/LIV) | 35.0 | 8 | |
| | | Boro(HYV)→ Fallow→T. Aman(HYV) | 140.0 | 30 | |
| | | Vegetables→Vegetables-----T. Aman(HYV/LIV) | 25.0 | 5 | |
| | | Total | 465.0 | 100 | |

Source: Land Zoning Report, August 2011

Major Agricultural Problems under Pourashava

The major problems of this Pourashava are: rapid unplanned urbanization, water stagnation, and drainage congestion, low organic matter contents in soil, soil moisture deficit during the dry months, essential plant nutrient deficiency and risk of flood. Flash floods occurred frequently and cause degradation of natural vegetation and loss of agricultural crops, salt and shrimp areas.

The details of problems with their impacts on agriculture and other resources have been elaborately described in Betagi Union which is also applicable for this union.

Recommendations

The suggested management practices are: planned urbanization, removal of drainage congestion, ensures availability of both chemical and organic fertilizers, encouragement of leguminous crop cultivation etc. Introduction of drought and salt tolerant varieties of crops are very important.

Zoning of land as per its existing uses and potentialities and the enforcement land zoning system is very essential to control land degradation as well as to ensure sustainable management of land.

Details of other management practices with their possible benefits on agriculture and other resources have been elaborately described in Betagi Union which are also applicable for this Union.

The Rajanagar, Hosnabad, S .Rangunia and Mariamnagar Unions present land use under Rangunia Upazila were obtained from the field survey is shown in **Table 21**. The Rajanaga Union covers a net cropped area 1100ha of which about cultivated area 1920 ha. The highest percentage is double cropped area (71%) and followed by single (27%) and triple cropped area (2%) under Rajanaga Union. Similarly, the Hosnabad Union covers a net cropped area 725 ha of which about cultivated area 1126 ha. The highest percentage is double cropped area (67%) and followed by single crop area (26%) and triple cropped area (7%) under Hosnabad Union. Further, the S .Rangunia Union covers a net cropped area 727 ha of which about cultivated area 1307 ha. The highest percentage is double cropped area (76%) and followed by single crop area (28%) and triple cropped area (2%) under S .Rangunia Union. Mariamnagar Union covers a net cropped area 319 ha of which about cultivated area 623 ha. The highest percentage is double cropped area (92%) and followed by single crop area (6%) and triple cropped area (2%) under Mariamnagar Union (**Table 21**).

Table-21: Present Land Use under Rajanagar, Hosnabad, S. Rangunia and Mariamnagar Unions

| Sl. No. | Types of Land use | Present land used in ha (%) | | | |
|---------|------------------------|-----------------------------|--------------|--------------|-------------|
| | | Rajanagar | Hosnabad | S .Rangunia | Mariamnagar |
| 1 | Cultivated area | 1920 | 1126 | 1307 | 623 |
| 2 | Single cropped area | 300 (27.27%) | 188 (25.93%) | 162 (22.28%) | 20 (6.27%) |
| 3 | Double cropped area | 780(70.91%) | 485 (66.90%) | 550 (75.65%) | 294(92.16%) |
| 4 | Triple Cropped area | 20 (1.82%) | 52 (7.17%) | 15 (2.06%) | 5(1.57%) |
| 5 | Net cropped area | 1100 | 725 | 727 | 319 |
| | Cropping Intensity (%) | 174.54% | 155.31% | 179.77% | 195.29% |

Source: Concern 4 Unions SAAOs, DAE-2016

The Parua, Pomra, Betagi and Sarafbhata Unions present land use were obtained from the field survey is shown in **Table 22**. Parua Union covers a net cropped area 1237 ha of which about cultivated area 2134 ha. The highest percentage is double cropped area (63%) and followed by single crop area (32%) and triple cropped area (5%) under Parua Union. Similarly, Pomra Union covers a net cropped area 858 ha of which about cultivated area 1488 ha. The highest percentage is double cropped area (70%) and followed by single crop area (28%) and triple cropped area (2%) under Pomra Union. Further, Betagi Union covers a net cropped area 809 ha of which about cultivated area 1397 ha. The highest percentage is double cropped area (68%) and followed by single crop area (30%) and triple cropped area (2%) under Betagi Union. Finally, Sarafbhata Union covers a net cropped area 1004 ha of which about cultivated area 1762 ha. The highest percentage is double cropped area (65%) and followed by single crop area (30%) and triple cropped area (5%) under Sarafbhata Union (**Table 22**).

Table-22: Present Land Use under Parua, Pomra, Betagi and Sarafbhata Unions

| Sl. No. | Types of Land use | Present land used in ha (%) | | | |
|---------|------------------------|-----------------------------|--------------|--------------|--------------|
| | | Parua | Pomra | Betagi | Sarafbhata |
| 1 | Cultivated area | 2134 | 1488 | 1397 | 1762 |
| 2 | Single cropped area | 400(32.34%) | 243 (28.32%) | 240(29.67%) | 300 (29.88%) |
| 3 | Double cropped area | 777(62.81%) | 600 (69.93%) | 550 (67.98%) | 650 (64.74%) |
| 4 | Triple Cropped area | 60 (4.85%) | 15(1.75%) | 19 (2.35%) | 54 (5.38%) |
| 5 | Net cropped area | 1237 | 858 | 809 | 1004 |
| | Cropping Intensity (%) | 172.50% | 163.17% | 172.68% | 175.49% |

Source: Concern 4 Unions SAAOs, DAE-2016

The Shilok, Padua, Chandraghona and Kodala Unions present land use were obtained from the field survey data is shown in **Table 23**. Shilok Union covers a net cropped area 634 ha of which about cultivated area 1182 ha. The highest percentage is double cropped area (79%) and followed by single crop area (17%) and triple cropped area (4%) under Shilok Union. Padua Union covers a net cropped area 2564 ha of which about cultivated area 4728 ha. The highest percentage is double cropped area (77%) and followed by single crop area (19%) and triple cropped area (3%) under Padua Union. Chandraghona Union covers a net cropped area 876 ha of which about cultivated area 1578 ha. The highest percentage is double cropped area (74%) and followed by single crop area (23%) and triple cropped area (3%) under Chandraghona Union. Kodala Union covers a net cropped area 804 ha of which about cultivated area 1462 ha. The highest percentage is double cropped area (76%) and followed by single crop area (21%) and triple cropped area (3%) under Kodala Union (**Table 23**).

Table-23: Present Land Use under Shilok, Padua, Chandraghona & Kodala Unions

| Sl. No. | Types of Land use | Present land used in ha (%) | | | |
|---------|------------------------|-----------------------------|--------------|--------------|-------------|
| | | Shilok | Padua | Chandraghona | Kodala |
| 1 | Cultivated area | 1182 | 4728 | 1578 | 1462 |
| 2 | Single cropped area | 110 (17.36%) | 500(19.50%) | 200(22.83%) | 170(21.14%) |
| 3 | Double cropped area | 500 (78.86%) | 1964(76.60%) | 650 (74.20%) | 610(75.87%) |
| 4 | Triple Cropped area | 24 (3.78%) | 100 (3.90%) | 26 (2.97%) | 24 (2.99%) |
| 5 | Net cropped area | 634 | 2564 | 876 | 804 |
| | Cropping Intensity (%) | 186.43% | 184.39% | 180.14% | 181.84% |

Source: Concern 4 Unions SAAOs, DAE-2016

The present land use data under Islampur, Dakkin Rajanagr, and Lalanagar unions are shown in **Table 24**. Islampur Union covers a net cropped area 985 ha of which about cultivated area 1670 ha. The highest percentage is double cropped area (70%) and followed by single crop area (25%) and triple cropped area (5%) under Islampur Union. Dakkin Rajanagr Union covers a net cropped area 1000 ha of which about cultivated area 1585 ha. The highest percentage is double cropped area (59%) and followed by single crop area (35%) and triple cropped area (6%) under Dakkin Rajanagr Union. Lalanagar Union covers a net cropped area 889 ha of which about cultivated area 1598 ha. The highest percentage is double cropped area (75%) and followed by single crop area (23%) and triple cropped area (2%) under Lalanagar Union. Municipality covers a net cropped area 1200ha of which about cultivated area 2610 ha. The highest percentage is double cropped area (67%) and followed by triple cropped area (25%) and single crop area (8%) under Municipality (**Table 24**).

Tabl-24: Present Land Use under Islampur, Dakkin Rajanagr, Lalanaga Unions & Municipality

| Sl. No. | Types of Land use | Present land used in ha (%) | | | |
|---------|------------------------|-----------------------------|-----------------|-----------------|--------------|
| | | Islampur | Dakkin Rajanagr | Lalanagar | Municipality |
| 1 | Cultivated area | 1670 | 1585 | 1598 | 2610 |
| 2 | Single cropped area | 250 (25.38%) | 355(35.50%) | 200 (22.50%) | 95 (7.92%) |
| 3 | Double cropped area | 685 (69.54%) | 585(58.50%) | 669 (75.25%) | 800(66.67%) |
| 4 | Triple Cropped area | 50 (5.08%) | 60 (6.00%) | 20 (2.25%) | 305 (25.41%) |
| 5 | Net cropped area | 985 | 1000 | 889 | 1200 |
| | Cropping Intensity (%) | 169.54% | 158.5% | 179.75% | 207.5% |

Source: Concern 3 Unions & 1 Municipality SAAOs, DAE 2016

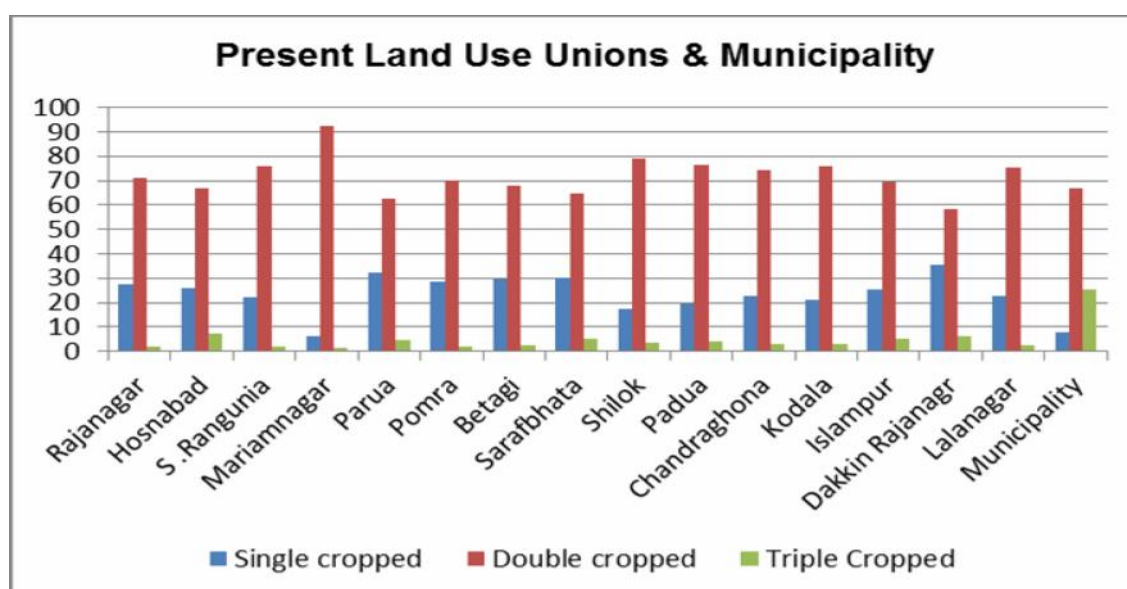


Figure-3: Present Land use of Rangunia Upazila
Source: SAAOs and UAO, Rangunia, DAE 2016

Chapter-04

Cropping Pattern and Cropping Intensities

4.1 Cropping Pattern

The term 'Cropping pattern' as it applies to the area of reclamation can be defined as the acreage distribution of different crops in any one year in a given farm area such as a water agency, or farm. Thus, a change in a cropping pattern from one year to the next can occur by changing the relative acreage of existing crops, and/or by introducing new crops, and/or by cropping existing crops'. Information that defines a cropping system consists of the number of crops on a given field per year including the accompanying cropping periods from sowing to maturity for each crop cycle and whether each crop is grown under rain fed or irrigated conditions.

The scenario of existing cropping pattern within Rangunia Upazila predominantly Rice, Vegetables, Pulses, Oilseeds, Spices, Betel Leaf and Orchard based. Detailed Upazila cropping patterns by season are presented in Table 25. Rangunia Upazila present one cropping pattern area is Boro (HYV/Hybrid) → Fallow → T. Aman (HYV) which is practiced 49% of the Net Cultivable Area (NCA). Fallow → Fallow → T. Aman (HYV) which is practiced 38% of the Net Cultivable Area (NCA). Winter vegetables → summer vegetables → T. Aman (HYV) is the cropping pattern covering 3% of the net crop area. Similarly, winter vegetables → Kharif-1 vegetables → Kharif-2 summer vegetables which are practiced about 3% of the Net Cultivable Area (NCA). Winter → vegetables → Fallow → T. Aman (HYV) is covering about 1% of the NCA. Pulses (Phelon, lentil & Mung bean) → Fallow → T. Aman (HYV) is the cropping pattern covering about 2% of the NCA. Potato/Sweet potato → Fallow → T. Aman (HYV) is practiced about 2% of the Net Cultivable Area. Spices → Fallow → T. Aman (HYV) is practiced about 2% Net Cultivable Area (**Table 25**). This finding clearly indicated that HYV/Hybrid rice and high value vegetables cropped area switchover gradually increased and significantly decreased local variety of rice cultivation in this Upazila. A detailed GIS based map of cropping pattern will be produced for the whole Upazila comprising single, double and triple cropped agricultural land after physical feature data processing.

Table-25: Present Cropping pattern under Rangunia Upazila

| Major Cropping Pattern | | | Area(ha) | Contribution % |
|---|-------------------|-------------------|--------------|----------------|
| Rabi | Kharif-1 | Khari-2 | | |
| Boro (HYV/Hybrid) | Fallow | T. Aman (HYV) | 9145 | 49.00 |
| Fallow | Fallow | T. Aman (HYV) | 7127 | 38.00 |
| Winter vegetables | Summer vegetables | T. Aman (HYV) | 545 | 3.00 |
| Winter Vegetables | Summer vegetables | Summer vegetables | 500 | 2.60 |
| Winter vegetables | Fallow | T. Aman (HYV) | 146 | 0.76 |
| Potato/Sweet Potato | Fallow | T. Aman (HYV) | 354 | 1.86 |
| Pulses (Phelon, Lentil, Mung Bean) | Fallow | T. Aman (HYV) | 350 | 1.90 |
| Mustard/Groundnut | Boro(HYV/Hybrid) | T. Aman (LV) | 150 | 0.70 |
| Betel Leaf | Betel leaf | Betel Leaf | 150 | 0.70 |
| Spices(Ginger, Turmeric Onion, Garlic and Chili) | Fallow | T. Aman (HYV) | 288 | 1.50 |
| Total | | | 18755 | 100.00 |

Source: SAAOs and UAO Rangunia Upazila, DAE 2016

4.2 Cropping Intensity

Cropping intensity is an important index of utilization of land. Crop intensity index assesses farmers actual land use in area and time relationship for each crop or group of crops compared to the total available land area and time, including land that is temporarily available for cultivation. It is calculated by summing the product of area and duration of each crop divided by the product of farmers total available cultivated land area and time periods plus the sum of the temporarily available land area. For a specific crop, the cropping intensity is the number of times that crop is grown in one year on the same field. It is distinguish single, double and triple cropping systems respectively.

Cropping patterns of 15 Unions and 1 Municipality of Rangunia Upazila are presented in **Figure-3**. The highest cropping intensity is achieved in Municipality (207%) and Mariamnagar Union (195%). Among the Unions Hosnabad (155%) and Dakkin Rajanar (158%) and Islampur (160%) Unions have lowest cropping intensities. The average cropping intensity under Rangunia Upazila is 181%.which is less than Chittagong district (187%) and national average cropping intensity 190% (Krishi Diary 2016). There is an ample of scope for double crop area converting into triple cropped areas under each Union after improvement of present condition through intervention of UD project.

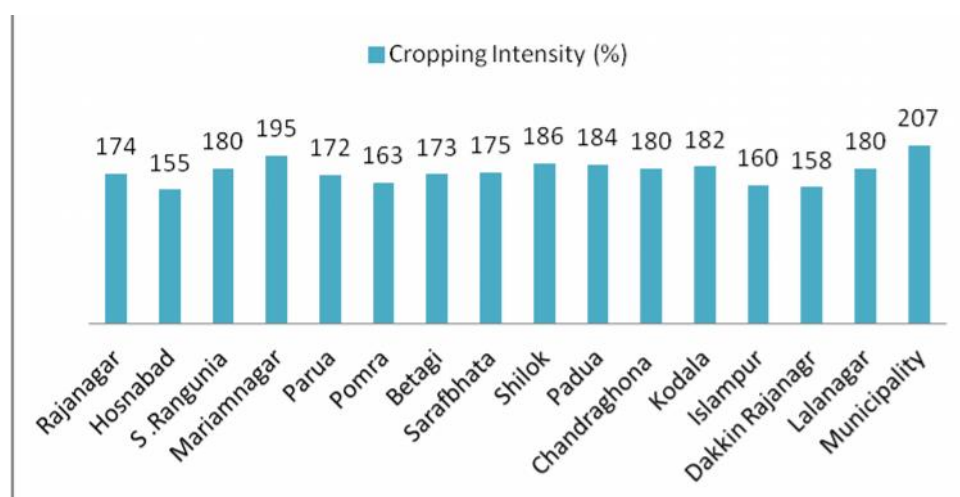


Figure-4: Union Wise Cropping Intensity under Rangunia Upazila
Source: 15 Union & 1 Municipality SAAOs of Rangunai Upazila, DAE 2016)

4.3 Present Cropped Area

Rice, winter and summer vegetables, potato, groundnut and pulses etc crops are grown in 15 Unions and 1 Municipality under Rangunia Upazila. Rangunia Upazila present scenario of different cropped area, yield rate and production levels are shown in Table 26. The present total cropped area is 31128 ha of which rice cropped area is 27250 ha and the rest 3878 ha is covered by non-rice crops (vegetables, pulses, orchard and betel leaf etc.). The rice and non-rice cropped area are about 87.54% and 12.46% respectively of the total cropped area. The highest land area used for Boro (HYV/Hybrid) and T. Aman (HYV) rice cultivation.

4.4 Present Crop Production

HYV/Hybrid rice or others crops gives higher yield in compared to local variety crops. Total crop production is 200272.7 metric tons of which rice production is 132661.2 metric tons and non-rice production is 67611.5metric tons (**Table-26**). Among the rice crops the contributions of T. Aman (LV), T. Aman (HYV) and Boro (HYV & Hybrid) are about less than1%, 62%, & 37% respectively. The highest contribution among the non-rice crops are summer vegetables (42%) & winter vegetables (39%) followed by potato (11%) and Betel leaf (5%) respectively (**Table-26**).

Table-26: Present Cultivated Area, Yield and Production under Rangunia

| Crop Grown | Crop area(ha) | Yield/ha (mt) | Production (mt) | Contribution (%) |
|-----------------------|---------------|---------------|-----------------|------------------|
| T. Aman(LV) | 296 | 3.8 | 1124.8 | 0.85 |
| T. Aman(HYV) | 17809 | 4.6 | 81921.4 | 61.75 |
| Boro (HYV) | 9000 | 5.4 | 48600 | 36.63 |
| Boro (Hybrid) | 145 | 7 | 1015 | 0.77 |
| Sub Total Rice | 27250 | | 132661.2 | 100.00 |
| S. Vegetables | 1545 | 18.5 | 28582.5 | 42.27 |
| W. vegetables | 1191 | 22 | 26202 | 38.75 |
| Phelon | 350 | 2.8 | 980 | 1.45 |
| Potato | 354 | 21.5 | 7611 | 11.26 |
| Spices | 288 | 3.25 | 936 | 1.38 |
| Betel Leaf | 150 | 22 | 3300 | 4.88 |
| Sub-Total | 3878 | | 67611.5 | |
| Total | 31128 | | 200272.7 | 100.00 |

Source: SAAOs and UAO Rangunia Upazila, DAE 2016

4.5 Irrigation Facilities under Different Unions

Irrigation is the lifeline of agriculture, because without irrigation facility crops diversification or HYV /Hybrid cultivation would be impossible. Irrigation facilities assured production of crops in the dry season as well as stabilized production through supplemental irrigation of the rain fed crops and ensured greater productivity. This study are assessed the present scenario of irrigation facilities and problems. For irrigation purposes, generally, Deep Tube Wells (DTW), Shallow Tube Well (STW) and Low Lift Pump (LLP) are used. Union wise DTW, STW and LLP under Rangunia Upazila is shown in Table 27. There is no DTW used in different Unions for irrigation. Different Unions a total of 72 STW and 427 LLP used for irrigation under Rangunia Upazila. For irrigation half cusec, one cusec and two cusec LLP are used in 15 Unions and 1 Municipality under Rangunia Upazila. Surface water is available under different Unions. Farmers reported that above 95% of the irrigation drainage system is not pucca which is causes wastage of irrigation water. Farmers wanted pucca drainage system.

Table-27: Union Wise Irrigation Machine under Rangunia Upazila

| Name of Union | DTW | STW | LLP | Remarks |
|------------------|-------------|-----------|------------|--|
| Rajanagar | - | 3 | 57 | 1. Half Cusec, One Cusec and Two Cusec LLP used. 2. About 95% irrigation drainage systems are katcha. |
| Hosnabad | - | 2 | 24 | |
| S .Rangunia | - | 2 | 19 | |
| Mariamnagar | - | - | 34 | |
| Parua | - | - | 34 | |
| Pomra | - | 5 | 33 | |
| Betagi | - | 40 | 46 | |
| Sarafbhata | - | 5 | 10 | |
| Shilok | - | 3 | 33 | |
| Padua | - | - | 40 | |
| Chandraghona | - | 1 | 34 | |
| Kodala | - | 6 | 10 | |
| Islampur | - | - | 2 | |
| Dakkin Rajanagar | - | 3 | 33 | |
| Lalanagar | - | 2 | 13 | |
| Municipality | - | - | 5 | |
| Total | 0.00 | 72 | 427 | |

Source: SAAOs Rangunia Upazila, DAE 2016

4.6 Cultivation Practices

All the Unions are dominated by agriculture crops are: Boro (Plate -1 Boro rice crop field) and Transplanted Aman (T.Aman) rice, potato, pulses (Felon) and different kinds of winter and summer vegetables, spices which are cultivated under both rain fed and irrigation condition. Farmers are cultivated different vegetables such as Brinjal (Plate-2 Brinjal crop field), Potato, and Cabbage etc. All the SAOs and UAO reported that about 95-100% farmers used power tiller and tractor during land preparation. Boro and T.Aman rice seedlings grown in seedbed are uprooted when they are about 30-45 days old and transplanted in the main fields. They transplanted Boro and T. Aman rice haphazardly instead of line sowing. Generally in rice field weeding is done once, about a month after transplanting and this exercise is closely followed by top dressing with urea. Majority of the farmers did not use balance dose of chemical fertilizers due to lack of knowledge. Due to lack of knowledge and awareness' farmers did not cultivate T. Aus rice. Farmers reported pests are acute problems for crop production. Farmers used pesticides over and under dose as preventive and curative measures for controlling different pests because of lack of knowledge.



Plate-1: Boro Rice Crop Field



Plate-2: Brinjal Crop Field

4.7 Major Types of Crops Cultivated

Main crops: Paddy (Boro rice (HYV/Hybrid), T. Aman (HYV/LIV), Vegetables, Betel leaf, Betel nut, Maize, Groundnut, Phelon and Pulses etc.

Vegetables: Tomato, Potato, Brinjal,, Radish, Cauliflower, Cabbage, Bean, Chili, Lalshakh, Loncho, Kolmi, Peas, Kochu, Bitter gourd, Pumpkins, Gourd, Rai Shakh, Ladies finger, Palong, Spinach, Cucumber etc(**Plate-3:- Vegetables Seed bed**).

Spices: Chili, Turmeric, Ginger, Onion & Garlic etc.

Fruits: Mango, Damson Plum, Jackfruit, Pomelo, Orange, Olive, Star fruit, Banana, Wood Apple, Coconut, Areca Nut, Country Goose Berry, Beel, Golap Jum. Guava, Plum, Pineapple & Papaya etc(**Plate 4: Homestead Garden**).



Plate-3: Vegetables Seed bed



Plate-4: Homestead Garden

Chapter 05

Production Cost of Rice and Vegetables

5.1 Cost of Rice production

The production cost of paddy varies depending on crop season, variety (HYV/Hybrid/LV), land preparation (Power tiller/Tractor/Bullock), seeds and seedlings, manure and fertilizer, irrigation (complete irrigated (Boro Rice) and rain fed or provided supplementary irrigation), pesticide and labor. To assess farmers cost of rice production, Agriculture Economic Division of BRRI (2014-15) were conducted survey all over the country in three rice seasons (Borro, Aus and Aman paddy). BRRI study findings shows that Boro and Aus farmers per kg rice production cost is Tk 18.65 and Tk.18.64 and Aman rice production cost is Tk17.61 which is less than Boro and Aus. Rangunia upazila farmers T. Aus rice were not cultivated (**Table 28**). Rangunia upazila farmers and DAE SAAOs reported that Boro rice per kg or per ha production cost is higher than T. Aman rice because T. Aman rice is cultivated by natural water or rain water. There is no need for supplementary irrigation for Aman rice production. Fertilizers and pesticides are needed more in Boro rice production in compared to Aman rice.

Table-28: Cost of Rice Production (2014-15)

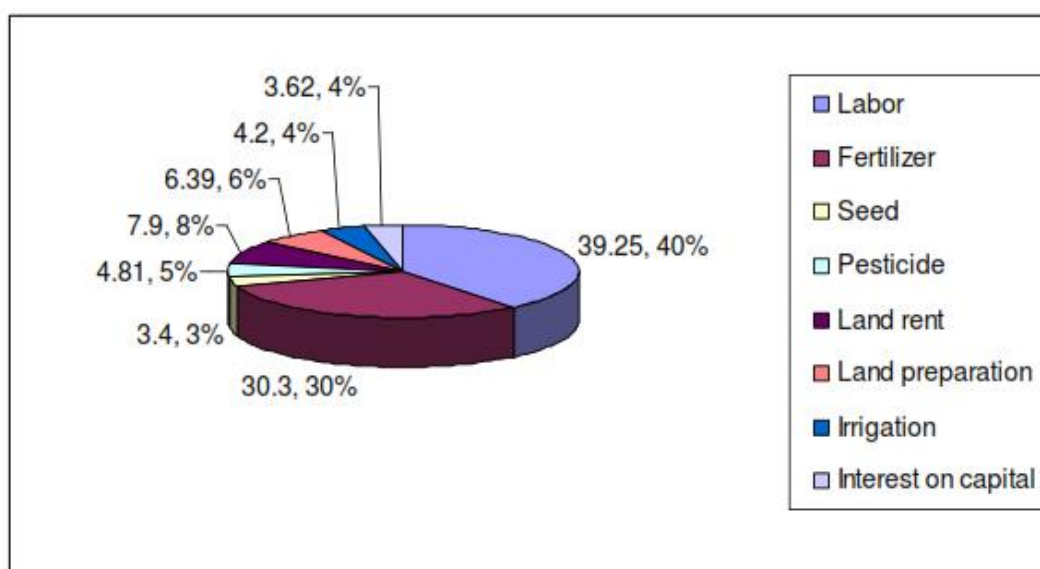
| Name of Rice | Average per kg rice production cost (TK) | Crop season |
|--------------|--|-------------|
| Boro | 18.65 | Rabi |
| Aus | 18.64 | Kharif-1 |
| Aman | 17.61 | Kharif-11 |

Source: Agriculture Economic Division, BRRI 2016

5.2 Cost of Vegetable Production

The production cost of vegetables varies depending on crop, variety, time, place, and season. During the survey, farmers were asked to identify the major types of production costs on which they usually spend. According to the respondents, the production cost of vegetables can be categorized into eight major categories: land preparation, seeds and seedlings, manure and fertilizer, irrigation, pesticide, labor, lease/rent of land, and other expenses like fencing, shedding, mulching etc.

Figure-5: Percentage of Major Types of Production Costs for Vegetables.



Source: ASA University Review, Vol. 4 No. 1, January–June, 2010

Monsura Zaman, Rokhsan-Ara-Hemel and Tahmina Ferdous (2010) assess the cost of production of four winter vegetables namely cauliflower, cabbage, tomato and brinjal in five villages under Dhaka district. The study finding shows that 39.2% of the total cost was devoted to labor, 30.3% to fertilizer, 3.4% to seed, 4.8% to pesticides, 7.9 % land rent, 6.3% to land preparation, 4.2% to irrigation and 3.6% to interest on capital, whereas, the result estimated by AVRDC (2001) shows that 48.4% of the total cost was devoted to labor, 24.2% to fertilizer, 6.1% to irrigation, pesticides and 3.7% to seeds. Fig.4) Cost of per kg and per 40kg was found approximately the highest for tomato and the lowest for cabbage and cauliflower.

Farmers of Rangunia Upazila reported that major cultivation occurred in land preparation (Power tiller/tractor cost), irrigation, pesticides, fertilizers and labor. Farmers reported that per ha cultivation cost is Tk. 6000-7000/- (*Upazila Agriculture Office, Rangunia*). Generally, supplementary irrigation provided potatoes, water melon, Chili and winter vegetables. Supplementary irrigation cost is 1000-15000 taka or more depends on crops and number of application. The highest supplementary irrigation provided in water melon and summer vegetables crop field. Farmers did not practice supplementary irrigation T. Aman crops. The highest pesticides used in T. Aman and Boro rice fields (Tk.2500-3000/-) and followed Groundnut & Water melon (Taka 1000-1500), W & S. vegetables fields (Taka 500-700/ha). Labor cost day by day increased and per day labor cost more or less Tk. 350-500 depends on crop season.

Brinjal is one of the most popular and important vegetable in Rangunia Upazila. Farmers are cultivated this vegetables throughout year. Some farmer's brinjal vegetable is cultivated commercial basis in Rangunia Upazila. Compare the financial profitability of brinjal vegetable production in different region in Bangladesh. Several studies were done to estimate the financial profitability of brinjal vegetable production (Table 29). It is evident from the table that productions of brinjal vegetable were increased chronologically. This is due to adoption of farmers for different HYV varieties of brinjal. Price of brinjal vegetable was also increased through time change. Farmers were adjusted their vegetables price due to change the production cost. Now farmers used different insecticide, pesticide and fertilizer to increase production and protect vegetables from disease and pest. For this reason profitability of different vegetables also increased. It is true that total production cost of different vegetables increased but net margin also increased. Farmers were produce different vegetables because vegetables productions were profitable in the present study area which is reflected by high BCR for brinjal vegetable. The previous studies were done several years ago and we can interpret the different return by yield, price and place difference. The prices of brinjal vegetable are high in all over the country. Finally it is clear that productions of vegetables are more profitable in the study area like other vegetables growing areas.

Table-29: Compare the Financial Profitability of Brinjal Vegetable Production in Different Region

| Cultivation year | Study Area | Yield (kg/ha) | Price (Tk/kg) | Gross Return (Tk/ha) | Total Cost(Tk/ha) | Net Return(Tk/ha) | BCR | Sources |
|------------------|------------|---------------|---------------|----------------------|-------------------|-------------------|------|---------------------------|
| 1997 | Bangladesh | 11730 | 6.0 | 70372 | 17,343 | 53,029 | 4.06 | EPC, 1997 |
| 1998 | Comilla | 24,699 | 2.51 | 61,994 | 31,339 | 30,655 | 1.98 | Miah et al. 1998 |
| 2002 | Jessore | 43,899 | 7.09 | 3,10,293 | 1,77,457 | 1,32,836 | 1.75 | Rashid et al. 2002 |
| 2014 | Dhaka | 55,691 | 18.00 | 10,02,438 | 269,627 | 732,811 | 3.72 | Hasan et.al 2014 |
| 2016 | Rangunia | 61750 | 20.00 | 1235000 | 306492 | 9,28,508 | 4.03 | UAO, DAE 2016 |

Chapter 06

Growth or Decline of Agricultural Land During Last Ten Years

Quantification of various parameters in relation to land use and farming is really a very difficult task, specially, in Bangladesh where record keeping is poor either by an organization or by individual. Beside this difficulty in mind a sincere attempt has been made to collect land use last ten year data (2005 to 2015) from Upazila Agriculture Office and discussion with 15 Unions and 1 Municipality all Sub- Assistant Agriculture Officers of Rangunia Upazila and review the other documents. The growth or decline of agricultural land use during last ten years under Rangunia Upazila is shown in Table 30. Table 10 findings shows about 81% local variety rice and 11% HYV rice and 32% oilseeds area were decreased during last ten years. The main reason for decreased local variety rice area due to yield is less in compared to HYV rice and farmers dictated to switchover cultivated HYV rice. The HYV paddy cultivation area were 11% decreased. The reason for decreased HYV rice cultivated area due to flood many farmers could not cultivated HYV rice. SAAOs reported that farmers are not interested to cultivate oil seeds due to lack oil seed crushing mills in their areas. Remarkable significant changed or increased during 10 years was occurred in Tuber crops (133%), Fruits crops (68%) and Maize (119.1%) land use. The main reasons for increases are tuber crops, fruits and maize market demand and price is high. Table 10 shows, among the other purposes remarkable changed were occurred in Brick field (400%) and followed by fish/shrimp culture (300%) and poultry farm (100%) and housing (36%) respectively. Only 5 industries were available during 2005 to 2015 under Rangunia Upazila. There is no improvement in industry sector because existing industries could not show profitable.

Table-30: Growth or Decline Agriculture Land Use during the Last 10 Year

| Sl. No. | Agricultural land use | Land Use (2005) in ha | Land Use (2015) in ha | % Change |
|---------|-------------------------|-----------------------|-----------------------|----------|
| 01 | Paddy (local varieties) | 800 | 150 | -81.25 |
| 02 | Paddy (HYV) | 16580 | 14700* | -11.34 |
| 03 | Vegetables (Summer) | 300 | 380 | +26.67 |
| 04 | Vegetables (Winter) | 1700 | 1850 | +8.82 |
| 05 | Tuber crops | 150 | 350 | +133.33 |
| 06 | Pulse crops | 400 | 700 | +75% |
| 07 | Oilseed crops | 185 | 125** | -32.43 |
| 08 | Spice crops | 360 | 430 | +19.44 |
| 09 | Fruit crops | 50 | 84 | +68.00 |
| 10 | Maize | 12 | 35 | +191.67 |
| 11 | Sugarcane | 30 | 40 | +33.33 |
| 12 | Other purposes | 20 | 100 | +400.00 |
| | -Brick field | | | |
| | -Poultry farm | 5 | 10 | +100.00 |
| | -Fish/shrimp culture | 50 | 200 | +300.00 |
| | -Gardening/forestry | 50 | 60 | +20.00 |
| | -Industries | 5 | 5 | 0.00 |
| | -Housing | 1838 | 2500 | +36.02 |

Source: SAAOs and UAO Rangunia Upazila, 2016, * Flood occurred ** NO oil seed crushing mill

Chapter-07

Major Problems of Crop Production in Rangunia Upazila (15 Unions and 1 Municipality)

Agriculture survey findings and Participatory Rural Appraisal March 2016 study report findings show farmers some problems are common in different unions under Rangunia Upazila such as natural disaster, bad communication and wholesale market and infrastructure. Major problems are:

1. Natural disaster, such as heavy rain, flood, drought, and river erosion;
2. Bad communications due to many roads are damaged by floods.
3. About 90-95% irrigation canals are katcha which is increase the wastage of irrigation water and crop area is not possible to increase.
4. There is no wholesale market and infrastructure for agriculture product under 15 Unions.
5. No cold storage and large vegetables selling center or market in Unions
6. Produce rice crops market price is less but production cost is high & market control by local foria.
7. Agricultural labor is not available in crop seasons.
8. Farmers did not interest to invest recommended doses of inputs (fertilizer and seeds) in crop production.
9. Crop production inputs (seeds, fertilizers, pesticides, power tiller) are partly available and price is high.
10. T. Aus rice crops are not cultivated due to flash flood, draught and irrigation water problems and financial constraints.
11. Insects, diseases, rodents and weeds are acute problem causes 25-30% damage every year. Farmers were applied pesticides over and under dose haphazardly for controlled pests due to lack of technological knowledge.
12. Farmer's lack of knowledge on modern crop production technology.
13. There is no agro processing center and industries under Unions.

Chapter-08

Policy Framework and Conclusion

8.1 Policy Framework

As per Sub-Assistant Agriculture Officers, Farmers and District, Upazila level different organizational Officers opinions and field visit following recommendations are made which will help for proper planning and adoption of appropriate crop production measure in future to different Unions beneficiaries under Rangunia Upazila.

1. Developing Infrastructural Facilities: Road network, agro-processing and marketing infrastructure, canals and irrigation facilities need to be improved for mitigating impacts of crop production related vulnerabilities and climate change. Each Union one wholesale market infrastructure need to be constructed.

2. To Reduce the Irrigation water Wastage, proper utilization and increase the irrigated command crop area the DTW, STW and, LLP kutchra drain need to be converted into pucca drainage system or introduce underground pipe irrigation system.

3. Farming and Adaptation Practices: There is need for conducting, strengthening and expanding crop demonstrations and block farming based on adaptation practices. Introduction of risk resistant crop varieties in agriculture with emphasis on crop diversification should be an integral part of the TOT, farmers training and demonstrations.

4. Vegetables Production: Different types of winter and summer vegetables are grown under 15 unions and Municipality area. All the Unions are excellent suitable for vegetables cultivation round the year. There is no cold storage and large vegetable selling center (market) under 15 Unions. As results farmers could not get good price for their produced products. There is a need for establishment of cold storage each Union and development of market infrastructure.

5. Crop Production Inputs Availability: Ensure availability of quality HYV and Hybrid crop seeds, fertilizer, pesticides and cultivation equipments.

6. Availability of Crop Seeds: Drought, salt and submergence tolerant variety of different quality HYV/Hybrid crop seeds. BRRI, BARI, BSRI and BINA have recommended drought and salt tolerant rice, wheat, maize, potato, pulses and oilseeds. These are BRRI Dhan-47,-53,-55,-61,-67 and BRRI Dhan-73, BINA Dhan -8, BARI Wheat-25,BARI Muatard-11, BARI poato-22, Sugarcane Ishardi-40 widely introduce and encouraged to cultivated farmers.

7. Fertilizer Management and Soil Health: Chemical fertilizers application in HYV varieties crops trend increasing but decreasing inorganic fertilizer (Green manure, cow dung). As a result, soil nutritional health will be alarming situation which is in future serious affected on yield. There is a need for soil health improving program for Union farmers. DAE may arrange joint collaborative soil testing and recommendation and training program for beneficiaries. Financial support need to be provided to DAE from project.

8. Pest Management: Insects, rats, weeds and diseases are a chronic problems which causes considerable damage of crops every season and increase the farmers cultivation cost. For control this pests farmers were applied pesticides under or over dose. Judicious use of pesticides needs to be developing and implement pest surveillance, monitoring and forecasting system. Farmers also need to increase knowledge on Integrated Pest Management (IPM) technology through practical oriented program and DAE joint collaborative crop production training. Farmers training budget need to be provided to DAE from project.

9. Agro-based Industries: Establishment of Agro-based processing center & industries in 15 unions. There is a need for construction of infrastructure for some agro-base processing center.

10. Zoning of land: As per its present used and potentialities and the proper implementation of “preparation of Development Plan for Fourteen Upazilas” Package 05 (Ramu and Rangunia Upazila) as to ensure sustainable management of land resources in the area as well as improvement of agriculture sector

8.2 Conclusion

Soil and weather conditions are suitable for different vegetables and other high value crops cultivation round the year in Rangunia Upazila. There is a need to develop vegetables wholesale market and improvement of communication system different Unions to Upazila. Farmers need modern crop production technological training which will be helpful for crop diversification and proper utilization land and increase crop production. For improvement of irrigation facilities kutchra drain are to be made lined channel which will reduced irrigation water wastage and increase crop production.

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Annex-1 Questionnaire for KII

Name----- Designation----- Department-----

Upazila-----District-----Mobile No.----- Date-----

1. Category wise distribution of farm families

| SI No. | Category | No of farm family | % |
|--------------|--------------------------|-------------------|---|
| 1. | Land less (.05-.50 acre) | | |
| 2. | Marginal (.51-1.50 acre) | | |
| 3. | Small (1.51 -2.50 acre) | | |
| 4. | Medium (2.51-7.50 acre) | | |
| 5. | Larger (above 7.50 acre) | | |
| Total | | | |

2. Present Land Use under Union

| SI No. | Type of Land use | Present land used | |
|--------|-----------------------|-------------------|---|
| | | Area (ha) | % |
| 1. | • Cultivated Area | | |
| | • Single Cropped area | | |
| | • Double Cropped area | | |
| | • Triple Cropped area | | |
| 2. | Net cropped area | | |
| 3. | Cropping intensity | | |

3. Relationship of Land Type and Flood Depth with Area Cultivated

| SI No. | Land type and Flood Depth. (cm) | Present | |
|--------------|---------------------------------|----------|---|
| | | NCA (ha) | % |
| 1. | High land (0-30 cm) F0 | | |
| 2. | Medium high land (30-90 cm) F1 | | |
| 3. | Medium low land (90-180 cm) F2 | | |
| 4. | Low land (180-360 cm) F3 | | |
| 5. | Very low land above (360 cm) F4 | | |
| Total | | | |

4. Major crops/cropping patterns (both improper/exhaustive and sustainable)

| Season | Farming Practices |
|---|----------------------|
| Rabi (Mid October-Mid March) | |
| Kharif-I (Mid March-Mid July) | |
| Kharif-II (Mid July-Mid October) | |
| Irrigated Farming Rabi (Mid-October-Mid March) | |
| Kharif-I (Mid March-Mid July) | |
| Kharif-II (Mid July-Mid October) | |
| Name major cropping patterns | 1. 2. 3. 4. |

5. Crop cultivated and variety in project area

| Crop area | Name of crop | Name of variety |
|--|---|-----------------|
| Cultivated crops under single crop area= | | |
| Cultivated crops under double crop area= | | |
| Cultivated crops under triple crop area= | | |
| Cultivated crops under irrigated crop area= | | |
| Cultivated crops under non crop area= | | |
| Cultivated crops under homestead garden area= | | |
| Orchard area= | | |
| Seasonal Fallow land = | | |
| How many commercial fruit garden within polder area? Yes ----- No----- | Name of fruits garden Banana: Papaya: Coconuts: Mango: Others: | Number: |
| In future which crops will be profitable in your polder area: | | |

6. Present Crop Production and Area under polder/Upazila

| Crop Area(ha) | Yield/ha | Total Production(MT) | Crop Area(ha) | Yield/ha | Total Production(MT) |
|---|----------|----------------------|--------------------|----------|----------------------|
| Aus rice= LV = HYV = | | | Oilseeds= | | |
| Aman rice= LV = HYV = Hybrid = | | | Mustard= | | |
| Boro Rice= LV = HYV = Hybrid = | | | Sesame= | | |
| Total Rice= | | | Sunflower= | | |
| Wheat = | | | Groundnut= | | |
| Maize = | | | Others= | | |
| Pulses = | | | Winter vegetables= | | |
| Khesari = | | | Summer vegetables= | | |
| Mung bean = | | | Total vegetables= | | |
| Soybean = | | | Fruits | | |
| Cowpea = | | | Watermelon= | | |
| Chickpea= | | | Species= | | |
| Others= | | | Chili= | | |
| Tuber crops= | | | Onion= | | |
| Potato= | | | Garlic= | | |
| Sweet potato= | | | Jute= | | |
| Bamboo = | | | Sugarcane= | | |
| Betel vine(Pan)= | | | Betel nut= | | |

7. (a) Short term needs for better crop production under polder

1.-----2-----

3.-----4-----

5-----6-----

(b) Long term needs for better crop production under ploder

1.-----2-----

3.-----4-----

5-----6-----

Annexure-2
Agriculture Questionnaire for Urban and Rural Economy Study

Name: _____ Designation: _____
 Department: _____ Name of Block: _____
 Name of Union: _____ Upazila: _____
 District: _____
 Mobil No.: _____ Date: _____

8. Category wise distribution of Farm Families in Block

| Sl. No. | Category | No. of farm family | % |
|---------|--------------------------|--------------------|---|
| 6. | Land less (.05-.50 acre) | | |
| 7. | Marginal (.51-1.50 acre) | | |
| 8. | Small (1.51 -2.50 acre) | | |
| 9. | Medium (2.51-7.50 acre) | | |
| 10. | Larger (above 7.50 acre) | | |
| Total | | | |

2. Agricultural land and land Use in Block

| Sl. No. | Description of agricultural land | Area(ha) |
|---------|--|----------|
| 1 | Total agriculture land area | |
| | High land | |
| | Medium high land | |
| | Medium low land | |
| | Low land | |
| 2 | Permanent fallow land | |
| 3 | Current/seasonal fallow land(with fallow period) -Rabi fallow | |
| 4 | -Kharif-I fallow -Kharif-II fallow | |
| 5 | Net cropped area | |
| 6 | Single cropped area | |
| 7 | Double cropped area | |
| 8 | Triple cropped area | |
| 9 | Total cropped area | |
| 10 | Cropping intensity (%) | |
| 11 | Irrigated land area (%) | |

3. Irrigation Facilities

Deep Tube Well (DTW) Yes----- No----- Number-----
 Shallow Tube well (STW) Yes----- No----- Number-----
 Low Lift Pump (LLP) Yes----- No----- Number-----
 Others-----

4. Cultivation Practices

Power tiller-----% Used, Tractor -----% Used

Bullock -----% Used

5. Cropping Pattern

| Sl. No. | Cropping Pattern | Area of Land | Percentage (%) |
|---------|------------------|--------------|----------------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |

6. Cropping type and Present Crop Area & Production under Block

| Crop Area (ha) | Area (ha) | Yield/ha | Crop Area (ha) | Area (ha) | Yield/ha |
|----------------|-----------|----------|-------------------|-----------|----------|
| Aus rice | | | Oilseeds | | |
| LV | | | | | |
| HYV | | | | | |
| Aman rice | | | Mustard | | |
| LV | | | | | |
| HYV | | | | | |
| Hybrid | | | | | |
| Boro Rice | | | Sesame | | |
| LV | | | | | |
| HYV | | | | | |
| Hybrid | | | | | |
| Total Rice | | | Sunflower | | |
| Wheat | | | Groundnut | | |
| Maize | | | Others | | |
| Pulses | | | Winter vegetables | | |
| Khesari | | | Summer vegetables | | |
| Mung bean | | | Total vegetables | | |
| Soybean | | | Fruits Watermelon | | |
| Cowpea | | | Species | | |
| Chickpea | | | Chilli | | |
| Others | | | Onion | | |
| Tuber crops | | | Garlic | | |
| Potato | | | Jute | | |
| Sweet potato | | | Sugarcane | | |
| Bamboo | | | Betel nut | | |
| Betelvine(Pan) | | | banana | | |
| Other crops | | | Mango | | |
| | | | Papaya | | |

7. Growth or Decline Agriculture Land During the Last 10 year.

| SL No. | Agricultural land use | Land use (2005-06) in ha | Land use (2015-16) in ha | Causes of increase or decline |
|--------|-------------------------|--------------------------|--------------------------|-------------------------------|
| 01 | Paddy (local varieties) | | | |
| 02 | Paddy (HYV) | | | |
| 03 | Vegetables (Summer) | | | |
| 04 | Vegetables (Winter) | | | |
| 05 | Tuber crops | | | |
| 06 | Pulse crops | | | |
| 07 | Oilseed crops | | | |
| 08 | Spice crops | | | |
| 09 | Fruit crops | | | |
| 10 | Wheat | | | |
| 11 | Maize | | | |
| 12 | Sugarcane | | | |
| 13 | Jute | | | |
| 14 | Other purposes | | | |
| | -Brick field | | | |
| | -Poultry farm | | | |
| | -Fish/shrimp culture | | | |
| | -Gardening/forestry | | | |
| | -Industries | | | |
| | -Housing | | | |
| | -Others | | | |

9. Major problems to Crop Production in Block/Union

1. _____
2. _____
3. _____
4. _____
5. _____

10. Future Need for Sustainable Crop production.

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____

11. Major problems related to crop production system Under Union

- 1.
- 2.
- 3.
- 4.
- 5.

12. Future Need for Sustainable Crop production under Union

- 1.
- 2.
- 3.
- 4.
- 5.

13. Conclusion and Recommendation

- 1.
- 2.
- 3.
- 4.
- 5.



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas

Package 05:

**Ramu Upazila, District: Cox's Bazar &
Rangunia Upazila, District: Chittagong**

FINAL SURVEY REPORT

Formal-Informal Economic Survey of Rangunia Upazila

June 2016

Joint venture of

 **HOUSE OF CONSULTANTS LIMITED (HCL)**

and

 **dm.Watch Disaster Management Watch(dm. Watch)**

EXECUTIVE SUMMARY

Draft Survey Report is the third report under the Package-5 of the “Preparation of Development Plan for Fourteen Upazilas” Project. At this stage, all individual Draft Survey Report containing thematic survey data and information is to be presented before Preparation of the Final Development Plan of Rangunia Upazila of Chittagong District. As of ToR, a range of surveys have been carried out e.g. Physical Feature, Topography, Land Use, Socio-economic, Agricultural, Urban and Rural Economy, Transport and Geophysical. Present survey report of Rangunia Upazila of Chittagong District is presenting “Formal and Informal Economic” Survey Report containing all data. Analysis of data and Policy-Options and Strategic Planning will follow in the Final Plan Preparation Process. The report consists of 7 (seven) Chapters.

Introductory overview of the Formal-Informal Sector’s importance in terms of contribution to GDP and employment opportunities in national economy is briefly described in Chapter-1.

Formal Sector illustrates Professional (Bank/Bima, NGO, etc.), Types of Business Centers (Katcha Bazar, Hat, Retail Market, Wholesale Market, and other, etc.), Shopping Center, Industry, Trade and Consumer Groups, Types of Industrial Products, Marketing area etc. Their Output and Employment is taken care of GDP, GNP and National Accounting System.

Informal Sector Illustrates Means of Livelihoods, Unregistered Economy, Informal Trade Category, Fixed Place Retailers, Mobile hawkers, Daily Wage Earners Groups, Rickshaw Pullers, Daily Wage Earners Groups, Home-made Cloths and Food sellers, etc. This sector is beyond Govt. Control and exempted from tolls and taxes. This sector Output and Employment is not taken into GDP and National Accounting System.

Approach and Methodology (**Chapter-2**) is described for carrying out the formal-informal field survey of the study area and also brief Review of National Policy and Plans, Rationale of relating National and Local Plan, Perspective Plan, Seventh Five Year Plan (2016-2020), Poverty Reduction Strategy Paper (PRSP-2011), Millennium Development Goal (MDG), Disaster Management Plan, Integrated Coastal Zone Management Plan (ICZMP) and Coastal Zone Policy (CZPo-205), other Sectoral Policies and Acts related to Land Use Plan, Linkage of National Policies and Plan with 14 Upzila Development of Preparation Plan. .

Under **Formal Economic Activities Survey, Chapter-3** consists of four Sections-A, B, C and D. Hat/Bazar/Market/Growth Centers (Section-A), Bank and BIMA (Section-B), NGOs (Section-C) and Industry (Section-D) are functioning in the study area have been listed and their working/service area identified. Detailed data and information is presented in the respective section under **Chapter-3**.

Under **Informal Sector Economic Activities Survey, Chapter-4** discusses the Location of Trading/Growth Centers, Types of Traders/Sellers, Types of goods/commodities traded, Status of Trade Centers, No. of Traders interviewed, Consumer Groups, Monthly Income and Expenditure of interviewed Traders, No. of Traders having loan and having no loan identified. Data and information is inserted in the relevant section of the report (**Chapter-4**).

Chapter-6 describes the Survey findings of Formal and Informal Economic sectors, PRA and Agricultural Survey Findings of economic issues, identification of problems and potentials/economic issues.

Lastly, **Chapter-7** describes the policy recommendations for the future Development Policy - Options and priority Investment Packages/Programs on Short, Medium and Long Term basis for Rangunia Upazila. This has been reflected in our PRA and Agricultural Survey Findings. In the Investment Plan formulation process, it will actively consider local resources base, Climate Change - Sea Level Rise and Environmental Issues. Rangunia Upazila is buffer zone of the Coastal area of Bangladesh (CZPO-2005). So, Climate Change, Sea level rise and Environmental issues integration is inevitable in view of the Sustainable Development Goal (SDG).



Md. Shahjahan
Urban Economist

Abbreviations/Acronym

| | |
|-------|---|
| AAP | Action Area Plan |
| ADB | Asian Development Bank |
| BBS | Bangladesh Bureau of Statistics |
| BRAC | Bangladesh Rural Advancement Center |
| CBO | Community Based Organization |
| CCC | Chittagong City Corporation |
| CZPo | Coastal Zone Policy |
| DAE | Department of Agricultural Extension |
| DTW | Deep Tube Well |
| GDP | Gross Domestic Product |
| GIS | Geographic Information System |
| GNP | Gross National Product |
| HYV | High Yielding Variety |
| ICZMP | Integrated Coastal Zone Management Plan |
| LLP | Low Lift Pump |
| MDG | Millennium Development Goal |
| NCA | Net Cultivable Area |
| NGO | Non-Government Organization |
| NWPo | National Water Policy |
| PDP | Power Development Board |
| PRA | Participatory Rural Appraisal |
| PRSP | Poverty Reduction Strategy Paper |
| REB | Rural Electrification Board |
| RRA | Rapid Rural Appraisal |
| SDG | Sustainable Development Goal |
| SFYP | Sixth Five Year Plan |
| SME | Small and Medium Enterprise |
| SPSS | Statistical Package for Social Science |
| STW | Shallow Tube Well |
| ToR | Terms of Reference |
| ToP | Technology of Participation |
| UDD | Urban Development Directorate |
| WB | World Bank |

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Annexure 1: Sample Questionnaires

Annexure-2: Photographs of stakeholders Consultation/interview.

Chapter-1 Introduction

1.1 Introduction

Mix of formal-informal sectors constitutes the dominant economic activities in Bangladesh and its contribution to GDP and employment is unending fact. Empirical Studies indicate around 80% of labor force in Bangladesh works in the informal economy and that the contribution of the informal sector of the GDP is around 64%. The major informal sector in Bangladesh is agriculture, and a large number of Small and Medium Enterprises (SMEs) and Micro-enterprises fall into the category of informal sector. The major driving forces behind the growth in informal sector, is the rise of Household demand for informal sector goods and services as well as the rise in demand for intermediate inputs. In fact, informal sector covers a significant part of the economy and plays an important role in employment creation and Production. Therefore, informal sector is very important for the Bangladesh Economy, as its various channels have major impacts on both the formal economy as well as the overall economy of the country. Informal sector depends on a few characteristics such as easy access to business, reliance on indigenous resources, family ownerships, small scale operations, use labor intensive and adaptive technology, unregulated and competitive markets and skills acquired beyond formal sector.

Forms of informal employment include agricultural day labourers, small traders, urban foot path vendors, paid domestic workers and home produced cloths, handicrafts. Informal jobs mainly fall outside the domain of the Governments labour market regulation. Moreover, informal workers do not function with the types of legal protection connecting the number of working hours, health and safety or within the types mandated benefits that would be normally feature of formal employment opportunities in large ongoing private sector firms or in public sector.

In view of above facts, Preparation of Development Plan of Rangunia Upazila of Chittagong District under Fourteen Upazilas” project have envisaged for adopting Formal-Informal sector economic Survey for collecting data on Present Situation and last 10 years trends of employment, production, income generation and contribution to GDP and; future Scenarios Development (Projections) is also a realistic approach for formulating/ preparing whole of Upazila Urban Strategic Development Plan, results in reduced the unbearable population pressure in main cities those who are coming in search of employment and livelihood improvement. It is also estimated by 2040 BANGLADESH will fall under middle income group country and its expected urban population will be 40%-50% of total population (NWMP 2000). Accordingly, Urban physical and social infrastructure facilities in and around all Upazila to be developed gradually achieving avowed balanced development objectives in rural and urban areas in view of sustainable development goal (SDG).

Sub-sector wise survey data of Present Situation and in some areas for the last 10 years performance data/recorded in different tables are appended.

1.2 Sample Design

All our thematic Surveys collected primary level data of Formal Sector interviewing/ consulting the stakeholders and duly filled-in standard questionnaires prepared by the Consulting Firm. Sample questionnaires used for data collection are provided as **Annexure - 1** and Photographs of stakeholders consultation/interview are provided as **Annexure-2**. Formal and Informal Sector Economic Survey looked into following areas:

Formal Sector, first of all, Hat/Bazar/Market/Growth Centers, in Rangunia Upazila, there are 35 Hat/Bazar/Market/Growth Centers (**Table-3.2**). Out of it, 22 samples were taken up and questionnaires duly filled in, and information and observations were recorded. Similarly, Bank-BIMA (16 nos.): Bank (9 nos.) and BIMA (7 nos.) are functioning in the Study Area. Same no. of samples was taken collecting data and information, and data collected adopting same methodology. The same procedure was followed in collecting data from 8 nos. of NGOs.

Important area of formal sector is Industry. In Rangunia Upazila, total nos. of industries were 1,427 (**Table-27**) in Chittagong District (BBS-2011 Report). In Industrial Survey, 115 samples were taken up and 114 types of industries were interviewed/consulted. Standard Questionnaires were dully filled in for collecting data. In case of Agricultural Survey of 30,587 farm families in Rangunia Upazila, only 46 Farm families (samples) were taken up for interview/consultation. Additional data and information were also collected from the secondary sources (DAE Office) and BBS report-2011.

Informal Sector Economic Survey: 50 numbers trader/sellers in different locations, both in rural and urban areas, were interviewed/consulted. Standard questionnaires were duly filled-in in similar fashion as of other thematic survey mentioned above.

All the data were processed and tabulated in computer through SPSS software and finally presented in present Survey Report-May, 2016.

1.3 Understanding Formal-Informal Survey

Formal Sector

Information on formal sector has been collected mostly from the secondary sources. Direct inquiries of large employees, Chambers of Commerce, trade organizations, owner associations and Labour Unions were conducted. Besides, relevant Government agencies (Bureau of Statistics, Ministry of Industry) publish regular reports that contain information on employment, investment, production etc., are analyzed. Furthermore, Officials' records of Chittagong City Corporation (CCC) is also a valuable source of such information.

At first, necessary steps were undertaken to identify the nature of informal sector activities in the study area. Most of these activities were in the service sectors and small manufacturing units. A reconnaissance survey was proposed to identify the nature of activities.

Sample surveys were conducted at the household level and at the business unit level/trading centers with the help of two separate sets of questionnaires. While the household survey was designed to collect information on employees, type and nature of employment, income level etc. The business unit level survey was conducted to collect information on investment, production, if locally consumed, or "exported" type of trading, name of employees etc.

The objective of this study is to analyze the present economic base of the study area to assess how the significance of its economic base is changing compared to the national economy. This would determine the future growth potentials of the area. The Consultant will apply standard analytical tools for this purpose such as location quotient and shift, and share analysis. **The findings of these analyses will depict a clear picture about future employment and investment prospects in the study area.**

Table-1.1: Items to be Included in Formal and Informal Economic Study

| Items | Illustrated |
|------------------------------|--|
| Formal Economic Activities | Economic Group, Professional (NGOs/Bank/Insurance Co. etc), Economic Activities, Potentials, Type of business Center (Kacha Bazar, Hat |
| Informal Economic Activities | Means of Livelihood, Unregistered economy, informal Trade Category, Fixed place Retailers, Moblie hawkers , Paid Household Labour, Vegetables Sellers etc. |

1.4 Upazila Profile-Rangunia

Rangunia Upazila is an Upazila of Chittagong District in the Division of Chittagong, Bangladesh and has an area of around 410.73 sq km¹. It is located at 22.4667° North & 92.0833° East. (Please see **Map 1.1**) It is bounded by Kawkhali on the north Patiya and Boalkhali, on the south, Kaptai, Rajasthali and Bandarban Sadar on the east, Raozan and Kawkhali on the west. "Rangunia" is not a Bengali word. Some believes that it has similarities with Burmese word "Rengun" because once Rangunia was ruled by Burmese Arakans.

Administration of Rangunia Thana was formed on 24 January 1962 and it was turned into an Upazila in 1983. At present, total population of the Upazila is 303998, with male 15796 and female 146402. Average Literacy Rate is 54.3% of which male 57.4% and female 50.9%. Total Educational Institutions: College 9, Secondary School 41, Primary School 148, Madrasa 15. It also has library Club 10, Women's Organization 2 and Playground 30.

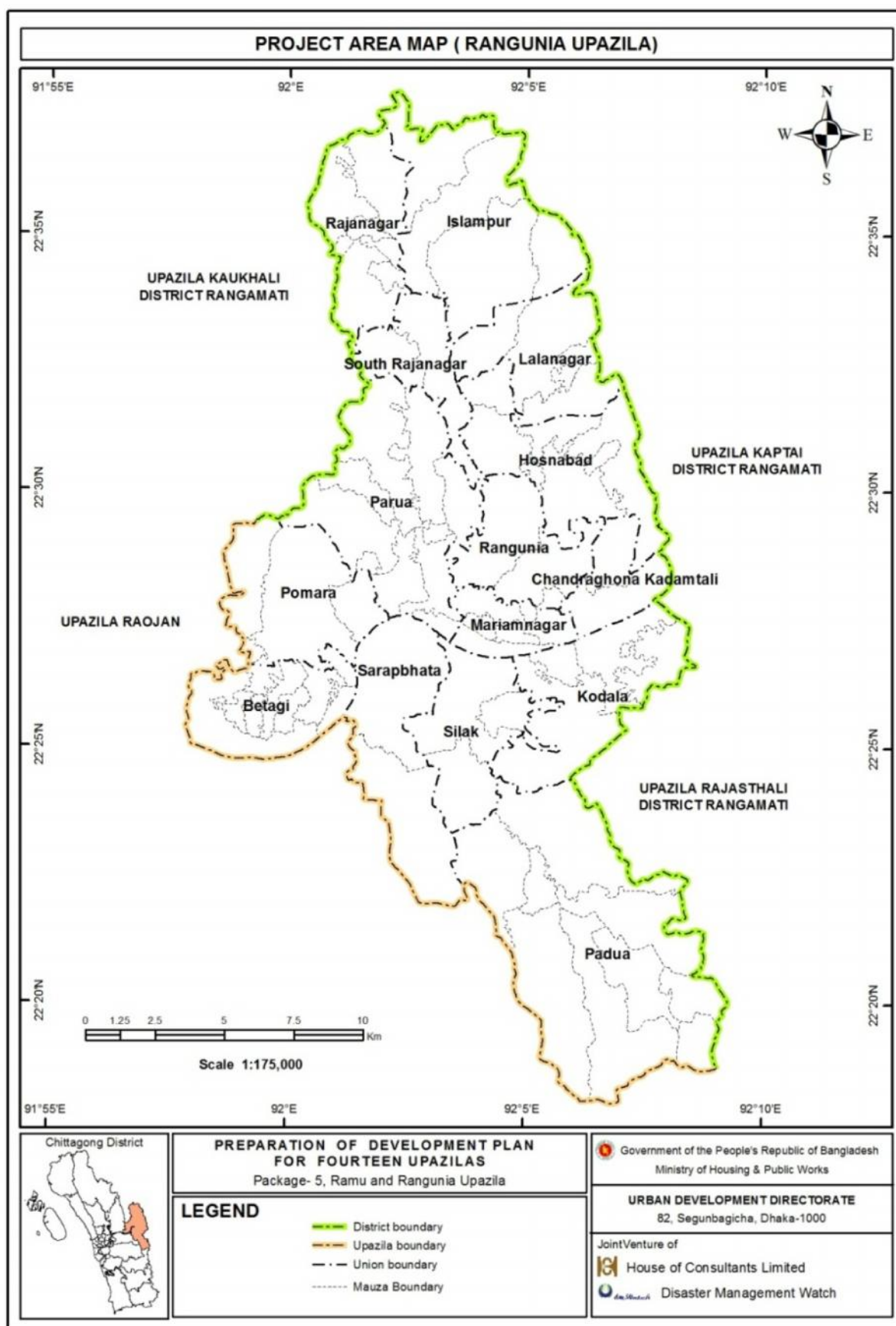
Gross Area of the Rangnia Upazila is 34755 ha, Net Cultivable area is 18755 ha (54% of total land), Total Cropped area is 34016 and Cropping Intensity is 181%. It is located in Agrological Zone (23 and 29). Main source of income of this Upazila: agriculture 39.7%, non-agriculture labourer 4.30%, Industry 0.58%, Commerce 16.24%, Transport and communication 3.57%, Service 12.31%, Construction 1.03%, Religious service 0.49%, Rent and remittance 10.91% and others 10.86%. Ownership of agricultural land- Land-owner 41.19%, Landless 58.1%; Agricultural land- Urban 38.21% and Rural 41.81%. According to religion, the population of this Upazila distributes as Muslims 236,474, Hindu 44,975, Buddhist 478, Christian 16,378 and others 65. Indigenous Community, such as Chakma and Marma belong to this Upazila and Water bodies - main river of this Upazila is the Karnafuli River. Religious Institutions of Upazila are in numbers: Mosque-359, Temple-42, Pagoda -41 and Sacred Place-1.

Important Archeological sites are: Palace Sukbillash (18th. Century), Rani Pukur (Raja Hat), Pagla Mama Dargha (19th Century), Shahen Shah Dargha (Pomara), Dhiva Chatuedashi Mandir (Parua), Krishna Mandir (Majumdarkhali), Sagar Dighi (Rajanagar), Mahamuni Buddhist Moaaterly, Simaghar.

Prominent Tourist Spots are: Chakma Rajbari (Shukbilaash Padua), Mahamuni Buddhist Monastery, Tea garden (Agunia, Kodalia, Thandachari).

Communication Facilities within the Upazila- it has road 53 km., mud road 598 km, water way 12.96 nautical miles. Noted Manufactories of this Upazila are Jute Mill, Carpet mill, saw mill, Chemical industries and welding factory.

¹http://en.banglapedia.org/index.php?title=Rangunia_Upazila



Map 1.1: Project Area Map of Rangunia Upazila

The no. of hats and bazar are 22, fairs 8, most noted of which Dhameer Hat, Mughelar Hat, Roazar Hat, Shantir, Mariumnagar Hat, Chaitra Samkranti Mela (Rajnagar), Muharam Mela (Rangunia), Surya Brota Mela (Majumdar khil Kadamtali), Rathajatra Mela and Bijoy Mela.

Rangunia-Paurashava

Rangunia Paurashava was established in 2000 and belongs to class B. It has an area of 8 sq km with 9 wards. Rangunia Paurashava belongs to Rangunia Sadar Upazila, Chittagong District. According to Population Census-2011, there are about 53,035 people in Rangunia Paurashava. Rangunia Upazila has 15 Unions, 73 Mauzas/Mahallas, and 149 villages. Union-wise introductory information is given below in **Table-1.2** below.

Table-1.2: Union-wise Basic Statistics of Rangunia Upazila

| Name of UP | Area (km ²) | Population | | Total |
|------------------------|-----------------------------|------------|--------|-------|
| | | Male | Female | |
| Rajanagar | 30 | 24275 | 20069 | 44344 |
| Hosnabad | 26 | 13098 | 13300 | 26398 |
| Rangunia | 10 | 5262 | 4980 | 10242 |
| Mariamnagar | 10 | 8683 | 8459 | 13642 |
| Parua | 30 | 7175 | 7190 | 14365 |
| Pomra | 22 | 12666 | 12050 | 24716 |
| Betagi | 17 | 10312 | 10306 | 20618 |
| Sarapbhata | 28 | 11650 | 11820 | 23470 |
| Silok | 23 | 8385 | 8515 | 16900 |
| Padua | 65 | 15456 | 14466 | 29922 |
| Chandraghona Kadamtali | 11 | 13202 | 11487 | 24689 |
| Kodala | 21 | 8174 | 7320 | 15494 |
| Islampur | 15 | 10895 | 9007 | 19902 |
| South Rajanagar | 29 | 5612 | 4640 | 10252 |
| Lalanagar | 14 | 2751 | 2793 | 5544 |

Source: BBS (Chittagong District Statistics), 2011

Chapter-2 Approach and Methodology

2.1 Methodology of Field Survey

Formal Sector

Information on formal sector has been collected mostly from the secondary sources. Direct inquiries of large employees, Chambers of Commerce, trade organizations, owners associations and Labour Unions were conducted. Besides, relevant Government agencies (Bureau of Statistics, Ministry of Industry) publish regular reports that contain information on employment, investment, production etc is analyzed. Furthermore, Officials records of Chittagong City Corporation (CCC) are also a valuable source of such information.

Informal Sector

At first, necessary steps were undertaken to identify the nature of informal sector activities in the study area. Most of these activities were in the service sectors and small manufacturing units. A reconnaissance survey was proposed to identify the nature of activities.

Sample surveys were conducted at the household level and the business unit level/trading centers with the help of two separate sets of questionnaires. The household surveys were designed to collect information on employees, type and nature of employment, income level etc. The business unit level survey was conducted to collect information on investment, production, if locally consumed, or “exported”, type of trading, name of employees etc.

The objective of this study is to analyze the present economic base of the study area to assess how the significance of its economic base is changing compared to the national economy. This would determine the future growth potentials of the area. The consultant will apply standard analytical tools for this purpose such as location quotient and shift and share analysis. **The findings of these analyses will depict a clear picture about future employment and investment prospects in the study area.**

Formal and Industrial Survey: Preparation of questionnaire for studying formal industries in SPSS and other compatible format, editing, piloting, finalization and printing of questionnaire by Consulting firm. The attribute data of survey commercial and industrial enterprises are linked with spatial data collected from physical feature and land use survey. The questionnaire contained the following:

- 1) Details of location, size and capacity of existing industries/institutes;
- 2) Details of labour statistics with the housing condition and their quality of life;
- 3) Other relevant data and information as directed by PD.

2.2 Review of National Policies and Plans

The national development plans studied in this report include, the Perspective Plan, The Sixth Five Year Plan, The Poverty Reduction Strategy (PRS), the Millennium Development Goals (MDGs) and National Disaster Management Plan (NDMP). This section summarizes the current plans associated with development plan policies of Bangladesh instead of plans prepared long back. National development plans are prepared considering the overall needs and aspirations of the country with respect to different sectors of development. Any development initiative at the local level must relate to the national level plans in order to achieve cohesion and integrity with overall development of the country to attain the national development objectives. It is, therefore, necessary to study how the Rangunia Upazila Development Plans is related to the national development plans of the country.

2.2.1 Perspective Plan

In recognition of the substantial development challenges, recently the Government has embarked on a Perspective Plan covering 2010 to 2021 aimed at implementing Vision 2021. The development perspective envisages to achieving, in the coming days, a prosperous progressive nation in which food and energy security shall prevail with drastic reduction of poverty and a low level of unemployment. The perspective also includes great strides in human development including health and nutrition, effective population control, progress in all levels of education, primary, secondary and tertiary in addition to commendable improvement in science and technology, along with great achievement in ICT. Infrastructure development will improve integrated multi-modal transport encompassing, railways, roads and inland water transport having connectivity with our neighboring countries. In other words, the development perspective implies the simultaneous fulfillment of economic and social rights of the people alongside civil and political rights. For this to happen strong links between economic growth on the one hand, and expansion of employment opportunities, reduction of poverty, expansion of democracy and empowerment, consolidation of cultural identity and protection of environment with its freshness for the next generation on the other will be established. The broad development goals underlying the Perspective Plan include:

- building a secular tolerant liberal progressive democratic state
- promoting good governance and curbing corruption
- promoting sustainable human development
- reducing the growth of population
- instituting a prudent macroeconomic policy mix
- promoting a favorable industrialization and trade policy regime
- addressing globalization and regional cooperation challenges
- ensuring adequate supply of electricity and fuel
- achieving food security
- making available adequate infrastructure
- pursuing environmental friendly development and
- building a digital Bangladesh

The Perspective Plan sets the strategic directions and provides a broad outline for the course of actions for making the Vision 2021 a reality. This broad framework leaves considerable latitude for the Sixth Five Year Plan (FY11-FY15) and the Seventh Five Year Plan (FY16-FY20) to work out operational details of how the country should move forward. Nevertheless, the objectives and targets of the two plans to be implemented [i.e. the Sixth Five Year Plan (FY11-FY15) and the Seventh Five Year Plan (FY16-FY20)] within the purview of the Perspective Plan period must be consistent with the visions, objectives, and targets contained in the Perspective Plan. A number of core targets have been identified to monitor the progress of the Sixth Plan. These targets have been set according to the vision

and objectives of the perspective plan as well as the goals of the Millennium Development Goals. The achievement of these targets by the end of the Sixth Plan should likely put Bangladesh on course to realize most of the objectives of the Vision 2021 and MDG goals. These monitorable targets fall in seven broad categories: (i) Income and Poverty; (ii) Human Resource Development (iii) Water and Sanitation; (iv) Energy and Infrastructure, (v) Gender Equality and Empowerment; (vi) Environment Sustainability; and (vii) Information and Communications Technology (ICT).

2.2.2 Sixth Five Year Plan

The Sixth Five Year Plan (SFYP) is framed for the period 2011-2015. This Sixth Plan's strategy for capacity development consists of four pillars: strengthening the civil service; promoting devolution to local governments; strengthening public-private partnerships and reforming planning and budgetary processes. Regarding the civil service, the strategy is to develop a long term program for re-building the civil service that is grounded in the socio-political realities in Bangladesh. The basic features of the reform strategy for civil service includes merit-based recruitment and promotion; strong training; ensuring a proper incentive and work environment; establishing and enforcing clear rules of business and codes of conduct; and seeking feedback on performance through a citizen's charter. The plan had set an environment to flourish the dynamic private sector.

Major Objectives of the SFYP

The objectives of the Sixth Five Year Plan can be summarized as follows:

- a) To reduce and ultimately eradicate poverty by accelerating economic growth
- b) To achieve sustained growth with equity and social justice
- c) To create productive job in the manufacturing and organized service sectors of the economy
- d) To reduce income inequality
- e) To reduce regional disparities by ensuring distributive justice
- f) To digitize the country with a view to exploiting the benefits of ICT
- g) To enhance the incremental capital output ratio (ICOR) through human development
- h) To revitalize the rural economy by higher farm productivity and stimulating SMEs
- i) To encourage diversification and commercialization of agriculture sector
- j) To ensure food security
- k) To achieve replacement level of fertility
- l) To ensure cent percent Net Enrolment at Primary Level

2.2.3 Poverty Reduction Strategy Plan

In persuasion of achieving the MDGs in 2003, Poverty Reduction Strategy (PRS) was prepared. PRS has taken over the place of Five-Year Plans. The Planning Commission under the Ministry of Finance initiated the Interim Poverty Reduction Strategy (IPRS) in March 2003 and a full blown Poverty Reduction Strategy (PRS) was prepared in 2005. PRS aims to targets of at least 20 sectors on special priority basis.

Physical planning, water supply and housing sector in the Planning Commission is now implementing development program of nine Ministries through the Annual Development Programme (ADP) under Ministry of Planning. UNDP & UNICEF assisted "Reduce Urban Poverty through Local Partnership" project is under implementation, which is very relevant with the objectives of the Poverty Reduction Strategy (PRS). The completion of the Interim Poverty Reduction Strategy (I-PRS) titled A National Strategy for Economic Growth, Poverty Reduction and Social Development, in March 2003, marked an important milestone in the process of renewing the national goal of policy ownership over the formulation of Poverty

Reduction Strategies (PRSs). PRS is prepared for unlocking the potentials using government's own resources and by local experts; thematic reports is prepared by the Ministries in their own areas to serve as background papers for the PRS.

2.2.4 Millennium Development Goals (MDGs)

In September 2000, at the Millennium Summit, the United Nations issued the Millennium Declaration, signed by 189 countries, committing themselves to a series of targets, most of which are to be achieved by 2015. This is known as Millennium Development Goals (MDGs); they represent a framework for achieving human development and broadening its benefits. The Millennium Development Goals provide a road map for the international community's efforts for development. They encompass a set of eight goals:

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equity and empower women
4. Reduce mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership for development

2.2.5 National Disaster Management Plan

The National Plan for Disaster Management is prepared by the Disaster Management and Relief Division. The Plan is to be used to:

- i. Articulate the long-term strategic focus of disaster management in Bangladesh.
- ii. Demonstrate a commitment to address key issues: risk reduction, capacity building, information management, climate change adaptation, livelihood security, issues of gender and the socially disadvantaged, etc.
- iii. Show the relationship between the government vision, key result areas, goals and strategies, and to align priorities and strategies with international and national drivers for change.
- iv. Detail a road map for the development of disaster management plans by various entities.
- v. Guide the DM & RD in the development and delivery of guidelines and program.
- vi. Illustrate to other ministries, NGOs, civil society and the private sector how their work can contribute to the achievements of the strategic goals and government vision on disaster management.
- vii. Provide a framework within which to report performance and success in achieving goals and strategies.

2.2.6 Integrated Coastal Management Plan (ICZP) and Coastal Zone Policy (CZP)

Rangunia Upazila is located in the coastal zone of Bangladesh, which are facing 710 km long coast to the Bay of Bengal. This coastal zone contains several ecosystems that have important conservations values. As a zone of vulnerabilities as well as opportunities this coast prone to natural disaster like cyclone, storm surge and flood. This poses severe challenges to the life and livelihood of the people live in coastal areas. The coastal zone of Bangladesh is an area of 47,201 sq. km that consists of 19 Districts covering 32% of the total landmass. Around 35 million people representing 29% of the total population of the country live in the coastal zone. Integrated Coastal Zone Management policy has 8 (eight) objectives to address the vulnerabilities and opportunities of the coastal areas where environmental friendly activities and other sustainable use of natural resources have been used very carefully and lawfully. The ICZM process consists of three main components:

- A coastal zone policy;
- A coastal zone strategy; and
- A priority investment program.

The coastal zone policy of 2005 was adopted with the overall goal to create conditions in which the reduction of poverty, development of sustainable livelihoods and the integration of the coastal zone into national processes can take place. Therefore, the development project of Rangunia has been attempted to consider the Integrated Coastal Zone Management (ICZM) and Policy of Bangladesh for the formulation of its local to sub-regional planning.

2.2.7 Other Sectoral Policies and Acts related to Land Use Planning

The major Sectoral Policies and Acts related to Land use Planning are described below:

Sector Policies:

- National Water Policy, 1999
- National Urban Policy (Draft)
- National Housing Policy, 1993
- Population Policy, 2004
- Agriculture Policy, 2004
- Industrial Policy, 2005
- Bangladesh Urban Management Policy Statement, 1999

Major Acts and Rules

- The Local Government (Pourashova) Act, 2009
- The Local Government (City Corporation) Act, 2009
- Building Construction Act, 1952
- Town Improvement Act, 1953
- Building Construction Rules, 1996
- Dhaka City Building Construction Act, 2008
- National Reservoir Protection Act, 2000
- Brick Burning (Control) Ordinance, 1989
- Conservation of Environment Act, 1995
- Land Development for Private Housing Project Act, 2004

2.3 Linkage of National Plans and Policies with Development Plan of 14 Upazilas Project

Following the goals, objectives, aims, policies and strategies of upper level plan which are described above, the plan for Rangunia Upazila Development Plan will be prepared. The perspective Plan, The Sixth Five Year Plan, The Poverty Reduction Strategy (PRS), Millennium Development Goal, National Disaster Management Plan and other policies are the major guiding factors of 14 Upazila Development Plan Project. The sectoral policies will also be reflected in the final plan preparation

Chapter-3 Formal Economic Survey

3.1 Introduction

Formal Economic Sector (Table-1) includes Hat/Bazar/Market/Growth Centers, Industry, Bank/Bima, NGOs, CBOs. These are located in and around Upazila centers and Union Parishad centers. There are some small hats/bazars situated in roadsides and rural areas.

Informal Economic Sector include- agricultural day labourers, small traders, urban street vendors, paid domestic workers and home produced cloths, handicrafts, Small Tea stall, Ferry wala, Vegetables Seller/Van, Rickshaw Puller, Van . Informal jobs mainly mostly fall outside the domain of the Governments labor market regulation.

Table-3.1: Formal-Informal Sector Activities Types

| Economic Employment Status | Category Name |
|----------------------------|--|
| Formal Economic Sectors | <ul style="list-style-type: none"> • Hat/ Bazar/Market • Industry • Bank/Bima • NGO • CBO |
| Informal Economic Sectors | Informal Economic Sector(Agriculture Labourers, Hawkers, Footpath Traders, House hold Servants, Daily Wage Earners etc. |

3.2 Section-A: Hat/Bazar/Market

The **Table-3.2** has presented the Chittagong District Total: Growth Centers (112), Hat/Bazar (513), Nos. of Poultry Farm (6880), Nursery (323), Horticulture Farm (11), Dairy Farm (15496), Brick Kiln (345), Decorator Service (1340).

Rangunia Upazila in same area' Total: Growth Centers (13), Hat/Bazar (22), Poultry Farm (256), Nursery (30), Horticulture Farm (0), Dairy Farm (76), Brick Kiln (91), Decorator Service (85).

Table-3.2: Chittagong District: Growth Centers, Hat/Bazar_Poultry, Dairy, Horticulture, Brick Kiln and Decorator

| Name of Upazila | Growth Center | Hat/Bazaar | Poultry Farm | Dairy Farm | Nursery | Horticulture Farm | Brick Klin | Decorator Service |
|-----------------------------|---------------|------------|--------------|--------------|------------|-------------------|------------|-------------------|
| Anowara | 5 | 28 | 522 | 63 | 7 | 0 | 0 | 39 |
| Banshkhali | 9 | 35 | 21 | 13 | 27 | 0 | 3 | 3 |
| Boalkhali | 0 | 24 | 280 | 60 | 15 | 2 | 9 | 83 |
| Chandanaish | 6 | 22 | 82 | 54 | 5 | 0 | 31 | 55 |
| Chittagong City Corporation | 0 | 81 | 186 | 159 | 83 | 1 | 10 | 208 |
| Fatikchari | 2 | 56 | 270 | 2 | 17 | 0 | 39 | 102 |
| Hathazari | 3 | 36 | 43 | 17 | 2 | 2 | 10 | 106 |
| Lohagara | 0 | 20 | 585 | 21 | 0 | 0 | 5 | 30 |
| Mirsharai | 20 | 38 | 44 | 9 | 30 | 0 | 12 | 90 |
| Patiya | 12 | 36 | 343 | 72 | 31 | 4 | 18 | 210 |
| Rangunia | 13 | 22 | 256 | 76 | 30 | 0 | 91 | 85 |
| Raozan | 0 | 26 | 94 | 30 | 36 | 0 | 44 | 119 |
| Sandwipp | 5 | 42 | 257 | 67 | 10 | 4 | 6 | 42 |
| Satkania | 4 | 24 | 3500 | 14810 | 16 | 0 | 45 | 83 |
| Sitakundu | 6 | 23 | 397 | 43 | 14 | 0 | 22 | 67 |
| Total | 112 | 513 | 6880 | 15496 | 323 | 11 | 345 | 1340 |

Source: BBS (Chittagong District Statistics), 2011

3.2.1 HAT/BAZAR/MARKET, Rangunia

From Study findings, it is revealed that there are 22 nos. Hat/Bazar/Markets. These are conducted by Cooperative Association (36.40%), Upazila Parishad (4.5%), Leaseholder (36.4%), Property Owner (18.2%) and by other arrangement (4.5%). Total number of Hats/Bazars of Chittagong are 513 and in Rangunia it is about 4% of the District total.

3.2.2 Governing Authority and its Coverage (%)

As of Table-3.3, 8 nos. (36.4%) hats/bazars are conducted by co-operative association, 1 no. (4.5%) by Upazila Parishad, 8 nos. (36.4%) by lease-holder, 4 nos. (18.2%) by property owner and 1 no. (4.5%) by others

Table-3.3: Hat/Bazar Management

| Conducting Way of Hat/Bazar/Market | Frequency | Percent |
|------------------------------------|-----------|------------|
| Co-operative Association | 8 | 36.4 |
| Upazila Parishad | 1 | 4.5 |
| Leaseholder | 8 | 36.4 |
| Property Owner | 4 | 18.2 |
| Others | 1 | 4.5 |
| Total | 22 | 100 |

Source: Field Survey, 2016

3.2.3 Owner of Land of Hat/Bazar/Market

As of **Table-3.4**, Governing Authority of these Hat/Bazar/Market – Personal Property 5 nos. (22.7%), Upazila Parishad 4 nos. (18.2%), LGED 4 nos. (18.2%) and 9 nos. Cooperative Association (40.9%).

Table-3.4: Ownership of Hat/Bazar

| Governing Authority | Frequency | Percent |
|-------------------------|-----------|------------|
| Personal Property | 5 | 22.7 |
| Upazila Parishad | 4 | 18.2 |
| LGED | 4 | 18.2 |
| Cooperative Association | 9 | 40.9 |
| Total | 22 | 100 |

Source: Field Survey, 2016

3.2.4 Regulation process of Hat/Bazar/Market

Table-3.5 below has shown the owner of the land of 22 nos. Hat/Bazar/Markets and their regulation process. Owner of the land are Personal, Upazila Parishad, LGED, and Cooperative Association.

Table-3.5: Regulation Process

| Name of the Authority/Owner | Regulation Process | | | | | Total |
|-----------------------------|-------------------------|------------------|-------------|----------------|----------|-----------|
| | Cooperative Association | Upazila Parishad | Leaseholder | Property Owner | Others | |
| Personal Property | 1 | 0 | 1 | 3 | 0 | 5 |
| Upazila Parishad | 0 | 0 | 3 | 1 | 0 | 4 |
| LGED | 1 | 0 | 3 | 0 | 0 | 4 |
| Cooperative Association | 6 | 1 | 1 | 0 | 1 | 9 |
| Total | 8 | 1 | 8 | 4 | 1 | 22 |

Source: Field Survey, 2016

3.2.5 Location of Hat/Bazar/Market Regulation Mechanism

Table-3.6 has shown the detailed list of 22 nos. Hat/Bazar/Markets in Rangunia Upazila and also has shown its regulatory bodies. Regulatory Bodies are: Cooperative Associations, Upazila Parishad, Leaseholders, Property Owners and Others.

Table-3.6: Location of Hat/Bazar/Market

| List of the Hat/Bazar/Market | Regulation Process | | | | | Total |
|------------------------------|-------------------------|------------------|-------------|----------------|----------|-----------|
| | Cooperative Association | Upazila Parishad | Leaseholder | Property Owner | Others | |
| Abdul Kuddus Market | 0 | 0 | 0 | 1 | 0 | 1 |
| Al Emarat Complex | 0 | 0 | 0 | 1 | 0 | 1 |
| BangalHalia Bazar | 0 | 0 | 0 | 1 | 0 | 1 |
| Dhamair Hat | 1 | 0 | 0 | 0 | 0 | 1 |
| Dobhashi Bazar | 0 | 1 | 0 | 0 | 0 | 1 |
| Gawsia Market | 0 | 0 | 0 | 1 | 0 | 1 |
| Gochara Bazar | 0 | 0 | 0 | 0 | 1 | 1 |
| Hajani Hat | 1 | 0 | 0 | 0 | 0 | 1 |
| Ichakhali Bazar | 0 | 0 | 1 | 0 | 0 | 1 |
| Kodala Hat | 0 | 0 | 1 | 0 | 0 | 1 |
| Lichu Bagan Bazar | 1 | 0 | 0 | 0 | 0 | 1 |
| Mariamnagar Daily Bazar | 1 | 0 | 0 | 0 | 0 | 1 |
| Mogholer Hat | 0 | 0 | 1 | 0 | 0 | 1 |
| Padua | 1 | 0 | 0 | 0 | 0 | 1 |
| Rajar Hat | 1 | 0 | 1 | 0 | 0 | 2 |
| Ranir Hat Bazar | 1 | 0 | 0 | 0 | 0 | 1 |
| Rowajar Hat | 0 | 0 | 1 | 0 | 0 | 1 |
| Shantir Hat | 0 | 0 | 1 | 0 | 0 | 1 |
| Silok Bazar | 0 | 0 | 1 | 0 | 0 | 1 |
| Udol Bania Bazar | 0 | 0 | 1 | 0 | 0 | 1 |
| Zia Market | 1 | 0 | 0 | 0 | 0 | 1 |
| Total | 8 | 1 | 8 | 4 | 1 | 22 |

Source: Field Survey, 2016

In **Figure-1** shows based on survey in the study area: about 50% hat/bazar/markets cover 5 acre of land, 27% more than 15 acres and the rest 23% covers 10-15 acres of land.

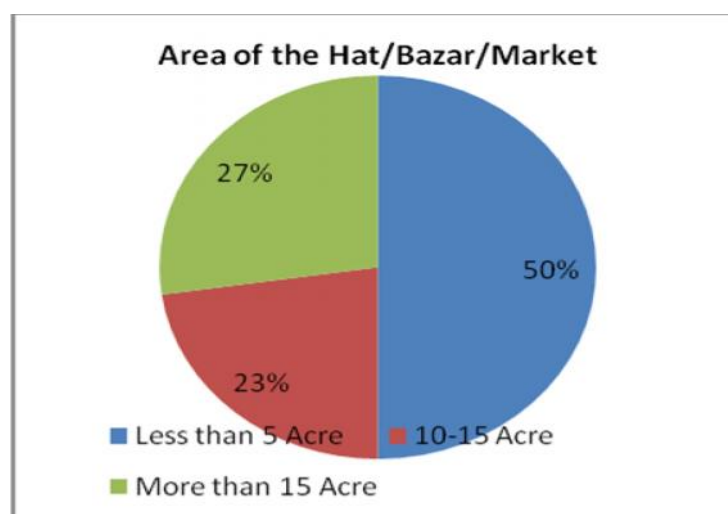


Figure 1: Area of the Hat/Bazar/Market

Source: Field Survey, 2016

3.2.6 Transportation System (Hat/Bazar/Market)

From the **Table-3.7**, it is found that out of 22 nos. Hat/Bazar/Markets, 19 nos. are connected by Road ways (86.4%) and the rest 3 nos. (13.6%) are connected by road & Water Ways.

Table-3.7: Transportation System

| Transportation System | Frequency | Percent |
|-----------------------|-----------|--------------|
| Roadway | 19 | 86.4 |
| Roadway & Waterway | 3 | 13.6 |
| Total | 22 | 100.0 |

Source: Field Survey, 2016

3.2.7 Waste Dumping Site

Table-3.8 shows that 22 nos. Hat/Bazar/Markets were surveyed, 7 nos. (31.8%); wastes are being dumped in nearby dustbin - 5 nos. (22.7%) in specific dumping site- 2 nos. (9.1%); hats wastes are dumped along roadside - 1 no. (4.5%) hats. Wastes are dumped in fallow land- 7 nos. Hats/Bazar/Markets wastes are dumped into river/canal (31.18%).

Table-3.8: Waste Dumping Site

| Waste Dumping Site | Frequency | Percent |
|--------------------|-----------|--------------|
| Nearby Dustbin | 7 | 31.8 |
| Dumping Site | 5 | 22.7 |
| Along the Roadside | 2 | 9.1 |
| Fallow Land | 1 | 4.5 |
| River/Canal | 7 | 31.8 |
| Total | 22 | 100.0 |

Source: Field Survey, 2016

3.2.8 Amount Money is dealing With (Hat/Bazar/Market)

As of **Table-3.9** shows 10 nos. Hats/Bazars/Markets are dealing money about 50 lakh (59%), 2 nos. dealing 50-100 lakh (12%) and 5 nos. are dealing more than 100 Lakh (29%).

Table-3.9: Amount of Money dealing

| Amount of dealing Money (in lac) | Frequency | Percentage |
|----------------------------------|-----------|------------|
| Less than 50 | 10 | 59 |
| 50-100 | 2 | 12 |
| More than 100 | 5 | 29 |

Source: Field Survey, 2016

3.2.9 Sanitation System of Hat/Bazar/Market

Table-10 shows, 95.5% Hat/Bazar/Market are being provided with Sanitary Latrines, Only one have no provision of Sanitary Latrine.

Table-3.10: Sanitation Facility

| Sanitation Facility | Frequency | Percent |
|---------------------|-----------|------------|
| Sanitary Latrine | 21 | 95.5 |
| No Provision | 1 | 4.5 |
| Total | 22 | 100 |

Source: Field Survey, 2016

3.2.10 Water supply System Hat/Bazar/Market

Table-3.11 shows 21 nos. Hat/Bazar/Market have Tube Well water Supply (95.5%) and 1 has no provision of water connection (4.5%).

Table-3.11: Water Supply Connection

| Water Supply Connection | Frequency | Percent |
|-------------------------|-----------|--------------|
| Tube well | 21 | 95.5 |
| No. of Water Connection | 1 | 4.5 |
| Total | 22 | 100.0 |

Source: Field Survey, 2016

3.2.11 Electricity Connections

Table-3.12 Shows 21 Hat/Bazar/Markets have Electricity connections (95.5%) and only one have no provision for Electricity Connection.

Table-3.12: Electricity Connection

| Electricity Connection | Frequency | Percent |
|------------------------|-----------|------------|
| Yes | 21 | 95.5 |
| No | 1 | 4.5 |
| Total | 22 | 100 |

Source: Field Survey, 2016

3.2.12 Way of Waste Disposal

It is shown in **Table-13** that waste disposal works of 9 nos. (40.9%) Hat/Bazar/Market are done by owners' workers, 8 nos. (36.4%) are done by Covered Van, 3 nos. (13.6%) by community Van and 1 no (4.5%) is done by Private Organizations, There is no provision of waste disposal for 1 no. (4.5%) market.

Table-3.13: Way of Waste Disposal

| Way of Waste Disposal | Frequency | Percent |
|----------------------------|-----------|--------------|
| Own worker | 9 | 40.9 |
| Covert Van | 8 | 36.4 |
| Community Van | 3 | 13.6 |
| Private Organization's Van | 1 | 4.5 |
| No Provision | 1 | 4.5 |
| Total | 22 | 100.0 |

Source: Field Survey, 2016

3.2.13 Summary of Economy Survey

In Formal Economic Survey (Section-A), we have carried out RRA survey with standard questionnaires and also focus group discussion for collecting data on 22 nos. Hat/Bazar/Market in the Study area, out of total 35 nos. (Table-3.2) Hat/Bazar/Markets in Rangunia Upazila. Data were collected of 22 nos. Hat/Bazar/Markets. Field Investigators interviewed/consulted with range of business owners/traders, sellers and buyers on physical and social infrastructures facilities are there and problems are encountered by the stakeholders. Data on management system of the Hat/Bazar/Markets and these data are tabulated and furnished in **Table-3.1** to **Table-3.13**. It is found from the data have shown in tables that Hat/

Bazar/Markets are managed/conducted by Cooperative Associations, Market Committee, Lease-holders, Upazila Parishad, Personal Property Owners and others. Almost all the Hat/Bazar/Market/Growth Centers have waste management system. Water Supply, Electricity Connections, Sanitary facilities (95.5% coverage). 31.8% of wastes of the Hat/Bazar/Market/Growth Centers are dumped in nearby dust bean, 22.7% dumping site, 9.1% along Road side, 4.5% Fallow land and 31.5% in river and canals.

Transportation system to the Hat/Bazar/Market/Growth Centers is 86.4% by Road Way and 13.6% by Road way and Water Way.

3.3 Section-B: Banks and Bimas

3.3.1 Total Bank & BIMA

In the Study area, 16 nos. Banks and Bimas are functioning. 9 Banks are covering about 56.3% area and 7 nos. BIMA covering 43.8%. Figure 2 & 3 are showing nature of services (%) area coverage e.g. Agriculture, Normal Banking, Project Loan, Deposit loan, E-Banking, Mobile banking, foreign Banking, Project Loan, Industry Loan, etc.

Normal BIMA service is covering 14% as of **Figure-2**.

Table-3.14: Type of the Organization

| Type of the Organization | Frequency | Percent |
|--------------------------|-----------|--------------|
| Bank | 9 | 56.3 |
| Bima | 7 | 43.8 |
| Total | 16 | 100.0 |

Source: Field Survey, 2016

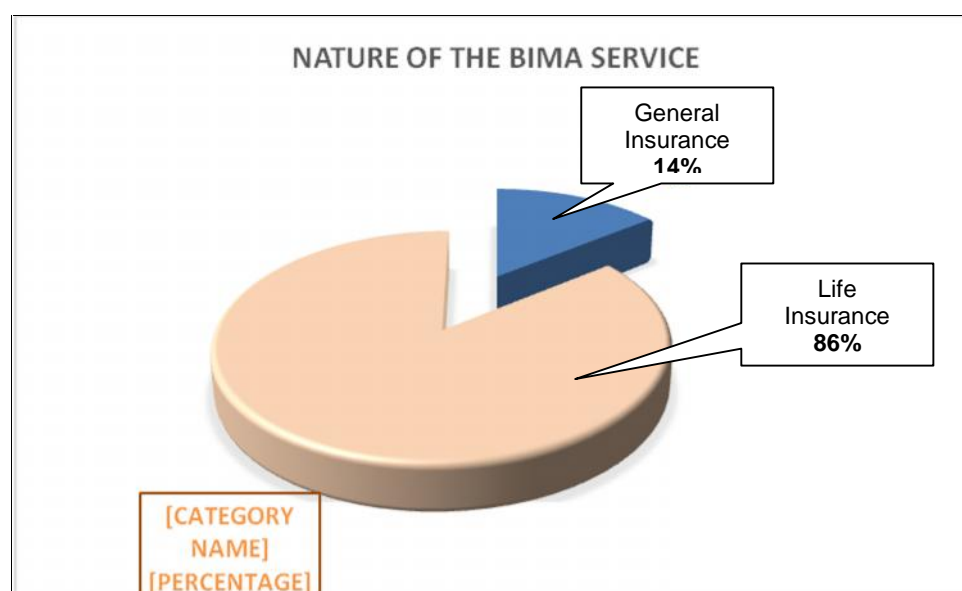


Figure 2: Nature of the Bima Services

Source: Filed Survey, 2016

Nature of Banking Services in the study area is (**Figure-3**): Agriculture (13%), SME Banking (18%), Deposit Loan (13%), E-Banking (11%), Normal Banking (24%), Project Loan (5%), Industry Loan (5%), Foreign Loan (3%) and Mobile Banking (8%).

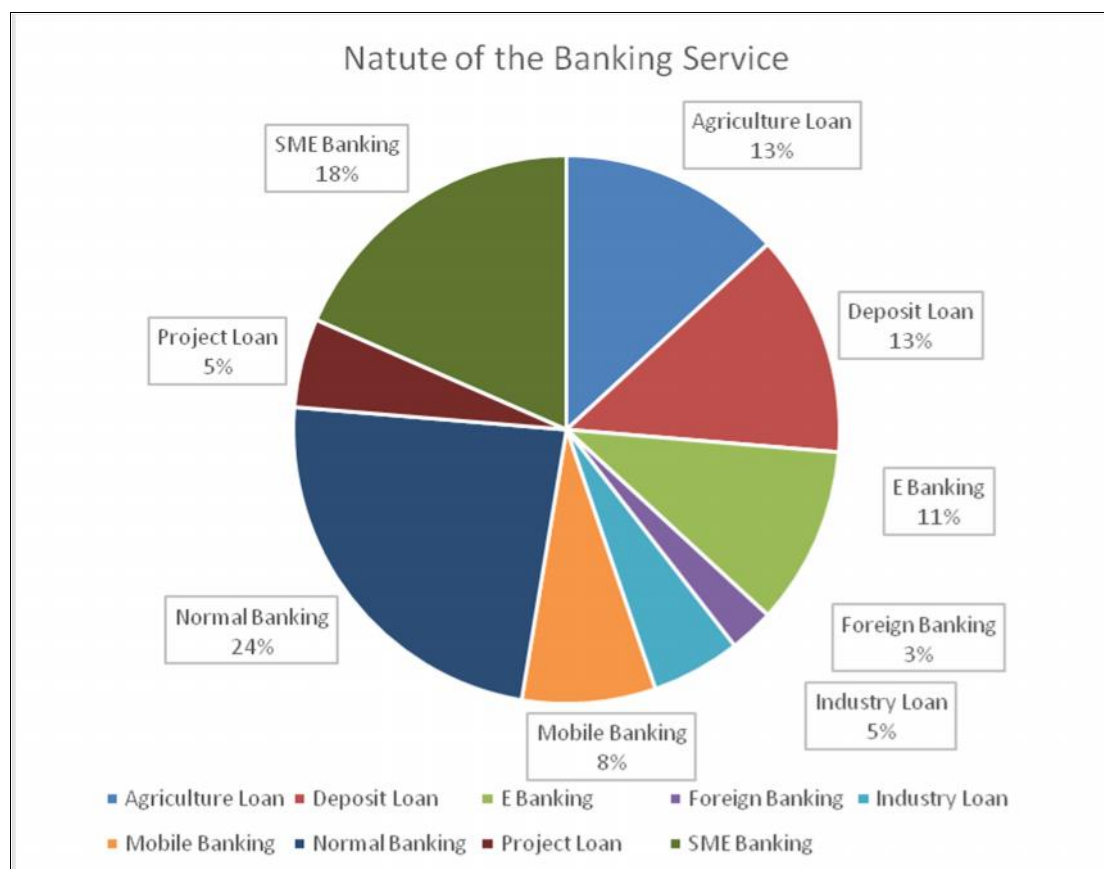


Figure 3: Nature of Banking Services

Source: Field Survey, 2016

3.3.2 Name of BIMA Companies and Nature of Services

Table-3.15 shows that 7 nos. BIAM Companies are functioning in the Study area and their recipient's nos. Chartered Life Insurance Co. Lichu Bagan, Chandraghona (20), Far East Islami Life Insurance Co. Ltd. Lichu Bagan, Chandraghona (1000), Life Insurance Co. (400), National Life Insurance Co. Ltd. Lichu Bagan, Chandraghona (10000), Prime Islami Life Insurance Co. Ltd. Chandraghona (4000), Sunflower Life Insurance Co. (500). Figures in brackets are recipients/Members of the respective BIMA Companies in the study area.

Table-3.15: Names of the Bima Companies and Nos. of the Recipients/Members

| Names of the Bima Companies | No. of the Recipients/Members | | | | | | | Total |
|--|-------------------------------|----------|----------|----------|----------|----------|----------|----------|
| | 20 | 400 | 500 | 1000 | 4000 | 5000 | 10000 | |
| Chartered Life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Fareast Islami life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Life Insurance Company | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| National Life Insurance Compay Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Prime Islami Life Insurance Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Sondhani Life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Sunflower Life Insurance Company Ltd. Lichu Bagan | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Total | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 7 |

Source: Field Survey, 2016

3.3.3 Name of Bank and No. of the Recipients

Table-3.16 shows that 9 Banks are working in the study area there locations and Recipients are as follows: Asia Bank Ltd. Lichu Bagan Branch (3,000), First Security Islami Bank Ltd. Ranir Hat (1,000), One bank Ltd. Dovasi Bazar Branch (4,000), One Bank Ltd., Ranir Hat Branch (5,000), Rupali Bank Ltd. Ranir Hat Branch (14,000), Pubali Bank Ltd. Lichu Bagan Branch (15,000), Social Bank Ltd. Roajar Hat, Rangunia (1,00,000), Union Bank Ltd. Lichu Bagan, Rangunia. Range (2,770). Figures have shown in brackets no. of recipients\ members of Banks functioning in Study area.

Table-3.16: Name of the Bank and No. of the Recipient/Members

| Name of the Bank | No. of the Recipient/Members | | | | | | | | Total |
|--|------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 2770 | 3000 | 4000 | 5000 | 10000 | 14000 | 15000 | 45000 | |
| Bank Asia Ltd. Lichu Bagan Branch | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| First Security Islami Bank Ltd. Ranirhat | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| One Bank Ltd. Dovasi BazarBranch. | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| One Bank Ltd. Ranir Hat Branch | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Pubali bank Ltd. Ranirhat Branch | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Rupali bank Ltd. Lichu Bagan Branch | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Social Bank Ltd. Rowajar Hat, Rangunia | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| Union Bank Ltd. Lichu Bagan, Rangunia | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 9 |

Source: Field Survey, 2016

3.3.4 Amount of Due Loan\Arrear

The **Table-3.17** below shows the amount of due loan against the Banks are functioning in the study area. It is found that due loan to Rupali Bank is amounting to Taka 2,34,000, to First Security Bank amounting to Taka 74,74,000, to Pubali Bank is amounting to Taka 25,00,000, to Social Bank is amounting to 2,50,000. Total amount due loan in study are is amounting to Taka 10,458,000.

Table-3.17: Name of the Bank and Amount of Due Loan

| Name of the Bank | Amount of Due Loan | | | | Total |
|--|--------------------|----------|----------|----------|----------|
| | 234000 | 250000 | 2500000 | 7400000 | |
| First Security Islami Bank Ltd. Ranirhat | 0 | 0 | 0 | 1 | 1 |
| Pubali bank Ltd. Ranirhat Branch | 0 | 0 | 1 | 0 | 1 |
| Rupali bank Ltd. Lichu Bagan Branch | 1 | 0 | 0 | 0 | 1 |
| Social Bank Ltd. Rowajarhat, Rangunia | 0 | 1 | 0 | 0 | 1 |
| Total | 1 | 1 | 1 | 1 | 4 |

Source: Field Survey, 2016

3.3.5 Total Agricultural Loan Disbursed

Table-3.18 below is showing amount of agricultural loan disbursing by One Bank is amounting to Taka 10,000,000, Rupali Bank Taka 20,000, Social Bank Taka 16,00,000, and Union Bank Taka 3,00,000. Total amount disbursed agricultural loan is Taka 29,20,000.

Table-3.18: Total Agricultural Loan Disbursed

| Name of the Bank | Amount of Agricultural Loan | | | | Total |
|---------------------------------------|-----------------------------|----------|----------|----------|----------|
| | 20000 | 300000 | 1000000 | 1600000 | |
| One Bank Ltd. Dovasi Bazar Branch. | 0 | 0 | 1 | 0 | 1 |
| Rupali bank Ltd. Lichu Bagan Branch | 1 | 0 | 0 | 0 | 1 |
| Social Bank Ltd. Rowajarhat, Rangunia | 0 | 0 | 0 | 1 | 1 |
| Union Bank Ltd. Lichu Bagan, Rangunia | 0 | 1 | 0 | 0 | 1 |
| Total | 1 | 1 | 1 | 1 | 4 |

Source: Field Survey, 2016

3.3.6 Name of BIMA and No. of Premium Recipients

Table-3.19 below has shown BIMA Company wise no. of premium recipients. Total no. of BIMA Companies are working in the study area is 7. Chartered Insurance Co.'s recipients number is 450, Fareast Islami Life Insurance Co.'s - 500, National Life Insurance Co.'s - 4000, Prime Life Insurance Co.'s - 50, Sondhani Life Insurance Co.'s - 600 and Sunflower Life Insurance Co.'s - 300. So, total nos. of BIMA service recipients are 2,300.

Table-3.19: Name of the Bima Company and Number of the Premium Recipients

| Name of the Bima Company | No. of the Premium Recipient | | | | | | Total |
|--|------------------------------|----------|----------|----------|----------|----------|----------|
| | 50 | 300 | 450 | 500 | 600 | 4000 | |
| Chartered Life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Fareast Islami life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Life Insurance Company | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| National Life Insurance Company Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Prime Islami Life Insurance Ltd. Lichu Bagan, Chondroghona | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Sondhani Life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Sunflower Life Insurance Company Ltd. Lichu Bagan | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Total | 1 | 2 | 1 | 1 | 1 | 1 | 7 |

Source: Field Survey, 2016

3.3.7 Name BIMA Co. & Amount of Premium Collected

Table-3.20 below shows the present amount of premium collected by different Companies. Chartered Life Insurance has collected amounting to Taka 80,000, Fareast Islami Life Insurance amounting to Taka 50,000, Life Insurance Co. amounting to Taka 20,000, National Life Insurance Co. amounting to Taka 80,000,000, Prime Life Insurance Co. amounting to Taka 25,000, Sandhani Life Insurance Co. amounting Taka.12,00,000/= and Sunflower Life Insurance Co. amounting to Taka. 40,000. Total amount of premium collected by BIMA Companies working in the Study area is Taka. 8,335,000.

Table-3.20: Name of the Bima Companies and Amount of Collected Premium

| Name of the Bima Company | Amount of Collected Premium | | | | | | | Total |
|--|-----------------------------|----------|----------|----------|----------|----------|----------|----------|
| | 25000 | 40000 | 200000 | 500000 | 800000 | 1200000 | 8000000 | |
| Chartered Life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Fareast Islami life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Life Insurance Company | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| National Life Insurance Compay Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Prime Islami Life Insurance Ltd. Lichu Bagan, Chondroghona | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Sondhani Life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Sunflower Life Insurance Company Ltd. Lichu Bagan | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Total | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 7 |

Source: Field Survey, 2016

3.3.8 Name of BIMA Co. & No. of Due Premium Recipients

Table-3.21 below shows the amount of premium due/arrears to the recipients/members. No. of premium is due to Chartered Life Insurance 150. No. of Premium is due to Fareast Islami Life Insurance 500, No. of Premium is due to Life Insurance Co. 150, No. of Premium is due to National Life Insurance Co. 115, No. of Premium is due to Prime Life Insurance Co. 200, No. of Premium is due to Sandhani Life Insurance Co. 200 and No. of Premium is due to Sunflower Life Insurance Co. 200. Total No. of premium is due by BIMA Companies working in the Study area is 1,315.

Table-3.21: Name of the Bima Company and Nos. of Due Premium Recipient

| Name of the Bima Company | No. of Due Premium Recipient | | | | Total |
|--|------------------------------|----------|----------|----------|----------|
| | 115 | 150 | 200 | 500 | |
| Charterd Life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 1 | 0 | 0 | 1 |
| Fareast Islami life Insurance Co. Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 0 | 1 | 1 |
| Life Insurance Company | 0 | 1 | 0 | 0 | 1 |
| National Life Insurance Compay Ltd. Lichu Bagan, Chondroghona | 1 | 0 | 0 | 0 | 1 |
| Prime Islami Life Insurance Ltd. Lichu Bagan, Chondroghona | 0 | 0 | 1 | 0 | 1 |
| Sunflower Life Insurance Company Ltd. Lichu Bagan | 0 | 0 | 1 | 0 | 1 |
| Total | 1 | 2 | 2 | 1 | 6 |

Source: Field Survey, 2016

3.3.9 Summary of Bank and BIMA

In the study area (Rangunia Upazila), total nos. of Banks and BIMA working are 16. Out of this, total 9 nos. are Banks and 7 nos. are BMA Companies, 9 Banks cover about 56.3% area and 7 nos. BIMA cover 43.8%. **Figure-4** (Please see **Page 17**) is showing nature Banks service (%) area coverage e.g. Agriculture (13%), Normal Banking (24%), SME (18%), Project Loan (5%), Deposit loan (13%), E-Banking (24%), Mobile banking (8%), Foreign Banking (3%), Industry Loan (5%) etc. Total number of Bank recipients 69,770. Total due/arrear loan is amounting to Taka 1,04,58,000. Total Agricultural loan disbursed by the Banks in the Study is amounting to Taka 2,92,000. BIMA services recipients numbers are 2,300. Total due premium recipients are 1,315 and total premium collected is amounting to Taka 83,35,000.

3.4 Section-C: NGO

3.4.1 Introduction

Just after liberation war of Bangladesh, NGOs, particularly Foreign NGO's and some local NGO's started working in Bangladesh for reconstruction of war-ravaged economy. Later, since early 1980's, local NGO's activities were being expanded progressively funding from External (USAID, OXFAM, IUCN, EEC, ADB, CARE) and Local Sources both in urban and rural areas of Bangladesh. At present, 8 nos. prominent (Table-19) NGOs are working in the study area (Rural and Urban). NGOs are ASHA (Members 1500), BRAC (Members-150), Center for Development (CDS Members 600), Jamuna Multi-Purpose Cooperative Society Ltd. (Members-797), PROSHIKA (Members- 1269), SHATHI (Members-800) and UDDIPON (Members-1000). They are providing Micro credit (Loan) 100%. Their area Coverage conducting activities are Countrywide, Village wise, Lower Income Group, District-wise, Market-wise, Slum area, Naturally Vulnerable Areas. Beneficiaries of the NGOs are Lower Income Group 75% and; Professional-wise Group 25%. Table-3.22 Listed the Name of the Working areas of the 8 NGOs and their share of loan coverage in Bangal Halia area:– ASHA (50%) and CDS (50%), Ichakhali Paurashova UDDIPAN (100%), Hajar Hat SHATHI (100%), Lichu Bagan, Chondroghona: ASHA (25%), BRAC (25%), Jamuna MPS, it is (25%), PROSHIKA (25%).

3.4.2 Name NGO and Loan Providing

Table-3.22, Table-3.23 and Table-3.24 are showing 7 NGOs working in the Study Area (Rangunia Upazila). Their area coverage Country wide, District wise, Market wise and Village-wise, Target groups (Lower income group). All the NGO's providing micro credit to their Target Groups e.g. Lower Income Group and Professional Groups 75% and 25% respectively

Table-3.22: Names of the NGOs and Loan providing

| Name of the NGO | Provided Service | Total |
|--|------------------|----------|
| | Providing Loan | |
| ASA | 2 | 2 |
| BRAC | 1 | 1 |
| Center for Development | 1 | 1 |
| Jamuna Multi-Purpose Co-operative Society Ltd. | 1 | 1 |
| Proshika Manobik Unnoyan Kendro | 1 | 1 |
| Sathi | 1 | 1 |
| Uddipon | 1 | 1 |
| Total | 8 | 8 |

Source: Field Survey, 2016

3.4.3 Names of NGO & Working Area

NGOs are working country wide. District wise, Market wise, Village-wise and on Target Group, as such Lower Income Groups and Professional Groups. Details are provided in Table-3.23.

Table-3.23: Names of the NGOs and Working Areas

| Name of the NGO | Area Coverage for Conducting Activities | | | | | Total |
|--|---|--------------|--------------------|---------------|-------------|----------|
| | Country wide | Village wise | Lower Income Group | District wise | Market wise | |
| ASA | 0 | 1 | 1 | 0 | 0 | 2 |
| BRAC | 0 | 0 | 0 | 0 | 1 | 1 |
| Center for Development | 0 | 0 | 0 | 1 | 0 | 1 |
| Jamuna Multi-Purpose Co-operative Society Ltd. | 0 | 0 | 0 | 0 | 1 | 1 |
| Proshika Manobik Unnoyan Kendro | 0 | 1 | 0 | 0 | 0 | 1 |
| Sathi | 0 | 0 | 0 | 1 | 0 | 1 |
| Uddipon | 1 | 0 | 0 | 0 | 0 | 1 |
| Total | 1 | 2 | 1 | 2 | 2 | 8 |

Source: Field Survey, 2016

3.4.4 NGO's Target Group/Beneficiaries

Target Group/Beneficiaries of NGOs are Lower Income Group-75% and Profession-wise Group-25% as shown in Table-3.24.

Table-3.24: NGO's Target Group/Beneficiaries

| Beneficiary Target Group | Frequency | Percent |
|------------------------------|-----------|--------------|
| Lower Income Group | 6 | 75.0 |
| Profession-wise Group People | 2 | 25.0 |
| Total | 8 | 100.0 |

Source: Field Survey, 2016

3.4.5 Names of NGOs, NGO's Members and Loan Coverage

As of Table-3.25, Members of NGO's: Uddipon (1000 nos.), PROSHIKA (11,269), BRAC (150), ASHA (1500), ASHA (380), Center for Development (600 nos.), Jamuna Multi-purpose Co-operative Society (797 nos.) and Sathi (800 nos.). Their 100% activities are on micro- credit\Loan providing Services.

Table-3.25: No. of Member, Name of NGO and Loan Coverage(%)

| No. of Members | Name of the NGO | Provided Service |
|----------------|--|------------------|
| | | Providing Loan |
| 1000 | Uddipon | 100% |
| 1269 | Proshika Manobik Unnayan Kendro | 100% |
| 150 | BRAC | 100% |
| 1500 | ASA | 100% |
| 380 | ASA | 100% |
| 600 | Center for Development | 100% |
| 797 | Jamuna Multi-Purpose Co-operative Society Ltd. | 100% |
| 800 | Sathi | 100% |

Source: Field Survey, 2016

3.4.6 Name of NGOs, Working Area/Location and Loan Coverage

Table-3.26 below is showing specific locations of NGOs' working area and loan is being providing by NGO (%). At Bangal Halia area, ASA and Center for Development (CD) are working exclusively for Loan providing - 50% and 50% respectively. At Ichakhali, only Uddipan is providing 100% loan. At Lichu Bagan-Chondroghona, ASA, BRAC, PROSHIKA, Jamuna Multi-Purpose Society's is working and they are providing Loan only 20%, 25%, 25% respectively and at Rajar Hat SATHI is providing 100% loan.

Table-3.26: Names, Locations of NGO's and Loan Coverage (%)

| Address | Name of the NGO | Provided Service |
|------------------------------|--|------------------|
| | | Providing Loan |
| BangalHalia | ASA | 50.0% |
| | Center for Development | 50.0% |
| Ichakhali Paurashava | Uddipon | 100.0% |
| Lichu Bagan, Chondroghona | ASA | 25.0% |
| | BRAC | 25.0% |
| | Jamuna Multi-Purpose Co-operative Society Ltd. | 25.0% |
| | Proshika Manobik Unnoyan Kendro | 25.0% |
| Rajar Hat | Sathi | 100.0% |

Source: Field Survey, 2016

3.4.7 Summary of NGO

In formal sector, NGO's activities are playing dominant role in income generation activities and thus providing ample employment opportunities both in rural and urban areas as well disaster prone vulnerable areas and in especial eco-zones (Hoar areas and Coastal areas, Drought prone areas) for improving the livelihoods of the have-nots. Proposed Study area: Rangunia Upzila is located in Chittagong District. It is nearby the Bay of Bengal and area is surrounded by hilly areas and there about 5-10% population is belonging to ethnic groups. So, the area is potentials for NGO's, here local resource base (bamboo, Cane, Vegetables growing, High Value Crops growing) is useful for working NGO's and micro credit program is very popular among grass root population (Target Groups). It is found from Table-3.25 that total number of members of in 8 NGOs are 6,496 Only in Rangunia Upazila) and it is higher side than Upazilas of all over Bangladesh.

3.5 Section-D: Industrial

3.5.1 Introduction

Formal Sector Industries are organized sector and within the legal frame-work e.g. they are chartered sector. Data and information collected from the Study Area (Rangunia Upazila-Urban-Rural) through standard questionnaire and Secondary Sources (BBS, Pourashova), simply calculated and tabulated forms are presented below. Formal-Informal Sector contribution to GDP is broadly 36.4% and 63.6% respectively. 15 sectors and sub-sector GDP break up (%) national level may please be seen before looking into the Study area findings (Table-3.1 to Table-3.25) industrial data & information. As of **Table-3.53** Total nos. of industries in Chittagong are 31,587, Rangunia Upazila 1,427 and No. of samples in the study area were taken 115 nos. (**Table-3.38**)

3.5.2 Ownership Pattern of Industry

Table-3.27 shows the Study area total nos. industries interviewed 116 and their coverage 81 nos. personal property (69%), Limited Company 1. Nos. (0.9%) and Joint Venture 35 nos. (30.2%).

Table-3.27: Ownership Pattern of Industry

| Status of Industry Ownership | Frequency | Percent |
|------------------------------|------------|--------------|
| Personal Property | 80 | 69.0 |
| Limited Company | 1 | 1.0 |
| Joint Venture | 35 | 30.2 |
| Total | 116 | 100.0 |

Source: Field Survey, 2016

3.5.3 Types of Industry

Table-3.28 shows types of industries (114 nos.) and its % coverage in different types of Industries. Highest no. of interviewed Industries belongs to Rice Mill (32.5%), second highest Brick field (23 nos. (20.2%) and third highest Wooden Materials 15 nos. (13.2%) and Fourth Highest Handloom Industry 14 nos. (12.3%).

Table-3.28: Types of Industries

| Type of Industry | Frequency | Percent |
|------------------------|------------|--------------|
| Fish Manufacturer | 1 | 0.9 |
| Brick Field | 23 | 20.2 |
| Wooden Materials | 15 | 13.2 |
| Handloom Industry | 14 | 12.3 |
| Shops | 1 | 0.9 |
| Ice Cream/ Ice Factory | 4 | 3.5 |
| Confectionery | 6 | 5.3 |
| Saw Mill | 5 | 4.4 |
| Rice Mill | 37 | 32.5 |
| Flour Mill | 4 | 3.5 |
| Cloth Industry | 4 | 3.5 |
| Total | 114 | 100.0 |

Source: Field Survey, 2016

3.5.4 Funding Source of Setting up Industries

Table-3.29 shows industries setting up funding sources. Out of 116 nos., industries are 58 (50%) from own savings, 8 nos. (6.9%) from inheritance source, 45 nos. (38.8%) from Family and Bank loan source, 1 no. (0.9%) from relative, 1 no. (0.9%) from remittance and 3 nos. (2.6%) from Cooperative Association.

Table-3.29: Funding Source for Setting Up of Industries

| Source of Capital for setting up Industry | Frequency | Percent |
|---|------------|--------------|
| Personal Savings | 58 | 50.0 |
| Inheritance Property | 8 | 6.9 |
| Personal/Family Savings & Bank Loan | 45 | 38.8 |
| Loan from Relatives | 1 | .9 |
| Remittance | 1 | .9 |
| Cooperative Association | 3 | 2.6 |
| Total | 116 | 100.0 |

Source: Field Survey, 2016

3.5.5 Ownership Status & Source of Capital

Table-3.30 (69.%) capital source from personal property, (9%) from limited company 32.2% from joint venture owner.

Table-3.30: Ownership Status & Source of Capital

| Status of Ownership | Source of Capital | | | | | | Total |
|---------------------|-------------------|----------------------|-------------------------------------|---------------------|---------------|-------------------------|---------------|
| | Personal Savings | Inheritance Property | Personal/Family Savings & Bank Loan | Loan from Relatives | Remittance | Cooperative Association | |
| Personal Property | 42 | 8 | 28 | 1 | 1 | 0 | 80 |
| | 72.4% | 100.0% | 62.2% | 100.0% | 100.0% | .0% | 69.0% |
| Limited Company | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | .0% | .0% | .0% | .0% | .0% | 33.3% | .9% |
| Joint Venture | 16 | 0 | 17 | 0 | 0 | 2 | 35 |
| | 27.6% | .0% | 37.8% | .0% | .0% | 66.7% | 30.2% |
| Total | 58 | 8 | 45 | 1 | 1 | 3 | 116 |
| | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

Source: Field Survey, 2016

3.5.6 Products Industries in Local Market

Table-3.31 is showing types of industrial products are Brick, Fish, Cooking Oil, Confectionery items, Agricultural Products, Cloth & Twist, Wooden Materials, Hand loom Products, Ice/Ice cream, flour etc. These listed products are both locally and all over the country are marketed.

Table-3.31: Products of Industries in Local Market

| Type of Production | Contribution of Products in Local Market (In Percentage) | | | | | | | | | Total |
|-----------------------|--|-------------|-------------|--------------|------------|------------|-------------|------------|--------------|--------------|
| | 10% | 20% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | |
| Brick | 3 | 4 | 0 | 1 | 1 | 4 | 3 | 1 | 2 | 19 |
| | 15.8 | 21.1 | .0 | 5.3 | 5.3 | 21.1 | 15.8 | 5.3 | 10.5 | 100.0 |
| Fish Manufacturing | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | .0 | .0 | .0 | 100.0 | .0 | .0 | .0% | .0% | .0% | 100.0 |
| Cooking Oil | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | .0% | 100.0 | .0% | .0% | .0% | .0% | .0% | .0% | .0% | 100.0 |
| Confectionery Item | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 4 |
| | .0% | .0% | 25.0 | 25.0% | .0% | 25.0 | 25.0 | .0% | .0% | 100.0 |
| Agricultural Products | 1 | 0 | 2 | 1 | 1 | 2 | 3 | 0 | 20 | 30 |
| | 3.3% | .0% | 6.7% | 3.3% | 3.3 | 6.7 | 10.0 | .0% | 66.7% | 100.0 |
| Cloth & Twist | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| | .0% | .0% | .0% | .0% | .0% | .0% | .0% | .0% | 100.0 | 100.0 |
| Wooden Material | 2 | 3 | 1 | 10 | 1 | 1 | 0 | 0 | 3 | 21 |
| | 9.5% | 14.3 % | 4.8% | 47.6% | 4.8 | 4.8 | .0% | .0% | 14.3% | 100.0 |
| Handloom Products | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7 |
| | .0% | .0% | .0% | .0% | .0% | .0% | .0% | .0% | 100.0 | 100.0 |
| Ice/Ice cream | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 4 |
| | .0% | .0% | .0% | 25.0% | .0% | .0% | .0% | .0% | 75.0% | 100.0 |
| Flour | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| | .0% | .0% | .0% | 50.0% | .0% | .0% | .0% | .0% | 50.0% | 100.0 |
| Total | 6 | 8 | 4 | 16 | 3 | 8 | 7 | 1 | 38 | 91 |
| | 6.6% | 8.8% | 4.4% | 17.6% | 3.3 | 8.8 | 7.7% | 1.1 | 41.8% | 100.0 |

Source: Field Survey, 2016

3.5.7 Products in Domestic Market

Local and Domestic market shares are shown in **Table-3.32** and **Table-3.33**. Bangladesh is now country of more than 160 million people. So, all the industrial products are demand-driven domestically.

Table-3.32: Products of Industries in Domestic Market (All over the Country)

| Type of Production | Contribution of Products within Country Market (In Percentage) | | | | | | | | | Total |
|-----------------------|--|-------------|-------------|------------|-------------|------------|-------------|-------------|-------------|--------------|
| | 10% | 20% | 30% | 40% | 50% | 60% | 80% | 90% | 100% | |
| Brick | 1 | 3 | 4 | 1 | 1 | 0 | 4 | 3 | 1 | 18 |
| | 5.6% | 16.7 | 22.2 | 5.6% | 5.6% | .0% | 22.2% | 16.7 | 5.6% | 100.0 |
| Cooking Oil | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | .0% | .0% | .0% | .0% | .0% | .0% | 100.0 | .0% | .0% | 100.0 |
| Confectionery Item | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | .0% | 50.0 | 50.0 | .0% | .0% | .0% | .0% | .0% | .0% | 100.0 |
| Agricultural Products | 1 | 3 | 1 | 1 | 1 | 2 | 0 | 1 | 0 | 10 |
| | 10.0 | 30.0 | 10.0 | 10.0 | 10.0% | 20.0 | .0% | 10.0 | .0% | 100.0 |
| Cloth & Twist | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | .0% | .0% | .0% | .0% | .0% | .0% | .0% | .0% | 100. | 100.0 |
| Wooden Material | 0 | 1 | 1 | 0 | 10 | 1 | 3 | 2 | 0 | 18 |
| | .0% | 5.6% | 5.6% | .0% | 55.6% | 5.6 | 16.7 | 11.1 | .0% | 100.0 |
| Ice/Ice cream | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| | .0% | .0% | .0% | .0% | 100.0 | .0% | .0% | .0% | .0% | 100.0 |
| Flour | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| | .0% | .0% | .0% | .0% | 100.0 | .0% | .0% | .0% | .0% | 100.0 |
| Total | 2 | 8 | 7 | 2 | 14 | 3 | 8 | 6 | 2 | 52 |
| | 3.8 | 15.4 | 13.5 | 3.8 | 26.9 | 5.8 | 15.4 | 11.5 | 3.8% | 100.0 |

Source: Field Survey, 2016

3.5.8 Products of Industry for Export

As of **Table-3.33** some items of industrial products of study area is exported as such Fish Manufacturing, Crockery items, Confectionery, Agricultural products and Hand loom products in 16.7%, 33.3%, 16.7% and 33.7% respectively.

Table-3.33: Products of Industry for Export

| Type of Production | Contribution of Products to Local Authority for Exporting (In Percentage) | | | | Total |
|-----------------------|---|--------------|--------------|--------------|---------------|
| | 20% | 50% | 60% | 100% | |
| Fish Manufacturing | 0 | 1 | 0 | 0 | 1 |
| | .0% | 100.0% | .0% | .0% | 100.0% |
| Crockery | 0 | 0 | 0 | 1 | 1 |
| | .0% | .0% | .0% | 100.0% | 100.0% |
| Confectionery Item | 0 | 1 | 1 | 0 | 2 |
| | .0% | 50.0% | 50.0% | .0% | 100.0% |
| Agricultural Products | 1 | 0 | 0 | 0 | 1 |
| | 100.0% | .0% | .0% | .0% | 100.0% |
| Handloom Products | 0 | 0 | 0 | 1 | 1 |
| | .0% | .0% | .0% | 100.0% | 100.0% |
| Total | 1 | 2 | 1 | 2 | 6 |
| | 16.7% | 33.3% | 16.7% | 33.3% | 100.0% |

Source: Field Survey, 2016

3.5.9 Types of Transport Used for Marketing Industrial Products

Table-3.34 shows industrial products use transport for marketing are: Bus, Truck, Pickup, Auto, Van, walking. Transport owners were interviewed and it was found that 59.8% (49 nos.) products were transported by truck and by Van 25.6% (21) out 82 stakeholders were consulted.

Table-3.34: Types of Transport used for Marketing Industrial Products

| Transportation Way of conveying the Products | Frequency | Percent |
|--|-----------|------------|
| Bus | 1 | 1.2 |
| Truck | 49 | 59.8 |
| Pickup | 4 | 4.9 |
| Auto | 2 | 2.4 |
| Rickshaw | 1 | 1.2 |
| Van | 21 | 25.6 |
| Walking | 4 | 4.9 |
| Total | 82 | 100 |

Source: Field Survey, 2016

3.5.10 Waste Management System Industries (Dumping Place)

Table-3.35 and **Table-3.36** have presented the dumping places of industrial wastes namely along the roadside, open place, canal, River, Agricultural Land and Dumping sites both in purified and unpurified forms. Dumping place ownership are own dumping site, Government Own Place, Individual open land

Table-3.35: Waste Management System of Industries (Dumping Place)

| Purification System of Dumping Waste | | | Dumping Place | | | | | | Total |
|--------------------------------------|-----------------------------|------------|--------------------|------------|-------|-------|--------------------|--------------|--------|
| | | | Along the Roadside | Open Place | Canal | River | Agricultural Field | Dumping Site | |
| Yes | Nature of Dumping Procedure | Purified | 9 | | 3 | 1 | 1 | 23 | 37 |
| | | | 24.3% | | 8.1% | 2.7% | 2.7% | 62.2% | 100.0% |
| | | Unpurified | 0 | | 0 | 0 | 0 | 2 | 2 |
| | | | .0% | | .0% | .0% | .0% | 100.0% | 100.0% |
| | Total | | 9 | | 3 | 1 | 1 | 25 | 39 |
| | | | 23.1% | | 7.7% | 2.6% | 2.6% | 64.1% | 100.0% |
| No | Nature of Dumping Procedure | Purified | 3 | 0 | 1 | 6 | | 3 | 13 |
| | | | 23.1% | .0% | 7.7% | 46.2% | | 23.1% | 100.0% |
| | | Unpurified | 2 | 1 | 0 | 0 | | 1 | 4 |
| | | | 50.0% | 25.0% | .0% | .0% | | 25.0% | 100.0% |
| | Total | | 5 | 1 | 1 | 6 | | 4 | 17 |
| | | | 29.4% | 5.9% | 5.9% | 35.3% | | 23.5% | 100% |

Source: Field Survey, 2016

Table-3.36: Ownership of Dumping Sites/Places

| Authority of Dumping Place | | | Dumping Place | | | | | | Total |
|----------------------------|-----------------------------|------------|--------------------|------------|-------|--------|---------------------|---------------|--------|
| | | | Along the Roadside | Open Place | Canal | River | Agricul-tural Field | Dump-ing Site | |
| Own Dumping Site | Nature of Dumping Procedure | Purified | 8 | 0 | 3 | 1 | 1 | 26 | 39 |
| | | | 20.5% | .0% | 7.7% | 2.6% | 2.6% | 66.7% | 100.0% |
| | | Unpurified | 0 | 1 | 0 | 0 | 0 | 2 | 3 |
| | | | .0% | 33.3 % | .0% | .0% | .0% | 66.7% | 100.0% |
| | Total | | 8 | 1 | 3 | 1 | 1 | 28 | 42 |
| | | | 19.0% | 2.4% | 7.1% | 2.4% | 2.4% | 66.7% | 100.0% |
| Government Place | Nature of Dumping Procedure | Purified | 1 | | 1 | 5 | | 1 | 8 |
| | | | 12.5% | | 12.5% | 62.5 % | | 12.5% | 100.0% |
| | | Unpurified | 2 | | 0 | 0 | | 0 | 2 |
| | | | 100.0% | | .0% | .0% | | .0% | 100.0% |
| | Total | | 3 | | 1 | 5 | | 1 | 10 |
| | | | 30.0% | | 10.0% | 50.0% | | 10.0% | 100.0% |
| Individual Open Land | Nature of Dumping Procedure | Purified | 1 | | | | | | 1 |
| | | | 100.0% | | | | | | 100.0% |
| | Total | | 1 | | | | | | 1 |
| | | | 100.0% | | | | | | 100% |

Source: Field Survey, 2016

3.5.11 Whether the Industries have EIA Clearance

It is reported as of **Table-3.37** that 85 industry owners were interviewed. 42 (49.4%) responded their industries have EIA clearance and 43 (50.6%) owners responded no clearance as yet.

Table-3.37: Whether the Industries have EIA Clearance

| Having EIA | Frequency | Percent |
|--------------|-----------|------------|
| Yes | 42 | 49.4 |
| No | 43 | 50.6 |
| Total | 85 | 100 |

Source: Field Survey, 2016

3.5.12 Whether the Industries Have NOC

As of **Table-3.38**, out of 115 owners 85 (73.90%) responded they procured NOC for competent authority for setting up Industries and 30 (26.1%) responded they did not procure NOC.

Table-3.38: Whether the Industries Have NOC

| Having Environmental Certificate (NOC) | Frequency | Percent |
|--|------------|------------|
| Yes | 85 | 73.9 |
| No | 30 | 26.1 |
| Total | 115 | 100 |

Source: Field Survey, 2016

3.5.13 Amount of Land Used by Employer/Employee.

Table-3.39 shows area of Industry is used for residential purposes 36 (39.1%) nos. of industry owners, 33 (35.9%) nos. owners have own house and 23 (25%) nos. owners rented out

Table-3.39: Amount of Land Used by Employer\Employee

| Habitation of Employer/Employee in Industry | Frequency | Percent |
|---|-----------|------------|
| Residential Area of Industry | 36 | 39.1 |
| Own House | 33 | 35.9 |
| Rented Place | 23 | 25.0 |
| Total | 92 | 100 |

Source: Field Survey, 2016

3.5.14 Types of Water Supply Industry Campus

Table-3.40 shows that out of 116 industries/factories 113 (97.4%) nos. water supply are connected by Tube wells and in 3 nos. of industries have no water supply provision.

Table-3.40: Types of Water Supply in Industrial Campus

| Provision of Drinking Water | Frequency | Percent |
|-----------------------------|------------|--------------|
| Tube Well | 113 | 97.4 |
| No Provision | 3 | 2.6 |
| Total | 116 | 100.0 |

Source: Field Survey, 2016

3.5.15 Sanitary System in Industrial Plots

Table-3.41 shows that in survey area 77 (84%) nos. industries have sanitary latrines, 3 nos. (3%) have pit latrine and 12 nos. (13%) have no latrine provision.

Table-3.41: Sanitary System in Industrial Plots

| Having Sanitation Facility | Frequency | Percent |
|----------------------------|------------|-------------|
| Sanitary Latrine | 77 | 84% |
| Pit Latrine | 3 | 3% |
| No Provision | 12 | 13% |
| Total | 116 | 100% |

Source: Field Survey, 2016

3.5.16 Quality of Sanitary Latrine

Table-3.42 shows that out of 116 nos. industries 95.6% (65) sanitary latrines are in good condition, 6 nos. in bad condition and 3 nos. pit latrines are in good condition.

Table-3.42: Quality of Sanitary Latrine

| Having Sanitation Facility | Quality of Sanitation Facility | | Total |
|----------------------------|--------------------------------|-------------|-------------|
| | Good | Bad | |
| Sanitary Latrine | 65 | 6 | 71 |
| | 95.6% | 100.0% | 95.9% |
| Pit Latrine | 3 | 0 | 3 |
| | 4.4% | .0% | 4.1% |
| Total | 68 | 6 | 74 |
| | 100% | 100% | 100% |

Source: Field Survey, 2016

3.5.17 Water Supply Sources of Industries

Table-3.43 shows water supply source in industries. It has found from study area survey 48 (43%) industries have DTW supply, 19 (17%) nos. have water supply from pond, 2 (2%) nos. have water supply from canal and 38 (34%) has reported no need of water.

Table-3.43: Water Supply Sources of Industries

| Water Source for Production | Frequency | Percent |
|-----------------------------|------------|-------------|
| Deep Tube Well | 48 | 43% |
| Pond | 19 | 17% |
| Canal | 2 | 2% |
| River | 4 | 4% |
| No need of Water | 38 | 34% |
| Total | 116 | 100% |

Source: Field Survey, 2016

3.5.18 Electricity Source of Industry

Table-3.44 shows out of 116 industries, 22 (19%) nos. is provided supply from PDP, 89(78%) nos. is connected from REB and 3 (3%) nos. generator in absence of electricity.

Table-3.44: Electricity Source of Industry

| Electricity Connection | Frequency | Percent |
|-------------------------------------|------------|-------------|
| PDB | 22 | 19% |
| REB | 89 | 78% |
| Generator in absence of Electricity | 3 | 3% |
| Total | 116 | 100% |

Source: Field Survey, 2016

3.5.19 Status of Electricity

Table-3.45 shows that electricity supply in 55 nos. of industries are regular and no problem, 8 (8%) nos. respondents said electricity supply is irregular, in case of 32 nos.(34%) is regular but low voltage, 1 no. respondent said irregular but low voltage.

Table-3.45: Status of Electricity Supply

| Electricity Supply | Frequency | Percent |
|---------------------------|------------|-------------|
| Regular & No problem | 55 | 57% |
| Irregular | 8 | 8% |
| Regular but low voltage | 32 | 34% |
| Irregular but low voltage | 1 | 1% |
| Total | 116 | 100% |

Source: Field Survey, 2016

3.5.20 Electricity Supply Source and Status

Table-3.45A shows out of 96 connections 19 from PDB connections, 76 from REB connections and 1 by Generator in absence of Electricity. Source wise status e.g. 55 nos. are regular and no problem, 8 nos. connections are irregular, 32 nos. connections are regular but low voltage and 1 no. irregular but low voltage.

Table-3.45A: Electricity Supply Regularity and Irregularity Status

| Electricity Connection | Electricity Supply | | | | Total |
|-------------------------------------|----------------------|-----------|-------------------------|---------------------------|-----------|
| | Regular & No problem | Irregular | Regular but low voltage | Irregular but low voltage | |
| PDB | 6 | 4 | 9 | 0 | 19 |
| REB | 49 | 4 | 22 | 1 | 76 |
| Generator in absence of Electricity | 0 | 0 | 1 | 0 | 1 |
| Total | 55 | 8 | 32 | 1 | 96 |

Source: Field Survey, 2016

3.5.21 Health\Medical Facility Industry's Employee

Table-3.46 shows the health facility of employer/employee, out of 101 owners 11 nos. said health facility is OK, but 90 (89.1%) replied negatively about health facility.

Table-3.46: Health Facility of Industry's Employee

| Health Facility for Employer/Employee | Frequency | Percent |
|---------------------------------------|------------|--------------|
| Yes | 11 | 10.9 |
| No | 90 | 89.1 |
| Total | 101 | 100.0 |

Source: Field Survey, 2016

3.4.22 Nature Health Facility in Industry Campus

Table-3.47 shows that 23% (3 nos.) respondents says doctors/physicians sit his own chambers but they are paid when they visit to attend patients of industry employees and 8%(1) respondents says they are given financial aid for their treatment.

Table-3.47: Nature of Health Facility in Industry Campus

| Nature of Health Facility | Frequency | Percent |
|---|-----------|-------------|
| Presence of Doctor in due time at own territory | 9 | 69% |
| Doctors in his own chamber but financed by industry | 3 | 23% |
| Financial Aid for Health | 1 | 8% |
| Total | 13 | 100% |

Source: Field Survey, 2016

3.4.23 Training Facilities\Opportunity in Industry

Table-3.48 and Table-3.49 show that there are training opportunities for employers and employees. 12 (71%) nos. respondents said that there are probationer training facility, 4 (23%) nos. said that there are training facility for Training Centers Associates professions and 1(6%) said that there are foreign training facility.

Table-3.48: Training opportunity of Employees/Workers

| Training Opportunity for Employer/Employee | Frequency | Percent |
|--|------------|--------------|
| Yes | 18 | 18.0 |
| No | 82 | 82.0 |
| Total | 100 | 100.0 |

Source: Field Survey, 2016

Table-3.49: Types of Training

| Nature of Training | Frequency | Percent |
|---|-----------|-------------|
| Probationer | 12 | 71% |
| Training Center for associated profession | 4 | 23% |
| Training in abroad | 1 | 6% |
| Total | 17 | 100% |

Source: Field Survey, 2016

3.4.24 Problems of Industries

Table-3.50 has stated that various problems are facing by the industries: The Problems are: Infrastructure problems, Bad communication system, Insufficiency of Fuel, Extortion, Waste disposal, Bureaucratic Complexity, Problem of Skilled man power, Lack of Capital, Insufficiency of loan. **Table-3.51** shows that out of 64 establishments 9 nos. (14.1%) have Infrastructural Problems, 13 nos. (20.3%) have Bad Transportation System, 6 nos. (9.4%) have fuel insufficiency problems, 5 nos. (7.8%) have waste disposal problems, 2 nos.(3.1%) have Bureaucratic complexity, 2 nos. (3.1%) have Imbalance Competency with Importing, 12

nos. (18.8%) have insufficiency of skilled workers, 9 nos. (14.1%) have insufficiency of loan, 4 nos. (6.3%) have Infrastructural & Waste Water Disposal Problems, 1 nos. (1.6%) have lack of capital.

Table-3.50: Problems of Industries

| Problem of Industry | Frequency | Percent |
|--|-----------|------------|
| Infrastructural Problem | 9 | 14.1 |
| Bad Transportation System | 13 | 20.3 |
| Insufficiency of Fuel | 6 | 9.4 |
| Problem in Waste Disposal | 5 | 7.8 |
| Extortion | 1 | 1.6 |
| Bureaucratic complexity | 2 | 3.1 |
| Imbalance competency with Importing | 2 | 3.1 |
| Insufficiency of Skilled Worker | 12 | 18.8 |
| Lack of Capital | 1 | 1.6 |
| Insufficiency of Loan | 9 | 14.1 |
| Infrastructural & Waste Disposal Problem | 4 | 6.3 |
| Total | 64 | 100 |

Source: Field Survey, 2016

3.4.25 Types of Industrial Problems and Ownership Status

Table-3.51 shows that out of 64 industries, 45 nos. are personal ownership and 19 nos. are joint venture ownership.

Table-3.51: Types of Problems in Industries and Ownership Status

| Problem of Industry | Status of Ownership | | Total |
|--|---------------------|---------------|-----------|
| | Personal Property | Joint Venture | |
| Infrastructural Problem | 7 | 2 | 9 |
| Bad Transportation System | 10 | 3 | 13 |
| Insufficiency of Fuel | 1 | 5 | 6 |
| Problem in Waste Disposal | 4 | 1 | 5 |
| Extortion | 1 | 0 | 1 |
| Bureaucratic complexity | 1 | 1 | 2 |
| Imbalance competency with Importing | 2 | 0 | 2 |
| Insufficiency of Skilled Worker | 8 | 4 | 12 |
| Lack of Capital | 1 | 0 | 1 |
| Insufficiency of Loan | 8 | 1 | 9 |
| Infrastructural & Waste Disposal Problem | 2 | 2 | 4 |
| Total | 45 | 19 | 64 |

Source: Field Survey, 2016

It appears from **Table-3.52** that agriculture, fishing, construction, wholesale and retail trade, the real estate business and community services are predominantly informal activities. It has calculated the share of the formal and informal sector share in GDP. It is evident that the whole informal sector(nationally) accounts for 63.6% of the GDP and formal sector 36.6%. It is also estimated that 94.30% of the agricultural activities are informal. The corresponding figures for fishing, construction, wholesale and retail trade, real estate business, and community services in informal sector are 86%, 71.4%, 90.7%, 93.80% and 90.7% respectively. For the same for the formal sector share in GDP are 16%, 28.6%, 9.3%, 6.2% and 9.3% respectively.

Table-3.52: Estimates of the Size of the Formal-Informal Sector % of GDP

| Sl. No | ISIC Sector | Total Share to GDP (%) | Share to GDP (%) Formal Sector | Share to GDP (%) Informal Sector |
|--------|--|------------------------|--------------------------------|----------------------------------|
| 1 | Agriculture | 16.75 | 0.94 | 15.71 |
| 2 | Fishing | 4.71 | 0.66 | 0.4.05 |
| 3 | Mining and quarrying | 1.2 | 0.75 | 0.45 |
| 4 | Manufacturing | 17.5 | 11.88 | 5.77 |
| 5 | Electricity, Gas, & Water | 1.6 | 1.5 | 0.10 |
| 6 | Construction | 9.23 | 6.98 | 2.95 |
| 7 | Wholesale & Retail | 14.24 | 1.32 | 12.92 |
| 8 | Hotels and Restraint | 0.70 | 0.47 | 0.23 |
| 9 | Transportation, Storage and Communications | 9.30 | 6.98 | 2.95 |
| 10 | Financial Intermediation | 1.71 | 1.60 | 0.10 |
| 11 | Real Estate, Renting & Business | 7.62 | 0.47 | 7.15 |
| 12 | Public Admn. & defense | 2.81 | 2.64 | 0.17 |
| 13 | Education | 2.51 | 1.98 | 0.53 |
| 14 | Health & Social Works | 2.31 | 1.89 | 0.24 |
| 15 | Community, Social & Personal Services | 7.12 | 0.66 | 6.48 |
| | Total: | 100 | 36.6 | 63.4 |

Source: Raihan, 2010

3.4.26 No. of Industries in Chittagong Dist, Rangunia Upazila, and Study Samples.

Table-3.53 shows types/category of total industries/factories in Chittagong District (31,587), Ranunia Upazila (1,427) and Surveyed samples (115). They are all together 33,129 nos. of industries. Total no. of employment in Chittagong District 1,72,150, Rangunia Upazila 13,455 respectively and grand total is 185605. But Surveyed area total employment is not recorded.

**Table-3.53: Rangunia Upazila and Dist. Total No. of Industries and Persons Engaged/
Employed**

| Sl. No. | Name of Industry | Dist. Total | Upzilla Total | Surveyed No. in S. Area (R.Up) | Persons Engaged Dist Total | Upazila Total Person Engaged | Study Area Total Person Engaged |
|---------|-----------------------|--------------|-------------------------|--------------------------------|----------------------------|------------------------------|---------------------------------|
| 1 | Textiles | 35 | 0.0 | 0.0 | 0.00 | | |
| 2 | Garments | 298 | 0.0 | 0.0 | 4300 | | |
| 3 | Rice Mil | 963 | 0.0 | 37 | | | |
| 4 | Match factory | 2 | | 0.00 | 0.00 | | |
| 5 | Steel & Engg. | 56 | | | | | |
| 6 | Aluminium | 25 | | | | | |
| 7 | Jute Mill | 12 | 0.0 | 0.0 | 9367 | | |
| 8 | Sugar Mills | 1 | 0 | 1 | | | |
| 9 | Fish Manufacturing | | | 1 | | | |
| 10 | Brick Field | 0.0 | 0.00 | 23 | | | |
| 11 | Wooden Materials | 0.0 | 0.0 | 15 | | | |
| 12 | Handloom | | | 14 | | | |
| 13 | Shops | | | 1 | | | |
| 14 | Ice Cream/Ice Factory | | | 4 | | | |
| 15 | Confectionery/Bakery | 824 | 25 | 6 | 4912 | 70 | |
| 16 | Saw mill | 676 | 53 | 5 | 3886 | 212 | - |
| 17 | Flour Mill | 410 | 0.00 | 4 | 1666 | 0.00 | - |
| 18 | Cloth Industries | 0 | | 4 | - | | |
| 19 | Cottage Industry | 9426 | 522 | 0.00 | 117838 | 1150 | |
| 20 | Bamboo\Cane Industry | 4250 | 138 | | 483 | 10143 | |
| 21 | Auto Rice | 114 | 58 | 0.0 | 774 | 348 | |
| 22 | Semi Auto Rice | 485 | 283 | 0.0 | 1259 | 283 | |
| 23 | Oil Mills | 22 | 0.00 | 0.00 | 281 | 0.00 | 0.00 |
| 24 | Cold Storage | 7 | | | - | | |
| 25 | Plastic Industry | 34 | 0.00 | 0.00 | 641 | | |
| 26 | Tailoring | 7188 | 263 | | 24513 | 1079 | |
| 27 | Pottery | 794 | 85 | 0.00 | 2230 | 170 | 0.00 |
| | Total: | 31587 | 1427 (4.52%) | 115 (8.05%) | 172150 | 13455 (8%) | |

Source: BBS (Chittagong District), 2011 and Field Survey, 2016

3.4.28 Summary of Industry

Total no. of Industries in Rangunia Upazilla 1,427 (Table-27) and no. of samples were taken for collecting data was 115. That is 115 no. of industries were consulted for collecting a range of data presented in Table-1 to Table-27. It is broadly speaking a range of data are collected: Types of Industries and pattern of Ownerships, Physical and Social infrastructure in and around the existing industrial environment e.g. Communication net work, Gas-electricity, water supply connections, Sanitation system, Nature of Health Facility, EIA & Waste Management Status, Capital Funding Source, Goods\commodities and marketing areas (local, domestic and exporting), Consumer Groups, Problems of industries, Law enforcing status. In view of this, PRA report perspectives reveals that ample opportunities is expected to be developed small and medium types industries(agro-processing industries in particular) if interior and peripheral road communication and other enabling environment is improved.

Chapter-4

Informal Sector Economy- Business/Trading Centers, Goods, Economic Activities and Occupations

4.1 Introduction

Informal sector have dominant role in sharing GDP and employment opportunities in our economy as well in local economy. It is found from Table-26 that informal sector share to GDP is 63.40% and employment is 80%. In our Study area 11 types of informal traders/sellers and 50 nos. were interviewed\consulted in 16 locations. Types of informal traders interviewed/had talk with: Betel nut business, Crockery, Dry fish, Fish sellers, Fruit sellers, Garments sellers, Hawkers, Raw materials sellers, Shoe sellers, small business. Vegetable Sellers, etc. Among these Fruit sellers, Fish Sellers, Garment sellers, Vegetables sellers, Small business\Traders have lion shares in the market.

4.1.1 Name of Survey Locations and No. of People Consulted

For Informal Sector Data Collection Investigators visited 16 nos. informal business/trading centers out of which 6 were urban and 10 were rural spot. Total no. of people was asked/interviewed 50. Highest no. of coverage at Chondroghona (9) and Dovashi Bazar (9), Second Lowes at Zia Market (6) and third lowest Mariamnagag, Padua Bazar (5) and Lowest no. of Coverage at 8 spots (Adhurpara, Dhamrai hat, Bonegram, Dashmile, Haji Para, Mogholer hat, Saiud Bari and Shorof hata). Business turn over and buyers and sellers gather in large numbers where highest nos. interviewees and interviewed for data collection and future potentials.

Table-4.1: Survey Location-Rural-Urban, Total No. of Traders/Seller Consulted

| Sl. No. | Name of the Surveyed Location | Frequency | Percent | Remarks |
|---------|-------------------------------|-----------|---------|---------|
| 1 | Adhur Para | 1 | 2.0 | Rural |
| 2 | Bonegram | 1 | 2.0 | Rural |
| 3 | Chondroghona | 9 | 18.0 | Rural |
| 4 | Dhamair Hat | 1 | 2.0 | Rural |
| 5 | Doshmile | 1 | 2.0 | Rural |
| 6 | Dovasi Bazar | 9 | 18.0 | Urban |
| 7 | Haji Para | 1 | 2.0 | Rural |
| 8 | Lichu Bagan | 2 | 4.0 | Urban |
| 9 | Mogholer Hat | 1 | 2.0 | Rural |
| 10 | Moriamnogor | 5 | 10.0 | Urban |
| 11 | Padua Bazar | 5 | 10.0 | Rural |
| 12 | Rajar Hat | 4 | 8.0 | Rural |
| 13 | Rowazar Hat | 2 | 4.0 | Urban |
| 14 | Saiud Bari | 1 | 2.0 | Urban |
| 15 | Shorofbhata | 1 | 2.0 | Urban |
| 16 | Zia Market | 6 | 12.0 | Rural |
| | Total | 50 | 100.0 | |

Source: Field Survey, 2016

4.1.2 Types and No. of Informal Traders/Sellers Consulted

It is found from **Table-4.1** that 16 nos. of informal business centers/growth centers of different locations were visited and there 11 (Table-4.2) types of traders/sellers were interviewed/consulted/asked for a range of queries about their business problems and potentials. Big nos. sellers/traders are mainly-Small Business, Fruit sellers, Vegetables sellers, Fish & Dry Fish Sellers, Garments Business, Shoe sellers. Highest nos. of sellers were talked small business owners (12 nos.), Vegetables sellers (9 nos.), Fruit sellers/traders(8 nos.), Garment Business (7 nos.), Fish and Dry Fish sellers(8 nos.) and then comes Hawkers, Betel-nut Business, crockery, Raw materials sellers(2), shoe sellers(1). It is found that Small Business/Traders in informal sector are dominant and Vegetables and Fish selling, fruit business, Garment items are also playing key roles. Their % coverage is varying from 2% to 18%.

Table-4.2: Types and No. Informal Business/traders/Sellers Interviewed

| Sl. No | Nature of the Informal Sectors | Frequency | Percent |
|--------|--------------------------------|-----------|------------|
| 1 | Betel-Nut Business | 1 | 2.0 |
| 2 | Crockery | 1 | 2.0 |
| 3 | Dry Fish Seller | 5 | 10.0 |
| 4 | Fish Seller | 3 | 6.0 |
| 5 | Fruit Seller | 8 | 16.0 |
| 6 | Garments Business | 7 | 14.0 |
| 7 | Hawker | 1 | 2.0 |
| 8 | Raw Materials Seller | 2 | 4.0 |
| 9 | Shoe Seller | 1 | 2.0 |
| 10 | Small Business | 12 | 24.0 |
| 11 | Vegetable Seller | 9 | 18.0 |
| | Total | 50 | 100 |

Source: Field Survey, 2016

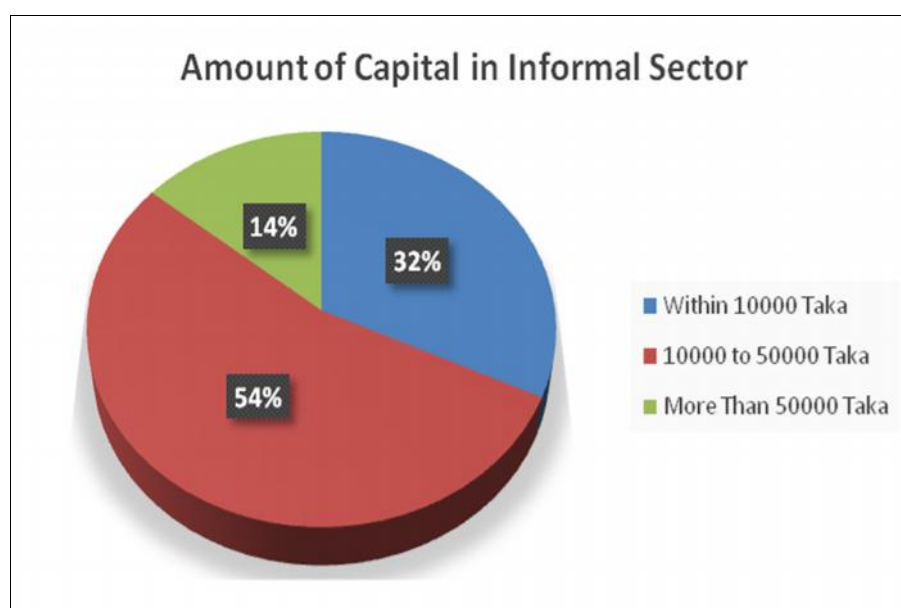


Figure-4: Amount of Capital to be Invested in Informal Sector

Source: Field Survey, 2016

The above pie chart (Figure-4) shows that amount of capital is rolling in informal sector varying from Taka 10,000 (32%), Taka: 10,000 to 50,000 (54%) and more than Taka. 50,000 (14%). It is also found from Table-6 that 18 nos. traders/sellers having loan (36%) and 34 nos. (64%) having no. loan out of 50 people interviewed.

4.1.3 Types of Commodities

Table-4.3 shows 11 types of consumer goods are bought and sold in the informal market and also has shown consumer groups of these commodities/goods. In Table-4.3, six types of consumer groups are consuming the goods/commodities are traded/sold by the surveyed informal sector traders/sellers in different locations. Groups/Classes are: Middle Class, Low Class, Specific Group, Not Specially Specified, High Class & Middle Class, Low Class & Middle Class. It is found that interviewed Population were: Middle Class (8), Low Class(3), Specific Group (1), Not Specifically Classified (35), High Class-Middle Class (2), Low class and Middle Class (1). It has also shown that highest consumer group belongs to Not Specifically Classified group (35) and they are 70% of surveyed population. Then, Comes Middle Class and Low Lass 8 (16%) and 3 (06%) respectively. So, consumers' point of view informal sector is important as all classes consumers come informal market for buying goods and services. It is because their products

Table-4.3: Types Commodities and Consumer Groups

| Sl. No. | Nature of Informal Sectors | Consumer's Group | | | | | | Total |
|---------|----------------------------|------------------|-----------|----------------|-----------------------------|---------------------------|--------------------------|-----------|
| | | Middle class | Low class | Specific group | Not specifically classified | High Class & Middle Class | Middle Class & Low Class | |
| 1 | Betel-Nut Business | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 2 | Crockery | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 3 | Dry Fish Seller | 0 | 0 | 0 | 5 | 0 | 0 | 5 |
| 4 | Fish Seller | 1 | 0 | 0 | 1 | 0 | 1 | 3 |
| 5 | Fruit Seller | 2 | 0 | 0 | 5 | 1 | 0 | 8 |
| 6 | Garments Business | 2 | 1 | 0 | 4 | 0 | 0 | 7 |
| 7 | Hawker | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 8 | Raw Materials Seller | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| 9 | Shoe Seller | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 10 | Small Business | 0 | 1 | 0 | 11 | 0 | 0 | 12 |
| 11 | Vegetable Seller | 1 | 0 | 0 | 7 | 1 | 0 | 9 |
| | Total | 8 | 3 | 1 | 35 | 2 | 1 | 50 |

Source: Field Survey, 2016

4.1.4 Status of Informal Trading Centers

It is reported that (Table-4.4) about 22% of trading centers have permanent establishment, 44% temporary establishments, 24% trades/business/shopping by non-motorized vehicles and 10% by Head or Floating/mobile. Total 50 stakeholders were consulted/interviewed of which 11 nos. are Permanent traders/Business man, 22 nos. are temporary traders/sellers, 12 nos. are on Non-motorized Vehicles and 5 nos. are on head/floating. So, Highest no. of population of informal sector sitting place/working place is Temporary (44%), second highest is Permanent (22%) and rest two's status are 24% and 10% respectively. So it is evident that although informal sector contribution in Employment is about 80% but they are doing business at risk and their sense of security is in fragile condition.

Table-4.4 Status of Informal Trading Centers

| Status of Informal Sector's Trading Center | Frequency | Percent |
|--|-----------|------------|
| Permanent | 11 | 22.0 |
| Temporary | 22 | 44.0 |
| Through Non-motorized vehicle | 12 | 24.0 |
| Through Head or Floating | 5 | 10.0 |
| Total | 50 | 100 |

Source: Survey 2016

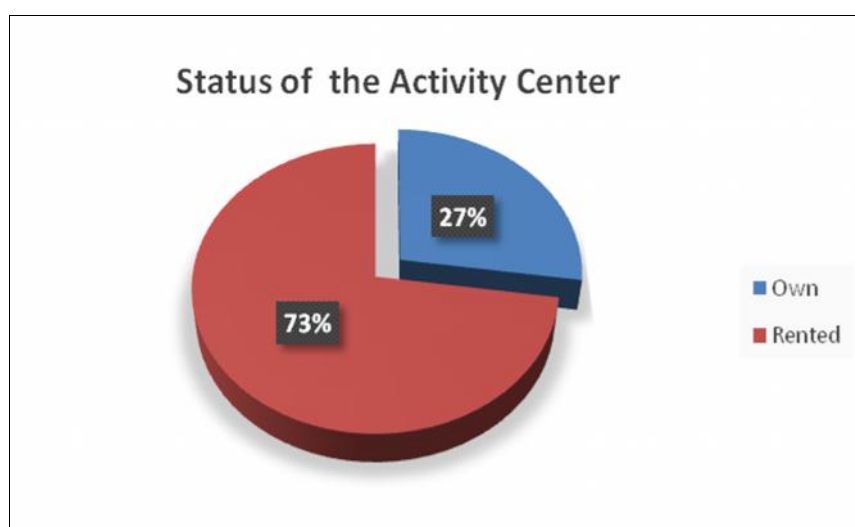


Figure-5: Status of the Ownership of Informal Center

Source: Field Survey, 2016

It has also been shown in Figure-5 that Status of Informal sector working place 27% is owner holding and 73% is rented holding.

4.1.5 Period of Informal Business

Table 4.5 shows that total 50 stakeholders were interviewed of Informal sector and 5 people responded (10%) that they do/carryout their trade only in the monsoon and 45 people responded (90%) that they carry out business whole year. That is 10% traders are off from business in monsoon season.

Table-4.5: Period of Informal Business/Activities

| Time Period For Informal Activities | Frequency | Percent |
|-------------------------------------|-----------|--------------|
| Monsoon | 5 | 10.0 |
| Whole year | 45 | 90.0 |
| Total | 50 | 100.0 |

Source: Field Survey, 2016

4.1.6 No. of Traders Having Loan\No. Loan

Table-4.6 shows the Informal traders/Business people - 18 out of 50 (36%) responded they do their business having loan and no loan responded 32 people out of 50 (64%). That is informal sector access to loan market is limited in the study area.

Table-4.6: No. of Traders Having Loan/No Loan

| Having Loan | Frequency | Percent |
|--------------|-----------|------------|
| Yes | 18 | 36.0 |
| No | 32 | 64.0 |
| Total | 50 | 100 |

Source: Field Survey, 2016

4.1.7 Traders\Sellers Monthly Income Statement

It has shown in **Table-4.1** that 11 types of traders/sellers and from all 11 types of informal traders 50 nos. people were consulted/interviewed regarding their income Taka/Month. 30 nos. people of Informal rural trade centers/Markets were consulted/interviewed and they responded their monthly income ranging from Taka 10,000 to 30,000. And 20 nos. people of informal urban trade centers were interviewed and they also responded their monthly income ranging from Taka 10,000 to 20,000 (Table-4.7).

Table-4.7: Types of Traders/Sellers and Monthly Income Statement

| Name of the Location | Status of the Location | Nature of Business | Monthly Income | | | Total |
|----------------------|------------------------|----------------------|--------------------|----------------------|-----------------------|-------|
| | | | Within 10000 (Tk.) | 10000 to 20000 (Tk.) | More than 30000 (Tk.) | |
| Adhur Para | Rural | Vegetable Seller | | | 1 | 1 |
| Bonegram | Rural | Vegetable Seller | 1 | | | 1 |
| Chondroghona | Rural | Dry Fish Seller | | 1 | | 1 |
| | | Fish Seller | 1 | | | 1 |
| | | Fruit Seller | 1 | | | 1 |
| | | Raw Materials Seller | 1 | | | 1 |
| | | Small Business | 1 | | | 1 |
| | | Vegetable Seller | 1 | 3 | | 4 |
| Dhamair Hat | Rural | Small Business | 1 | | | 1 |
| Doshmile | Rural | Betel-Nut Business | 1 | | | 1 |
| Dovasi Bazar | Urban | Crockery | 1 | | | 1 |
| | | Fruit Seller | 2 | | | 2 |
| | | Garments Business | 3 | | | 3 |
| | | Small Business | 1 | 2 | | 3 |
| Haji Para | Rural | Small Business | 1 | | | 1 |
| Lichu Bagan | Urban | Hawker | 1 | | | 1 |
| | | Vegetable Seller | 1 | | | 1 |
| Mogholer Hat | Rural | Small Business | | 1 | | 1 |

| Name of the Location | Status of the Location | Nature of Business | Monthly Income | | | Total |
|----------------------|------------------------|----------------------|--------------------|----------------------|-----------------------|-------|
| | | | Within 10000 (Tk.) | 10000 to 20000 (Tk.) | More than 30000 (Tk.) | |
| Moriamnogor | Urban | Fruit Seller | 2 | 1 | | 3 |
| | | Shoe Seller | 1 | | | 1 |
| | | Small Business | 1 | | | 1 |
| Padua Bazar | Rural | Dry Fish Seller | | 1 | | 1 |
| | | Garments Business | | 1 | | 1 |
| | | Raw Materials Seller | 1 | | | 1 |
| | | Small Business | 2 | | | 2 |
| Rajar Hat | Rural | Garments Business | | 3 | | 3 |
| | | Small Business | | 1 | | 1 |
| Rowazar Hat | Urban | Dry Fish Seller | 1 | | | 1 |
| | | Fish Seller | 1 | | | 1 |
| Sayud Bari | Urban | Dry Fish Seller | 1 | | | 1 |
| Shorofbhata | Urban | Vegetable Seller | 0 | 1 | | 1 |
| Zia Market | Rural | Dry Fish Seller | 1 | | | 1 |
| | | Fish Seller | | 2 | | 2 |
| | | Fruit Seller | 1 | | | 1 |
| | | Small Business | 1 | | | 1 |
| | | Vegetable Seller | 1 | | | 1 |
| Total | | | | | | 50 |

Source: Field Survey, 2016

4.1.8 Monthly Expenditure on Various Account

Informal surveyed people expensed on various accounts as shown in above Table-4.8. 25 people out of 50 responded their average monthly expenses on education is Taka 1,580, Medical Taka 1361, Cloth: Taka 1,311, Entertainment: Taka. 1,040 and other expenses Taka: 1,043. Highest in Education account and the Lowest is in Entertainment. Total expense, except food, is Taka: 6,635 e.g. on an average 45%. (assuming average monthly income Taka: 15,000 as of **Table-4.7**).

Table-4.8: Monthly Expenditure on various account of Surveyed Population

| Monthly Expenses on Various Sectors of Surveyed people's Individual | N | Mean |
|---|----|---------|
| Expense on Education | 25 | 1580.00 |
| Expense on Medical | 36 | 1361.11 |
| Expense on Cloth | 34 | 1311.76 |
| Expense on Entertainment | 5 | 1040.00 |
| Others expenses | 22 | 1043.18 |

Source: Field Survey, 2016

4.1.9 Type of Problems Facing Informal Sector Business Location

Problems encountered by Informal sector traders (**Table-4.9**) in respect of their working/Trade centers are: adverse weather, Eviction panic, Extortion, Police Harassment, Structural problem, Business recession, Police Harassment and Eviction Panic, Police Harassment and adverse Weather, Police Harassment and Business Recession. 9 nos. respondent expressed they are in adverse weather panic doing their business, scared by eviction panic 4 nos. respondent, extortion and police harassment panic by 2 responded, panic of business recession by 6 respondent and structural problem panic by 3 respondent, 5 respondent expressed their panic both from Police harassment and adverse weather panic, Adverse weather and Business Recession, Adverse weather and Eviction Panic. That is, about 60% informal traders feel the sense of insecurity doing/running their business in respect of vulnerability of business location/Trading centers.

Table-4.9: Types of Problems facing Informal sector in Business Location

| Name of the Location | Problems faced in working place | | | | | | | | | Total |
|----------------------|---------------------------------|----------------|-----------|-------------------|---------------------|--------------------|---|-------------------------------------|-------------------------------------|-----------|
| | Adverse weather | Eviction panic | Extortion | Police harassment | Business recessions | Structural problem | Police harassment & Business Recessions | Adverse weather & Police harassment | Adverse weather & panic of Eviction | |
| Adhur Para | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Chondroghona | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 5 |
| Dovasi Bazar | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 7 |
| Mogholer Hat | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Moriamnogor | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 |
| Padua Bazar | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| Rajar Hat | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 4 |
| Rowazar Hat | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Saiyud Bari | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Shorofbhata | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Zia Market | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Total | 9 | 4 | 1 | 1 | 6 | 3 | 1 | 1 | 2 | 28 |

Source: Field Survey, 2016

4.1.10 Total No. of Traders Facing Various Types of Problems

Table-4.10 represents the no. of traders are suffering from different adverse panic and their % coverage. It is shown in column-3 of **Table-4.10** that 9 nos. respondent (32.1%) out of 28 total respondent suffers from adverse weather panic, Eviction panic from 14.3%, Extortion 3.6%, Police harassment 3.6%, Business recession 21.4%, structural problem 10.7%, Police harassment and business recession 3.6%, Adverse weather and Police harassment 3.6%, Adverse Weather and Eviction panic 7.1%. These panic situation affect overall business environment which result in their overall livelihood and employment opportunities.

Table-4.10: Total no. of traders/sellers facing various types of problems

| Facing Problems in Informal Sectors | Frequency | Valid Percent |
|---|-----------|---------------|
| Adverse weather | 9 | 32.1 |
| Eviction panic | 4 | 14.3 |
| Extortion | 1 | 3.6 |
| Police harassment | 1 | 3.6 |
| Business recessions | 6 | 21.4 |
| Structural problem | 3 | 10.7 |
| Police harassment & Business Recessions | 1 | 3.6 |
| Adverse weather & Police harassment | 1 | 3.6 |
| Adverse weather & panic of Eviction | 2 | 7.1 |
| Total | 28 | 100 |

Source: Field Survey, 2016

4.1.11 Causes of Shifting Occupation in informal sector

It is regular feature/phenomena of shifting of occupation or diverting of works in informal sector because of various reasons. These reasons are identified in informal sector survey of Rangunia Upazila of Chittagong district as shown in Table-4.11:

Adverse weather induced 32.1% of sample population diverting/shifting their occupation from one sub-sector to another, similarly 14.3% from eviction Panic, 3.6% from extortion, 3.6 % from Police harassment, 21.4 from business recession, 10.7% from structural problems, Police harassment and business recession 3.6%, Adverse weather and Police harassment 3.6%, Adverse Weather and Eviction Panic 7.1%. That is natural calamities and human intervention (Eviction, extortion and police harassment) together results in shifting of occupations mostly in informal sector.

Table-4.11: Causes Shifting Occupation in informal sector

| Causes for Diverting Works | Frequency | Valid Percent |
|--|-----------|---------------|
| Adverse weather | 9 | 32.1 |
| Eviction panic | 4 | 14.3 |
| Extortion | 1 | 3.6 |
| Police harassment | 1 | 3.6 |
| Business recessions | 6 | 21.4 |
| Structural problem | 3 | 10.7 |
| Police harassment& Business Recessions | 1 | 3.6 |
| Adverse weather & Police harassment | 1 | 3.6 |
| Adverse weather & panic of Eviction | 2 | 7.1 |
| Total | 28 | 100.0 |

Source: Field Survey, 2016

4.1.12 Summary

In our Study area 11 types of informal traders\sellers and 50 nos. stakeholders were interviewed\consulted in 16 locations. Types of informal traders were interviewed\had talk with: Betel-nut business, Crockery, Dry fish, Fish sellers, Fruit sellers, Garments sellers, Hawkers, Raw materials sellers, Shoe sellers, small businessmen and Vegetable sellers, etc. Among these, Fruit sellers, Fish Sellers, Garment sellers, Vegetables sellers, Small business/Traders have lion shares in the market. But the informal sector traders\sellers have to frequently shift their occupation due to adverse weather panic, Police harassment, extortions, eviction panic, etc.

Chapter-5 Summary Findings

5.1 PRA Survey Findings on Economic Issues

PRA Objectives: To involve the local people in the planning process by letting the local people identify their own problems and potentials, development needs (issues-options) and planning priorities for next 20 years. To match PRA findings matching with technical analysis of different sectoral findings, particularly for spatial analysis and GIS mapping, and to supplement other data sources. PRA has been done to make participants sense of ownership of the project and its activities towards realizing participatory planning approach.

5.1.1 Identification of Problems and Potentials/Economic Issues

Major Problems and potentials were identified through Venn diagram. For Rangunia Sadar Upazila, main problems were lack of health facility considering the amount of population, poor communication system and broken road, lack of educational infrastructure, unemployment, river erosion, unemployment, lack of industrialization and lack of adequate number of organized hat-bazar.

On the other hand, main potentials factors were people's awareness(consciousness), gas provisions, sufficient place for health and education facilities, sufficient raw materials(Brick-Sand, Wood etc), people's cooperation, growing trend of industrialization, social unity, drainage system, availability of agricultural land, hardworking and skilled/semi-skilled man power, donor activities, initiatives for maintenance of existing embankment, positive role of local leaders and law enforcement agencies, fertile land and growing trend of school going boys and girls.

For Rangunia Paurashava, main problems were poor communication system and broken road, river erosion, lack of proper drainage system, lack of health facility considering the amount of population, lack of educational infrastructure, load shedding and lack of supply in electricity and lack of gas connection.

On the other hand, main potentials were availability of agricultural land, availability of demesne land, people's enthusiasm and spontaneous participation, hardworking man power, government initiatives, sufficient hilly area for waste management and for infrastructural development, availability of raw materials (bricks and sand, wood)

5.1.2 Development Priorities

Participants identified prioritized development issues for 20 years and categorized it into three categories, respectively- short term, mid-term and long term. Development priorities were identified through ToP. For Rangunia Sadar Upazila, participants identified improving community, health & education facilities as key areas. They also mentioned about preventing terrorism, drug addiction, gas & electricity connection etc.

For Rangunia Paurashava, participants identified almost same areas as Rangunia Sadar Upazila. They added the initiatives of promoting poultry & fisheries culture, promotion of dairy industry, prevention of load shedding, new gas & electricity connection etc.

Discussion: Core issues raised from PRA were kind of similar in both areas. The only difference found due to geographic position and rural-urban format. Key issues covered the areas of health, communication, agricultural and education. Interestingly, these issues are equally applicable for rest of the country. The findings of PRA effectively reflected participants or community voice.

In view of the above core issues expressed by surveyed people of Rangunia Upazila, is essentially to be given utmost importance for formulation of policy-strategy and options development of 20 years (2016 -2036) Development Plan of the Study area in line with achieving the target of Middle Income Group Country as well sustainable development goal.

5.2 Survey Findings on Formal-Informal Issues

Formal Sector:

- 22 nos. hat/bazar/markets were surveyed in the study area.
- Waste management system is not satisfactory.
- 31.5% wastes are dumped at nearby Dustbin, 22.7% wastes are dumped at dumping site, 9.0% at road side, 4.5% at fallow land and 31.5% at rivers and canals.
- Of total surveyed sample, 95.5% have sanitary latrines and 4.5% has no provision.
- 95% hat/bazar/markets have water supply, electricity connections and sanitation facilities.

Banks and Bimas:

- Total 16 nos. Banks and Bimas are working in the study area.
- Nature of Banking services: 13% agricultural loan, SME Banking 18%, Project Loan 5%, Deposit 13%, Normal Banking 24%, E-Banking 11%, Foreign Banking 3%, Industry Loan 5%, Mobile Banking 8%.

NGOs and CBOs:

- 8 Nos. NGOs are working in the study area.
- Target Groups
 - Lower Income Group – 75%
 - Profession-wise Target Group – 25%.

Industries:

- 116 industries were interviewed/consulted in the study area.
- 80 nos. personal property.
- 1 no. limited company.
- 35 nos. joint venture company.
- 58 nos. industries are financed by personal savings.
- 8 nos. are inherited property.
- 45% nos. are financed by personal/family savings/bank loan.
- Products of industries widely covered local and domestic markets.
- Problems of industries – infrastructure, bad communication, problems of waste disposal, extortion, lack of capital, etc.

Informal Sector Survey Findings:

- 15 nos. trading centres were surveyed in the study area.
- 11 types of goods, commodities were found trading e.g. fish, vegetables, fruits, garments, shoes, garments, etc.
- Monthly income of the informal sector traders vary on an average Tk. 50,000.

5.3 Survey Findings on Socio-economic Issues

Current socio-economic study was conducted under this development plan. The overall objective of this study was to map the socio economic status of the population residing in Rangunia Upazila.

A total of 1100 participants were interviewed in this study aged 20-60 years. Among them, 82% were male and 18% were female. Highest numbers of participants among them were students, which is 29.3% (311). The second highest occupation was housewife. For educational qualification, 12.2% participants never went to school, 21.8% participants participated in primary or less than primary education and only 1.3% participants studied up to Honor's/equivalent level of education. Most of them found living in Kacha house (57.3%) and 74.6% participants mentioned that they lived in their own land. Despite of participant's living condition, 95.4% participants of total 1100 had their own latrine at house.

On the other hand, migration ration was found high in terms of both in-country and overseas migration. 93.1% household head came to Rangunia through migration. Government health facility, family planning, community clinic, private hospital, police box, park, playground, secondary school, high school, college, madrasa, club/gymnasium, cinema hall, bus stand, library, grave yard, eidgah, public toilet, various religious center etc were found available at Rangunia. Despite of these broad facilities, participants mentioned about some problems like- transportation, broken road, waste management, load shedding etc.

For, income earning activities, 35.7% participants mentioned about agricultural activities as main source of income. 17.9% participants also mentioned about remittance as well. At last we asked for their suggestion about further development activities and they emphasized on road construction/repair, employment creation, and health facilities and on educational facilities.

5.4 Agricultural Survey Findings on Economic Issues

Both PRA Consultation and Agricultural Survey suggest that in the Study area, Agricultural land is fertile and there is also enough potentials for vertical expansion and increase crop yield through crop diversification program. At present, Total Cultivable land of the Study area is 18,755 ha and Net Cropping Area is also 18,755. Total Cropped area as of **Table-5.1** below is 31,128 ha. Total Rice Cropped area is 27,250 ha. and at present, total rice production is 13,2661 m.ton. It is found in **Table-5.2** that during the last 10 years, land use growth or decline all varieties rice production area was 17,380 ha. in 2005 where as in 2015 it is reduced to 14,750 ha (11.34%). The main reason for decreased local variety rice area due to yield is less in compared to HYV rice and farmers are induced to switchover cultivated HYV rice. The HYV paddy cultivation area is decreased by 11%. The reason for decreased HYV rice cultivated area due to flash flood, many farmers could not cultivate HYV rice. Moreover, Medium and Large farmers are also more profit-oriented and risk averse-oriented and consequently, farmers are reluctant to rice cultivation.

SAAOs reported that farmers are not interested to cultivate oil seeds due to lack of oil seed crushing mills in their areas. Remarkable changed or increased during 10 years was occurred in Tuber crops (133%), Fruits crops (68%) and Maize (1191%) land use. The main reasons for increases are tuber crops, fruits and maize market demand and price is high. Table 10 shows, among the other purposes remarkable changed were occurred in Brick field (400%) and followed by fish/shrimp culture (300%) and poultry farm (100%) and housing (36%) respectively (**Table-5.2**). Only 5 industries are available from 2005 to 2015 under Rangunia Upazila. There is no improvement in industry sector because existing industries could not show profitable.

Single area is 5127, double cropped area is 11,995 and triple cropped area is 1,633 ha. Total Cropped area is 34,016 ha and Cropping Intensity is 181%. Total Agricultural Household is 30,587. Out of this, total Land less farmers are 7,773, Marginal farmers 14,000, small farmers 7,000, Medium Farmers 1,300 and Large Farmers are 432 (Source: Present Upazila Land Use – 3.3.1 of Agriculture Survey Report).

Table-5.1: Present Cultivated Area, Yield and Production under Rangunia

| Crop Grown | Crop area(ha) | Yield/ha (mt) | Production (mt) | Contribution (%) |
|-----------------------|---------------|---------------|-----------------|------------------|
| T. Aman(LV) | 296 | 3.8 | 1124.8 | 0.85 |
| T. Aman(HYV) | 17809 | 4.6 | 81921.4 | 61.75 |
| Boro (HYV) | 9000 | 5.4 | 48600 | 36.63 |
| Boro (Hybrid) | 145 | 7 | 1015 | 0.77 |
| Sub-Total Rice | 27250 | | 132661.2 | 100 |
| S. Vegetables | 1545 | 18.5 | 28582.5 | 42.27 |
| W. Vegetables | 1191 | 22 | 26202 | 38.75 |
| Phelon | 350 | 2.8 | 980 | 1.45 |
| Potato | 354 | 21.5 | 7611 | 11.26 |
| Spices | 288 | 3.25 | 936 | 1.38 |
| Betel Leaf | 150 | 22 | 3300 | 4.88 |
| Sub-Total | 3878 | | 67611.5 | |
| Total | 31128 | | 200272.7 | 100 |

Source: Agricultural Survey and Consultant Estimates, 2016

Table-5.2: Growth or Decline Agriculture Land Use during the last 10 Year

| Sl. No. | Agricultural land use | Land Use (2005) in ha | Land Use (2015) in ha | % Change |
|---------|-------------------------|-----------------------|-----------------------|----------|
| 01 | Paddy (local varieties) | 800 | 150 | -81.25 |
| 02 | Paddy (HYV) | 16580 | 14700* | -11.34 |
| 03 | Vegetables (Summer) | 300 | 380 | +26.67 |
| 04 | Vegetables (Winter) | 1700 | 1850 | +8.82 |
| 05 | Tuber crops | 150 | 350 | +133.33 |
| 06 | Pulse crops | 400 | 700 | +75% |
| 07 | Oilseed crops | 185 | 125** | -32.43 |
| 08 | Spice crops | 360 | 430 | +19.44 |
| 09 | Fruit crops | 50 | 84 | +68.00 |
| 10 | Maize | 12 | 35 | +191.67 |
| 11 | Sugarcane | 30 | 40 | +33.33 |
| 12 | Other purposes | 20 | 100 | +400.00 |
| | -Brick field | | | |
| | -Poultry farm | 5 | 10 | +100.00 |
| | -Fish/shrimp culture | 50 | 200 | +300.00 |
| | -Gardening/forestry | 50 | 60 | +20.00 |
| | -Industries | 5 | 5 | 0.00 |
| | -Housing | 1838 | 2500 | +36.02 |

Source: SAAOs and UAO Rangunia Upazila, 2016, * Flood occurred ** No oil seed crushing mill

In the Study area, there are 3450 nos. of ponds, 110 nos. of Dhigees and area coverage is 2044 and 242 acres respectively. District total nos. of ponds are 73,884, and in Upazila, nos. of Dhigees are 1,566 and their area coverage is 49,900 and 7,844 acres respectively. These are to be brought under modern aquaculture and production is expected to be increased.

So, Investment in Agriculture sector in the study area is must but not in traditional agriculture (Crop sector only) should continue. It must be promoting integrated and multi objective demand driven modern agri-farming management which must have in built innovative program. (Advertisement, marketing, choice of consumers groups, Motivated approach, export oriented non-traditional items- High value Crops) popularize agricultural products of the area both home and abroad. As the Study area is adjacent to only Commercial city of Bangladesh, Export Processing Zone with the biggest sea port and international airport. So agro based and agro processing industry building\expansion potentials is very high from export point of view. PRA report findings also admitted about the availability of chief labour force in and around project area. So our long term policy-strategy is to mobilize medium and long term investment fund with the cooperation of public-private and GO-NGO sources.

Chapter-6

Recommendations and Conclusion

6.1 Recommendations

Socio-economic survey report reveals that Rangunia Upazila is adjacent to Chittagong Commercial City and the study area has gas and electricity connections, so, it is potential for establishing agro-based small and medium enterprises (SME).

There is a big Export Processing Zone in the suburb of Chittagong City, so, it has also potential for setting up supporting industries in the study area.

PRA perspectives reveal that agricultural land in the study area is fertile and land is available for further expansion of modern agricultural activities applying modern integrated farming system.

PRA Participants have identified prioritized development issues for the next 20 years and categorized it into three categories, (1) Short Term, (2) Medium Term and (3) Long Term. Development priorities were identified through ToP. For these developments, necessary measures for improvement of transportation, broken road, waste management, load shedding, etc. should be taken which will pave the way for enabling environment for rapid urbanization and industrialization consistent with the Fourteen Upazilas Development Plan.

PRA Participants identified improving community health and education facilities as key areas. They also mentioned about preventing River erosion, terrorism, drug addiction, gas and electricity connection etc. Necessary steps/actions should be taken for the above identified problems as the short, medium and long-term basis depending on the urgency of the issues.

Policy recommendations for accelerating the Upazila Urbanization process would be to take up utilities providing services project within medium term basis (by 10 years time horizon) e.g. Electricity, Gas and water supply connections and along with provision of adequate

Skilled manpower and managerial/administrative staff should be increased for strong monitoring and supervision system of the urban Physical and social infrastructures and this initiative will accelerate and strengthen the urbanization process of Upazila Development Plan Project.

For urban expansion, small towns and cities requires to be connected with high ways by flyovers and over bridges, provided we are not allowed to encroaching further agricultural land.

It is inevitable to activate Govt.'s different regulatory bodies exerting punitive measures keep in track harmonious growth of Urbanization process. Regulatory measures shall have to exert Price Policy, Fiscal measures (VAT, taxes, duties, surcharges) and imposition of punishment; penalties, etc. are to be implemented.

The socio economic survey shows that there is a clear indication of demographic dividend in Rangunia Upazila. This suggests that the economic growth potential can result from shift in a population's age structure; the share of young population can be contributed to the further local economic growth involving them in different economic sectors. But to ensure this "Demographic Gift" the young population group who are beyond the proper education system should be incorporated in the other programs such as vocational, technical, professional training etc.

6.2 Conclusion

Formal informal sector survey findings data was collected for preparation of Rangunia Upazila Development Plan. In view of the above, Analyses and projections of data will be made in the Final Plan Preparation Process of Upazila.

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গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৫ (রামু উপজেলা, কক্সবাজার ও রাঙ্গুনিয়া উপজেলা, চট্টগ্রাম)
অ-আনুষ্ঠানিক অর্থনৈতিক কর্মকাণ্ড জরিপ প্রশ্নমালা

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ স্থানঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :
(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

.....
সুপারভাইজারের স্বাক্ষর

১. সাক্ষাৎকার প্রদানকারীর নাম, ঠিকানা ও মোবাইল নম্বর :

২. জরিপ এলাকা (হাট/বাজার/মার্কেট/গ্রাম/মহল্লার নাম) :.....

৩. সাক্ষাৎকার প্রদানকারীর আর্থসামাজিক বৈশিষ্ট্যঃ

| খানার সদস্য | বয়স (বছর) | লিঙ্গ (কোড) | বৈবাহিক অবস্থা (কোড) | শিক্ষা (কোড) | জন্মস্থান | অভিগমনের কারণ (কোড) |
|-------------|------------|-------------|----------------------|--------------|-----------|---------------------|
| ১ | | | | | | |
| ২ | | | | | | |
| ৩ | | | | | | |
| ৪ | | | | | | |
| ৫ | | | | | | |
| ৬ | | | | | | |
| ৭ | | | | | | |
| ৮ | | | | | | |
| ৯ | | | | | | |

কোড : লিঙ্গ

| | | |
|----------|----------|-----------|
| ১. পুরুষ | ২. মহিলা | ৩. নপুংসক |
|----------|----------|-----------|

কোড : বৈবাহিক অবস্থা

| | | | | | | |
|-------------|------------|-------------------|------------------|---------|--------------|-------------|
| ১. অবিবাহিত | ২. বিবাহিত | ৩. বিধবা/বিপত্নিক | ৪. তালাক প্রাপ্ত | ৫. পৃথক | ৬. পরিত্যক্ত | ৭. অন্যান্য |
|-------------|------------|-------------------|------------------|---------|--------------|-------------|

কোড : শিক্ষা

| | | | | |
|------------------------|---------------------------|---------------------------|-------------------|-------------------|
| ১. নিরক্ষর | ২. প্রাথমিক | ৩. নিম্ন-মাধ্যমিক | ৪. মাধ্যমিক/দাখিল | ৫. এইচ.এস.সি/আলিম |
| ৬. ডিগ্রি/অনার্স/ফাজিল | ৭. মাস্টার্স ডিগ্রি/কামিল | ৮. টেকনিক্যাল সার্টিফিকেট | ৯. অন্যান্য : | |

কোড : অভিগমনের কারণ

| | | | | |
|---------------|-----------------------|-----------------|---------------------|-----------|
| ১. কর্মস্থল | ২. বেকারত্ব/দারিদ্রতা | ৩. বৈবাহিক কারণ | ৪. সামাজিক অস্থিরতা | ৫. ব্যবসা |
| ৬. নদী ভাঙ্গন | ৭. অন্যান্য : | | | |

৪. বর্তমান পেশার ধরন :

৫. পূর্বের পেশার ধরন :

৬. পূর্বের পেশা পরিবর্তনের কারণ :

৭. স্বনিয়োজিত পেশা হলে মূলধনের পরিমাণ : (টাকা)

৮. মূলধনের উৎস (কোড)ঃ

কোড ৮ : মূলধনের উৎস

| | | | | | | |
|-----------------------|----------|----------------------------|-----------------|-------|-------------------|---------------|
| ১. উত্তরাধিকার সূত্রে | ২. যৌতুক | ৩. নিজ পরিবার/বন্ধু-বান্ধব | ৪. বিনিয়োগকারী | ৫. ঋণ | ৬. নিজেদের সমবায় | ৭. অন্যান্য : |
|-----------------------|----------|----------------------------|-----------------|-------|-------------------|---------------|

৯. বিক্রিত পণ্যের ধরন :

১০. ভোক্তা শ্রেণি (কোড) :

কোড ১০ : ভোক্তা শ্রেণি

| | | | |
|--------------------|------------------|----------------|--|
| ১. উচ্চ বিভাগ | ২. মধ্যবিভাগ | ৩. নিম্ন বিভাগ | ৪. নির্দিষ্ট গোষ্ঠী/শ্রেণি/পেশার মানুষ |
| ৫. সুনির্দিষ্ট নয় | ৬. অন্যান্য..... | | |

১১. কর্মকালের কাল : ☐ ১. মৌসুমী ☐ ২. সারা বৎসর

১১.১ যদি মৌসুমী হলে, কোন মৌসুম :

১১.২ কর্ম-মৌসুমের ব্যাপ্তিকাল :

১২. আপনার অর্থনৈতিক কর্মকাণ্ড পরিচালনার স্থান :

১৩. আপনার অর্থনৈতিক কর্মকাণ্ডের অবস্থানের ধরন (কোড) :

কোড ১৩ : অবস্থানের ধরন

| | | | |
|------------|-------------|-------------------------------|-------------------------|
| ১. স্থায়ী | ২. অস্থায়ী | ৩. অযান্ত্রিক বাহনে ড্রাম্যাণ | ৪. মাথায় করে ড্রাম্যাণ |
|------------|-------------|-------------------------------|-------------------------|

১৪. দোকানের মালিকানা : ☐ ১. নিজস্ব ☐ ২. ভাড়া

১৫. আপনার কি কোন ঋণ আছে : ☐ ১. হ্যাঁ ☐ ২. না

১৫.১ যদি 'হ্যাঁ' হয়,

| উৎস | টাকার পরিমাণ | সুদের হার | উদ্দেশ্য (কোড) |
|----------------------|--------------|-----------|----------------|
| সরকারি ব্যাংক | | | |
| বেসরকারি ব্যাংক | | | |
| সমবায় সমিতি | | | |
| মহাজন | | | |
| আত্মীয়/বন্ধু-বান্ধব | | | |
| এন.জি.ও - ১ | | | |
| এন.জি.ও - ২ | | | |
| এন.জি.ও - ৩ | | | |
| অন্যান্য | | | |

কোড : উদ্দেশ্য

| | | | |
|-------------------------|--------------------|-------------------|-------------|
| ১. ব্যবসা | ২. আসবাবপত্র ক্রয় | ৩. ঘরবাড়ি মেরামত | ৪. বিবাহ |
| ৫. গবাদি পশু-পাখি ক্রয় | ৬. চিকিৎসা | ৭. জমি ক্রয় | ৮. অন্যান্য |

১৬. মোট মাসিক আয় (টাকা) : ১৬.১ প্রধান পেশা : ১৬.২ সহায়ক পেশা :

১৭. মাসিক ব্যয়ঃ

| খাত | খাদ্যসামগ্রী | বাসা ভাড়া | যাতায়াত | শিক্ষা | চিকিৎসা | পোষাক-পরিচ্ছদ | বিনোদন | অন্যান্য | মোট |
|--------------------|--------------|------------|----------|--------|---------|---------------|--------|----------|-----|
| মাসিক ব্যয় (টাকা) | | | | | | | | | |

১৮. বাসস্থানের মালিকানা : ☐ ১. নিজস্ব ☐ ২. ভাড়াটে ১৮.১ ভাড়াটে হলে মাসিক ভাড়া (টাকা)ঃ

১৯. কর্মক্ষেত্রে আপনি কি ধরনের সমস্যার সম্মুখীন হন (কোড) :

কোড ১৯ : সমস্যা

| | | | | | |
|-------------------|-----------------|--------------|--------------------|---------------------|----------------------|
| ১. বিরূপ আবহাওয়া | ২. উচ্ছেদ আতঙ্ক | ৩. চাঁদাবাজি | ৪. পুলিশের হয়রানি | ৫. ব্যবসায়িক মন্দা | ৬. অবকাঠামোগত সমস্যা |
|-------------------|-----------------|--------------|--------------------|---------------------|----------------------|

২০. সমস্যা সমাধানের জন্য কি করা যেতে পারে বলে আপনি মনে করেন?

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২১. আপনার আর্থ-সামাজিক উন্নয়নের জন্য কি সাহায্য সহযোগিতা প্রয়োজন?

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২২. ভবিষ্যৎ পরিকল্পনা :

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তথ্য প্রদানের জন্য আপনাকে আন্তরিক ধন্যবাদ

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৫ (রামু উপজেলা, কক্সবাজার ও রাঙ্গুনিয়া উপজেলা, চট্টগ্রাম)
আনুষ্ঠানিক অর্থনৈতিক কর্মকাণ্ড জরিপ প্রশ্নমালা
(শিল্প কারখানা)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :
(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

☐ সকল তথ্য নেয়া হয়েছে

☐ অসম্পূর্ণ

.....
সুপারভাইজারের স্বাক্ষর

১. শিল্প কারখানা বৃহৎ/ ক্ষুদ্র/ মাঝারি/ কুটির

১.১ শিল্প কারখানা/প্রতিষ্ঠানের নাম :

১.২ শিল্প কারখানা/প্রতিষ্ঠানের ঠিকানা :

১.৩ মালিকানার ধরন (কোড): কোড ১.৩ : মালিকানার ধরন

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| ১. ব্যক্তিগত মালিকানা | ২. লিমিটেড কোম্পানি | ৩. অংশীদারী প্রতিষ্ঠান |
|-----------------------|---------------------|------------------------|

১.৪ মালিক/ব্যবস্থাপনা পরিচালক/ব্যবস্থাপনা অংশীদারের নামঃ

১.৫ প্রতিষ্ঠানের ধরন (কোড): কোড ১.৫ : প্রতিষ্ঠানের ধরন

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|-------------------------|---------------------------|---------------------------|---------------------------------|
| ১. নির্মাণ সামগ্রী | ২. মৎস্য প্রক্রিয়াজাতকরণ | ৩. তামাক প্রক্রিয়াজাতকরণ | ৪. কুটির শিল্প |
| ৫. ইট ভাটা | ৬. খাদ্য প্রক্রিয়াজাতকরণ | ৭. কাষ্ঠজাত দ্রব্য | ৮. হস্ত শিল্প |
| ৯. দোকান | ১০. বরফ কারখানা/আইসক্রিম | ১১. ভোজ্য তেল কল | ১২. মোটর গ্যারেজ |
| ১৩. যন্ত্রপাতি বিপণন | ১৪. পোশাক | ১৫. ঔষধ শিল্প | ১৬. সিগারেট কারখানা |
| ১৭. হাট/বাজার | ১৮. দুগ্ধ খামার | ১৯. মেটাল প্রডাক্ট | ২০. বিড়ি বানানো |
| ২১. লব্ধি | ২২. মৎস্য খামার | ২৩. প্লাস্টিক শিল্প | ২৪. রুটি/বিস্কুট কারখানা |
| ২৫. রাসায়নিক দ্রব্যাদি | ২৬. ছাপাখানা | ২৭. করাত কল | ২৮. রাইস মিল |
| ২৯. আটা/ময়দা মিল | ৩০. কোল্ড স্টোরেজ | ৩১. সিমেন্ট কারখানা | ৩২. সিরামিক পণ্য উৎপাদন কারখানা |
| ৩৩. সুতা ও বস্ত্র শিল্প | ৩৪. অন্যান্য | | |

১.৬ আয়তন : বিঘা , একর (১ একর = ৩.০৩ বিঘা)

১.৭ মূলধন সংক্রান্ত তথ্য
প্রতিষ্ঠানের মোট মূলধন : টাঃ

১.৭.১ মূলধনের উৎস (কোড) :

কোড ১.৭.১ : মূলধনের উৎস

| | | |
|--|-----------------------------|---|
| ১. ব্যক্তিগত সঞ্চয় | ২. পারিবারিক উৎস | ৩. ব্যক্তিগত/পারিবারিক সঞ্চয় ও ব্যাংক ঋণ |
| ৪. আত্মীয় স্বজন থেকে প্রাপ্ত ঋণ | ৫. প্রবাসী আয় থেকে প্রাপ্ত | ৬. স্থানীয় মহাজন থেকে প্রাপ্ত |
| ৬. সমবায় প্রতিষ্ঠান হিসেবে প্রতিষ্ঠিত | ৭. অন্যান্য | |

১.৮ কর্মকর্তা ও কর্মচারীর সংখ্যা :

১.৮.১ সর্বমোট সংখ্যা : ১.৮.২ পুরুষঃ ১.৮.৩ নারী :

১.৮.৪ প্রশাসনিক কর্মকর্তা ও কর্মচারীর সংখ্যা :

১.৮.৫ শ্রমিক ও অন্যান্য কর্মচারীর সংখ্যা :

১.৯ কাঁচামাল সংক্রান্ত তথ্যঃ

| ক্রমিক নং | ব্যবহৃত কাঁচামাল | কাঁচামালের উৎস | |
|-----------|------------------|----------------|---------------|
| | | স্থানীয় (%) | আমদানিকৃত (%) |
| ১ | | | |
| ২ | | | |
| ৩ | | | |
| ৪ | | | |
| ৫ | | | |

১.১০ উৎপাদিত পণ্য :

১.১০.১ উৎপাদিত পণ্যের প্রকার (কোড) :

কোড ১.১০.১ : উৎপাদিত পণ্যের প্রকার

| | | | |
|------------------------------|-------------------------|-------------------------|-----------------------------|
| ১. ইট | ২. প্রক্রিয়াজাতকৃত মাছ | ৩. দুধ ও দুগ্ধজাত খাবার | ৪. গৃহস্থালির পণ্যসামগ্রী |
| ৫. ভোজ্য তেল | ৬. ডিম/পোল্ট্রি | ৭. প্যাকেটজাত খাবার | ৮. তামাকজাত দ্রব্য |
| ৯. কৃষিজাত পণ্য | ১০. ধাতব পাত্র | ১১. সুতা ও বস্ত্র | ১২. ঔষধ |
| ১৩. কাঁচ, টাইলস, রিং স্ল্যাব | ১৪. কাষ্ঠজাত দ্রব্য | ১৫. প্লাস্টিক পণ্য | ১৬. জি আই পাইপ, পানির পাম্প |
| ১৭. রাসায়নিক দ্রব্যাদি | ১৮. হস্তশিল্প পণ্য | ১৯. বরফ/আইসক্রিম | ২০. কৃষি যন্ত্রপাতি |
| ২১. আটা/ময়দা | ২২. আলু সংরক্ষণ | ২৩. সিমেন্ট | ২৪. সিরামিকের তৈজসপত্র |
| ২৫. অন্যান্য | | | |

১.১০.২ উৎপাদিত পণ্য বাজারজাতকরণ :

| ক্রম | বিবরণ | পরিমাণ (%) |
|----------|---|------------|
| ১.১০.২.১ | স্থানীয় বাজার | |
| ১.১০.২.২ | সারা দেশ | |
| ১.১০.২.৩ | রপ্তানির জন্য স্থানীয় রপ্তানিকারককে সরবরাহ | |
| ১.১০.২.৪ | সরাসরি রপ্তানি (বিদেশ) : | |

১.১১ কাঁচামাল ও উৎপাদিত পণ্য বাজারজাতকরণে ব্যবহৃত পরিবহন :

১.১১.১ সড়ক পথ (কোড) :

কোড ১.১১.১ : সড়ক পথের বাহন

| | | | | | | |
|--------|-----------|-----------|----------------------|---------------|--------------|--------------------------------|
| ১. বাস | ২. ট্রাক | ৩. পিকআপ | ৪. মাইক্রোবাস | ৫. মটরসাইকেল | ৬. কার | ৭. ট্যাম্প/বেবি ট্যাক্সি/ভটভটি |
| ৮. অটো | ৯. রিক্সা | ১০. ভ্যান | ১১. গরু/ঘোড়ার গাড়ি | ১২. বাইসাইকেল | ১৩. অন্যান্য | |

১.১১.২ রেলপথ: ১. বাংলাদেশ রেলওয়ে

১.১২ বর্জ্য ব্যবস্থাপনা :

১.১২.১ দৈনিক বর্জ্য উৎপাদনের পরিমাণ ও ধরন : টন

১.১২.১.১ কঠিন : % ১.১২.১.২ তরল : %

১.১২.২ বর্জ্য অপসারণ: ১. পরিশোধিত ২. অপরিশোধিত

১.১২.৩ বর্জ্য অপসারণের স্থান (কোড) :

কোড ১.১২.৩ : বর্জ্য অপসারণের স্থান

| | | | | | |
|-----------------|-------------|--------|--------|-------------|-------------------------|
| ১. রাস্তার পাশে | ২. খোলা মাঠ | ৩. খাল | ৪. নদী | ৫. কৃষি জমি | ৬. বর্জ্য ডাম্পিং স্থান |
|-----------------|-------------|--------|--------|-------------|-------------------------|

১.১২.৪ বর্জ্য অপসারণ স্থানের মালিকানা (কোড) :

কোড ১.১২.৪ : বর্জ্য অপসারণ স্থানের মালিকানা

| | | |
|----------------------------|-----------------|--------------------------------|
| ১. নিজস্ব ডাম্পিং গ্রাউন্ড | ২. সরকারি স্থান | ৩. বেসরকারি মালিকানাধীন জায়গা |
|----------------------------|-----------------|--------------------------------|

১.১৩ বর্জ্য পরিশোধন ব্যবস্থা আছে কি না?

১. হ্যাঁ ২. না

১.১৪ প্রতিষ্ঠান থেকে সৃষ্ট পরিবেশ দূষণ রোধের ব্যবস্থার বিবরণ:

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১.১৫ ই.আই.এ (এনভায়রনমেন্টাল ইমপ্যাক্ট এসেসমেন্ট) করেছেন কি না?

১. হ্যাঁ ২. না

১.১৬ প্রতিষ্ঠানের শ্রমিক - কর্মচারীদের পেশাগত প্রশিক্ষণের ব্যবস্থা আছে কি?

১. হ্যাঁ না ২.

থাকলে প্রশিক্ষণের ধরন (কোড) :

কোড ১.১৬ : প্রশিক্ষণের ধরন

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| ১. প্রতিষ্ঠানে শিক্ষানবিস | ২. সংশ্লিষ্ট পেশার প্রশিক্ষণ কেন্দ্র | ৩. কোম্পানির খরচে বৈদেশিক প্রশিক্ষণ |
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১.১৭ প্রতিষ্ঠানের শ্রমিক-কর্মচারীদের স্বাস্থ্য পরীক্ষার ব্যবস্থা আছে কি?

১. হ্যাঁ ২. না

থাকলে কি ধরনের ব্যবস্থা (কোড) :

কোড ১.১৭ : শ্রমিক-কর্মচারীদের স্বাস্থ্য পরীক্ষার ব্যবস্থার ধরন

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| ১. নিজস্ব ডাক্তার প্রতিদিন নির্দিষ্ট সময়ে প্রতিষ্ঠানে এস স্বাস্থ্য সেবা দেন | ২. কোম্পানির ব্যবস্থানুযায়ী ডাক্তার নিজস্ব চেম্বারে দেখেন |
| ৩. প্রতিষ্ঠানের ভেতর ছোট হাসপাতাল আছে | ৪. স্বাস্থ্য সেবার জন্য আলাদা আর্থিক ভাতা পান |

১.১৮ শিল্প কারখানার পরিবেশ বিষয়ক ছাড়পত্র আছে কিনা (বিবরণসহ) :

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১.১৯ কর্মকর্তা/কর্মচারীদের বাসস্থান সম্পর্কিত তথ্য (কোড) :

কোড ১.১৯ : বাসস্থান

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| ১. শিল্প প্রতিষ্ঠানের নিজস্ব আবাসন | ২. কর্মকর্তা/কর্মচারীদের নিজস্ব বাড়ি | ৩. ভাড়া বাসা | ৪. অন্যান্য |
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১.১৯.১ প্রতিষ্ঠানের নিজস্ব স্টাফ কোয়ার্টার আছে কি? ১. হ্যাঁ ২. না

১.২০ এই প্রতিষ্ঠানের খাবার পানি সরবরাহ (কোড) :

কোড ১.২০ : খাবার পানি সরবরাহ

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| ১. নিজস্ব টিউবওয়েল | ২. সিটি কর্পোরেশনের পাইপ লাইন | ৪. সরবরাহ নাই |
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১.২১ খাবার পানির মান (কোড) : ☐ ভাল ☐ ভাল নয়

১.২২ এই মার্কেট/হাট/বাজার এর গণশৌচাগার ব্যবস্থা (কোড) :

কোড ১.২২ : গণশৌচাগার ব্যবস্থা

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| ১. স্যানিটারী টয়লেট | ২. পিট ল্যাট্রিন | ৩. ব্যবস্থা নাই |
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১.২৩ গণশৌচাগারের মান (কোড) : ☐ ভাল ☐ ভাল নয়

১.২৪ এই কারখানার উৎপাদন কাজের জন্য পানির উৎস (কোড) :

কোড ১.২৪ : পানির উৎস

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| ১. ডিপ টিউবওয়েল | ২. পুকুর | ৩. খাল | ৪. নদী | ৫. পানির প্রয়োজন নাই |
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১.২৫ এই কারখানার বিদ্যুৎ সরবরাহ ব্যবস্থা (কোড) :

কোড ১.২৫ : বিদ্যুৎ সরবরাহ ব্যবস্থা

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| ১. পি.ডি.বি | ২. আর.ই.বি সরবরাহ | ৩. আর.ই.বি সরবরাহ বন্ধ থাকলে নিজস্ব জেনারেটর |
| ৪. আর.ই.বি সরবরাহ বন্ধ থাকলে উৎপাদন বন্ধ হয়ে যায় | ৫. সৌর বিদ্যুৎ | ৬. অন্যান্য |

১.২৬ এই কারখানার বিদ্যুৎ সরবরাহের অবস্থা (কোড) :

কোড ১.২৬ : বিদ্যুৎ সরবরাহ অবস্থা

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| ১. নিয়মিত ও অসুবিধা নাই | ২. অনিয়মিত | ৩. নিয়মিত কিন্তু লো-ভোল্টেজ | ৪. অনিয়মিত ও লো-ভোল্টেজ |
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১.২৭ প্রতিষ্ঠানে উৎপাদিত পণ্যের পরিমাণ (বাৎসরিক) :

..... পিস টন গজ/মিটার

১.২৮ উৎপাদিত পণ্যের মূল্য (বাৎসরিক) : টাকা

১.২৯ শিল্প কারখানার সমস্যা (কোড) :

কোড ১.২৯ : কারখানার সমস্যা

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| ১. অবকাঠামোগত সমস্যা | ২. অপ্রতুল যোগাযোগ ব্যবস্থা | ৩. জ্বালানি সংকট |
| ৪. বর্জ্য অপসারণ সমস্যা | ৫. চাঁদাবাজি | ৬. শ্রমিক অসন্তোষ |
| ৭. আমলাতান্ত্রিক জটিলতা | ৮. আমদানী পণ্যের সাথে অসম প্রতিযোগিতা | ৯. দক্ষ শ্রমিকের অভাব |
| ১০. অর্থনৈতিক কর বসানো | ১১. সময়মত জাহাজীকরণ সংকট | ১২. দুর্নীতি |
| ১৩. প্রয়োজনীয় মূলধনের অভাব | ১৪. ব্যাংক থেকে ঋণ পাওয়ায় সমস্যা | ১৫. অন্যান্য |

১.৩০ উল্লিখিত সমস্যা সমাধানের পরামর্শ থাকলে তার বিবরণ :

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তথ্য প্রদানকারীর নাম :

পদবী :

মোবাইল নম্বর :

তথ্য প্রদানের জন্য ধন্যবাদ

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৫ (রামু উপজেলা, কক্সবাজার ও রাঙ্গুনিয়া উপজেলা, চট্টগ্রাম)
আনুষ্ঠানিক অর্থনৈতিক কর্মকাণ্ড জরিপ প্রশ্নমালা
(ব্যাংক ও বীমা)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :
(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

☐ সকল তথ্য নেয়া হয়েছে

☐ অসম্পূর্ণ

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সুপারভাইজারের স্বাক্ষর

১.১ প্রতিষ্ঠানের ধরন : ☐ ব্যাংক ☐ বীমা

১.২ প্রতিষ্ঠানের নাম ও ঠিকানা :
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২. ব্যাংক

২.১ সেবা প্রদানের খাত (কোড) : কোড ১.২ : সেবার খাত

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| ১. সাধারণ ব্যাংকিং | ২. বৈদেশিক বাণিজ্য | ৩. এস.এম.ই ব্যাংকিং | ৪. মোবাইল ব্যাংকিং | ৫. ই-ব্যাংকিং |
| ৬. চলতি মূলধন ঋণ | ৭. শিল্প ঋণ | ৮. কৃষি ঋণ | ৯. প্রকল্প ঋণ | ১০. অন্যান্য |

২.২ সেবা প্রদানের ক্ষেত্রঃ

যে সব এলাকা এই সেবার আওতাধীন :

২.৩ মোট গ্রাহক :

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| ১. সাধারণ ব্যাংকিং: | ২. বৈদেশিক বাণিজ্য: | ৩. এস.এম.ই ব্যাংকিং: |
| ৪. মোবাইল ব্যাংকিং: | ৫. ই-ব্যাংকিং: | ৬. চলতি মূলধন ঋণ: |
| ৭. শিল্প ঋণ: | ৮. কৃষি ঋণ: | ৯. প্রকল্প ঋণ: |
| ১০. অন্যান্য: | | |

২.৪ মোট প্রদত্ত ঋণের পরিমাণ : টা..... ২.৪.১ মোট আনাদায়ী ঋণের পরিমাণ টা.....

২.৪.২ কৃষি -ঋণের পরিমাণ : টা.....

২.৫ মোট ঋণ খেলাপি : ২.৫.১ কৃষি ঋণ খেলাপি : ২.৫.২ অকৃষি ঋণ খেলাপি :

২.৫.৩ অন্যান্য :

৩. বীমা

৩.১ সেবা প্রদানের খাত (কোড) : কোড ১.২ : সেবার খাত

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| ১. সাধারণ বীমা | ২. জীবন বীমা | ৩. যানবাহন বীমা | ৪. স্বাস্থ্য বীমা | ৫. গৃহ বীমা |
| ৬. শস্যঝুঁকি বীমা | ৭. অগ্নি বীমা | ৮. গবাদি পশু বীমা | ৯. দুর্ঘটনা বীমা | ১০. নৌ-বীমা |
| ১১. শ্রম বীমা | ১২. শিক্ষা বীমা | ১৩. ঝুঁকি বীমা | ১৪. অন্যান্য:..... | |

৩.২ সেবা প্রদানের ক্ষেত্রঃ

যে সব এলাকা এই সেবার আওতাধীন :

৩.৩ মোট গ্রাহক :

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| ১. সাধারণ বীমা: | ২. জীবন বীমা: | ৩. যানবাহন বীমা: |
| ৪. স্বাস্থ্য বীমা: | ৫. গৃহ বীমা: | ৬. শস্যঝুঁকি বীমা: |
| ৭. অগ্নি বীমা: | ৮. গবাদি পশু বীমা: | ৯. দৃঘর্টনা বীমা: |
| ১০. নৌ-বীমা: | ১১. শ্রম বীমা | ১২. শিক্ষা বীমা |
| ১৩. ঝুঁকি বীমা | ১৪. অন্যান্য: | |

৩.৪ নিয়মিত প্রিমিয়াম প্রদানকারী গ্রাহকের সংখ্যা.....

৩.৫ সংগ্রহকৃত মোট প্রিমিয়ামের পরিমাণ:টাকা/মাসিক

৩.৬ বকেয়া প্রিমিয়াম প্রদানকারী গ্রাহকের সংখ্যা.....

৩.৭ বকেয়া প্রিমিয়ামের পরিমাণ:টাকা/মাসিক

৪.১ ব্যাংকিং/বীমা কার্যক্রম পরিচালনায় যে সব সমস্যার মোকাবিলা করতে হয়ঃ

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৪.২ সমস্যাগুলোর সমাধানে পরামর্শ :

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তথ্য প্রদানকারীর নাম :

মোবাইল নম্বর :

পদবী :

তথ্য প্রদানের জন্য ধন্যবাদ

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৫ (রামু উপজেলা, কক্সবাজার ও রাঙ্গুনিয়া উপজেলা, চট্টগ্রাম)
আনুষ্ঠানিক অর্থনৈতিক কর্মকান্ড জরিপ প্রশ্নমালা
(এন.জি.ও.)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :

(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

☐ সকল তথ্য নেয়া হয়েছে

☐ অসম্পূর্ণ

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সুপারভাইজারের স্বাক্ষর

১. এন.জি.ও. (নন গভমেন্ট অর্গানাইজেশন)

১.১ এন.জি.ও.-র নাম :

১.২ এন.জি.ও.-র ঠিকানা :

১.৩ প্রতিষ্ঠানের কর্মকান্ড পরিচালনার ব্যাপ্তি (কোড) :

কোড ১.৩ : প্রতিষ্ঠানের কর্মকান্ড পরিচালনার ব্যাপ্তি

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| ১. সারাদেশ | ২. সিটি কর্পোরেশন এলাকা | ৩. ওয়ার্ড ভিত্তিক |
| ৪. গ্রাম ভিত্তিক | ৫. স্বল্প আয় শ্রেণির জন্য | ৬. বিভাগ ভিত্তিক |
| ৭. জেলা ভিত্তিক | ৮. অন্যান্য | |

১.৪ সেবার ধরন (কোড) :

কোড ১.৪ : সেবার ধরন

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| ১. বিভিন্ন ট্রেডে প্রশিক্ষণ | ২. উন্নত বীজ সরবরাহ | ৩. সামাজিক বনায়নে উদ্বুদ্ধকরণ |
| ৪. তামাক প্রক্রিয়াজাতকরণ | ৫. পানির আর্সেনিক দূরীকরণ বা সতর্কীকরণ | ৬. চারাগাছ বিতরণ |
| ৭. ঋণ প্রদান | ৮. ভূমির উর্বরতা হ্রাস ও প্রতিকার বিষয়ে প্রশিক্ষণ | ৯. বিভিন্ন জনগুরুত্বপূর্ণ বিষয়ে জনসচেনতা সৃষ্টি |
| ১০. অন্যান্য : | | |

১.৫ কর্মকান্ডের সুবিধাভোগী শ্রেণি

কোড ১.৫ : সুবিধাভোগী শ্রেণি

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| ১. নিম্ন আয়ের জনসাধারণ | ২. পেশা ভিত্তিক জনগোষ্ঠী | ৩. ইস্যুভিত্তিক সুবিধাভোগী |
| ৪. বিশেষ বৈশিষ্ট্য এলাকাভিত্তিক সুবিধাভোগী | ৫. অন্যান্য | |

১.৬ সমিতির মোট সদস্য সংখ্যা : জন

তথ্য প্রদানকারীর নাম :

মোবাইল নম্বর :

পদবী :

তথ্য প্রদানের জন্য ধন্যবাদ

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভেলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৫ (রামু উপজেলা, কক্সবাজার ও রাঙ্গুনিয়া উপজেলা, চট্টগ্রাম)
আনুষ্ঠানিক অর্থনৈতিক কর্মকান্ড জরিপ প্রশ্নমালা
(সি. বি. ও)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ

সাক্ষাৎকার গ্রহণকারীর নামঃ সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :

(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

☐ সকল তথ্য নেয়া হয়েছে

☐ অসম্পূর্ণ

.....
সুপারভাইজারের স্বাক্ষর

১. সি. বি. ও (কমিউনিটি বেইজড অর্গানাইজেশন)

১.১ সি.বি.ও.-র নাম :

১.২ সি.বি.ও.-র ঠিকানা :

১.৩ প্রতিষ্ঠানের কর্মকান্ড পরিচালনার ব্যাপ্তি (কোড) :

কোড ১.৩ : প্রতিষ্ঠানের কর্মকান্ড পরিচালনার ব্যাপ্তি

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| ১. সারাদেশ | ২. সিটি কর্পোরেশন এলাকা | ৩. ওয়ার্ড ভিত্তিক |
| ৪. গ্রাম ভিত্তিক | ৫. স্বল্প আয় শ্রেণির জন্য | ৬. বিভাগ ভিত্তিক |
| ৭. জেলা ভিত্তিক | ৮. অন্যান্য | |

১.৪ সেবার ধরন (কোড) :

কোড ১.৪ : সেবার ধরন

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| ১. বিভিন্ন ট্রেডে প্রশিক্ষণ | ২. উন্নত বীজ সরবরাহ | ৩. সামাজিক বনায়নে উদ্বুদ্ধকরণ |
| ৪. তামাক প্রক্রিয়াজাতকরণ | ৫. পানির আর্সেনিক দূরীকরণ বা সতর্কীকরণ | ৬. চারাগাছ বিতরণ |
| ৭. ঋণ প্রদান | ৮. ভূমির উর্বরতা হ্রাস ও প্রতিকার বিষয়ে প্রশিক্ষণ | ৯. বিভিন্ন জনগুরুত্বপূর্ণ বিষয়ে জনসচেনতা সৃষ্টি |
| ১০. অন্যান্য : | | |

১.৫ কর্মকান্ডের সুবিধাভোগী শ্রেণি

কোড ১.৫ : সুবিধাভোগী শ্রেণি

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| ১. নিম্ন আয়ের জনসাধারণ | ২. পেশা ভিত্তিক জনগোষ্ঠী | ৩. ইস্যুভিত্তিক সুবিধাভোগী |
| ৪. বিশেষ বৈশিষ্ট্য এলাকাভিত্তিক সুবিধাভোগী | ৫. অন্যান্য | |

১.৬ সমিতির মোট সদস্য সংখ্যা : জন

তথ্য প্রদানকারীর নাম :

মোবাইল নম্বর :

পদবী :

তথ্য প্রদানের জন্য ধন্যবাদ

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
গৃহায়ন ও গণপূর্ত মন্ত্রণালয়
নগর উন্নয়ন অধিদপ্তর
প্রিপারেশন অফ ডেভলপমেন্ট প্ল্যান ফর ফরটিন উপজেলাস প্রকল্প
প্যাকেজ নং-৫ (রামু উপজেলা, কক্সবাজার ও রাঙ্গুনিয়া উপজেলা, চট্টগ্রাম)
আনুষ্ঠানিক অর্থনৈতিক কর্মকাণ্ড জরিপ প্রশ্নমালা
(মার্কেট/কাঁচাবাজার/হাট)

প্রশ্নমালা নংঃ জরিপের তারিখঃ সময়ঃ.....

সাক্ষাৎকার গ্রহণকারীর নাম ও মোবাইল নম্বর : সাক্ষাৎকার গ্রহণকারীর স্বাক্ষর :

(শুধুমাত্র দাপ্তরিক কাজের জন্য)

তথ্য লিপিবদ্ধকারীর নাম ও স্বাক্ষরঃ তারিখ :.....

তথ্য নিরীক্ষকের নাম ও স্বাক্ষরঃ তারিখ :.....

☐ সকল তথ্য নেয়া হয়েছে

☐ অসম্পূর্ণ

.....
সুপারভাইজারের স্বাক্ষর

১. মার্কেট/কাঁচাবাজার/হাট

১.১ মার্কেট/হাট/বাজারের নামঃ

১.২ এই মার্কেট/হাট/বাজার কোন সংস্থার কর্তৃত্বাধীন (কোড) :

কোড ১.২ : মালিকানা

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| ১. ব্যক্তি মালিকানাধীন | ২. উপজেলা পরিষদ | ৩. স্থানীয় সরকার প্রকৌশল বিভাগ | ৪. সিটি কর্পোরেশন |
| ৫. সমবায় সমিতি | ৬. জেলা পরিষদ | ৭. অন্য কোন সরকারি প্রতিষ্ঠান | ৮. অন্যান্য |

১.৩ এই মার্কেট/হাট/বাজার কিভাবে পরিচালিত হয়? (কোড) :

কোড ১.৩ : পরিচালনার ধরন

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| ১. সমিতির মাধ্যমে | ২. উপজেলা পরিষদ কর্তৃক সরাসরি | ৩. ইজারাদার কর্তৃক |
| ৪. মালিক কর্তৃক | ৫. সিটি কর্পোরেশন কর্তৃক সরাসরি | ৬. অন্যান্য |

১.৪ ইজারাদার দ্বারা পরিচালিত হলে বর্তমান অর্থ বছরে ইজারার পরিমাণ : টাঃ

১.৫ মার্কেট/হাট/বাজারের আয়তন : একর/বিঘা

১.৬ মার্কেট/হাট/বাজারে কত সংখ্যক দোকান আছে?

১.৭ কত ধরনের ব্যবসা হয় এই মার্কেট/বাজার বা হাটে? (সম্ভব হলে পাশে দোকানের সংখ্যা লিখুন)

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| মুদি দোকান | ক্রোকারি সামগ্রী | মাংস বিক্রির দোকান |
| স্টেশনারি দোকান | হাঁড়ি-পাতিলের দোকান | গরু/ছাগলের হাট |
| কনফেকসনারি দোকান | সেলুন | প্লাস্টিক আসবাব ও সামগ্রী |
| মোবাইল বিক্রয় ও মেরামত | সজির বাজার | মাইক ভাড়া |
| মোবাইল কার্ড ও ফ্লেক্সিলোড | মাছের বাজার | সি আই সিট |
| ঘড়ি ও ইলেক্ট্রনিক্স সামগ্রী | চাপকল ও এর যন্ত্রাংশ | কামারের দোকান |
| জুতার দোকান | স্যালাইন ইঞ্জিন মেরামত | রেস্তুরা |
| তৈরি পোষাকের দোকান | হার্ডওয়্যার সামগ্রী | পাইপের দোকান |
| কাপড়ের দোকান | স্যানিটারি সামগ্রী | নির্মাণ সামগ্রী |
| দর্জি দোকান | মটর সাইকেল মেরামত | স্বর্ণের দোকান |
| সিমেন্ট | রড | অন্যান্য |

১.৭ (ক) হাট বসার ধরন (কোড) :

কোড ১.৭(ক) : হাট বসার ধরন

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| ১. দৈনিক | ২. সাপ্তাহিক | ৩. সপ্তাহে দুই/তিন দিন |
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১.৭ (খ) বাজার বসার ধরন (কোড) :

কোড ১.৭(খ) : বাজার বসার ধরন

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| ১. দৈনিক | ২. সকাল | ৩. সন্ধ্যা |
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১.৭ (গ) এই মার্কেট/হাট/বাজার এর বিদ্যুৎ সরবরাহঃ ☐ আছে ☐ নাই

১.৭ (ঘ) এই মার্কেট/হাট/বাজার এর খাবার পানি সরবরাহ (কোড) :

কোড ১.৭(ঘ) : খাবার পানি সরবরাহ

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| ১. টিউবওয়েল | ২. পুকুর | ৩. সিটি কর্পোরেশনের পাইপ লাইন | ৪. সরবরাহ নাই |
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১.৭ (ঙ) এই মার্কেট/হাট/বাজার এর গণ শৌচাগার ব্যবস্থা (কোড) :

কোড ১.৭(ঙ) : গণ শৌচাগার ব্যবস্থা

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| ১. স্যানিটারী টয়লেট | ২. পিট ল্যাট্রিন | ৩. ব্যবস্থা নাই |
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১.৮ এই মার্কেটে মাসিক লেন-দেনের পরিমাণ?

১.৯ মাসে কি পরিমাণ ভাড়া বা টোল আদায় হয়?

১.১০ বর্জ্য অপসারণের দায়িত্ব কার? (কোড) :

কোড ১.১০ : বর্জ্য অপসারণকারী

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| ১. ইজারাদার | ২. দোকানদার মালিক সমিতি | ৩. সিটি কর্পোরেশন | ৪. মার্কেট/হাট/ বাজার কমিটি |
| ৫. দোকানের মালিক | ৬. বেসরকারি সাহায্যসংস্থা | ৭. জেলা পরিষদ | ৮. অন্যান্য : |

১.১১ কিভাবে বর্জ্য অপসারিত হয় (কোড) :

কোড ১.১১ : বর্জ্য অপসারণের মাধ্যম

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| ১. নিজস্ব লোক দ্বারা | ২. নিজস্ব ভ্যানে করে | ৩. কমিউনিটি ভ্যানে করে |
| ৪. বেসরকারি সংস্থার ভ্যানে করে | ৫. বেসরকারি সংস্থার ট্রাকে করে | ৬. সিটি কর্পোরেশনের গাড়িতে |
| ৭. বর্জ্য অপসারণের ব্যবস্থা নেই | ৮. অন্যান্য : | |

১.১২ কোথায় বর্জ্য ফেলা হয় (কোড) :

কোড ১.১২ : বর্জ্য ফেলার স্থান

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| ১. নিকটস্থ ডাষ্টবিনে | ২. বর্জ্য ফেলার নির্দিষ্ট স্থানে | ৩. রাস্তার পার্শ্বে | ৪. নিচু/পতিত জমিতে |
| ৫. নদীতে বা খালে | ৬. অন্যান্য : | | |

১.১৩ মার্কেট/হাট বাজারে/যাতায়াতের ব্যবস্থা (কোড) :

কোড ১.১৩ : যাতায়াত ব্যবস্থা

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| ১. রাস্তা | ২. নৌ পথ | ৩. রাস্তা নেই | ৪. অন্যান্য : |
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১.১৪ আপনার প্রতিষ্ঠানের নিম্নবর্ণিত প্রতিবেদন থাকলে সরবরাহ করার অনুরোধ করা হলো :

- বাৎসরিক প্রতিবেদন
- মার্কেটের লে আউটপ্ল্যান
- পরিবেশ সংক্রান্ত প্রতিবেদন
- প্রতিষ্ঠান পরিচালনার বাজেট
- প্রতিষ্ঠানের উন্নয়ন, ট্রেনিং বা কর্মকর্তা কর্মচারীদের গুণগত মান উন্নয়নের জন্য নীতিমালা
- ভূমি উন্নয়ন, পানি নিষ্কাশন, পয়নিষ্কাশন, পরিবহন সংক্রান্ত প্রতিবেদন

১.১৫ পরিচালনা কমিটি/সমিতির বক্তব্য

১.১৫.১ মার্কেট/হাট-বাজার ব্যস্থাপনায় কোন সমস্যা থাকলে উল্লেখ করুন :

.....
.....
.....

১.১৫.২ সমস্যা উত্তরণের সম্ভাব্য সমাধান বা দিক নির্দেশনামূলক কিছু বলুন :

.....
.....
.....

তথ্য প্রদানকারীর নাম :

মোবাইল নম্বর :

পদবী :

তথ্য প্রদানের জন্য ধন্যবাদ

ANNEXURE-2

PHOTOGRAPHS OF STAKEHOLDERS

CONSULTATION/INTERVIEW OF RANGUNIA UPAZILA



Photographs of Mariamnagar



Photographs of Mariamnagar



Photographs of Lichu Bagan



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas

Package 05:

**Ramu Upazila, District: Cox's Bazar &
Rangunia Upazila, District: Chittagong**

FINAL SURVEY REPORT

Traffic and Transportation Survey of Rangunia Upazila

June 2016

Joint venture of

 **HOUSE OF CONSULTANTS LIMITED (HCL)**

and

 **dm.Watch Disaster Management Watch(dm. Watch)**

EXECUTIVE SUMMARY

Rangunia is well connected with the communication network of the country. The regional Highway R-163 from Chittagong to Kaptai has passes over the middle part of the Upazila from west to south acting as the main road of the Upazila. The national Highway N-07 from Chittagong to Rangamati has passes over at northern part of the Paurashava. It is well connected by National and Regional Highway originating from different Districts/Upazilas like Chittagong, Bandarban, Rangamati, Comilla etc. Total road length in this Upazila is 1072 km of which around 169 km is pucca, around 339 km is Katcha and rest are semi Pucca (CDMP-2014).

There are two bus terminals in the study area namely Dhamairhat Bus Terminal and Lichu Bagan Bus Terminal. There is no defined truck terminal at Upazilla and existing bus terminal are using as truck stand. There is no railway network in Rangunia Upazilla. The river Karnaphuli follows on the Upazila provided river-way network. The people mainly cross the river from one side to the other side of the river by boat. They do not use the river for long distance journey.

Major traffic congestion areas of the Upazila are Rowajar Hat, Mariamnagar, Lichu Bagan and Godown area. Traffic congestion occurs due to lack of footpath, lack of shoulder, surface condition, insufficient road width, haphazard trip generation, lack of bus bays, behavioral problems of pedestrians, problems of land use patterns etc.

There is 4 (four) intersections and one important link within the Upazila. Within all links the highest PCU passing through the link on Hat-Day is 698 at Shantirhat-Godwon link and the lowest on Hat Day is 234 at Chowmuhan-Shaperdanga link. Within all vehicles passes through the different link of the intersection above 80% are motorized vehicle and up-to 20% are non-motorized vehicle.

Within all the trips passes over the Upazila have originated and distributed within Chittagong, Raojan and Rangamati. The rest of the trips go to the other places through Rangunia. Around 33% of the trips are generating for work purpose, 25% for different social reasons, 14% for shopping, 10% for recreation, 9% for educational purpose and rest 9% for business purpose.

This is a submission of the traffic and transportation survey report as a part of Survey Report as per TOR of the project and mainly describes the traffic and transportation survey activities performed as per TOR.



S.M. Abdullah Al-Masum
Senior Urban Planner

ABBREVIATION AND ACRONYMS

| | |
|------|---|
| CUET | - Chittagong University of Engineering & Technology |
| DC | - District Commissioner |
| LGED | - Local Government Engineering Department |
| OD | - Origin and Destination |
| PCE | - Passenger Car Equivalent |
| PCU | - Passenger Car Unit |
| PRA | - Participatory Rural Appraisal |
| RHD | - Roads and Highway Department |
| TAZ | - Traffic Analysis Zone |
| TOR | - Terms of Reference |
| UDD | - Urban Development Directorate |

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Chapter-1 Introduction

1.1 Introduction

Transportation linkages are integral to any Master Plan Project. In fact the growth and development of towns and cities or any region are so much dependent on the condition of transportation, that any deterioration in the latter automatically signify decline of the respective towns or regions. The opposite is also true in the sense that improved transportation enhances the growth possibilities of the settlements falling in their alignments. Detailed study of present availability and future development prospects of transportation is therefore of paramount importance. The following paragraphs stand witness to our concern of these vital aspects. The consultant has collected, collated and reviewed all relevant data from past studies and reports on traffic. Reviewing of this information has been helped identify the data gaps and the need for and extent of additional surveys and investigations required to prepare the report.

1.2 Inventory of Transportation Infrastructure and Facilities

This component of information is essentially in the preparation of an inventory of existing facilities available, in the study area for the transportation of passengers and goods by all the modes of road and river. The required information has been collected from RHD, LGED, Rangunia Paurashava and Rangunia Upazilas well as field surveys conducted by the consultants. Major information has been collected by mode is mentioned below.

Road

- Road network by hierarchy
- Physical condition of roads (row, x-sectional elements, pavement type and condition etc.)
- Geometries of major road intersections
- Truck routes and their loading unloading areas
- Bus route and terminals
- Traffic control, management, and signaling
- Parking

River

- Location of existing ghats
- Physical condition and facilities
- River route

1.3 Survey Methodology

1.3.1 Sampling Technique

The initial sample size was determined by the following formula

$$n = \frac{z^2 pq}{d^2} \quad \text{Where,}$$

z is the normal variation and which has 1.96 for 95% confidence interval

p is the target proportion. In this case, we have assumed p= 0.5

p+q =1, therefore q=0.5

And d is the desired error which is 0.1.

(Cochran, 1963)

The initial sample size is therefore:

$$n_0 = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.1)}$$

$$= 96.04$$

These sample size was adjusted by using the following formula:

$$n = \frac{n_0}{1 + \frac{n_0}{N}}$$

Where n is requiring sample size and N is no. of Population of Upazila.

1.3.2 Conducted Surveys

Existing road network, road classification and other road information data has collected through inventory, local consultation and physical feature survey. Besides in order to identify the major causes of the congestion and the nature of the problem on transportation networks, a number of tasks were undertaken. Those tasks included traffic volume counting at directions, speed and delay studies, Origin & Destination (O-D) survey at major traffic generating intersections, regional network analysis, bus passenger study, consultation with the stakeholders regarding traffic and transportation problems etc. The volume and movement pattern of people and goods within the study area were collected through a series of traffic count and O-D surveys. In addition to collecting information on volume and pattern of traffic movement by traffic survey, the consultants have accommodate certain important questions regarding people's attitude, preference etc. To know the above discussed scenario the consultants have conducted a number of surveys on traffic and transportation which are as follows:

- A. Traffic Volume Count Survey
- B. Origin & Destination(O-D) Survey
- C. Bus Passenger Interview Survey and
- D. Regional Transportation Survey

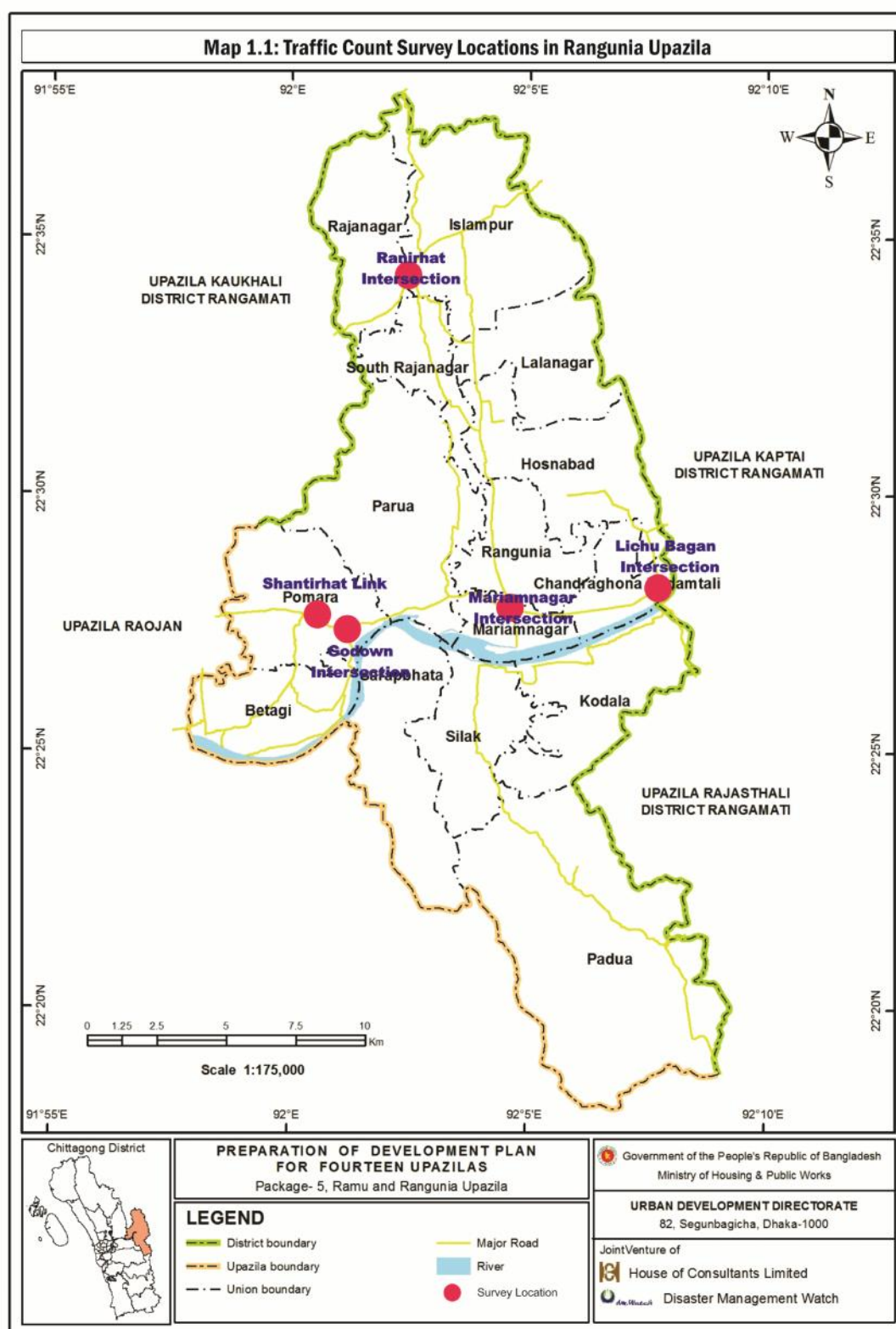
Here, Rangunia has the population of 339004. After applying the above formula, it is found that minimum 96 samples will be surveyed for each category of survey. Considering the formula, the sample size of traffic and transportation surveys have been determined.

A reconnaissance survey was carried out on the study area and a survey plan was prepared considering the requirement of TOR. To understand the present nature and impact of the transportation system several surveys were conducted. To know the hourly traffic volume, 4 (four) important intersections and 1(one) important road link (Entrance Point) of Rangunia were surveyed (Please See **Map 1.1**). For understanding the traffic flow generations and travel behavior OD survey has conducted at the roadside of important junctions and intersections (Please See **Map 1.2**). Regional Transportation survey has conducted on the Bus and Truck terminal to know the no. of vehicles entering or exiting from the study area (Please See **Map 1.3**). Bus /Boat Passenger survey has conducted at the bus terminal and Ferry Ghat (Please See **Map 1.4**).

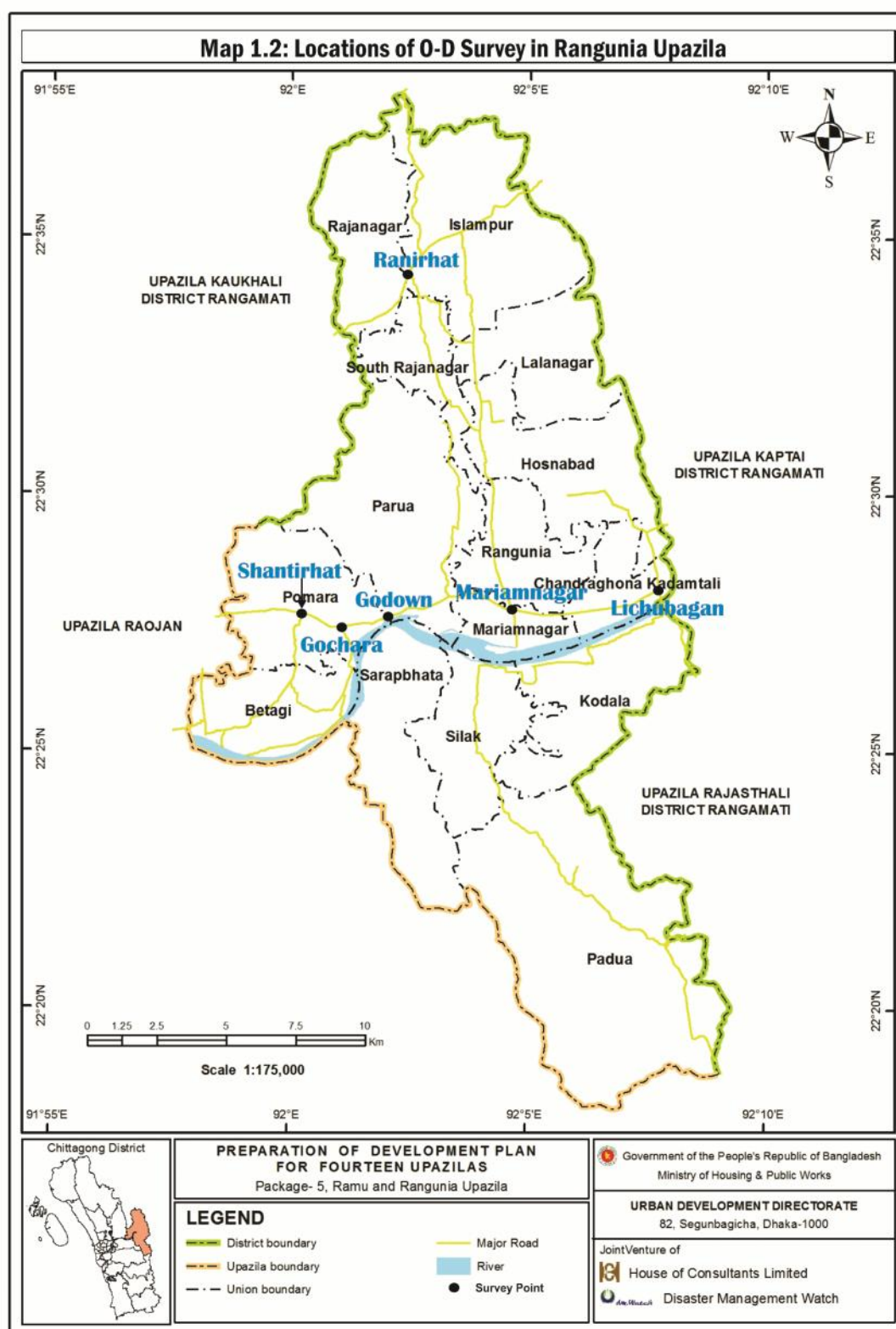
A. Traffic Volume Count Survey

Traffic volume means the number of vehicles passing a particular section of the road per unit time at a specified time. Such traffic volume study can be done mechanically or manually. Traffic movement variations are measured for different hours of a day and then variation in different days. Traffic count has done from different stations and such stations were located where traffic volume is the most. Vehicle counts has been made for five days on Hat day (Saturday and Tuesday of each week for Shantirhat, Godown and Ranirhat, Friday and Monday for Mariamnagr and Lichubagan) and Non Hat day at four important intersections (control stations) and one road section/link to raise the survey data for 3(three) predetermined hours (8:30 am to 9:30am, 12:30 pm to 1:30 pm and 4:30 pm to 5:30 pm). The survey has been conducted on prescribed format approved by UDD (Please See **Annexure-1**). The intersection have been selected on the basis of its importance and connectivity. For conducting survey work at Cross Intersection survey team member were at least 9 (nine) including 8(eight) Surveyor and 1(one) Survey Coordinator. For each T Intersection survey team member were at least 7(seven) members including 6(Six) Surveyor and 1(one) Survey Coordinator. In each link there are two directions and for each direction one member for making a classified count of all vehicles and pedestrians passing out. Manual hand-held counter has been used for counting purpose. Depending on reconnaissance in most locations, survey hours have been between 9:30 am to 12:30 pm and 1:30 pm to 4:30 hours.

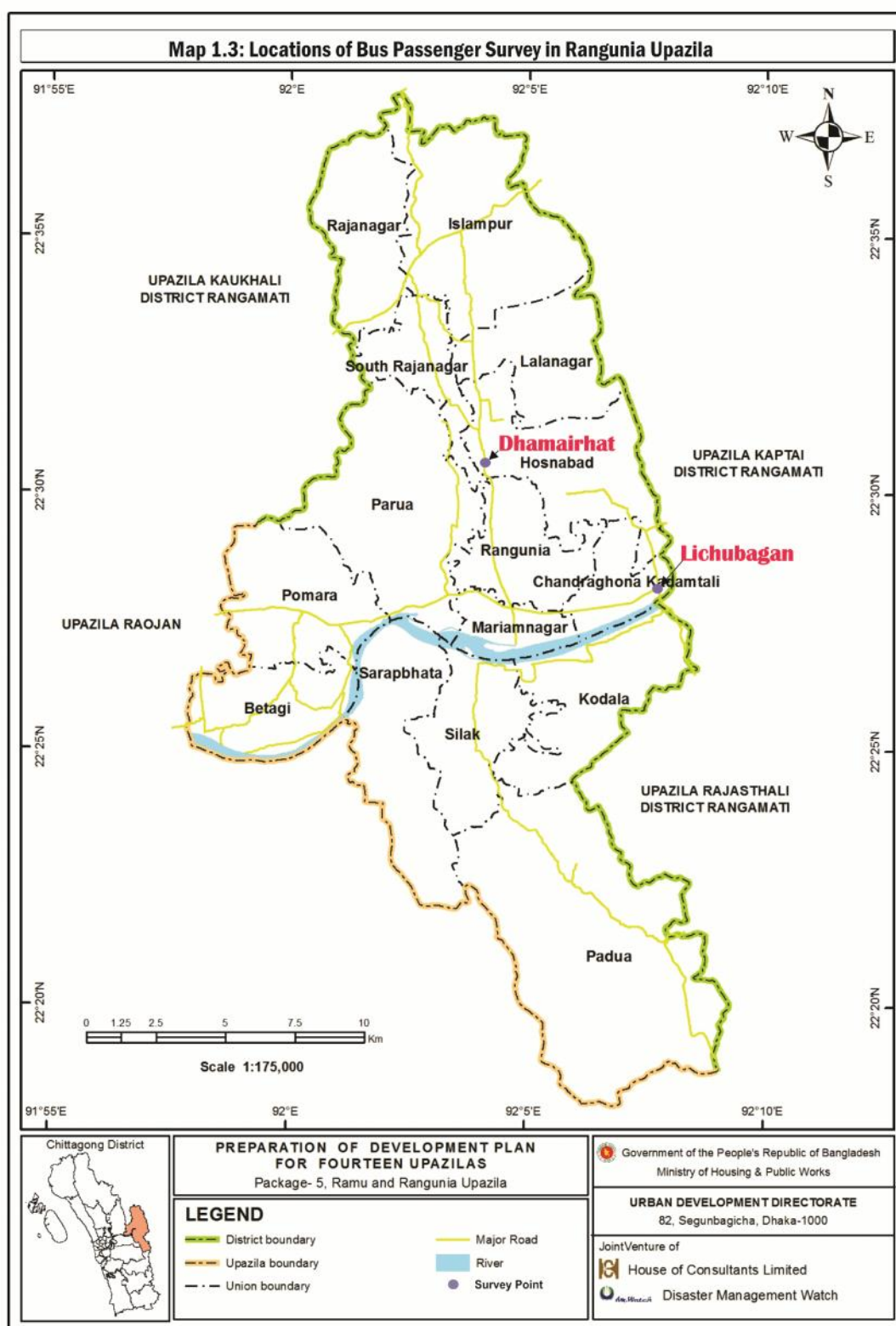
The counted traffic has converted into Passenger Car Unit (PCU) from Passenger Car Equivalence (PCE), the method of expressing various types of vehicles having different characteristics in a common equivalent unit. The reason to calculate PCU values for each vehicle was to bring them in a same unit form which output was drawn. Different vehicles were with different PCE value in accordance with their capacity to bear goods or people and the space that the vehicle required to move on the road. For computing total PCU values, the individual vehicle frequency is multiplied by its unique PCU value. The list of standard PCU values for different vehicles has shown below.



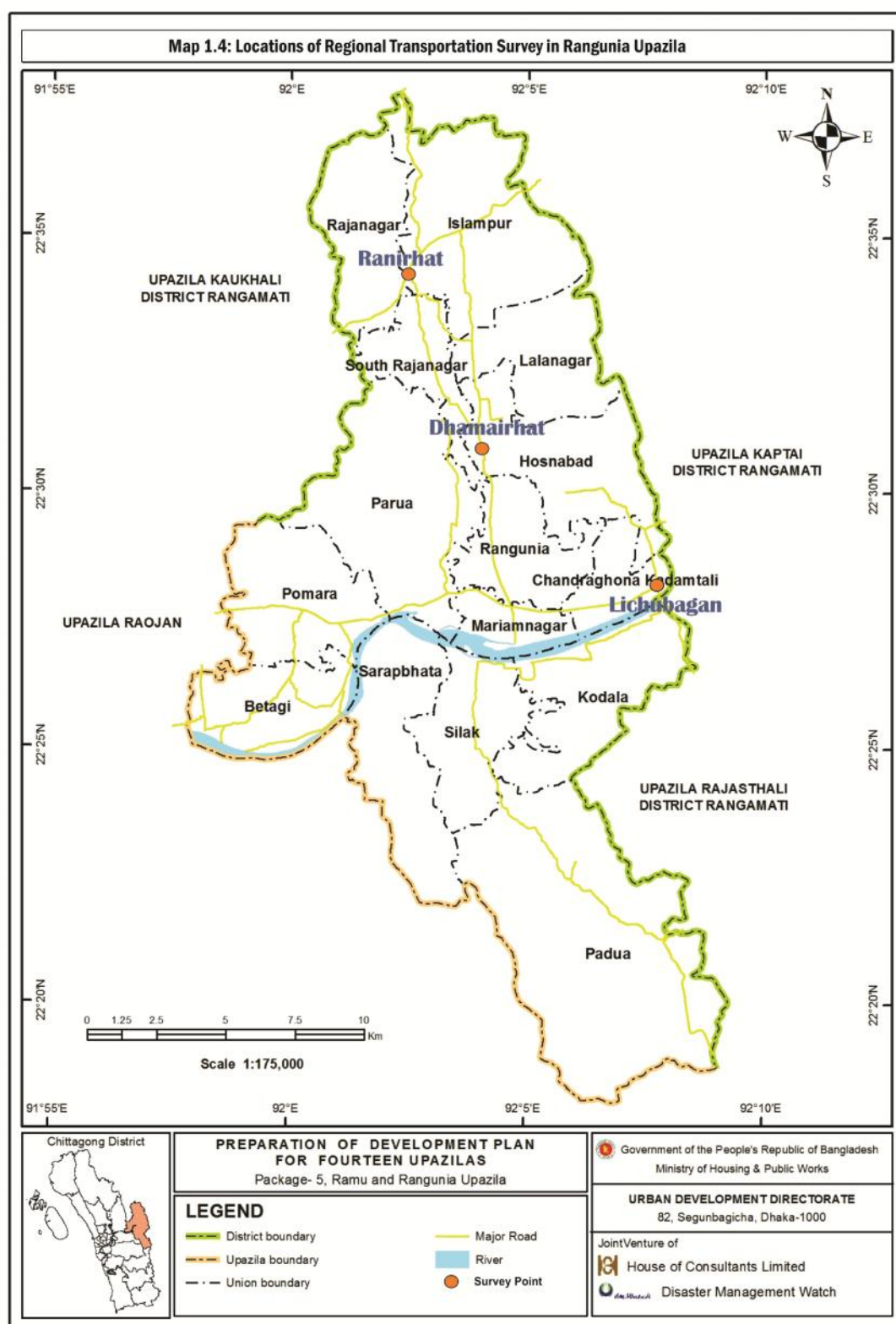
Source: Traffic and Transportation Survey, 2016



Source: Traffic and Transportation Survey, 2016



Source: Traffic and Transportation Survey, 2016



Source: Traffic and Transportation Survey, 2016

Table 1.1: List of PCU value for various Vehicles

| Sl. No. | Vehicle Categories | PCE |
|---------|-----------------------------|------|
| 1 | Passenger Car | 1.00 |
| 2 | Light Goods Vehicle | 1.00 |
| 3 | Truck | 3.00 |
| 4 | Bus | 3.00 |
| 5 | Auto-Rickshaw | 0.75 |
| 6 | Motor-cycle, moped, scooter | 0.75 |
| 7 | Paddle Cycle | 0.50 |

Source: Ministry of Communications, 2000 (Cited in Roads & Highways, 1994)

B. Origin & Destination Survey

In order to determine the transportation needs and appropriate solutions for an area it is important to have an understanding of the underlying characteristics of travel. The origins and destinations of traffic are among the most important of these characteristics.

By knowing where traffics were coming from and going to, better estimates could be made about where traffic would reroute itself if a particular street were closed. This information is especially important in trying to gauge the amount of possible spillover. Another purpose of the survey is to determine how much of the traffic are generated from within the neighborhood and how much of it is ‘through’ traffic which does not have an origin or a destination in the neighborhood.

A comprehensive O-D survey extended to the whole of the study area has been carried out. For this purpose, the whole survey area has been divided into a suitable number of traffic analysis zones (TAZs) depending on the homogeneity of activities in the zone.

The road side interview method has been followed. Vehicles of all types has been stopped and questioned regarding their origin and destination and other journey data. The surveyors have been entered all this information in a preceded form.

The interview sites have been located near important intersection surveyed. Four O-D survey spots have been fixed (Please See **Map 1.2**). Each interview team has been consisted of at least 5 members, two members for each direction and a team coordinator. In each direction one member for making a classified count of all vehicles and pedestrians passing and the other member conducting the actual interviews. Manual hand-held counter has been used for counting purpose. Sampling procedure has been used for taking interviews. Depending on field conditions in most locations, survey hours have been between 9:30am to 12:30 pm and 1:30 pm to 4:30 hours. Format of O-D survey is appended in **Annexure-3**.

C. Bus Passenger Survey

The bus passenger interview survey has been conducted at two important bus stoppage on the basis of random sampling. Bus Passenger interview survey has been made at existing bus terminals and bus stands both arriving and departed passengers (Please See **Map 1.3**). Bus Passengers of each route has been interviewed. Format of Bus Passenger survey is appended in **Annexure-3**.

D. Regional Network System Analysis

To know the regional linkage number of trips going out or coming into study area by Bus and Truck including their distance, character has been determined. Regional Survey was conducted how many bus or truck coming or going from study area. The surveyed area was selected at the bus (Dhamairhat Bus Terminal & Lichu Bagan Bus Terminal) and truck terminal as to know the frequency easily (Please See **Map 1.4**). Format of traffic survey is appended in **Annexure-4**. Following format are used for data collection for traffic survey:

- | | |
|---|----------------|
| 1. Format of Traffic Volume Count Survey | - Annexure: 01 |
| 2. O-D Survey Questionnaire | - Annexure: 02 |
| 3. Bus Passenger Interview Survey Questionnaire | - Annexure: 03 |
| 4. Regional Transportation Questionnaire | - Annexure: 04 |

1.4 Survey Team Mobilization

1.4.1 Team Formation

The total survey has been conducted with direct coordination and supervision of Transport Planning Expert with the support of urban planner and surveyors. To conduct the transportation survey, 15(fifteen) Surveyors comprising 12(twelve) students from Urban & Regional Planning Department of Chittagong University of Engineering & Technology (CUET) and 3(three) local honors students were selected. The designated Transport Expert of this project has leaded the group as Group Coordinator. The names of the study group are given in following table:

Table 1.2: Team Composition for Traffic and Transportation Study

| Sl. No. | Name | Designation |
|---------|-----------------------|---|
| 1 | Atif Maswood M Sadi | Transport Planning Expert (Group Coordinator) |
| 2 | Mohammad Kawsar Uddin | Asst. Planner (Deputy Coordinator) |
| 3 | Surveyor | 15 Nos. |

The responsibilities of the survey team have given in the following table:

Table 1.3: responsibilities of the survey team for Traffic and Transportation Study

| Designation | Responsibility |
|---------------------------|---|
| Transport Planning Expert | Overall supervision and co-ordination of traffic survey, data processing and mapping |
| Assistant Urban Planner | To conduct the survey, Supervision and conducting the survey with the help of Transport Expert. |
| Transport Surveyors | To do the work on the extent of different of surveys. |

1.4.2 Training Session

A day long training session was conducted by the Transport Expert to provide the sufficient knowledge about the aspects and importance of the transportation survey and the way how to collect the data through survey.



Plate 1: Field Training of the surveyors by Transport Planning Expert at Mariamnagar Intersection

Source: Traffic and Transportation Survey, 2016

1.4.3 Deployment of the Team

Traffic surveys were conducted from 17-01-2016 to 30-01-2016. At 8:00 am survey team was deployed at the respective intersections and points of survey with the supervisor/coordinator.

Chapter-2 Existing Transportation Network and Facilities

2.1 Regional Connectivity

Rangunia is an Upazila under Chittagong District and located in the south-eastern region of Bangladesh. Rangunia Upazila is very well connected with the communication network of the country. The regional Highway R-163 from Chittagong to Kaptai has passes over the middle part of the Upazila from west to south acting as the main road of the Upazila. The national Highway N-07 from Chittagong to Rangamati has passes over at northern part of the Paurashava. It is well connected by National and Regional Highway originating from different Districts/Upazilas like Chittagong, Bandarban, Rangamati, Comilla etc. At present the national and regional highways roads playing very important role in communication network. Besides number of Zila roads and internal local roads are also providing regional connectivity (**Map 2.1**).

2.2 Existing road network

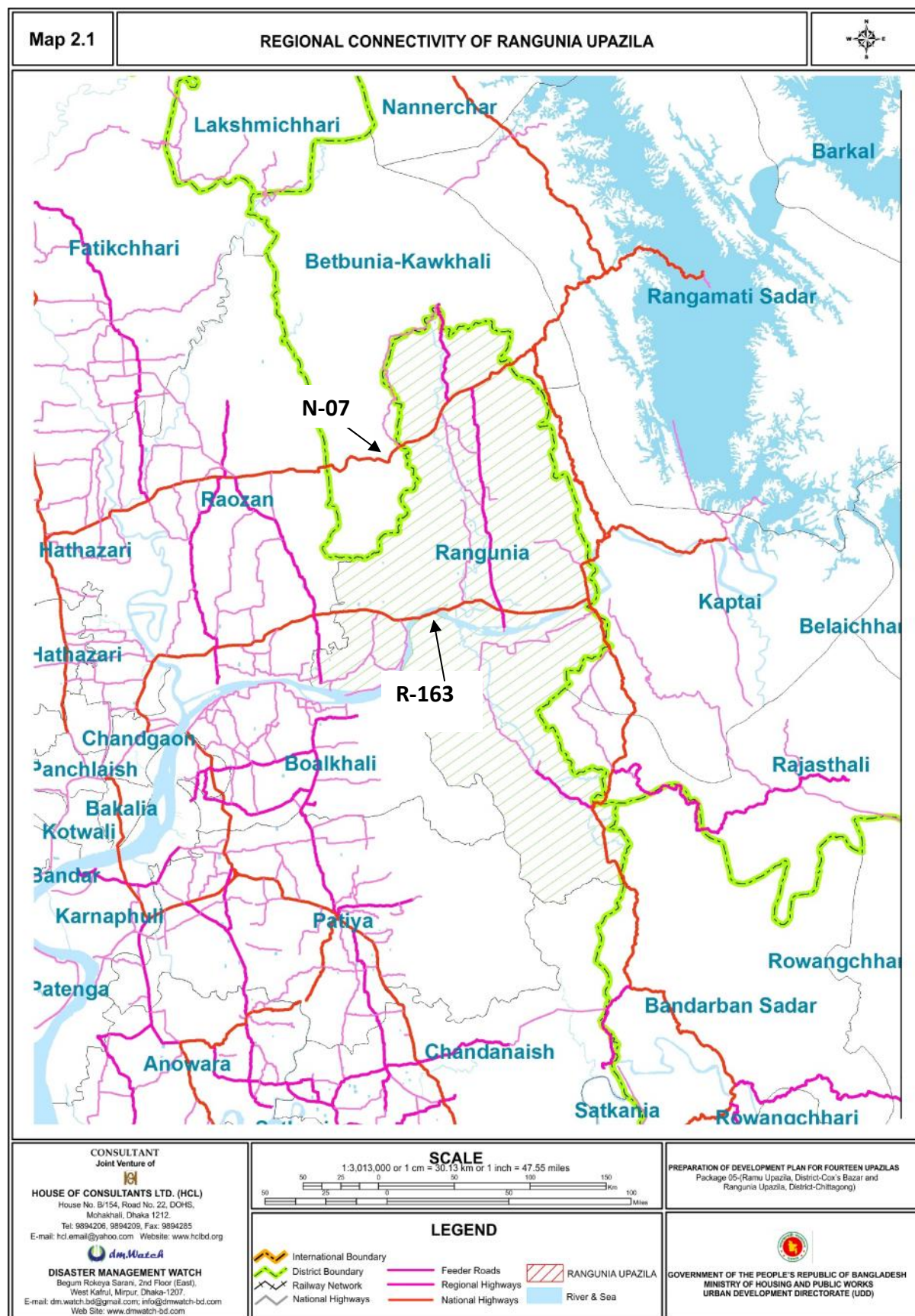
2.1.1 Existing Road Network of Rangunia Upazila

Road network connectivity within the unions of the Upazila is not well. Most of the villages directly connected with the main road in this Upazila. Total road length in this Upazila is 1072 km. of which around 169 Km is pucca, around 339 Km is Katch and rest are semi Pucca (CDMP, 2014). The Road network within the Rangunia Upazila has shown in **Map 2.2**.

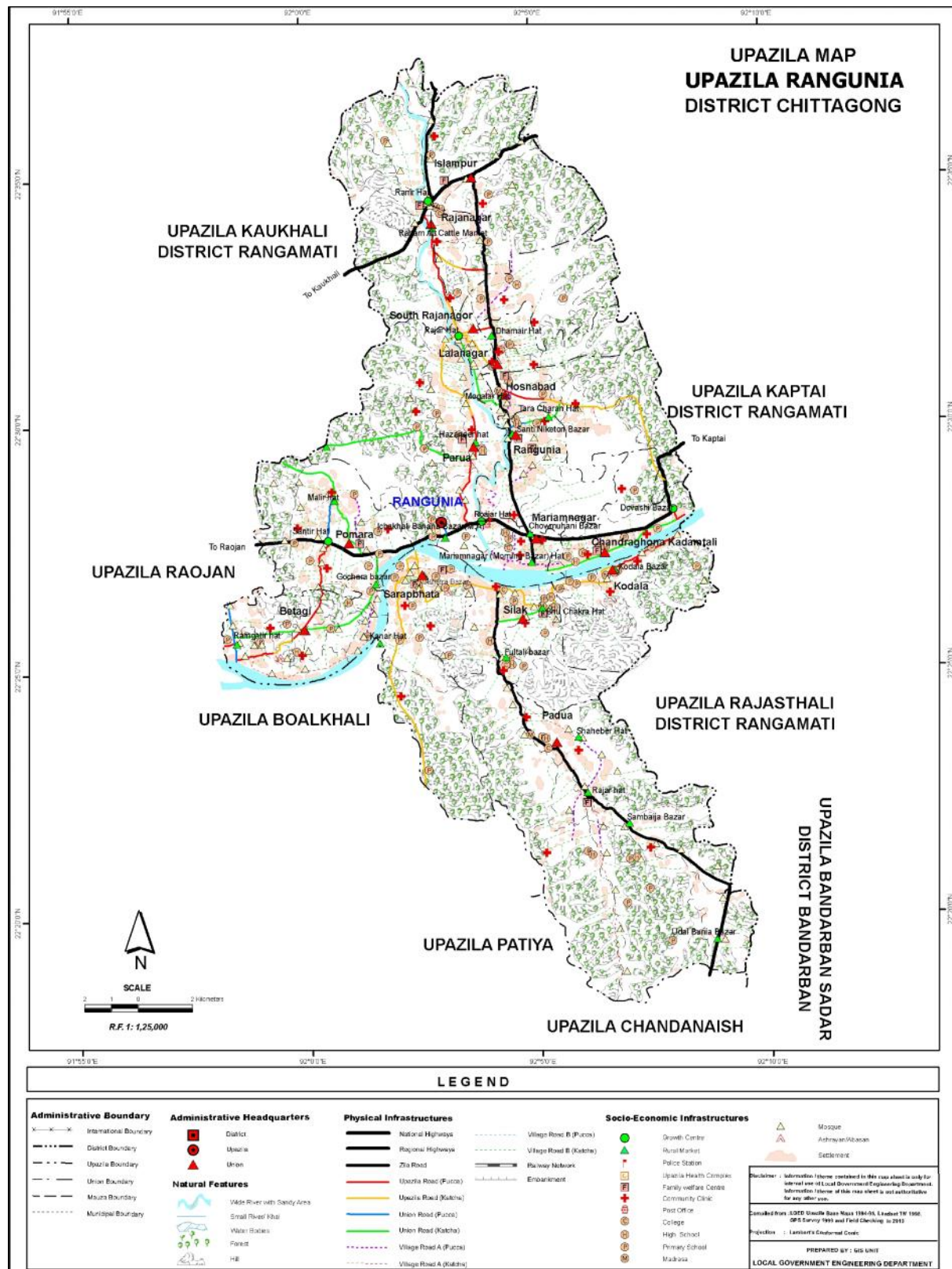


Plate 2: Major Road Network of Rangunia Upazila

Source: Traffic and Transportation Survey, 2016



Source: Traffic and Transportation Survey, 2016



Map 2.2: Existing Road Network of Rangunia Upazila

Source: LGED, 2010

2.2.2 Existing Road Network in Rangunia Paurashava

There is around 59.5 km road network within the Rangunia Paurashava of which 15.13 % (9.0 km) are Katcha, 59.66 % (35.50 km) are semi-pucca and 25.21 % (15.00 km) roads are Pucca.

Source: www.paurainfo.gov.bd

Table 2.1: Existing road network according to condition within Rangunia Paurashava

| Sl. No. | Type | Length (Km) | Percentage (%) |
|--------------|------------|--------------|----------------|
| 1 | Katcha | 9.0 | 15.13 |
| 2 | Semi-pucca | 35.5 | 59.66 |
| 3 | Pucca | 15.00 | 25.21 |
| Total | | 59.50 | 100.00 |

Source: www.paurainfo.gov.bd

The detail ward-wise road infrastructure data will be developed after physical feature data processing.

2.3 Functional Classification of Road

Considering the roadway hierarchy (functional classification), there are primary roads including national highways, secondary roads and tertiary and access roads in the Upazila. Distribution of existing roads as per roadway hierarchy will develop after physical feature survey data processing.

2.4 Inventory of Important Roads of the Study Area

The major roads of Roads and Highway Department (RHD), which pass through Rangunia Upazila are as shown in **Table 2.2**.

Table 2.2: Major Roads of Roads and Highways (RHD) in Rangunia Upazila

| Sl. No | Name of Road | Road ID |
|--------|--|---------|
| 1 | Chattagong-Kaptai Regional Highway | N-07 |
| 2 | Chittagong-Rangamati National -Highway | R-163 |

Source: *Roads & Highways, 2016*

LGED maintains a number of roads within the Upazila. Some major LGED maintaining roads are: Parua DC Road, Uttar Rangunia Road, Jakirabad Road, Mariamnagar Road, Muradnagar Road, Rangunia Gram Road and Shilak to Fultali Bazar Road.

Source: *LGED, 2016*

2.5 Existing Infrastructure

Existing infrastructure includes location of transportation infrastructures like bus terminals, truck terminals, bus stands, rickshaw/easy bike stand, etc.

2.5.1 Bus Terminals

Within the study area, no intra-urban communication system has yet developed. As a result, no public bus service is available for internal transportation. But the major study area streets are used by inter-district uses. There are two bus terminals in the study area namely Dhamairhat Bus Terminal and Lichu Bagan Bus Terminal. (Please see **Map 2.3**)



Plate 3: Dhamairhat Bus Terminal



Plate 4: Lichu Bagan Bus Terminal

Source: Traffic and Transportation Survey, 2016

2.5.2 Truck Terminals

At present there is no defined truck terminal at Upazila. Existing bus terminal are using as truck stand.

2.5.3 Rail Way Network

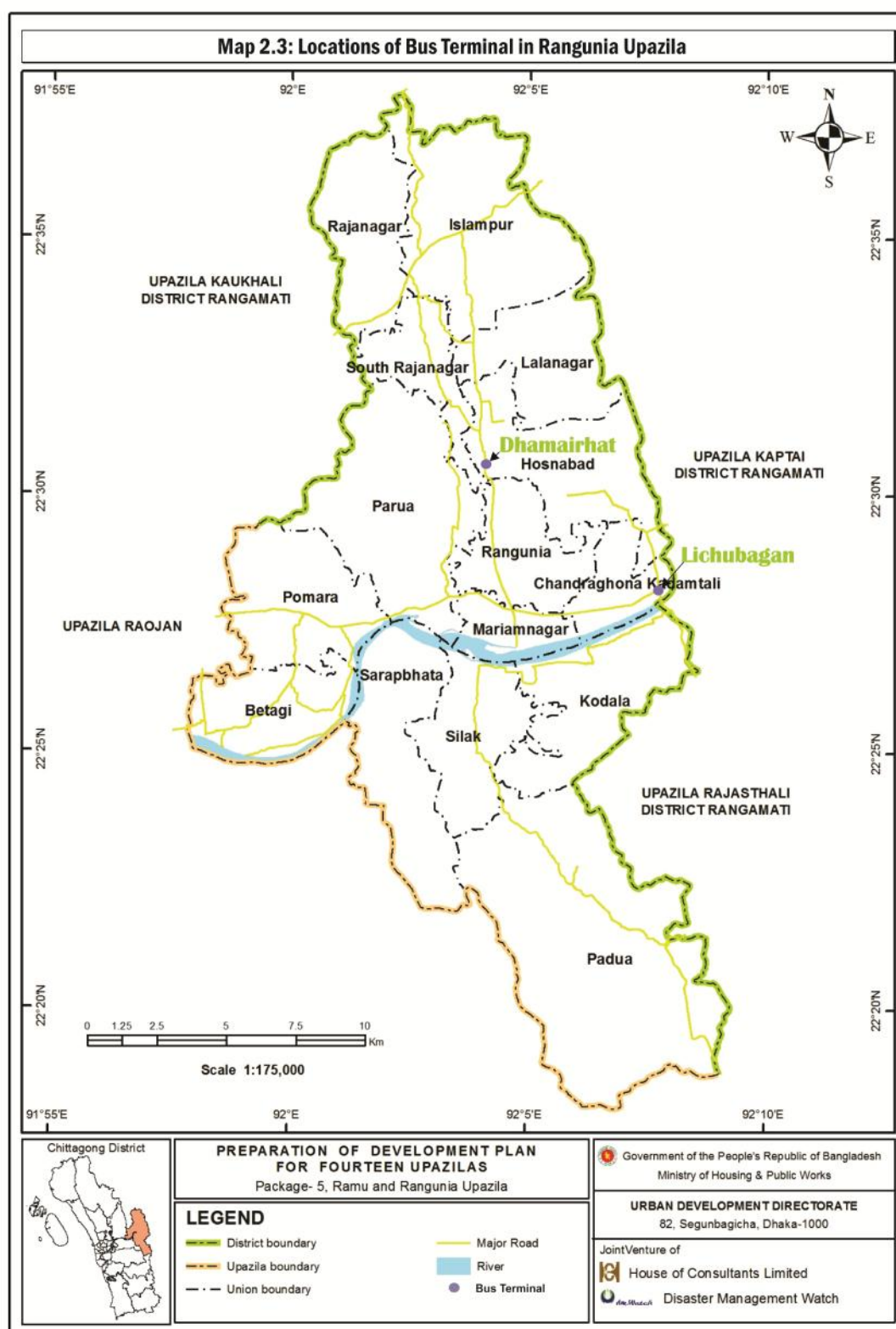
There is no railway network in Rangunia Upazila.

2.5.4 Water-way network

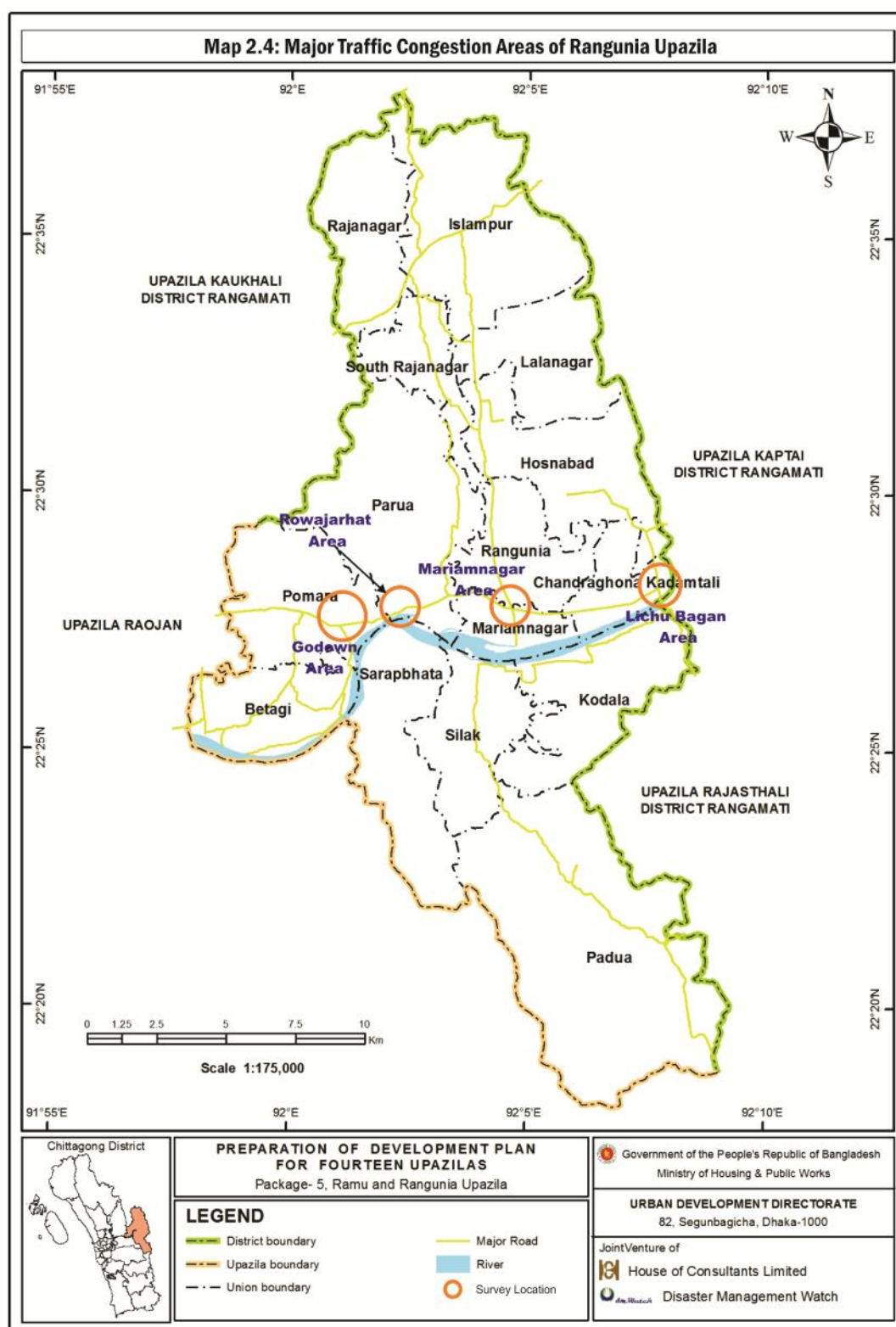
The river Karnaphuli follows on the Upazila provided river-way network. The people mainly cross the river from one side to the other side of the river by boat. They do not use the river for long distance journey.

2.6 Major Traffic Congestion Areas

Though there is no significant traffic congestion within the Upazila but the consultants identified some important places for traffic congestion. Major Traffic Congestion areas of the Upazila are Godown, Rowajar Hat, Mariamnagar and Lichu Bagan area. (Please See **Map 2.4**)



Source: Traffic and Transportation Survey, 2016



Source: Traffic and Transportation Survey, 2016

2.6.1 Causes for Congestion

✓ **Lack of Footpath**

Footpath for pedestrian is an important component of Road design. In Rangunia Upazila, along the main road calling Kaptai road there is no footpath. Due to lack of footpath pedestrian occupy a portion of road. This not only creates problem in rapid vehicle flow but also increase accident.

✓ **Lack of Shoulder**

Shoulder has great influence on speed of vehicles. With the increase of shoulder width speed of vehicle also increase. But there has no provision of shoulder at all.

✓ **Surface Condition**

The surface condition of Kaptai road is reasonable but now the condition is changing with time. Now surface condition is going worse. It has negative impact on speed of vehicles.



Plate 5: Bad Surface Condition

Source: Traffic and Transportation Survey, 2016

✓ **Insufficient Road width**

This road is two-lane road and the width of the road is not sufficient, so sometimes vehicles get collided. The space along the road way is narrow.



Plate 6: Narrow Road in Godown to Lichu Bagan & Ranirhat to Uttar Rangunia

Source: Traffic and Transportation Survey, 2016

✓ **Haphazard Trip Generation**

Functionality of a road is greatly influenced by the number of trip generated in the surrounding area and the type of trip generation. Haphazard trip generation has negative impact on the efficiency of a road. In the study road link, there are a lot of access roads and it seems that access road means trip generation. Passengers usually aim to get into vehicle as soon as they reach the main road and driver takes them from every spot. It hampers the free flow of the vehicles.

✓ **Lack of Bus bays**

Chittagong-Kaptai road is an important link road which connects Chittagong hill-tract with Chittagong city. Bus is an important mode of transport for travelling Chittagong city to Chittagong hill-tracts. Buses create congestion on the road. Passengers get in and out of the bus at different areas but there is no space for bus bays where bus can stop and passengers get in or out of the bus.

✓ **Behavioral Problems**

It is frequently seen that getting down goods on the road & Lack of consciousness among the passengers, they usually stand on the road for waiting vehicles. The vehicles stop and stay anywhere as their wishes. As the number of small vehicle is more than demand, it sometimes creates over crowded vehicles in a place.

✓ **Land Use Problems**

Land use pattern is an important determinant of traffic congestion. In the major intersection points, there are more commercial uses, so trips are made frequently in this area and traffic congestion occurring regularly. In Mariamnagar Chowmuhani, there is a fish storage where fish business is occurred along the road side which creates traffic congestion frequently specially in morning.



Plate 7: Haphazard CNG Standing on Main Road for Passengers at Godown Intersection

Source: Traffic and Transportation Survey, 2016



Plate 8: Loading of Goods on Road



Plate 9: Commercial Business along the Rangamati Road on Ranirhat Intersection

Source: Traffic and Transportation Survey, 2016



Plate 10: Storage of Fish in Mariamnagar which creates disturbance at Road

Source: Traffic and Transportation Survey, 2016



Chapter-3 Survey Findings

3.1 Traffic count survey

Transportation survey was conducted in one important link without intersection and four important intersections of Rangunia Upazila. Traffic volume survey was conducted at three times in day (8.30 am -9.30 am, 12.30 am- 1.30 pm and 4.30 pm-5.30 pm on Hat day (Saturday and Tuesday of each week for Shantirhat, Godown and Ranirhat, Friday and Monday for Mariamnagr and Lichubagan) and Non Hat day (other days except hat days) at each important intersection.

Following are the surveyed link and intersection:

- Shantirhat (without Intersection)
- Godown Intersection
- Ranirhat Intersection
- Chondroghona Lichu Bagan Intersection
- Mariamnagar Chowmuhan Intersection

From the survey it is observed that within all vehicle passes through the different link of the intersection above 80% are motorized vehicle and up-to 20% are non-motorized vehicle. From the Survey it is observed that the highest PCU is passing through Shantinhath-Godown link at Hat-Day. The Percentage of Motorized and Non-Motorized vehicles are shown in **Figure 3.1**.

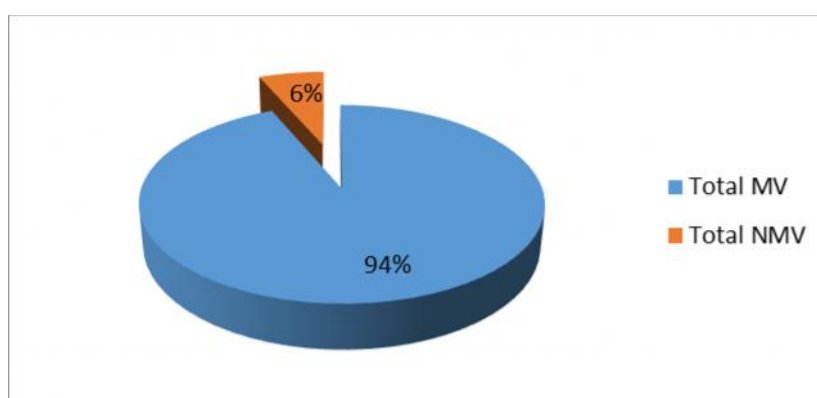


Figure 3.1: Percentage of Motorized and Non-Motorized Vehicles at Shantinhath-Godown link.

Source: Traffic and Transportation Survey, 2016

From the survey it is found that within motorized vehicle Bus, Truck, Car/Micro/Jeep and Auto-rickshaw/Tempoo/Nosimon and Motorcycle are mainly found in the study area. Within motorized vehicle Rickshaw/Van, Bicycle and Animal/Push cart are mainly found in the study area of which most are Rickshaw/Van. From the Survey it is observed that the highest PCU is passing through Shantinhath-Godown link at hat day. The composition of motorized vehicles at Shantinhath-Godown link at Hat-Day are shown in **Figure 3.2**.

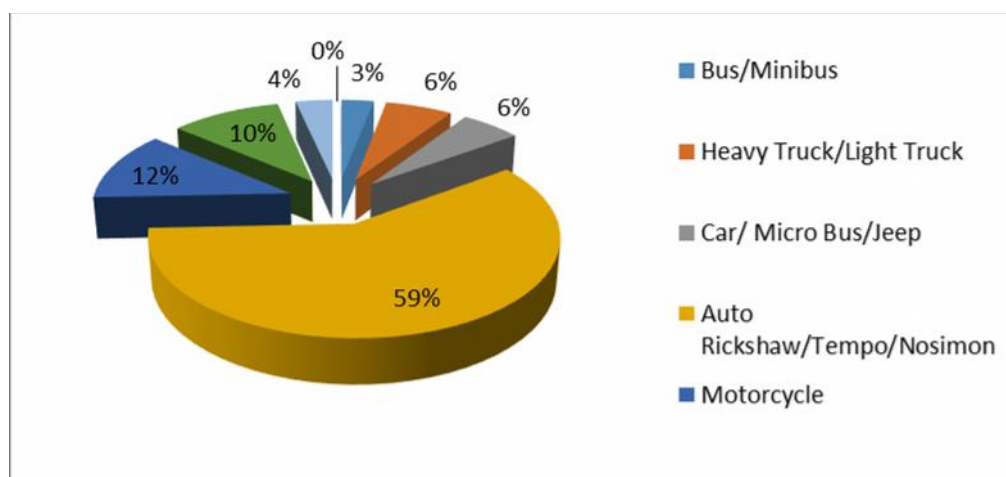


Figure 3.2: Percentage of Motorized Vehicle at Shantinhat-Godown link.

Source: Traffic and Transportation Survey, 2016

Detailed survey findings for each intersection are shown in **Annexure-5**.

From the survey, it is observed that within all link the highest PCU passing through the link on Hat-Day is 698 at Shantirhat-Godwon link and the lowest on Hat Day is 234 at Chowmuhani-Shaperdanga Link. The highest PCU passing through the link on Non Hat-Day is 626 at Godown-Mariamnagar link and the lowest on Non-Hat Day is 195 at Lichu Bagan-Ferry Ghat Link. From the traffic analysis it is observed that all of the roads are carrying low level of PCU value which indicates that the roads capacities presently are adequate in nature. The detailed of traffic volume calculation is shown in **Annexure-5**.

Table 3.1: Summary of PCU Passing through Different Intersection at Hat Day and Non Hat Day

| Intersection/ Route Name | Link Name | PCU (Average/Hour) | | Highest PCU/Hour | |
|---------------------------------------|-------------------------------|--------------------|-------------|------------------|-------------|
| | | Hat Day | Non Hat Day | Hat Day | Non Hat Day |
| Shantirhat | Shantirhat-Godown | 665 | 458 | 698 | 473 |
| Godown Intersection | Godown-Mariamnagar | 637 | 613 | 654 | 626 |
| | Godown-Sharafbhata | 242 | 215 | 288 | 239 |
| | Godown-Shantirhat | 637 | 612 | 657 | 626 |
| Mariamnagar Chowmuhani Intersection | Chowmuhani-Lichu Bagan | 435 | 397 | 464 | 447 |
| | Chowmuhani-Godown | 369 | 349 | 412 | 396 |
| | Chowmuhani-Uttar Rangunia | 349 | 385 | 419 | 427 |
| | Chowmuhani-Shaperghata | 218 | 219 | 234 | 252 |
| Chondroghona Lichu Bagan Intersection | Lichu Bagan-Kaptai | 303 | 234 | 399 | 287 |
| | Lichu Bagan-Mariamnagar | 322 | 251 | 417 | 301 |
| | Lichu Bagan-Ferry Ghat | 215 | 171 | 235 | 195 |
| Ranirhat Intersection | Ranirhat-Raozan | 450 | 380 | 528 | 480 |
| | Ranirhat-Rangamati | 542 | 435 | 623 | 515 |
| | Ranirhat-Uttar Ranunia | 268 | 192 | 293 | 218 |

Source: Traffic and Transportation Survey, 2016

3.1.1 Pedestrian Survey

As pedestrian is an important element or a part of moving vehicle, it is necessary to know the pedestrian flow in measuring the capacity of road, that's why the traffic survey has included the pedestrian count. The maximum number of pedestrian passes through Lichu Bagan-Kaptai link (134 nos) and lowest number of pedestrian found in Lichu Bagan-Chowmuhani Link (only 34 nos). The pedestrian count on the basis of link has summarized below:

Table 3.2: Summary of Pedestrian Count at Hat Day and Non Hat Day

| Intersection/ Route Name | Link Name | Passengers/Hour | |
|---|---------------------------|-----------------|-------------|
| | | Hat Day | Non Hat Day |
| Shantirhat | Shantirhat-Godown | 135 | 78 |
| Godown Intersection | Godown-Mariamnagar | 120 | 67 |
| | Godown-Sharafbhata | 65 | 45 |
| | Godown-Shantirhat | 69 | 36 |
| Mariamnagar Chowmuhani Intersection | Chowmuhani-Lichu Bagan | 45 | 34 |
| | Chowmuhani-Godown | 56 | 45 |
| | Chowmuhani-Uttar Rangunia | 78 | 49 |
| | Chowmuhani-Shaperghata | 59 | 46 |
| Chondroghona Lichu Bagan Intersection | Lichu Bagan-Kaptai | 134 | 92 |
| | Lichu Bagan-Mariamnagar | 87 | 74 |
| | Lichu Bagan- Ferry Ghat | 124 | 86 |
| Ranirhat Intersection | Ranirhat-Raozan | 78 | 60 |
| | Ranirhat-Rangamati | 63 | 48 |
| | Ranirhat-Uttar Ranunia | 59 | 38 |

Source: Traffic and Transportation Survey, 2016



Plate 11: Traffic count at Mariamnagar Intersection

Source: Traffic and Transportation Survey, 2016



Plate 12: Traffic count at Godown Intersection

Source: Traffic and Transportation Survey, 2016



Plate 13: Traffic Count at Lichubagan Intersection

Source: Traffic and Transportation Survey, 2016

3.2 Origin-Destination (O-D) Survey Findings

Origin-Destination (O-D) Survey have conducted in important nodes of the study area. Major findings of Origin-Destination (O-D) Survey are described in the following paragraphs.

3.2.1 Trip Distribution Pattern

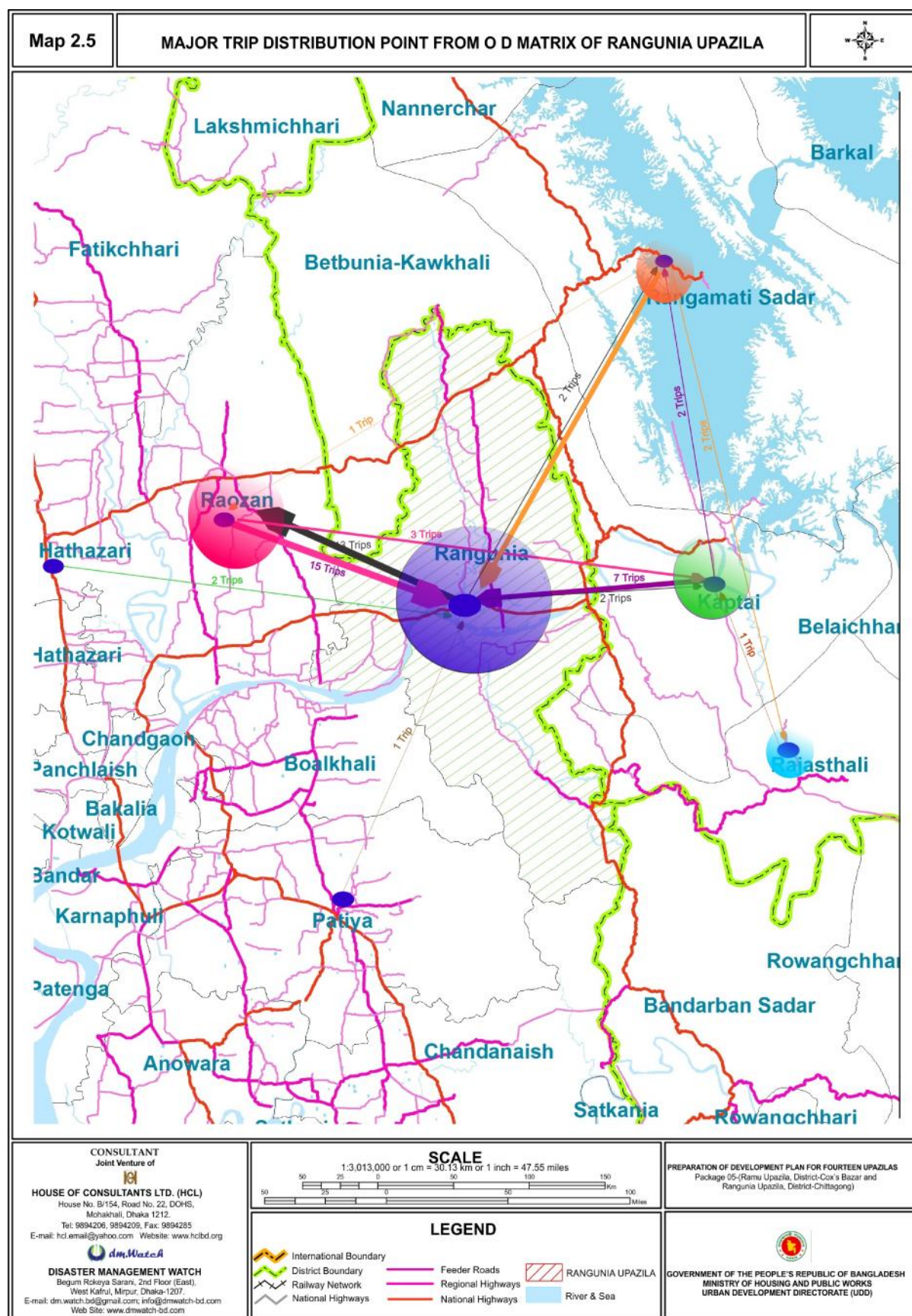
The O-D survey has been conducted on 168 trips of both motorized and non-motorized vehicles. It is found that most of the trips generated in the Rangunia Upazila area travel within the Rangunia, Uttar Rangunia & Dakshin Rangunia and that is 81 trip out of 168. Within other trip which are going outside the study area is 87 nos.

Within all the trips passes over the Upazila have originated and distributed within Chittagong, Raozan and Rangamati. The rest of the trips go to the other places through Rangunia. It is observed that a limited numbers of trip goes into detailed survey findings are shown in Annexure-6. Table shows the O-D matrix of surveyed trips from one place to another and **Map 2.5** has been derived from O D Matrix.

Table 3.3: Origin and Destination (O-D) Matrix

| Origin \ Destination | Rangunia | Kaptai | Raozan | Patiya | Bandarban | Chittagong | Hathazari | Rajasthali | Cox's Bazar | Rangamati | Total(Trips) |
|----------------------|-----------|----------|-----------|----------|-----------|------------|-----------|------------|-------------|-----------|--------------|
| Rangunia | 0 | 2 | 13 | 0 | 0 | 4 | 0 | 0 | 1 | 2 | 22 |
| Kaptai | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 9 |
| Raozan | 15 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 |
| Patiya | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Bandarban | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Chittagong | 14 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| Hathazari | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Rajasthali | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Cox's Bazar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rangamati | 13 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 16 |
| Total | 52 | 8 | 15 | 0 | 0 | 4 | 0 | 2 | 1 | 5 | 87 |

Source: Traffic and Transportation Survey, 2016



Source: Traffic and Transportation Survey, 2016

3.2.2 Purposes of Trips

From the survey it is observed that around 33% of the trip are generating for work purpose, 25% for different social reason, 14% for shopping, 10% for recreation, 9% for educational purpose and rest 9% for business purpose. The following figures shows the purpose of trip of the people.

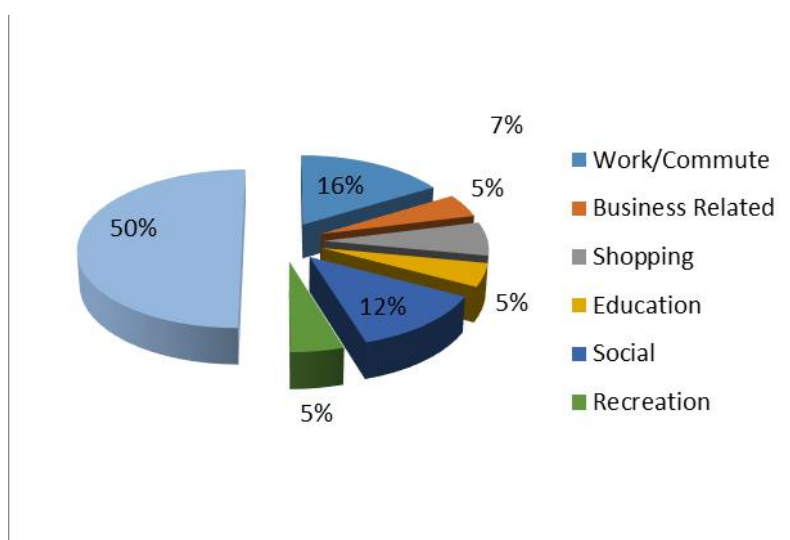


Figure 3.3: Purposes of Trips

Source: Traffic and Transportation Survey, 2016

3.2.3 Trips Starts and Ends Places

Within all trips most the trips start and ends at residence and then commercial and then social purpose. Details of types of place start and end points have shown in the table C of **Annexure-6**.

3.2.4 Bus Passenger/ Bus Trip

Within all trips made by Bus, most the trips ((93%) carries up to 10 nos. Passenger. A detail of bus passenger/ trip has shown in the table E of **Annexure-6**.

3.3 Bus Passenger Survey

Bus Passenger Survey was conducted to know the pattern of travel of bus passenger of Rangunia Upazila. Bus Passenger Survey has conducted at the Bus terminal namely Lichu Bagan Bus Terminal, Dhamaihat Bus Terminal and some bus stoppages where the surveyors were able to get information within short time.

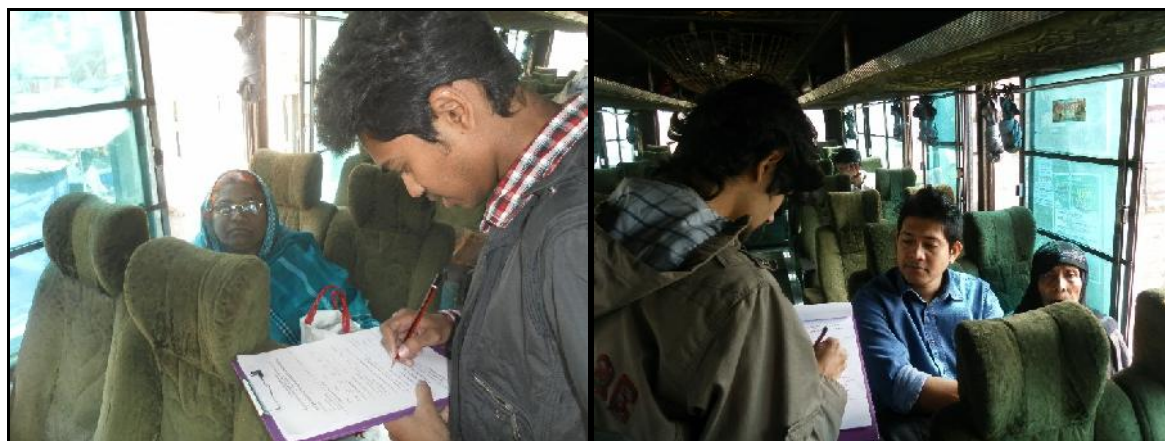


Plate 14: Bus Passenger Survey at Lichu Bagan

Source: Traffic and Transportation Survey, 2016

From the survey it is observed that people are travelling by bus mainly for Business (29%) and Social (24.6%) Purposes.

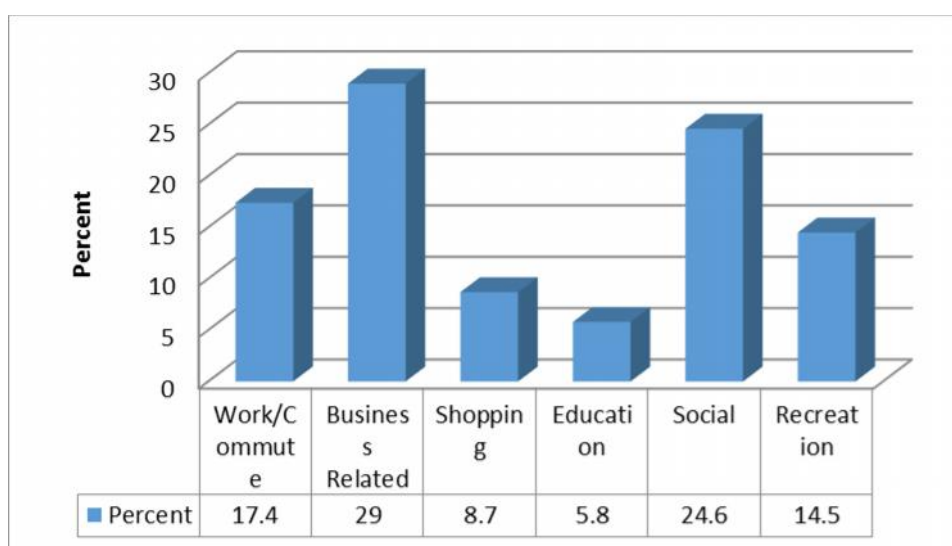


Figure 3.4: Purposes of travel by Bus Passenger

Source: Traffic and Transportation Survey, 2016

From the survey it is observed that within all bus passenger 31.9% are 21-30 years age group, 21.7% are at 31-40 years age group, 17.4% are at 16-20 years age group and rest are in different categories. About 80% of the passenger are male. Detailed of Age-Sex categories of the Bus Passengers are shown in the table-A of **Annexure-7**.

By bus passenger are mainly travelling above 5Km distance. Only 30% passenger are travelling bus to go less than 5km distance. About 70% passenger travel above 5km by bus of which 28% passenger travelling more than 30 km distance by bus.

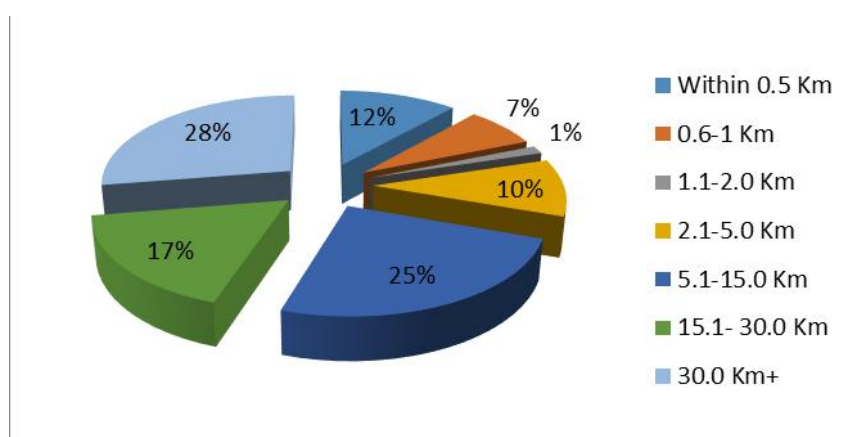


Figure 3.5: Distance of Travel by Bus

Source: Traffic and Transportation Survey, 2016

Most of the passenger made 1 to 3 trips per week (about 61%) and only 1% people made above 12 trip per week. The detailed findings of bus passenger survey are shown in **Annexure-7**.

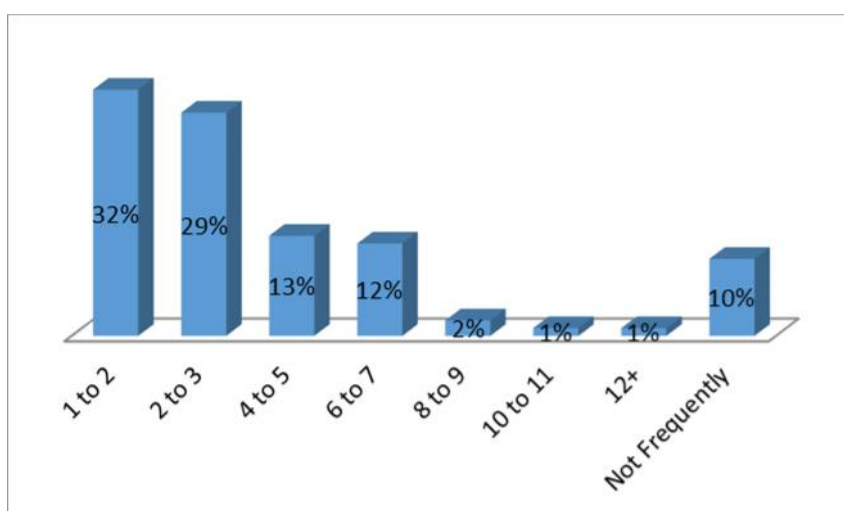


Figure 3.6: Number of Trips per Week by Bus Passengers

Source: Traffic and Transportation Survey, 2016

Within all bus passengers most of them are using 2(Two) modes to complete the trips and they are using mainly bus, boat and rickshaw for completing the trip. Detailed of Bus passenger trip, mode and cost and time have shown in Table-E, Table-F & Table-G of **Annexure-7**.

3.4 Regional Network System

Regional Survey was conducted how many bus or truck coming or going from study area. The surveyed area was selected at the bus and truck terminal as to know the frequency easily. The survey were conducted mainly in four important stoppage-a) Dhamair hat b) Lichubagan c) Ferry ghat and d) Ranirhat. The samples have taken randomly during hat day and non-hat day.



Plate 15: Regional Survey at Ranirhat Bus Terminal



Plate 16: Regional Survey at Ferry Ghat

Source: Traffic and Transportation Survey, 2016

3.4.1 Transport going out from study area to other region

To know the Regional Network system the character of buses and trucks going out from study area to other regions been analyzed. For this study 25 Buses and 43 Trucks has been interviewed. Truck and buses are mainly going Rangunia to Chittagong which are 34.9% and 44% respectively. Within other they are mainly travelling to Rangamati, Kaptai, Rajasthali and Kaptai. About 56%t of the buses have carrying capacity of 30 to 50 person/Trip. 20% buses have carrying capacity of 11 to 20 passenger and rest are in different category.

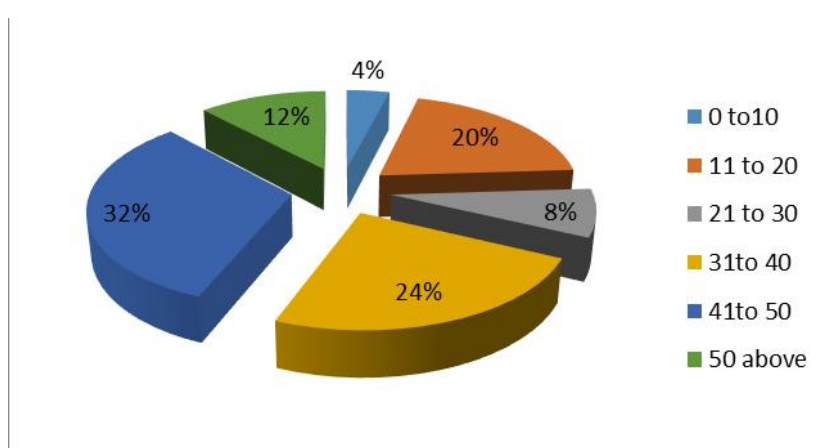


Figure 3.7: Average Numbers of Passengers Carried By Bus/Trip Going Out from Study Area

Source: Traffic and Transportation Survey, 2016

Within types of goods carried by truck/trip from Rangunia to other different places are mainly construction materials (59%) and rest are wood/Bamboo/Timber (26%), Medicine (4%) etc. shown in the following figure:

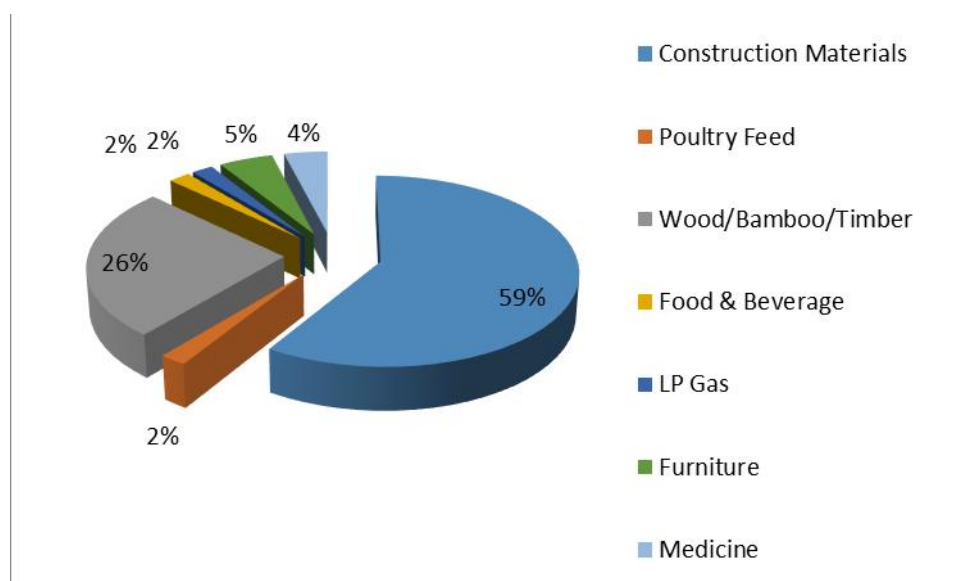


Figure 3.8: Types of Goods Carried By Truck/Trip Going Out From Study Area

Source: Traffic and Transportation Survey, 2016

3.4.2 Transport Coming from other region to study area

To know the Regional Network system, the character of buses and trucks coming from other regions to the study area has been analyzed. For this study 12 Buses and 28 Trucks has been interviewed.

Truck and buses are mainly coming from Chittagong which are 28.6% and 58.3% respectively. Within other they are mainly coming from Rangamati, Dhaka and Raozan. About 82% of the buses have carrying capacity of 20 to 40 person/Trip and rest are carrying above 40 passengers/trip.

Within types of goods carried by truck/trip from other different places to Rangunia are also mainly construction materials (41%) and rest are vegetable (22%), Food and beverage (19%), Medicine (7%) etc. shown in the following figure:

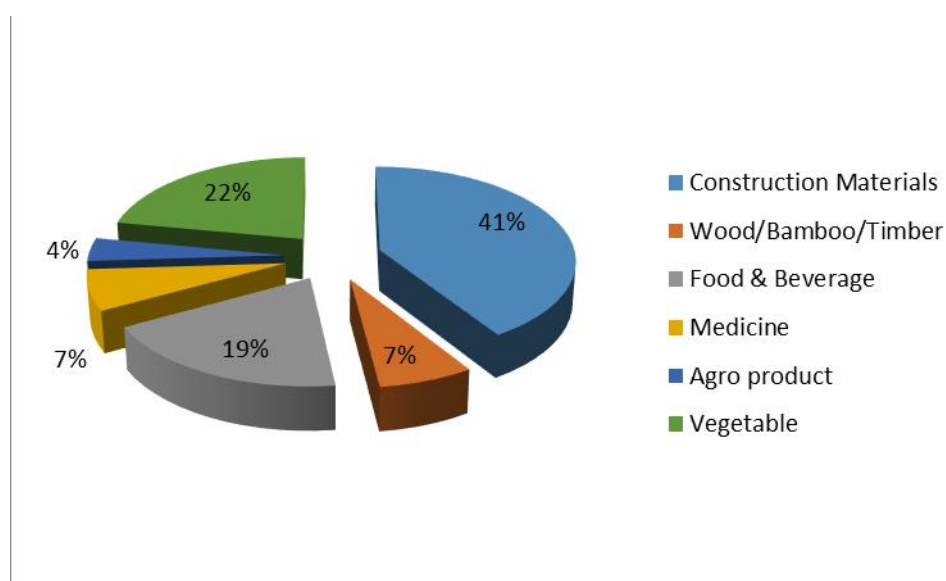


Figure 3.9: Types of Goods Carried by Truck/Trip Coming into Study Area from Other Regions

Source: Traffic and Transportation Survey, 2016

Buses are mainly using Rajsthali (50%) and Ranirhat (50%) as stoppage and trucks are using Ranirhat (84%) and Ferry Ghat (16%) as a stoppage. Details are shown in the Table-6 of **Annexure-8**. Other details for regional transport survey are shown in **Annexure-8**.

Chapter-4

Findings from PRA & Socio Economic Survey

4.1 Findings from PRA

PRA (Participatory Rural Appraisal) is an innovative approach to empower the people by sharing information and making decisions regarding the Development Project and to involve the local people in the planning process by letting the local people identify their own problems, potentials, development needs and planning priorities for next 20 years. In the PRA Session, different types of problems have identified where transportation problem was significant. The findings related to traffic and transportation of the PRA Session of Rangunia Upazila are summarized below:

- Poor condition road facilities
- Lack of repair and maintenance
- Narrow and broken roads
- Damaging road due to water logging
- Damaged of Road due to lack of drainage system
- Damage of road due to flash flood and rain
- Ample existence of Katcha road
- Unplanned infrastructure along the road side.
- Broken bridge and culvert.
- Heavy loaded vehicles on Road
- Encroachment of roads
- Natural Disasters
- No provision of Guide wall
- Lack of seriousness of concerned authority
- Below graded road construction by the contractors
- Bureaucratic Complexity and Budget insufficiency

4.2 Findings from Socio Economic Survey

4.2.1 Status of Access Road

Existence of road adjacent to house is one of the key components of access road. Participants were asked to measure a tentative width of the road in front of their house. There were three categories of response under this question. According to, 70% participants (770), width of the road in front of their house was 3 meter or less. 12.4% participants mentioned that, width of the road in front of their house was 5 meter or less. And, lastly 17.6% participants (194) mentioned that the width was more than 5 meters.

Table 4.1: Width of the Road in Front Houses

| Width of the Road | Frequency | Percent |
|-------------------|-------------|--------------|
| 3 meter | 770 | 70.0 |
| 5 meter | 136 | 12.4 |
| More than 5 meter | 194 | 17.6 |
| Total | 1100 | 100.0 |

Source: Socio Economic Survey, 2015

On the other hand, maximum of 39.6% participants mentioned about katcha road in front of their house. 15.2% participants mentioned about bituminous road. 37% participants mentioned that, type of the road was HBB in front of their house. Concrete road was not so common within the study area. Only 8.2% participants mentioned about concrete road in front of their house.

Table 4.2: Type of Road in front of house

| Type of Road | Frequency | Percent |
|--------------|-------------|--------------|
| Bituminous | 167 | 15.2 |
| Concrete | 90 | 8.2 |
| HBB Road | 407 | 37.0 |
| Katcha | 436 | 39.6 |
| Total | 1100 | 100.0 |

Source: Socio Economic Survey, 2015

4.2.2 Distance of main road from household

Following the width and type of road in front of participant's house, we asked them about the distance of between main road and house. 36.8% participants mentioned that, the distance between main road and their house was 50 meters or less. 40.8% participants mentioned of 51-100 meters and 246 participants (22.4%) participants of more than 100 meters as distance between main road and their house.

Table 4.3: Distance of the main road from house

| Distance | Frequency | Percent |
|---------------------|-------------|--------------|
| 0-50 meter | 405 | 36.8 |
| 51-100 meter | 449 | 40.8 |
| More than 100 meter | 246 | 22.4 |
| Total | 1100 | 100.0 |

Source: Socio Economic Survey, 2015

4.2.3 Condition of the road

Participants were asked to convey their knowledge about present condition of road. 9.5% participants (105) said the road condition was good. 55.6% participants (612) said that the road condition is not good. 2.1% participants (23) mentioned about encroachment of by hawkers & waste. 1% participants (11) mentioned the issue of heavy traffic. Significant amount of 336 participants (30.5%) mentioned that the road was narrow. At last, 1.2% participants (13) said neither good nor bad about the present situation of road.

Table 4.4: Present situation of road/ Problem

| Present Situation of Road | Frequency | Percent |
|---------------------------------|-------------|--------------|
| Good | 105 | 9.5 |
| Not good | 612 | 55.6 |
| Encroachment by hawkers & waste | 23 | 2.1 |
| Traffic | 11 | 1.0 |
| Narrow | 336 | 30.5 |
| Neither very good nor very bad | 13 | 1.2 |
| Total | 1100 | 100.0 |

Source: Socio Economic Survey, 2015

Chapter-5

Conclusion

Due to nearness of Chittagong City Rangunia Upazila has a potentiality for development activities. Its investment and economic importance will increase rapidly and currently this area is developing in an unplanned way without necessary infrastructures and service facilities. Size of the towns started growing with the increasing population. Development control is essential for the areas. To control, guide and monitor the development activities the planned growth a proper transportation plan is very important. In order to prepare proper transportation plan, survey and investigation of existing transportation network and facilities is also important. This report tries to identify the existing scenario of Traffic and Transportation of the Study Area. Several maps such as Road Infrastructure Map, Access Roads Map etc. will be developed after finishing the physical feature data processing.

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Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(PAGKAGE-05):UDD

Traffic and Transportation Survey
Traffic Volume Count Tally Sheet

(24 Hours long) Weather condition

Name of Upazila:

Date:

Route Name:

Hours counted: **Start**am/pm, **Finish**am/pm

Traffic Direction: Fromto.....

Intersection Name:

| Type of traffic | Number of Traffic | Speed (km/h) | Total |
|-----------------------------|-------------------|--------------|-------|
| Bus/Minibus | | | |
| Heavy Truck/ Light Truck | | | |
| Car/Micro-bus/Jeep | | | |
| Auto Rickshaw/Tempo/Nosimon | | | |
| Motorcycle | | | |
| Rickshaw/Van | | | |
| Bicycle | | | |
| Animal cart/Push cart | | | |
| Pedestrian | | | |
| Others (specify) | | | |

Name of Enumerator

Signature of Enumerator

Name of Supervisor

Signature of Supervisor

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(Package: 05): UDD

Roadside Interview Survey (O-D Survey) Questionnaire

Time: Every half an Hour Interval (24 hours clock)

Name of Upazila:

Date:

Route Name: Start point... ..End point.....

Hours counted: **Start**am/pm, **Finish**am/pm

Traffic Direction: Fromto.....

A. Vehicle Type:

1. Truck 2. Bus 3. Car/Pickup/Jeep/Motorbus 4. Auto Rickshaw/Tempo 5. Motorcycle 6. Rickshaw/Van 7. Bicycle

B. Where did your trip begin?

City/Town.....

C. What type of place is your trip start point?

1. Residence 2. Workplace 3. Shopping 4. School/College/University 5. Social 6. Recreational

D. Where did your trip end?

City/Town.....

E. What type of place is your trip end point?

1. Residence 2. Workplace 3. Shopping 4. School/College/University 5. Social 6. Recreational

F. What was the purpose of your trip?

1. Work/Commute 2. Business related 3. Shopping 4. Education 5. Social 6. Recreation

G. How many people were in the vehicle including the driver?

No. of people.....

H. Any comments on Transportation?

Name of Enumerator:

Signature of Enumerator:

Name of Supervisor:

Signature of Supervisor:

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(PACKAGE: 05): UDD

Bus/ Boat or Launch/ Train Passenger Interview Survey Questionnaire

Name of Upazila :

Date :

Time of Interview :

Location of Interview point :

A. Present Address of the respondent

B. Sex: (a) Male (b) Female

C. Age: 1. Below 15 years 2. 16-20 Years 3. 21-30 Years 4. 31-40 Years 5. 41-50 Years 6. Above 51 Years

D. Where did your trip begin?

E. Where did your trip end point?

F. What was the purpose of your trip?

1. Work/Commute 2. Business related 3. Shopping 4. Education 5. Social 6. Recreation

G. No. of trips in a week?

H. How many times you changed modes to complete this trip?

| | | |
|---|---|---|
| 1 | 2 | 3 |
|---|---|---|

I. What are types of modes you used to complete the trip?

1. Bus 2. Motor cycle 3. Rickshaw 4. Van 5. Rail 6. Boat/Launch 5. On foot 6. Others (specify)

J. Total travel time of the trip?(In min/hour)

K. Total costs of the trip? (In Taka)

L. Total distances of the trip? (In k.m.)

M. Any comments on transportation?

Name of Enumerator:

Name of Supervisor:

Signature of Enumerator:

Signature of Supervisor:

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(PACKAGE: 05): UDD

Questionnaire on Regional Transportation Network System

Name of Upazila :

Date of survey :

A. Information of trip going out from study area to other region (upazila/district)

1) Type of Mode (Bus/Truck/Train/Water way):

(Response will be collected from every mode)

- 2) Name of trip destination point (Upazila/District):
- 3) No. of trips per day (hour basis)
- 4) Average no. of passengers carried by per mode (per trip):
- 5) Types of goods carried by per mode (per trip):

B. Information of trip coming into study area from other region (upazila/district)

1) Type of Mode (Bus/Truck/Train/Water way):

(Response will be collected from every mode)

- 2) Name of trip origin point (Upazila/District):
- 3) No. of trips per day (hour basis)
- 4) Average no. of passengers carried by per mode (per trip):
- 5) Types of goods carried by per mode (per trip):
- 6) Stoppage area inside the upazila area

Traffic Count Survey Findings

A) GARJANIA BAZAR (WITHOUT INTERSECTION)

Table A.1: Hourly Volume of Traffic by Types on Garjania Bazar-Ramulink at Hat Day, 25th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 0 | 15 | 5 | 74 | 10 | 25 | 5 | 14 | 104 | 44 | 148 |
| 12.30 PM-1.30 PM | 0 | 6 | 9 | 68 | 6 | 10 | 5 | 13 | 89 | 28 | 117 |
| 4.30 PM-5.30 PM | 0 | 12 | 12 | 79 | 19 | 34 | 8 | 10 | 122 | 52 | 174 |
| Average/Hour | 0 | 11 | 9 | 74 | 12 | 23 | 6 | 12 | 105 | 41 | 146 |

Table A.2: Hourly Volume of Traffic by Types on Garjania Bazar-Ramulink at Non Hat Day, 23th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 0 | 4 | 8 | 67 | 27 | 30 | 11 | 3 | 106 | 44 | 150 |
| 12.30 PM-1.30 PM | 0 | 9 | 5 | 50 | 24 | 24 | 11 | 2 | 88 | 37 | 125 |
| 4.30 PM-5.30 PM | 0 | 2 | 10 | 74 | 22 | 36 | 18 | 3 | 108 | 57 | 165 |
| Average/Hour | 0 | 5 | 8 | 64 | 24 | 30 | 13 | 3 | 101 | 46 | 147 |

Table A.3: Total Volume of PCU of Garjania Bazar-Ramulink atHat Day, 25th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 113 | 66.47 | 57 | 33.53 | 170 |
| 12.30 PM-1.30 PM | 82.5 | 63.95 | 46.5 | 36.05 | 129 |
| 4.30 PM-5.30 PM | 121.5 | 70.43 | 51 | 29.57 | 173 |
| Average/Hour | 105.67 | 66.95 | 51.50 | 33.05 | 157.17 |

Table A.4: Total Volume of PCU of Garjania Bazar-Ramulink atNon Hat Day, 23th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 90.5 | 75.42 | 29.5 | 24.58 | 120 |
| 12.30 PM-1.30 PM | 87.5 | 78.83 | 23.5 | 21.17 | 111 |
| 4.30 PM-5.30 PM | 88 | 70.97 | 36 | 29.03 | 124 |
| Average/Hour | 88.67 | 75.07 | 29.67 | 24.93 | 118.33 |

B) RASHIDNAGAR (WITHOUT INTERSECTION)

Table B.1: Hourly Volume of Traffic by Types on Chittagong-Ramulink at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 88 | 34 | 66 | 101 | 50 | 16 | 21 | 0 | 339 | 37 | 376 |
| 12.30 PM-1.30 PM | 75 | 30 | 93 | 99 | 51 | 22 | 8 | 0 | 348 | 30 | 378 |
| 4.30 PM-5.30 PM | 79 | 48 | 82 | 125 | 55 | 13 | 12 | 0 | 389 | 25 | 414 |
| Average/Hour | 81 | 37 | 80 | 108 | 52 | 17 | 14 | 0 | 359 | 31 | 389 |

Table B.2: Hourly Volume of Traffic by Types on Chittagong-Ramulink at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 118 | 61 | 82 | 83 | 22 | 14 | 6 | 0 | 366 | 20 | 386 |
| 12.30 PM-1.30 PM | 146 | 34 | 146 | 149 | 63 | 15 | 7 | 0 | 538 | 22 | 560 |
| 4.30 PM-5.30 PM | 87 | 43 | 115 | 138 | 104 | 28 | 16 | 0 | 487 | 44 | 531 |
| Average/Hour | 117 | 46 | 114 | 123 | 63 | 19 | 10 | 0 | 464 | 29 | 492 |

Table B.3: Total Volume of PCU of Chittagong-Ramulink at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 545 | 96.72 | 18.5 | 3.28 | 564 |
| 12.30 PM-1.30 PM | 521 | 97.20 | 15 | 2.80 | 536 |
| 4.30 PM-5.30 PM | 598 | 97.95 | 12.5 | 2.05 | 611 |
| Average/Hour | 554.58 | 97.29 | 15.33 | 2.71 | 569.92 |

Table B.4: Total Volume of PCU of Chittagong-Ramulink at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 1098 | 94.82 | 60 | 5.18 | 1158 |
| 12.30 PM-1.30 PM | 1614 | 96.07 | 66 | 3.93 | 1680 |
| 4.30 PM-5.30 PM | 687 | 96.89 | 22 | 3.11 | 709 |
| Average/Hour | 1132.83 | 95.93 | 49.33 | 4.07 | 1182.17 |

C) RAMU CHOWMUHANI INTERSECTION

Table C.1: Hourly Volume of Traffic by Types on Chowmuhani-Ramu Cantonment link at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 4 | 34 | 41 | 256 | 83 | 55 | 23 | 2 | 418 | 80 | 498 |
| 12.30 PM-1.30 PM | 4 | 18 | 33 | 228 | 29 | 24 | 16 | 4 | 312 | 44 | 356 |
| 4.30 PM-5.30 PM | 4 | 38 | 27 | 240 | 131 | 139 | 7 | 5 | 440 | 151 | 591 |
| Average/Hour | 4 | 30 | 34 | 241 | 81 | 73 | 15 | 4 | 390 | 92 | 482 |

Table C.2: Hourly Volume of Traffic by Types on Chowmuhani-Ramu Cantonment link at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 8 | 32 | 36 | 297 | 45 | 103 | 22 | 0 | 418 | 125 | 543 |
| 12.30 PM-1.30 PM | 7 | 32 | 21 | 211 | 41 | 70 | 53 | 1 | 312 | 124 | 436 |
| 4.30 PM-5.30 PM | 12 | 46 | 46 | 222 | 53 | 119 | 13 | 0 | 379 | 132 | 511 |
| Average/Hour | 9 | 37 | 34 | 243 | 46 | 97 | 29 | 0 | 370 | 127 | 497 |

Table C.3: Hourly Volume of Traffic by Types on Chowmuhani-Chittagong link at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 3 | 27 | 52 | 327 | 109 | 132 | 11 | 2 | 518 | 145 | 663 |
| 12.30 PM-1.30 PM | 3 | 19 | 35 | 284 | 64 | 102 | 34 | 4 | 405 | 140 | 545 |
| 4.30 PM-5.30 PM | 3 | 26 | 55 | 283 | 135 | 152 | 15 | 5 | 502 | 172 | 674 |
| Average/Hour | 3 | 24 | 47 | 298 | 103 | 129 | 20 | 4 | 475 | 152 | 627 |

Table C.4: Hourly Volume of Traffic by Types on Chowmuhani-Chittagong link at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 0 | 23 | 30 | 355 | 75 | 175 | 15 | 0 | 483 | 190 | 673 |
| 12.30 PM-1.30 PM | 0 | 26 | 21 | 197 | 56 | 108 | 14 | 1 | 300 | 123 | 423 |
| 4.30 PM-5.30 PM | 3 | 25 | 37 | 239 | 61 | 141 | 6 | 0 | 365 | 147 | 512 |
| Average/Hour | 1 | 25 | 29 | 264 | 64 | 141 | 12 | 0 | 383 | 153 | 536 |

Table C.5: Hourly Volume of Traffic by Types on Chowmuhani-Ramu Bypass link at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 7 | 21 | 59 | 375 | 114 | 125 | 26 | 0 | 576 | 151 | 727 |
| 12.30 PM-1.30 PM | 3 | 17 | 38 | 346 | 65 | 98 | 36 | 0 | 469 | 134 | 603 |
| 4.30 PM-5.30 PM | 7 | 36 | 50 | 409 | 90 | 221 | 8 | 0 | 592 | 229 | 821 |
| Average/Hour | 6 | 25 | 49 | 377 | 90 | 148 | 23 | 0 | 546 | 171 | 717 |

Table C.6: Hourly Volume of Traffic by Types on Chowmuhani-Ramu Bypass link at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 8 | 15 | 26 | 296 | 68 | 122 | 21 | 0 | 413 | 143 | 556 |
| 12.30 PM-1.30 PM | 7 | 20 | 18 | 234 | 57 | 70 | 53 | 0 | 336 | 123 | 459 |
| 4.30 PM-5.30 PM | 9 | 27 | 23 | 243 | 76 | 140 | 7 | 0 | 378 | 147 | 525 |
| Average/Hour | 8 | 21 | 22 | 258 | 67 | 111 | 27 | 0 | 376 | 138 | 513 |

Table C.7: Total Volume of PCU of Chowmuhani-Ramu Cantonment Link at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 409.25 | 90.09 | 45 | 9.91 | 454 |
| 12.30 PM-1.30 PM | 291.75 | 90.12 | 32 | 9.88 | 324 |
| 4.30 PM-5.30 PM | 431.25 | 83.05 | 88 | 16.95 | 519 |
| Average/Hour | 377.42 | 87.75 | 55.00 | 12.25 | 432.42 |

Table C.8: Total Volume of PCU of Chowmuhani-Ramu Cantonment Link at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 412.5 | 86.84 | 62.5 | 13.16 | 475 |
| 12.30 PM-1.30 PM | 327 | 83.52 | 64.5 | 16.48 | 392 |
| 4.30 PM-5.30 PM | 426.25 | 86.59 | 66 | 13.41 | 492 |
| Average/Hour | 388.58 | 85.65 | 64.33 | 14.35 | 452.92 |

Table C.9: Total Volume of PCU of Chowmuhani-ChittagongLink at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 469 | 85.82 | 77.5 | 14.18 | 547 |
| 12.30 PM-1.30 PM | 362 | 81.90 | 80 | 18.10 | 442 |
| 4.30 PM-5.30 PM | 455.5 | 82.22 | 98.5 | 17.78 | 554 |
| Average/Hour | 428.83 | 83.31 | 85.33 | 16.69 | 514.17 |

Table C.10: Total Volume of PCU of Chowmuhani-Chittagong Link at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 421.5 | 81.61 | 95 | 18.39 | 517 |
| 12.30 PM-1.30 PM | 288.75 | 81.86 | 64 | 18.14 | 353 |
| 4.30 PM-5.30 PM | 346 | 82.48 | 73.5 | 17.52 | 420 |
| Average/Hour | 352.08 | 81.98 | 77.50 | 18.02 | 429.58 |

Table C.11: Total Volume of PCU of Chowmuhani-Ramu Bypass Link at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 509.75 | 87.10 | 75.5 | 12.90 | 585 |
| 12.30 PM-1.30 PM | 406.25 | 85.84 | 67 | 14.16 | 473 |
| 4.30 PM-5.30 PM | 553.25 | 82.85 | 114.5 | 17.15 | 668 |
| Average/Hour | 489.75 | 85.26 | 85.67 | 14.74 | 575.42 |

Table C.12: Total Volume of PCU of Chowmuhani-Ramu Bypass Link at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 368 | 83.73 | 71.5 | 16.27 | 440 |
| 12.30 PM-1.30 PM | 317.25 | 83.76 | 61.5 | 16.24 | 379 |
| 4.30 PM-5.30 PM | 370.25 | 83.44 | 73.5 | 16.56 | 444 |
| Average/Hour | 351.83 | 83.64 | 68.83 | 16.36 | 420.67 |

D) RAMU BYPASS INTERSECTION

Table D.1: Hourly Volume of Traffic by Types on Ramu Bypass-Chowmuhanilink at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 20 | 35 | 22 | 347 | 65 | 67 | 7 | 0 | 489 | 74 | 563 |
| 12.30 PM-1.30 PM | 20 | 35 | 25 | 392 | 100 | 74 | 11 | 5 | 572 | 90 | 662 |
| 4.30 PM-5.30 PM | 12 | 23 | 18 | 322 | 69 | 47 | 6 | 7 | 444 | 60 | 504 |
| Average/Hour | 17 | 31 | 22 | 354 | 78 | 63 | 8 | 4 | 502 | 75 | 576 |

Table D.2: Hourly Volume of Traffic by Types on Bypass-Chowmuhanilink at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 15 | 28 | 10 | 285 | 82 | 58 | 13 | 5 | 420 | 76 | 496 |
| 12.30 PM-1.30 PM | 9 | 25 | 13 | 178 | 55 | 48 | 10 | 5 | 280 | 63 | 343 |
| 4.30 PM-5.30 PM | 52 | 33 | 33 | 208 | 60 | 59 | 23 | 5 | 386 | 87 | 473 |
| Average/Hour | 25 | 29 | 19 | 224 | 66 | 55 | 15 | 5 | 362 | 75 | 437 |

Table D.3: Hourly Volume of Traffic by Types on Ramu Bypass-Chittagong link at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 71 | 47 | 72 | 78 | 88 | 60 | 1 | 0 | 356 | 61 | 417 |
| 12.30 PM-1.30 PM | 105 | 62 | 78 | 66 | 60 | 63 | 6 | 0 | 371 | 69 | 440 |
| 4.30 PM-5.30 PM | 99 | 57 | 75 | 88 | 70 | 50 | 7 | 0 | 389 | 57 | 446 |
| Average/Hour | 92 | 55 | 75 | 77 | 73 | 58 | 5 | 0 | 372 | 62 | 434 |

Table D.4: Hourly Volume of Traffic by Types on Ramu Bypass-Chittagong link at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 114 | 52 | 33 | 164 | 49 | 48 | 6 | 0 | 412 | 54 | 466 |
| 12.30 PM-1.30 PM | 112 | 56 | 107 | 69 | 44 | 44 | 13 | 3 | 388 | 60 | 448 |
| 4.30 PM-5.30 PM | 99 | 55 | 51 | 45 | 52 | 68 | 21 | 2 | 302 | 91 | 393 |
| Average/Hour | 108 | 54 | 64 | 93 | 48 | 53 | 13 | 2 | 367 | 68 | 436 |

Table D.5: Hourly Volume of Traffic by Types on Ramu Bypass-Cox's Bazar link at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 85 | 66 | 78 | 357 | 109 | 25 | 8 | 0 | 695 | 33 | 728 |
| 12.30 PM-1.30 PM | 123 | 89 | 91 | 414 | 110 | 113 | 11 | 5 | 827 | 129 | 956 |
| 4.30 PM-5.30 PM | 105 | 72 | 81 | 336 | 99 | 18 | 11 | 7 | 693 | 36 | 729 |
| Average/Hour | 104 | 76 | 83 | 369 | 106 | 52 | 10 | 4 | 738 | 66 | 804 |

Table D.6: Hourly Volume of Traffic by Types on Ramu Bypass-Cox's Bazar link at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 125 | 68 | 39 | 423 | 107 | 30 | 11 | 5 | 762 | 46 | 808 |
| 12.30 PM-1.30 PM | 115 | 67 | 110 | 197 | 47 | 12 | 11 | 8 | 536 | 31 | 567 |
| 4.30 PM-5.30 PM | 149 | 70 | 74 | 199 | 68 | 17 | 8 | 7 | 560 | 32 | 592 |
| Average/Hour | 130 | 68 | 74 | 273 | 74 | 20 | 10 | 7 | 619 | 36 | 656 |

Table D.7: Total Volume of PCU of Ramu Bypass-Chowmuhanilink at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 496 | 93.06 | 37 | 6.94 | 533 |
| 12.30 PM-1.30 PM | 559 | 90.67 | 57.5 | 9.33 | 617 |
| 4.30 PM-5.30 PM | 416.25 | 89.76 | 47.5 | 10.24 | 464 |
| Average/Hour | 490.42 | 91.16 | 47.33 | 8.84 | 537.75 |

Table D.8: Total Volume of PCU of Ramu Bypass-Chowmuhanilink at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 414.25 | 89.13 | 50.5 | 10.87 | 465 |
| 12.30 PM-1.30 PM | 289.75 | 86.82 | 44 | 13.18 | 334 |
| 4.30 PM-5.30 PM | 489 | 89.72 | 56 | 10.28 | 545 |
| Average/Hour | 397.67 | 88.56 | 50.17 | 11.44 | 447.83 |

Table D.9: Total Volume of PCU of Ramu Bypass-Chittagong link at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 550.5 | 94.75 | 30.5 | 5.25 | 581 |
| 12.30 PM-1.30 PM | 673.5 | 95.13 | 34.5 | 4.87 | 708 |
| 4.30 PM-5.30 PM | 661.5 | 95.87 | 28.5 | 4.13 | 690 |
| Average/Hour | 628.50 | 95.25 | 31.17 | 4.75 | 659.67 |

Table D.10: Total Volume of PCU of Ramu Bypass-Chittagong link at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 690.75 | 96.24 | 27 | 3.76 | 718 |
| 12.30 PM-1.30 PM | 695.75 | 94.89 | 37.5 | 5.11 | 733 |
| 4.30 PM-5.30 PM | 585.75 | 92.06 | 50.5 | 7.94 | 636 |
| Average/Hour | 657.42 | 94.40 | 38.33 | 5.60 | 695.75 |

Table D.11: Total Volume of PCU of Ramu Bypass-Cox's Bazar link at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 880.5 | 98.16 | 16.5 | 1.84 | 897 |
| 12.30 PM-1.30 PM | 1120 | 93.57 | 77 | 6.43 | 1197 |
| 4.30 PM-5.30 PM | 938.25 | 96.35 | 35.5 | 3.65 | 974 |
| Average/Hour | 979.58 | 96.03 | 43.00 | 3.97 | 1022.58 |

Table D.12: Total Volume of PCU of Ramu Bypass-Cox's Bazar link at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 1015.5 | 96.62 | 35.5 | 3.38 | 1051 |
| 12.30 PM-1.30 PM | 839 | 95.94 | 35.5 | 4.06 | 875 |
| 4.30 PM-5.30 PM | 931.25 | 96.53 | 33.5 | 3.47 | 965 |
| Average/Hour | 928.58 | 96.36 | 34.83 | 3.64 | 963.42 |

E) LINK ROAD INTERSECTION

Table E.1: Hourly Volume of Traffic by Types on Link Road-Chittagong link at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 135 | 62 | 112 | 164 | 70 | 27 | 11 | 15 | 543 | 53 | 596 |
| 12.30 PM-1.30 PM | 126 | 75 | 102 | 108 | 73 | 25 | 8 | 15 | 484 | 48 | 532 |
| 4.30 PM-5.30 PM | 89 | 61 | 96 | 140 | 82 | 28 | 16 | 17 | 468 | 61 | 529 |
| Average/Hour | 117 | 66 | 103 | 137 | 75 | 27 | 12 | 16 | 498 | 54 | 552 |

Table E.2: Hourly Volume of Traffic by Types on Link Road-Chittagong link at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 139 | 121 | 152 | 551 | 107 | 86 | 19 | 18 | 1070 | 123 | 1193 |
| 12.30 PM-1.30 PM | 146 | 102 | 127 | 554 | 138 | 59 | 13 | 23 | 1067 | 95 | 1162 |
| 4.30 PM-5.30 PM | 116 | 85 | 219 | 425 | 141 | 56 | 20 | 18 | 986 | 94 | 1080 |
| Average/Hour | 134 | 103 | 166 | 510 | 129 | 67 | 17 | 20 | 1041 | 104 | 1145 |

Table E.3: Hourly Volume of Traffic by Types on Link Road-Teknaflink at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 18 | 19 | 63 | 57 | 39 | 23 | 12 | 10 | 196 | 45 | 241 |
| 12.30 PM-1.30 PM | 17 | 14 | 42 | 60 | 42 | 18 | 11 | 8 | 175 | 37 | 212 |
| 4.30 PM-5.30 PM | 18 | 29 | 50 | 70 | 50 | 27 | 18 | 18 | 217 | 63 | 280 |
| Average/Hour | 18 | 21 | 52 | 62 | 44 | 23 | 14 | 12 | 196 | 48 | 244 |

Table E.4: Hourly Volume of Traffic by Types on Link Road-Teknaflink at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 37 | 88 | 57 | 511 | 72 | 57 | 20 | 18 | 765 | 95 | 860 |
| 12.30 PM-1.30 PM | 41 | 30 | 41 | 221 | 60 | 28 | 11 | 21 | 393 | 60 | 453 |
| 4.30 PM-5.30 PM | 36 | 43 | 54 | 135 | 42 | 20 | 18 | 15 | 310 | 53 | 363 |
| Average/Hour | 38 | 54 | 51 | 289 | 58 | 35 | 16 | 18 | 489 | 69 | 559 |

Table E.5: Hourly Volume of Traffic by Types on Link Road-Cox's Bazar link at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 149 | 61 | 101 | 193 | 79 | 42 | 9 | 9 | 583 | 60 | 643 |
| 12.30 PM-1.30 PM | 137 | 65 | 86 | 136 | 73 | 27 | 11 | 11 | 497 | 49 | 546 |
| 4.30 PM-5.30 PM | 95 | 52 | 94 | 156 | 62 | 31 | 16 | 13 | 459 | 60 | 519 |
| Average/Hour | 127 | 59 | 94 | 162 | 71 | 33 | 12 | 11 | 513 | 56 | 569 |

Table E.6: Hourly Volume of Traffic by Types on Link Road-Cox's Bazar link at Off Day, 22th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 168 | 117 | 191 | 840 | 159 | 65 | 11 | 18 | 1475 | 94 | 1569 |
| 12.30 PM-1.30 PM | 165 | 100 | 134 | 657 | 126 | 43 | 10 | 16 | 1182 | 69 | 1251 |
| 4.30 PM-5.30 PM | 110 | 90 | 215 | 500 | 141 | 44 | 14 | 11 | 1056 | 69 | 1125 |
| Average/Hour | 148 | 102 | 180 | 666 | 142 | 51 | 12 | 15 | 1238 | 77 | 1315 |

Table E.7: Total Volume of PCU of Link Road-Chittagong link at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 878.50 | 93.21 | 64 | 6.79 | 943 |
| 12.30 PM-1.30 PM | 840.75 | 93.18 | 61.5 | 6.82 | 902 |
| 4.30 PM-5.30 PM | 712.50 | 90.71 | 73 | 9.29 | 786 |
| Average/Hour | 810.58 | 92.37 | 66.17 | 7.63 | 876.75 |

Table E.8: Total Volume of PCU of Link Road-Chittagong link at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 1425.50 | 93.05 | 106.5 | 6.95 | 1532 |
| 12.30 PM-1.30 PM | 1390.00 | 92.98 | 105 | 7.02 | 1495 |
| 4.30 PM-5.30 PM | 1246.50 | 93.13 | 92 | 6.87 | 1339 |
| Average/Hour | 1354.00 | 93.05 | 101.17 | 6.95 | 1455.17 |

Table E.9: Total Volume of PCU of Link Road-Teknaf link at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 246.00 | 83.82 | 47.5 | 16.18 | 294 |
| 12.30 PM-1.30 PM | 211.50 | 84.60 | 38.5 | 15.40 | 250 |
| 4.30 PM-5.30 PM | 281.00 | 78.60 | 76.5 | 21.40 | 358 |
| Average/Hour | 246.17 | 82.34 | 54.17 | 17.66 | 300.33 |

Table E.10: Total Volume of PCU of Link Road-Teknaflink at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 869.25 | 90.38 | 92.5 | 9.62 | 962 |
| 12.30 PM-1.30 PM | 464.75 | 84.92 | 82.5 | 15.08 | 547 |
| 4.30 PM-5.30 PM | 423.75 | 86.88 | 64 | 13.12 | 488 |
| Average/Hour | 585.92 | 87.40 | 79.67 | 12.60 | 665.58 |

Table E.11: Total Volume of PCU of Link Road-Cox's Bazar link at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 935.00 | 94.68 | 52.5 | 5.32 | 988 |
| 12.30 PM-1.30 PM | 848.75 | 94.23 | 52 | 5.77 | 901 |
| 4.30 PM-5.30 PM | 698.50 | 91.79 | 62.5 | 8.21 | 761 |
| Average/Hour | 827.42 | 93.57 | 55.67 | 6.43 | 883.08 |

Table E.12: Total Volume of PCU of Link Road-Cox's Bazar link at Off Day, 22th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 1795.25 | 95.13 | 92 | 4.87 | 1887 |
| 12.30 PM-1.30 PM | 1516.25 | 95.32 | 74.5 | 4.68 | 1591 |
| 4.30 PM-5.30 PM | 1295.75 | 95.43 | 62 | 4.57 | 1358 |
| Average/Hour | 1535.75 | 95.29 | 76.17 | 4.71 | 1611.92 |

F) KHUNIA PALONG INTERSECTION

Table F.1: Hourly Volume of Traffic by Types on Khunia Palong-Ramulink at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 5 | 5 | 8 | 80 | 10 | 25 | 5 | 0 | 108 | 30 | 138 |
| 12.30 PM-1.30 PM | 10 | 16 | 28 | 61 | 17 | 22 | 10 | 0 | 132 | 32 | 164 |
| 4.30 PM-5.30 PM | 1 | 9 | 25 | 57 | 12 | 22 | 5 | 0 | 104 | 27 | 131 |
| Average/Hour | 5 | 10 | 20 | 66 | 13 | 23 | 7 | 0 | 115 | 30 | 144 |

Table F.2: Hourly Volume of Traffic by Types on KhuniaPalong-Ramulink at Off Day, 23th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 6 | 5 | 10 | 82 | 12 | 25 | 4 | 0 | 115 | 29 | 144 |
| 12.30 PM-1.30 PM | 2 | 18 | 40 | 61 | 15 | 23 | 4 | 0 | 136 | 27 | 163 |
| 4.30 PM-5.30 PM | 2 | 10 | 13 | 72 | 13 | 24 | 4 | 0 | 110 | 28 | 138 |
| Average/Hour | 3 | 11 | 21 | 72 | 13 | 24 | 4 | 0 | 120 | 28 | 148 |

Table F.3: Hourly Volume of Traffic by Types on KhuniaPalong-Cox's Bazarlink at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 21 | 17 | 33 | 155 | 25 | 23 | 5 | 0 | 251 | 28 | 279 |
| 12.30 PM-1.30 PM | 27 | 23 | 30 | 174 | 33 | 27 | 12 | 0 | 287 | 39 | 326 |
| 4.30 PM-5.30 PM | 21 | 18 | 14 | 122 | 19 | 19 | 1 | 0 | 194 | 20 | 214 |
| Average/Hour | 23 | 19 | 26 | 150 | 26 | 23 | 6 | 0 | 244 | 29 | 273 |

Table F.4: Hourly Volume of Traffic by Types on KhuniaPalong-Cox's Bazarlink at Off Day, 23th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 14 | 13 | 44 | 119 | 32 | 25 | 10 | 0 | 222 | 35 | 257 |
| 12.30 PM-1.30 PM | 21 | 18 | 34 | 124 | 37 | 26 | 9 | 0 | 234 | 35 | 269 |
| 4.30 PM-5.30 PM | 16 | 17 | 16 | 101 | 21 | 19 | 15 | 0 | 171 | 34 | 205 |
| Average/Hour | 17 | 16 | 31 | 115 | 30 | 23 | 11 | 0 | 209 | 35 | 244 |

Table F.5: Hourly Volume of Traffic by Types on KhuniaPalong-Teknaflink at On Day, 21th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 22 | 22 | 33 | 227 | 31 | 46 | 10 | 0 | 335 | 56 | 391 |
| 12.30 PM-1.30 PM | 37 | 29 | 54 | 207 | 36 | 39 | 16 | 0 | 363 | 55 | 418 |
| 4.30 PM-5.30 PM | 22 | 23 | 37 | 173 | 27 | 37 | 6 | 0 | 282 | 43 | 325 |
| Average/Hour | 27 | 25 | 41 | 202 | 31 | 41 | 11 | 0 | 327 | 51 | 378 |

Table F.6: Hourly Volume of Traffic by Types on KhuniaPalong-Teknaflink at Off Day, 23th January 2016.

| Hours Counted | MV | | | | | NMV | | | Total MV | Total NMV | Grand Total |
|------------------|-------------|-------------------------|---------------------|-----------------------------|------------|--------------|---------|------------------------|----------|-----------|-------------|
| | Bus/Minibus | Heavy Truck/Light Truck | Car/ Micro Bus/Jeep | Auto Rickshaw/Tempo/Nosimon | Motorcycle | Rickshaw/Van | Bicycle | Animal cart/ Push Cart | | | |
| 8.30 AM-9.30 AM | 16 | 18 | 48 | 183 | 38 | 44 | 14 | 0 | 303 | 58 | 361 |
| 12.30 PM-1.30 PM | 23 | 28 | 56 | 139 | 42 | 31 | 13 | 0 | 288 | 44 | 332 |
| 4.30 PM-5.30 PM | 18 | 15 | 25 | 153 | 26 | 39 | 19 | 0 | 237 | 58 | 295 |
| Average/Hour | 19 | 20 | 43 | 158 | 35 | 38 | 15 | 0 | 276 | 53 | 329 |

Table F.7: Total Volume of PCU of KhuniaPalong-Ramulink at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 105.5 | 87.55 | 15 | 12.45 | 121 |
| 12.30 PM-1.30 PM | 164.5 | 91.14 | 16 | 8.86 | 181 |
| 4.30 PM-5.30 PM | 106.75 | 88.77 | 13.5 | 11.23 | 120 |
| Average/Hour | 125.58 | 89.15 | 14.83 | 10.85 | 140.42 |

Table F.8: Total Volume of PCU of KhuniaPalong-Ramulink at Off Day, 23th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 113.5 | 88.67 | 14.5 | 11.33 | 128 |
| 12.30 PM-1.30 PM | 157 | 92.08 | 13.5 | 7.92 | 171 |
| 4.30 PM-5.30 PM | 112.75 | 88.95 | 14 | 11.05 | 127 |
| Average/Hour | 127.75 | 89.90 | 14.00 | 10.10 | 141.75 |

Table F.9: Total Volume of PCU of KhuniaPalong-Cox's Bazarlink at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 282 | 95.27 | 14 | 4.73 | 296 |
| 12.30 PM-1.30 PM | 335.25 | 94.50 | 19.5 | 5.50 | 355 |
| 4.30 PM-5.30 PM | 236.75 | 95.95 | 10 | 4.05 | 247 |
| Average/Hour | 284.67 | 95.24 | 14.50 | 4.76 | 299.17 |

Table F.10: Total Volume of PCU of KhuniaPalong-Cox's Bazarlink at Off Day, 23th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 238.25 | 93.16 | 17.5 | 6.84 | 256 |
| 12.30 PM-1.30 PM | 271.75 | 93.95 | 17.5 | 6.05 | 289 |
| 4.30 PM-5.30 PM | 206.5 | 92.39 | 17 | 7.61 | 224 |
| Average/Hour | 238.83 | 93.17 | 17.33 | 6.83 | 256.17 |

Table F.11: Total Volume of PCU of KhuniaPalong-Teknaflink at On Day, 21th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 358.5 | 92.76 | 28 | 7.24 | 387 |
| 12.30 PM-1.30 PM | 434.25 | 94.04 | 27.5 | 5.96 | 462 |
| 4.30 PM-5.30 PM | 322 | 93.74 | 21.5 | 6.26 | 344 |
| Average/Hour | 371.58 | 93.51 | 25.67 | 6.49 | 397.25 |

Table F.12: Total Volume of PCU of KhuniaPalong-Teknaflink at Off Day, 23th January 2016.

| Hours Counted | Total MV | | Total NMV | | Grand Total PCU |
|------------------|----------|------------------|-----------|------------------|-----------------|
| | PCU | % of grand total | PCU | % of grand total | |
| 8.30 AM-9.30 AM | 315.75 | 91.59 | 29 | 8.41 | 345 |
| 12.30 PM-1.30 PM | 344.75 | 94.00 | 22 | 6.00 | 367 |
| 4.30 PM-5.30 PM | 258.25 | 89.90 | 29 | 10.10 | 287 |
| Average/Hour | 306.25 | 91.83 | 26.67 | 8.17 | 332.92 |

Origin and Destination (O D) Survey Findings

2) Road Side Interview (O-D) Survey

A) Vehicle Type/Mode for OD Survey

| Vehicle Type/Mode | Frequency | Percent |
|--------------------------|-----------|---------|
| Truck | 2 | 1.3 |
| Bus | 42 | 28.0 |
| Car/Pickup/Jeep/Motorbus | 16 | 10.7 |
| Auto Rickshaw/Tempo | 83 | 55.3 |
| Motorcycle | 3 | 2.0 |
| Rickshaw/Van | 3 | 2.0 |
| Bicycle | 1 | .7 |
| Total | 150 | 100.0 |

B) Percentage Distribution in O-D Survey data

| Origin \ Destination | Ramu | Naikhongchari | Chakaria | Chittagong | Cox's Bazar | Dulhazara | Teknaf | Ukhia | Total(Trips) |
|----------------------|------|---------------|----------|------------|-------------|-----------|--------|-------|--------------|
| Ramu | 0 | 2 | 4 | 7 | 7 | 2 | 1 | 2 | 25 |
| Naikhongchari | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| Chakaria | 5 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 9 |
| Chittagong | 7 | 0 | 0 | 0 | 7 | 0 | 3 | 0 | 17 |
| Cox's Bazar | 5 | 0 | 2 | 5 | 0 | 2 | 2 | 0 | 16 |
| Dulhazara | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 5 |
| Teknaf | 5 | 0 | 0 | 4 | 5 | 0 | 0 | 0 | 14 |

| | | | | | | | | | |
|--------------|----|---|---|----|----|---|---|---|----|
| Ukhia | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 8 |
| Total | 29 | 2 | 6 | 16 | 28 | 4 | 9 | 2 | 96 |

C) Types of Place Start and End Points of Trip in Percentage

| Type of place | Trip Staring Point | | Trip Ending Point | |
|---------------------------|--------------------|---------|-------------------|---------|
| | Frequency | Percent | Frequency | Percent |
| Residence | 107 | 70.4 | 26 | 17.1 |
| Workplace | 23 | 15.1 | 64 | 42.1 |
| Shopping | 6 | 3.9 | 10 | 6.6 |
| School/College/University | 4 | 2.6 | 12 | 7.9 |
| Social | 7 | 4.6 | 25 | 16.4 |
| Recreational | 5 | 3.3 | 14 | 9.2 |
| Total | 152 | 100.0 | 1 | .7 |

D) Purposes of Travelers in Percentage

| Purpose of Trip | Frequency | Percent |
|------------------|-----------|---------|
| Work/Commute | 53 | 34.9 |
| Business Related | 18 | 11.8 |
| Shopping | 12 | 7.9 |
| Education | 13 | 8.6 |
| Social | 38 | 25.0 |
| Recreation | 17 | 11.8 |
| Total | 152 | 100.0 |

E) Bus Passenger/Trip including Driver

| Passengers/Trip | Frequency | Percent |
|------------------------|------------------|----------------|
| 0-10 | 98 | 64.5 |
| 11-20 | 12 | 7.9 |
| 21-30 | 21 | 13.8 |
| 31-40 | 9 | 5.9 |
| 41-50 | 8 | 5.3 |
| 50+ | 4 | 2.6 |
| Total | 152 | 100.0 |

Bus Passenger Survey Findings

A) Age-Sex Structure of the Bus Passengers

| Age of the respondent | | Sex of the respondent | | Total |
|-----------------------|------------|-----------------------|--------|-------|
| | | Male | Female | |
| 16-20 years | Frequency | 24 | 14 | 38 |
| | Percentage | 35% | 52% | 40% |
| 21-30 years | Frequency | 34 | 12 | 46 |
| | Percentage | 50% | 44% | 49% |
| 31-40 years | Frequency | 4 | 0 | 4 |
| | Percentage | 6% | 0% | 4% |
| 41-50 years | Frequency | 4 | 1 | 5 |
| | Percentage | 6% | 4% | 5% |
| Above 51 years | Frequency | 2 | 0 | 2 |
| | Percentage | 3% | 0% | 2% |
| Total | Frequency | 68 | 25 | 93 |
| | Percentage | 100% | 100% | 100% |

B) Purposes of Trip in Percentage

| Purpose of Trip | Frequency | Percent |
|------------------|-----------|---------|
| Work/Commute | 22 | 23.6 |
| Business Related | 16 | 17.2 |
| Shopping | 6 | 6.5 |
| Education | 10 | 10.7 |
| Social | 17 | 18.3 |
| Recreation | 21 | 22.6 |
| Treatment | 1 | 1.1 |
| Total | 93 | 23.6 |

C) Number of Trips per Week by Bus Passengers

| Numbers of Trip/Week | Frequency | Percent |
|-----------------------------|------------------|----------------|
| 1-2 | 23 | 24.7 |
| 3-4 | 7 | 7.5 |
| 5-6 | 17 | 18.3 |
| 7-8 | 5 | 5.4 |
| Not Frequently | 41 | 44.1 |
| Total | 93 | 100.0 |

D) Number of Modes used to Complete the Trip

| No. of Modes to complete the trip | Frequency | Percentage |
|--|------------------|-------------------|
| 1 | 15 | 30 |
| 2 | 11 | 22 |
| 3 | 24 | 48 |

E) Types of Mode to Complete the Trip

| Modes | Frequency | Percent |
|--------------|------------------|----------------|
| Bus | 42 | 39.6% |
| Motor cycle | 40 | 37.7% |
| Rickshaw | 11 | 10.4% |
| On foot | 4 | 3.8% |
| CNG | 9 | 8.5% |
| Total | 106 | 100.0% |

F) Total Travel Time and Cost of the Trips (In Taka)

| Total distance of the trip | | Total cost of the trip in taka | | | | | Total |
|----------------------------|------------|--------------------------------|-------------|--------------|--------------|-----------|--------|
| | | Within 50 Taka | 51-100 Taka | 101-200 Taka | 201-400 Taka | 600+ Taka | |
| 1.1-2.0 km | Frequency | 1 | 0 | 0 | 0 | 0 | 1 |
| | Percentage | 3.7% | .0% | .0% | .0% | .0% | 1.6% |
| 2.1-5.0 km | Frequency | 6 | 0 | 0 | 0 | 0 | 6 |
| | Percentage | 22.2% | .0% | .0% | .0% | .0% | 9.7% |
| 5.1-15.0 km | Frequency | 9 | 1 | 0 | 0 | 0 | 10 |
| | Percentage | 33.3% | 14.3% | .0% | .0% | .0% | 16.1% |
| 15.1- 30.0 km | Frequency | 8 | 2 | 0 | 0 | 0 | 10 |
| | Percentage | 29.6% | 28.6% | .0% | .0% | .0% | 16.1% |
| 30.0 km+ | Frequency | 3 | 4 | 5 | 18 | 5 | 35 |
| | Percentage | 11.1% | 57.1% | 100.0% | 100.0% | 100.0% | 56.5% |
| Total | Frequency | 27 | 7 | 5 | 18 | 5 | 62 |
| | Percentage | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

G) Total distances of the trip

| Total distance of the trip | Frequency | Percentage |
|----------------------------|-----------|------------|
| 1.1-2.0 Km | 1 | 1.6 |
| 2.1-5.0 Km | 6 | 9.7 |
| 5.1-15.0 Km | 10 | 16.1 |
| 15.1- 30.0 Km | 10 | 16.1 |
| 30.0 Km+ | 35 | 56.5 |
| Total | 62 | 100.0 |

Regional Transport Survey Findings

A. Transport going out from study area to other region (Upazila /district) on each day.

1) Types of Transport Going Out from Study Area to Other Region.

| Type of Mode | Frequency | Percent |
|--------------|-----------|---------|
| Bus | 38 | 46.9 |
| Truck | 43 | 53.1 |
| Total | 81 | 100.0 |

2) Destination of Trips Going Out from Study Area to other Region by Mode

| Trip Destination Point | | Type of Mode | | Total |
|------------------------|------------|--------------|--------|--------|
| | | Bus | Truck | |
| Chittagong | Frequency | 15 | 15 | 30 |
| | Percentage | 39.5% | 35.7% | 37.5% |
| Dhaka | Frequency | 6 | 4 | 10 |
| | Percentage | 15.8% | 9.5% | 12.5% |
| Cox's Bazar | Frequency | 5 | 8 | 13 |
| | Percentage | 13.2% | 19.0% | 16.3% |
| Chakaria | Frequency | 3 | 6 | 9 |
| | Percentage | 7.9% | 14.3% | 11.3% |
| Teknaf | Frequency | 5 | 4 | 9 |
| | Percentage | 13.2% | 9.5% | 11.3% |
| Naikhanchari | Frequency | 1 | 2 | 3 |
| | Percentage | 2.6% | 4.8% | 3.8% |
| Others | Frequency | 3 | 3 | 6 |
| | Percentage | 7.9% | 7.1% | 7.5% |
| Total | Frequency | 38 | 42 | 80 |
| | Percentage | 100.0% | 100.0% | 100.0% |

3) Number of Trips/Day by Different Mode of Transport Going Out From the Study Area to Other Region.

| No. of trips per day | | Type of Mode | | Total |
|----------------------|------------|--------------|--------|--------|
| | | Bus | Truck | |
| 1-2 | Frequency | 26 | 33 | 59 |
| | Percentage | 68.4% | 76.7% | 72.8% |
| 3-4 | Frequency | 9 | 7 | 16 |
| | Percentage | 23.7% | 16.3% | 19.8% |
| 5-6 | Frequency | 2 | 2 | 4 |
| | Percentage | 5.3% | 4.7% | 4.9% |
| 6+ | Frequency | 1 | 1 | 2 |
| | Percentage | 2.6% | 2.3% | 2.5% |
| Total | Frequency | 38 | 43 | 81 |
| | Percentage | 100.0% | 100.0% | 100.0% |

4. Average Numbers of Passengers Carried By Bus/Trip Going Out From Study Area to Other Region:

| Passengers/Trip | Frequency | Percent |
|-----------------|-----------|---------|
| 0-10 | 2 | 5.3 |
| 11-20 | 4 | 10.5 |
| 21-30 | 8 | 21.1 |
| 31-40 | 16 | 42.1 |
| 41-50 | 7 | 18.4 |
| 50+ | 1 | 2.6 |
| Total | 38 | 100.0 |

5) Types of Goods Carried By Truck/Trip Going Out From Study Area to Other Region.

| Types of Goods | Frequency | Percent |
|------------------------|------------------|----------------|
| Construction Materials | 16 | 38.1 |
| Sea Food/Fish | 8 | 19.0 |
| Food or Beverage | 2 | 4.8 |
| Agro-Product | 4 | 9.5 |
| Wood/Timber/Bamboo | 8 | 19.1 |
| Medicine | 1 | 2.4 |
| Others | 3 | 7.1 |
| Total | 42 | 100.0 |

B. Information of trip coming into study area from other region (upazila/district)

| Type of Mode | Frequency | Percent |
|---------------------|------------------|----------------|
| Bus | 10 | 22.2 |
| Truck | 35 | 77.8 |
| Total | 45 | 100.0 |

2) Origin of Trips Coming into Study Area from Other Regions by Mode.

| Name of the Trip Origin Point | | Type of Mode | | Total |
|-------------------------------|------------|--------------|--------|--------|
| | | Bus | Truck | |
| Chittagong | Frequency | 4 | 15 | 19 |
| | Percentage | 40.0% | 42.9% | 42.2% |
| Dhaka | Frequency | 0 | 5 | 5 |
| | Percentage | 0.0% | 14.3% | 11.1% |
| Cox's Bazar | Frequency | 1 | 0 | 1 |
| | Percentage | 10.0% | 0.0% | 2.2% |
| Chakaria | Frequency | 0 | 3 | 3 |
| | Percentage | 0.0% | 8.6% | 6.7% |
| Teknaf | Frequency | 3 | 4 | 7 |
| | Percentage | 30.0% | 11.4% | 15.6% |
| Ramu | Frequency | 1 | 4 | 5 |
| | Percentage | 10.0% | 11.4% | 11.1% |
| Naikhanchari | Frequency | 1 | 4 | 5 |
| | Percentage | 10.0% | 11.4% | 11.1% |
| Total | Frequency | 10 | 35 | 45 |
| | Percentage | 100.0% | 100.0% | 100.0% |

3) No. of Trips per Day Different Mode of Transport Coming into Study Area from Other Regions.

| No. of trips per day | | Type of Mode | | Total |
|----------------------|------------|--------------|--------|--------|
| | | Bus | Truck | |
| 1-2 | Frequency | 6 | 30 | 36 |
| | Percentage | 66.7% | 88.2% | 83.7% |
| 3-4 | Frequency | 0 | 3 | 3 |
| | Percentage | .0% | 8.8% | 7.0% |
| 5-6 | Frequency | 2 | 1 | 3 |
| | Percentage | 22.2% | 2.9% | 7.0% |
| 6+ | Frequency | 1 | 0 | 1 |
| | Percentage | 11.1% | .0% | 2.3% |
| Total | Frequency | 9 | 34 | 43 |
| | Percentage | 100.0% | 100.0% | 100.0% |

4) Average Numbers of Passengers Carried by Bus/Trip Coming into Study Area from Other Regions:

| Passengers/Trip | Frequency | Percent |
|-----------------|-----------|---------|
| 0-10 | 1 | 7.7 |
| 11-20 | 4 | 30.8 |
| 21-30 | 1 | 7.7 |
| 31-40 | 3 | 23.1 |
| 41-50 | 4 | 30.8 |
| Total | 13 | 100.0 |

5) Types of Goods Carried by Truck/Trip Coming into Study Area from Other Regions:

| Types of Goods | Frequency | Percent |
|---------------------------|------------------|----------------|
| Construction Materials | 14 | 42.4 |
| Sea Food/Fish | 4 | 12.1 |
| Poultry Feed/Cattle Grain | 1 | 3.0 |
| Vegetable | 5 | 15.2 |
| Agro-Product | 4 | 12.1 |
| Wood/Timber/Bamboo | 1 | 3.0 |
| Medicine | 1 | 3.0 |
| Others | 3 | 9.1 |
| Total | 33 | 100.0 |

6) Stoppage Area inside the Upazila Area for Bus/Truck Coming into Study Area from Other Regions:

| Stoppage Area | | Type of Mode | | Total |
|-------------------------------|------------|---------------------|--------------|--------------|
| | | Bus | Truck | |
| Eidghar | Frequency | 0 | 1 | 1 |
| | Percentage | .0% | 2.9% | 2.2% |
| Link Road | Frequency | 2 | 5 | 4 |
| | Percentage | 20% | 14.3% | 15.6% |
| Ramu By Pass | Frequency | 1 | 3 | 4 |
| | Percentage | 10.0% | 8.6% | 8.9% |
| Different Haphazard Locations | Frequency | 7 | 26 | 33 |
| | Percentage | 70.0% | 74.3% | 73.3% |
| Total | Frequency | 10 | 35 | 45 |
| | Percentage | 100.0% | 100.0% | 100.0% |



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas

Package 05:

**Ramu Upazila, District: Cox's Bazar &
Rangunia Upazila, District: Chittagong**

FINAL SURVEY REPORT

Geological Survey of Rangunia Upazila

June 2016

Joint venture of



HOUSE OF CONSULTANTS LIMITED (HCL)

and



dm.Watch Disaster Management Watch(dm. Watch)

EXECUTIVE SUMMARY

This geological, geophysical and geotechnical survey work has been carried out at Rangunia Upazila to determine the subsurface soil condition of the project area under the package-5, project titled 'Preparation of Development Plan for Fourteen Upazilas' an initiative of Urban Development Directorate (UDD). In this development plan, subsurface geological, geophysical and geotechnical information's has been considered for a durable and sustainable urban environment. Primarily this work is to determine subsurface soil condition of the project area and evaluating of natural geological and hydro-meteorological hazards such as earthquake, landslide and ground failure which integrate the consequence into the design of the infrastructure.

The survey program has been concentrated around the valley area where considerable thickness of engineering soil profile is occurred because study areas are geologically and structurally complex in nature. To accomplish the study work, following investigations and surveys has been carried out in the field which are geo-morphological survey; drilling of boreholes and preparation of borehole logs; collection of undisturbed and disturbed soil sample as per standard guide line; conducting standard penetration tests (SPTs); drilling of boreholes and casing by PVC pipe for conducting PS logging test; conducting PS logging test (Down-hole seismic test) and conducting Multi-Channel Analysis of Surface Wave (MASW). Laboratory testing of soil samples such as Grain Size Analysis, Natural moisture Content, Atterberg Limits, Specific Gravity, Direct Shear Test, Unconfined Compression strength, Triaxial test etc has been performing in the laboratory which will give more qualitative and quantitative information about the subsurface materials. To meet the above geological, geotechnical and geophysical task, 30 boreholes with SPT program, five MASW and three PS Logging survey programs have been conducted into the field at Rangunia Upazila.

Finally all sorts of field and laboratory investigation data will be analyzed for evaluation in future and result will be integrated with all information's in a module which can generate geomorphologic map, sub-surface litho-logical 3D model of different layers, engineering geological mapping based on AVS30, Seismic Hazard Assessment Map (risk sensitive micro-zonation maps), soil type map, seismic intensity map, Peak Ground Acceleration (PGA) and Peak Ground Velocity (PGV) map, recommended building height maps for both high rise building and low rise building, liquefaction and Ground Failure Map etc.

After completion all field investigation, laboratory testing, data analysis and respective map production with geotechnical and geological data base, it would give a clear idea about the geo-hazard status of particular landscape where newly urban developing activities or any other mega infrastructure project is going on and this mentioned investigation also gives idea about the vulnerability of existing build up infrastructure of a particular area. Based on these results, proper management techniques as well as other necessary adaptation process could be addressed before or after the development activities in the studied area. It is to be mentioned that the long-term maintenance cost will be reduced and the developed structure will withstand against the potential natural hazards if the infrastructures are built following the risk informed physical land-use plan.



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Abbreviations

| | |
|------------|---|
| ASTM | : American Society for Testing and Materials |
| AVS30 | : Average Shear Wave velocity of 30 meter |
| BH | : Borehole |
| HCL | : House of consultant Ltd |
| MASW | : Multi-Channel Analysis of Surface Wave |
| N value | : Soil resistance or compactness |
| PGA | : Peak Ground Acceleration |
| PGV | : Peak Ground Velocity |
| PS logging | : Primary and Shear wave logging (Down-hole seismic test) |
| SA | : Spectral Acceleration |
| SPAC | : Spatial Autocorrelation |
| SPT | : Standard Penetration Tests |
| UDD | : Urban Development Directorate |

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Chapter-01 Introduction

1.1. Background:

Bangladesh is facing rapid horizontal expansion of urban area due to rapid population growth and increasing life expectancy of the peoples. The present trend of planning practice is mostly oriented towards planning of major cities and towns in Bangladesh but not in all other towns or growth centers which is belonging district or Upazila urban area because involves of huge amount of financial allocation/grants. In the government's recent policy for overall administrative reorganization, the Upazila has been recognized as the most significant tier of administration. So that these areas are need to be planned and developed to accommodate all social, economic, administrative, infrastructure services and service facilities for the region. The current government's intention is to reflect the national policy of bringing development administrative and service facilities to the door step of rural masses and to ensure better delivery of government services to the people. Realizing the fact and importance of formulating development plans for Upazilas, Urban Development Directorate has come up with a great initiative to plan those areas. At the first phase of this initiative UDD has decided to prepare development plan for 14 Upazilas all over Bangladesh into five different packages. For each package separate consultancy team has been appointed to carry out that job more fruitfully. HCL (House of consultant Ltd) has been selected for package-5 (covering Rangunia Upazila, Dist: Chittagong; and Rangunia Upazila, Dist: Cox's Bazar) by project evaluation committee of UDD.

In this development plan, subsurface geological, geophysical and geotechnical information's has been considered for a durable and sustainable urban environment. Primarily this work is to determine subsurface soil condition of the project area and evaluating of natural geological and hydro-meteorological hazards such as earthquake, landslide and ground failure which integrate the consequence into the design of the infrastructure.

To ensure the sustainable development of the project area, following investigations and surveys has been carried out in the field which are geo-morphological survey; drilling of boreholes and preparation of borehole logs; collection of undisturbed and disturbed soil sample as per standard guide line; conducting standard penetration tests (SPTs); drilling of boreholes and casing by PVC pipe for conducting PS logging test (Down-hole seismic test); conducting PS logging test (Down-hole seismic test) and conducting Multi-Channel Analysis of Surface Wave (MASW). Geologically and structurally the area is very much complex, that's why geotechnical and geophysical investigations are mostly concentrated in the valley area where soil is much soft and thicker than hilly parts.

Laboratory testing of soil samples such as Grain Size Analysis, Natural moisture Content, Atterberg Limits, Specific Gravity, Direct Shear Test, Unconfined Compression strength, Triaxial test etc. has been performing in the laboratory which will give more qualitative and quantitative information about the subsurface materials. From above all sorts of field and laboratory data will be analyzed and integrated to produce risk sensitive micro-zonation maps.

1.2. Scope of Work:

- a) Preparation of geomorphologic map
- b) Preparation of sub-surface lithological 3D model of different layers through geotechnical investigation
- c) Preparation of engineering geological mapping based on AVS30
- d) Preparation of Seismic Hazard Assessment Map
- e) Peak Ground Acceleration (PGA) and Peak Ground Velocity (PGV) map.
- f) Liquefaction and Ground Failure Map.
- g) Finally intensity map is prepared for high rise and low rise building

Chapter-02 Methodology

The methods and materials used to carry out of these activities have been described below-

2.1. Test Details and Procedure of Down-hole Seismic Test (PS Logging)

The seismic down-hole test aims to measure the travelling time of elastic wave from the ground surface to some arbitrary depths beneath the ground. The seismic wave was generated by striking a wooden plank by a sledge hammer. The plank was placed on the ground surface at around 1 m in horizontal direction from the top of borehole. The plank was hit separately on both ends to generate shear wave energy in opposite directions and is polarized in the direction parallel to the plank.

The shear wave emanated from the plank is detected by a tri-axial geophone. The geophone was lowered to 1 m below ground surface and attached to the borehole wall by inflating an air bladder. Then, the measurements were taken at every 1 m interval until the geophone was lowered to 30 m below ground surface. For each elevation, 3 records were taken and then used to calculate the shear wave velocity.



Plate1: Test site

2.2.1. Procedure of Field Work and Analysis

A wooden plank with an approximate dimension of 2 ft x 1 ft x 2 ft is fixed to the ground. The wooden plank is placed about 1m from the borehole as shown in Plate2.



Plate2: Wooden Plank as the Vibration Source

- b) Cables are wired from the geophone Plate3 and the trigger to the data acquisition unit Plate4. Signals in the vertical, radial and transverse directions are recorded by the data acquisition unit.

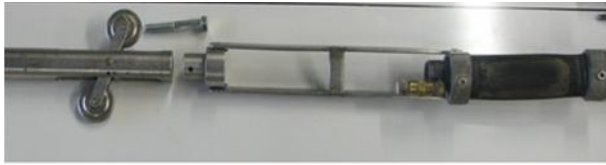


Plate3: Geophone



Plate4: Data Acquisition Unit

- c) The geophone is lowered into the borehole as shown in Plate5. Then, air is pumped into the air bag to fix the geophone to the casing (PVC pipe) at 1 m interval in depth basically.



Plate5: Geophone Lowering In the Borehole

- d) Excitations are generated by hitting the wooden plank in three directions by the hammer.



Plate6: Direction of Excitations

- e) Data is recorded in the data acquisition unit. Figure 1 illustrates a typical dataset in obtaining the arrival time of S-wave. Hitting the wooden plank in opposite directions generates signals as shown in the figure. The time that two curves begin to separate is the arrival time of shear wave. By doing the same analysis for every depth, S-wave profiles are obtained throughout the depth of the borehole.

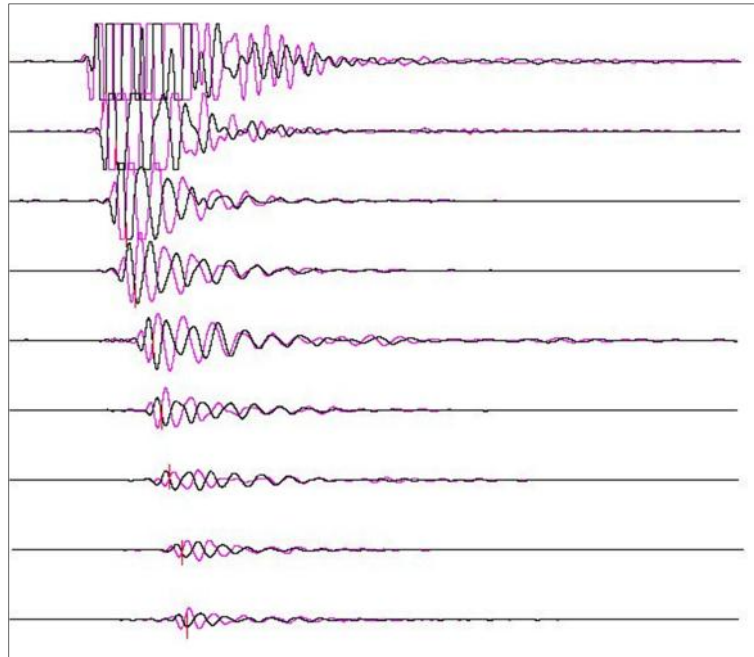
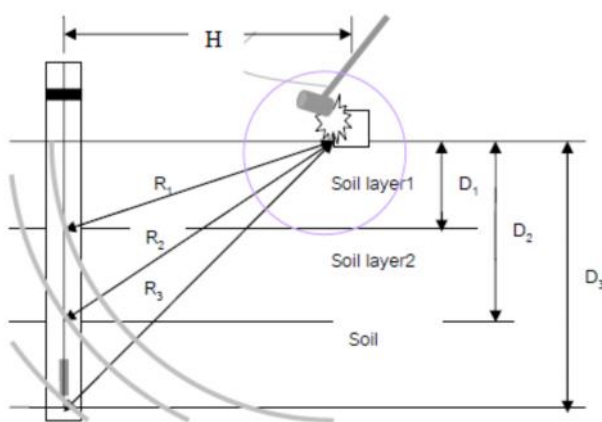


Figure 1: Determination of the Arrival Time Of S-Wave

- f) Using the raw data of the test depth (D), the shortest pass (R) and the recorded arrival time of S-wave (t) in the inclined path is calculated to the travel time, t_c , in the vertical path as shown in Figure 2.



$$t_c = D \frac{t}{R}$$

Where

t_c is the corrected travel time

D is the testing depth from ground surface,

t is the first arrival time from test

R is the distance between the source and receiver

[Auld 1977]

Figure 2: Calculation of the Travel Time

- h) By plotting the corrected travel time versus depth, the velocity of every 1 m interval is calculated from (Auld 1977)

$$V_d = \frac{\Delta D}{\Delta t_c} \text{ [Auld 1977]}$$

Where, ΔD is depth interval showing similar slope and Δt_c is the corrected travel time difference of ΔD .

2.2. Test Details and Procedure of Multi-Channel Analysis of Surface Wave (MASW)

The recent and very popular method for computation of shear wave velocity is Multichannel Analysis of Surface Wave (MASW). This method is widely used for seismic microzonation. A MASW is a seismic surface method, widely used for subsurface characterization and is increasingly being applied for seismic microzonation and site response studies (Anbazhagan and Sitharam, 2008). It is also used for the geotechnical characterization of near surface materials (Park and Miller, 1999; Xia et al., 1999; Miller et al., 1999; Anbazhagan and Sitharam, 2008). MASW is used to identify the subsurface material boundaries, spatial and depth variations of weathered and engineering rocks (Anbazhagan and Sitharam, 2009). We have used the MASW system consisting of 12 channels Geode seismograph with 12 vertical geophones of 10 Hz capacity.

The measuring procedure in this project is shown as follows:

- I. To decide the measuring line
- II. To set receivers along the line at the ground surface. The intervals of each geophone are 3m.
- III. To set an acrylic board at a half interval outside the line
- IV. To shoot it vertically. Then generated elastic waves are recorded by receivers.
- V. To shift the acrylic board between second receiver and the third receiver, and shoot it vertically. Then generated elastic waves are recorded at receivers.
- VI. To iterate this procedure up to setting the acrylic boards at a half interval outside the other side of the line.

The data acquisition parameters are given in Table 1.

Table 1: Data Acquisition Parameters

| Seismic refraction | |
|-------------------------------|---|
| Number of channels | 12 |
| Geophone spacing | 3m |
| Array length | 33m |
| Sampling rate | 1ms |
| Record length | 2 sec |
| Natural frequency of Geophone | 10 Hz |
| Source | 8 kg hammer |
| Shot number | 13 points, 11 between geophones and 2 outside of measuring line |

Source: Park and Miller, 1999; Xia et al. 1999; Miller et al. 1999; Anbazhagan and Sitharam, 2008.

2.2.1. Analysis of MASW

Data processing consists of two main steps: (i) Obtaining the dispersion curves of Rayleigh wave phase velocity from the records; (ii) Determining the V_s profiles from which the V_{s30} values are calculated (see Figure 3). In the phase velocity analysis, SPAC (Spatial Autocorrelation) method (Okada, 2003) is employed. Okada (2003) shows Spatial Autocorrelation function $\rho(\omega, r)$ is expressed by Bessel function.

$$\rho(\omega, r) = J_0(\omega r / c(\omega)) \dots\dots\dots (1)$$

[Okada (2003)]

Where, r is the distance between receivers, ω is the angular frequency, $c(\omega)$ is phase velocity of waves, J_0 is the first kind of Bessel function. The phase velocity was obtained at

each frequency using equation (2). A one dimensional inversion using a non-linear least square method has been applied to the phase velocity curves. In the inversion, the following relationship between P-wave velocity (V_p) and V_s (Kitsunezaki et. al., 1990):

$$V_p = 1.29 + 1.11V_s \quad \dots\dots\dots (2)$$

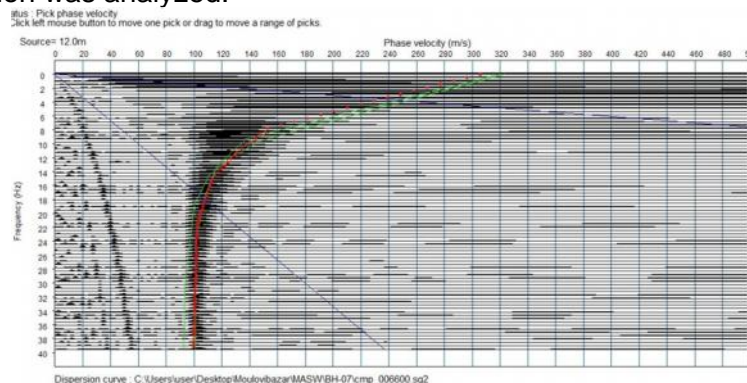
[Kitsunezaki et. al., 1990]

Where, V_s is S-wave velocity (km/s), V_p is P-wave velocity (km/s). In order to assume density (ρ in g/cm³) from S-wave velocity, the relationship of Ludwig et al. (1970) is used.

$$\rho = 1.2475 + 0.399V_p - 0.026V_p^2 \quad \dots\dots\dots (3)$$

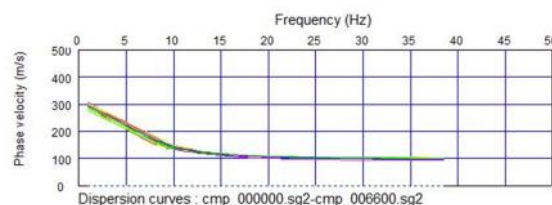
[Ludwig et al. (1970)]

These calculations are carried out along the measuring line, and the S-wave velocity distribution section was analyzed.



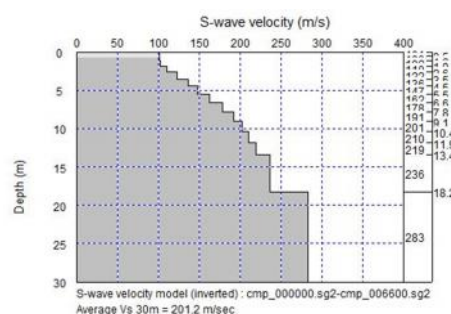
MASW Raw field data

F-K
Transform
↓



Dispersion for Rayleigh wave

Inversion
↓



Shear wave velocity profile

Figure 3: Main Step of the MASW Processing Technique

2.3. Test Details and Procedure of Standard Penetration Test

The geotechnical boreholes have been constructed using wash boring method. In this investigation, 30 no boreholes have been prepared at Rangunia Upazila. The borehole logs of 30 nos. boreholes log are enclosed in the Appendix. The boring method has been described in the following section.

2.3.1. Wash Boring

In this method, water is pumped through a string of hollow boring rods and is released under pressure through narrow holes in a chisel attached to the lower end of the rods. The soil is loosened and broken up by the water jets and the up and down movement of the chisel. There is also provision for the manual rotation of the chisel by means of a tiller attached to the boring rods above the surface. The soil particles are washed to the surface between the rods and the side of the borehole and are allowed to settle out in a sump. The rig consists of a derrick, a winch and a water pump. The winch carries a light steel cable which passes through the sheaf of the derrick and is attached to the top of the boring rods. The string of rods is raised and dropped by means of the winch unit, producing the chopping action of the chisel. The borehole is generally cased but the method can be used in uncased holes. Drilling fluid may be used as an alternative to water in the method, eliminating the need for casing.

Wash boring can be used in most types of soil but progress becomes slow if particles of coarse gravel size and larger are present. The accurate identification of soil types is difficult due to particles being broken up by the chisel and to mixing as the material is washed to the surface: in addition, segregation of particles takes place as they settle out in the sump. However, a change in the feel of the boring tool can sometimes be detected, and there may be a change in the color of the water rising to the surface, when the boundaries between different strata are reached. The method is unacceptable as a means of obtaining soil samples. It is used only as a means of advancing a borehole to enable tube samples to be taken or in-situ tests such as Standard Penetration Test (SPT) to be carried out below the bottom of the hole. An advantage of the method is that the soil immediately below the hole remains relatively undisturbed.

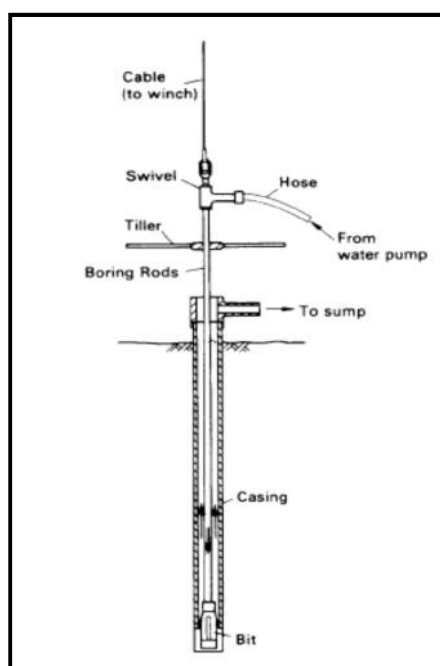


Figure 4: Wash Boring

2.3.2. Soil Sampling

Soil samples are divided into two main categories, undisturbed and disturbed. Undisturbed samples, which are required mainly for shear strength and consolidation tests, are obtained by techniques which aim at preserving the in-situ structure and water content of the soil. In boreholes, undisturbed samples can be obtained by withdrawing the boring tools (except when hollow-stem continuous-flight augers are used) and driving or pushing a sample tube into the soil at the bottom of the hole. The sampler is normally attached to a length of boring rod which can be lowered and raised by the cable of the percussion rig. When the tube is brought to the surface, some soil is removed from each end and molten wax is applied, in thin layers, to form a seal approximately 25mm thick: the ends of the tube are then covered by protective caps. Undisturbed block samples can be cut by hand from the bottom or sides of a trial pit. During cutting, the samples must be protected from water, wind and sun to avoid any change in water content: the samples should be covered with molten wax immediately they have been brought to the surface. It is impossible to obtain a sample that is completely undisturbed, no matter how elaborate or careful the ground investigation and sampling technique might be. In the case of clays, for example, swelling will take place adjacent to the bottom of a borehole due to the reduction in total stresses when soil is removed and structural disturbance may be caused by the action of the boring tools; subsequently, when a sample is removed from the ground the total stresses are reduced to zero.

Soft clays are extremely sensitive to sampling disturbance, the effects being more pronounced in clays of low plasticity than in those of high plasticity. The central core of a soft clay sample will be relatively less disturbed than the outer zone adjacent to the sampling tube. Immediately after sampling, the pore water pressure in the relatively undisturbed core will be negative due to the release of the in-situ total stresses. Swelling of the relatively undisturbed core will gradually take place due to water being drawn from the more disturbed outer zone and resulting in the dissipation of the negative excess pore water pressure: the outer zone of soil will consolidate due to the redistribution of water within the sample. The dissipation of the negative excess pore water pressure is accompanied by a corresponding reduction in effective stresses. The soil structure of the sample will thus offer less resistance to shear and will be less rigid than the in-situ soil.

A disturbed sample is one having the same particle size distribution as the in-situ soil but in which the soil structure has been significantly damaged or completely destroyed; in addition, the water content may be different from that of the in-situ soil. Disturbed samples, which are used mainly for soil classification tests, visual classification and compaction tests, can be excavated from trial pits or obtained from the tools used to advance boreholes (e.g. from augers and the clay cutter). The soil recovered from the shell in percussion boring will be deficient in fines and will be unsuitable for use as a disturbed sample. Samples in which the natural water content has been preserved should be placed in airtight, non-corrosive containers: all containers should be completely filled so that there is negligible air space above the sample.

All samples should be clearly labeled to show the project name, date, location, borehole number, depth and method of sampling; in addition, each sample should be given a serial number. Special care is required in the handling, transportation and storage of samples (particularly undisturbed samples) prior to testing. The types of tube samplers used in this study are described below.

Thin-walled Sampler

Thin-walled samplers (Figure 5a) have been used to collect undisturbed samples from boreholes. These samplers are used in soils which are sensitive to disturbance such as soft to firm clays and plastic silts. The sampler does not employ a separate cutting shoe, the

lower end of the tube itself being machined to form a cutting edge. The internal diameter may range from 35 to 100 mm. The area ratio is approximately 10% and samples of first-class quality can be obtained provided the soil has not been disturbed in advancing the borehole. In trial pits and shallow boreholes the tube can often be driven manually

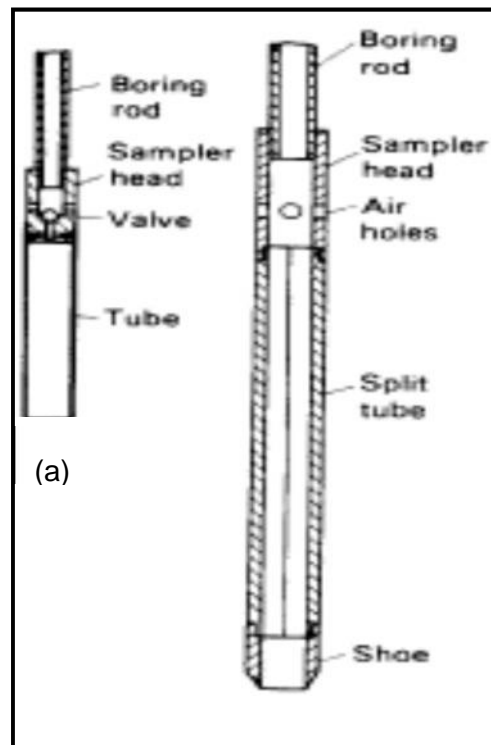


Figure 5: (A) Thin-Walled (Shelby Tube) Sampler, And (B) Split-Spoon Sampler.

Split-spoon sampler

Split-spoon samplers (Figure 5b) have been to collect disturb samples. It consists of a tube which is split longitudinally into two halves: a shoe and a sampler head incorporating air-release holes are screwed onto the ends. The two halves of the tube can be separated when the shoe and head are detached to allow the sample to be removed. The internal and external diameters are 35 and 50 mm, respectively, the area ratio being approximately 100%, with the result that there is considerable disturbance of the sample. This sampler is used mainly in sands, being the tool specified in the standard penetration test (SPT).

2.3.3. Standard Penetration Test (SPT)

One of the oldest and most common in-situ tests is the Standard Penetration Test (SPT). It was developed in the late 1920s and has been used extremely in North and South America, the United Kingdom, Japan, and elsewhere. Because of this long record of experience, the SPT is well-established in engineering practice. It is performed inside exploratory boring using inexpensive and readily available equipment, and thus adds little cost to a site characterization program.

Although the SPT also is plagued by many problems that affect its accuracy and reproducibility, it probably will continue to be used for the foreseeable future, primarily because of its low cost. However, it is partially being replaced by other test methods, especially on larger and more critical projects.

The ASTM standard D1586 has been followed to carry out SPT. The procedure is as follows:

1. Drill a 60-200 mm (2.5-8 in) diameter exploratory boring to the depth of the first test.
2. Insert the SPT sampler (also known as a Split-spoon Sampler) into the boring. The shape and dimensions of this sampler are shown in Figure 6. It is connected via steel rods to a 63.5 kg (140 lb) hammer, as shown in Figure 7.
3. Using either a rope and cathead arrangement (in case of wash boring used this technique in this investigation) or an automatic tripping mechanism (in case of rotary drilling used this technique in this investigation), raise the hammer a distance of 760 mm (30 in) and allow it to fall. This energy drives the sampler into the bottom of the boring. Repeat this process until the sampler has penetrated a distance of 450 mm (18 in), recording the number of hammer blows required for each 150 mm (6 in) interval. Stop the test if more than 50 blows are required for any of intervals, or if more than 100 total blows are required. Either of these events is known as refusal and is so noted on the boring log.
4. Compute the N-value by summing the blow counts for the last 300 mm (12 in) of penetration. The blow count for the first 150 mm (6 in) is retained for reference purposes, but not used to compute N because the bottom of the boring is likely to be disturbed by the drilling process and may be covered with loose soil that fell from the sides of the boring. Note that the N-value is the same regardless of whether the engineer is using English or SI units.
5. Extract the SPT sampler, then remove and save the soil sample (disturbed sample).
6. Drill the boring to the depth of the next test and repeat steps 2 through 6 as required.

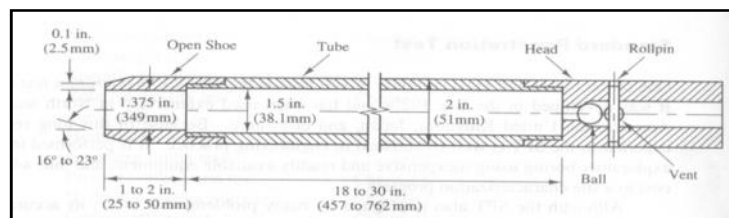


Figure 6: Split-Spoon Sampler.

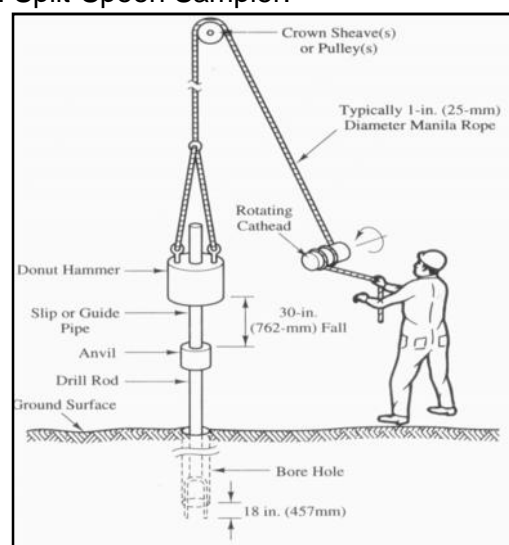


Figure 7: The SPT Sampler in Place In The Boring.

Thus, N-values may be obtained at intervals no closer than 500 mm (20 in). Typically these tests are performed at 1.5 – 5 m (5 – 15 ft) intervals (1.5 m interval in this investigation). The term consistency of the cohesive soil is generally used on the basis of the SPT values (N) in the following way.

| | | | | | | |
|---|-----|-----|-------|-----|-----|------------|
| N | ... | ... | 0-2 | ... | ... | Very Soft |
| N | ... | ... | 2-4 | ... | ... | Soft |
| N | ... | ... | 4-8 | ... | ... | Medium |
| N | ... | ... | 8-15 | ... | ... | Stiff |
| N | ... | ... | 15-30 | ... | ... | Very Stiff |
| N | ... | ... | 30-50 | ... | ... | Hard |
| N | ... | ... | >50 | ... | ... | Very Hard |

The term relative density for the non-cohesive soil is used on the basis of the SPT values (N) in the following way.

| | | | | | | |
|---|-----|-----|-------|-----|-----|--------------|
| N | ... | ... | 0-4 | ... | ... | Very loose |
| N | ... | ... | 4-10 | ... | ... | Loose |
| N | ... | ... | 10-30 | ... | ... | Medium dense |
| N | ... | ... | 30-50 | ... | ... | Dense |
| N | ... | ... | >50 | ... | ... | Very dense |

Visual Soil Classification Procedure:

Soils are classified according to grain size distribution and limit tests. Size divisions for various materials are as follows:

| Sieve | Soils Designations |
|---------------------------|--------------------|
| +No 4 (4.76mm) | Gravel |
| No.4 to No 10(2.00mm) | Coarse sand |
| No. 10 to No 40 (0.42mm) | Medium Sand |
| No. 40 to No 200 (0.07mm) | Fine sand |
| -No.200 | Silt or Clay |

Description of the Soil Composition:

The following terms have been used in this report for description of soil composition:

| | |
|-------------|-----------|
| Trace | 1 to 10% |
| Little | 10 to 25% |
| With | 25 to 35% |
| Substantial | 35 to 50% |

(Source: ASTM Standard D1586)

Chapter-03 Survey Result of Rangunia Upazila

3.1. Geophysical Investigations

In these investigations, the main aims to estimate local site effects against earthquakes. The objective of the work is three-fold: 1) To determine shear wave velocity profile at various sites, 2) To classify soil conditions according to seismic design specifications and 3) To analyze soil amplifications in the area. Field measurements of shear wave velocities were conducted in Rangunia and will be described in this below-

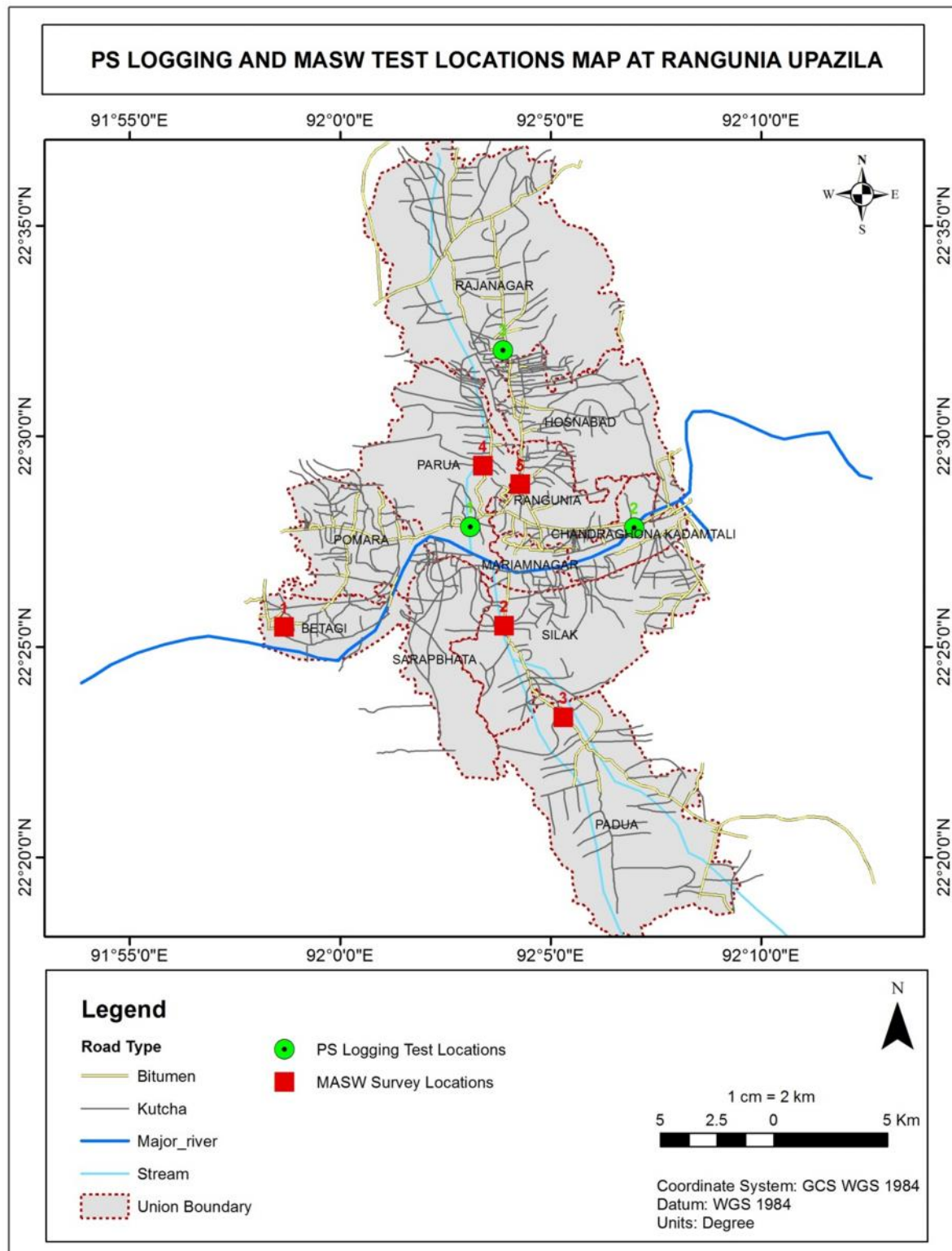
Field measurements of shear wave velocity profile (V_s profile) were carried out by two geophysical exploration methods namely 1) seismic down-hole test and 2) Multichannel Analysis of Surface Wave (MASW).

Seismic down-hole test is a direct measurement method for obtaining the shear wave velocity profile of soil stratum. However, the test requires borehole which is not time and cost effective for the project. Multichannel analysis of surface waves (MASW) is a non-invasive technique which can be used to determine the V_s profile at sites. In this project, the seismic down-hole and MASW tests were performed at 3 and 5 locations respectively. Locations of seismic down-hole test and MASW tests are shown in Figure 19. The GPS coordinate are also shown later in Table 2.

Table2: PS logging and MASW test locations

| Upazila Name | Test/ Survey Name | ID | Location Name | Coordinate | |
|--------------|---|---------|---|------------|-----------|
| | | | | Latitude | Longitude |
| Rangunia | Downhole Seismic Test (PS Logging) | BH-01 | Ishkali, Near Pouroshova Office | 22.46417 | 92.05151 |
| | | BH-03 | Unisia AziziaMadrasha Field, RanguniaUpazila | 22.46377 | 92.11636 |
| | | BH-08 | Uttar Rangunia High School & College Field, RanguniaUpazila | 22.53408 | 92.06448 |
| | Multichannel analysis of surface waves (MASW) | MASW-01 | ModhoBelagi Govt. Primary School, Khandocar Para | 22.42451 | 91.97781 |
| | | MASW-02 | DhokhinSilok M Shalam High School, Silok Union | 22.42507 | 92.06496 |
| | | MASW-03 | Uttar Padua Govt. Primary & High School, Padua Bazar, Padua Union | 22.38882 | 92.08831 |
| | | MASW-04 | Sahabdi Nagar, 5No. Parua Union | 22.48839 | 92.05659 |
| | | MASW-05 | Mozumdar Khali Govt. High School, RanguniaPuroshava | 22.48102 | 92.07127 |

Source: Field Survey, 2016



Map 1: Locations Map of the geophysical tests at Rangunia Upazila



Set receivers along the line at the ground surface and the intervals of each geophone are 3m



Vertical Geophone of 10 Hz capacity



Data Acquisition unit



shoot it vertically by 8kg hammer to generated elastic waves



Mozumdar Khali Govt. High School, Rangunia
Puroshava, Rangunia Upazilla

Plate 7: MASW Data Acquisitions at Rangunia Upazila

3.1.1. Down-Hole Seismic (PS Logging) Test Results

The average shear wave velocity (AVS) of each PS logging test are tabulated in Table 3. Work plan of the test depth was 30m, however, in some locations did not reach the geophone to the 30 m in depth due to adverse conditions of PVC.

Table 3: Summary of PS Logging Test Result

| Average Shear Wave Velocity (m/s) | RanguniaUpazila | | |
|-----------------------------------|-----------------|-------|-------|
| | BH-01 | BH-03 | BH-08 |
| AVS 5 | 81 | 83 | 77 |
| AVS10 | 103 | 113 | 105 |
| AVS 15 | 126 | 136 | 117 |
| AVS 20 | 150 | 155 | 128 |
| AVS 25 | 170 | 174 | 141 |
| AVS 27 to AVS 30 | - | 180 | 153 |

Source: Field Survey, 2016

The shear wave velocity is a fundamental parameter required to define the dynamic properties of soils. If the soil velocity is less than 180m/s, it can be said as loose or soft soil. Estimation of shear wave velocity (V_s) / average shear wave velocity (AVS) and mapping is a way to characterize varying site conditions, and it can also be used to model earthquake-related ground shaking (e.g., Petersen and others, 1997; 1999; Wills and others, 2000). Estimation of AVS aims to generate a map of estimated shear wave velocities for the upper 30m of the subsurface. Further this map can be used for seismic site response analysis i.e., to determine peak ground acceleration (PGA) and spectral acceleration (SA) values of both bedrock and ground surface.

According to field PS logging test result, average shear wave velocities are showing not much good soil condition as foundation soil except few depth position. But actual soil condition (soil type, engineering properties and seismic behavior of soil) will be known when all the field data (SPT and soil laboratory test result, down hole seismic test result and MASW test result) has been integrated in a module to produce different type of maps including micro-zonation map of the project area.

The shear wave velocities at every 1m interval of each site are given below at tabular (Please see Figure 8 to Figure 10) and also graphical format.

SHEAR WAVE VELOCITY MEASUREMENTS DOWNHOLE SEISMIC TEST (PS LOGGING)

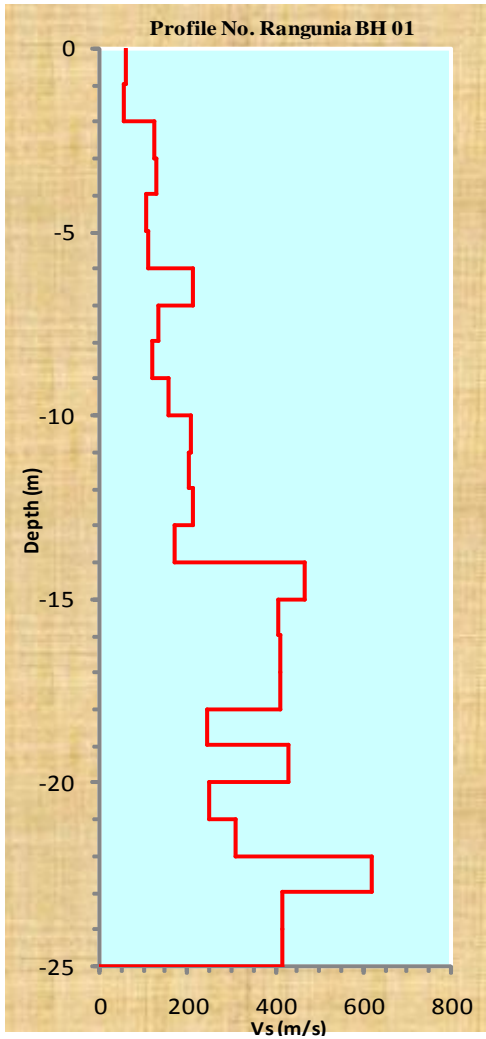
| Tested Date(dd/mm/yyyy) : 19/03/2016 | | | | | | Source : 7kg Sledge Hammer | |
|--|--|------------------------------|--|----------------------|---|--|---|
| Location : Ishkali, Near Pouroshova Office, Rangunia Upazila | | | | | | Downhole Receiver : Tri-axial Geophone | |
| PS Id : BH-01 | | | | | | Recording Equipment: Freedom Data PC | |
| Coordinate : Lat- 22.49417 N Long- 92.05151 E | | | | | | Borehole Information : Grouted Cased | |
| Operator : The Olson Instruments Downhole Seismic system | | | | | | Casing Diameter : 75mm PVC Casing | |
| Time arrival (s) | Recorded Geophone Depth from Existing Ground Level (m) | Source Saint Distance (m), R | Corrected Travel Time for Compresional Wave, $t_c=D^*/R$ (s) | Interval Time, T_s | Shear Wave Velocity Vs, $V_s=D^*/t_c$ (m/s) | Average Shear Wave Velocity (m/s) | Graphical Representation of Vs |
| Existing Ground Level | | | | | | | |
| 0.023520 | -1 | 1.41 | 0.0166 | 0.0166 | 60 | AVS5 81 |  |
| 0.039277 | -2 | 2.24 | 0.0351 | 0.0185 | 54 | | |
| 0.045673 | -3 | 3.16 | 0.0433 | 0.0082 | 122 | | |
| 0.052593 | -4 | 4.12 | 0.0510 | 0.0077 | 130 | | |
| 0.061698 | -5 | 5.10 | 0.0605 | 0.0095 | 106 | | |
| 0.070512 | -6 | 6.08 | 0.0696 | 0.0091 | 110 | AVS10 103 | |
| 0.075076 | -7 | 7.07 | 0.0743 | 0.0048 | 210 | | |
| 0.082368 | -8 | 8.06 | 0.0817 | 0.0074 | 135 | | |
| 0.090544 | -9 | 9.06 | 0.0900 | 0.0083 | 121 | | |
| 0.096955 | -10 | 10.05 | 0.0965 | 0.0065 | 154 | | |
| 0.101708 | -11 | 11.05 | 0.1013 | 0.0048 | 208 | AVS15 126 | |
| 0.106647 | -12 | 12.04 | 0.1063 | 0.0050 | 200 | | |
| 0.111378 | -13 | 13.04 | 0.1110 | 0.0048 | 210 | | |
| 0.117229 | -14 | 14.04 | 0.1169 | 0.0059 | 170 | | |
| 0.119346 | -15 | 15.03 | 0.1191 | 0.0022 | 465 | | |
| 0.121794 | -16 | 16.03 | 0.1216 | 0.0025 | 404 | AVS20 150 | |
| 0.124198 | -17 | 17.03 | 0.1240 | 0.0024 | 412 | | |
| 0.126602 | -18 | 18.03 | 0.1264 | 0.0024 | 413 | | |
| 0.130692 | -19 | 19.03 | 0.1305 | 0.0041 | 244 | | |
| 0.133012 | -20 | 20.02 | 0.1328 | 0.0023 | 428 | | |
| 0.137019 | -21 | 21.02 | 0.1369 | 0.0040 | 249 | AVS25 170 | |
| 0.140224 | -22 | 22.02 | 0.1401 | 0.0032 | 311 | | |
| 0.141826 | -23 | 23.02 | 0.1417 | 0.0016 | 620 | | |
| 0.144230 | -24 | 24.02 | 0.1441 | 0.0024 | 414 | | |
| 0.146634 | -25 | 25.02 | 0.1465 | 0.0024 | 415 | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Figure 8: Shear wave velocity measurement downhole seismic test (PS Logging) at near Rangunia Pourashava

SHEAR WAVE VELOCITY MEASUREMENTS DOWNHOLE SEISMIC TEST (PS LOGGING)

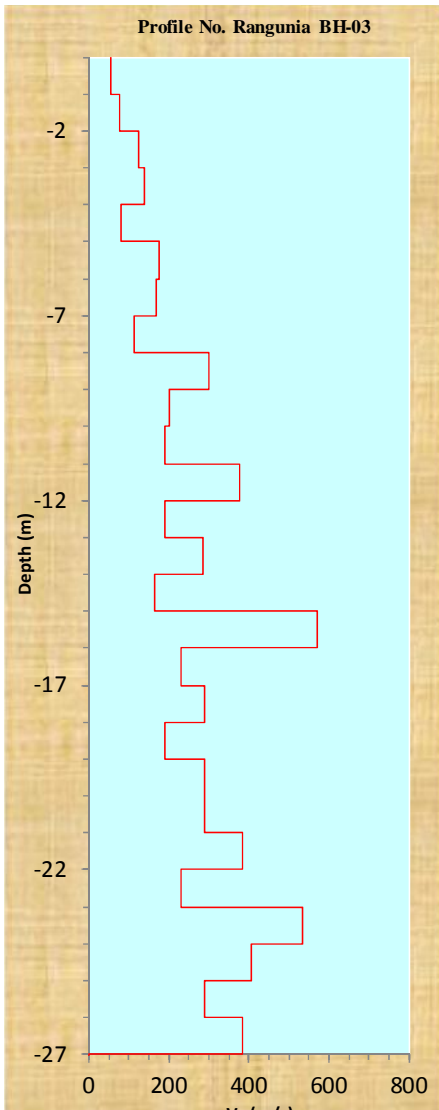
| Tested Date(dd/mm/yyyy) : 18/03/2016 | | | | | | Source : 7kg Sledge Hammer | | |
|---|--|------------------------------|--|-------------------|---|--|---|----|
| Location : Unisia Azizia Madrasha Field, Rangunia Upazila | | | | | | Downhole Receiver : Tri-axial Geophone | | |
| PS Id : BH-03 | | | | | | Recording Equipment : Freedom Data PC | | |
| Coordinate : Lat- 21.46377 N Long- 92.11636 E | | | | | | Borehole Information : Grouted Cased | | |
| Operator : The Olson Instruments Downhole Seismic system | | | | | | Casing Diameter : 75mm PVC Casing | | |
| Time arrival (s) | Recorded Geophone Depth from Existing Ground Level (m) | Source Saint Distance (m), R | Corrected Travel Time for Compresional Wave, $t_c=D/v_R$ (s) | Interval Time, Ts | Shear Wave Velocity Vs, $V_s=D/t_c$ (m/s) | Average Shear Wave Velocity (m/s) | <div>Graphical Representation of Vs</div> <div>Profile No. Rangunia BH-03</div>  | |
| Existing Ground Level | | | | | | AVS 5 | | 83 |
| 0.026442 | -1 | 1.41 | 0.0187 | 0.0187 | 53 | | | |
| 0.035256 | -2 | 2.24 | 0.0315 | 0.0128 | 78 | | | |
| 0.041666 | -3 | 3.16 | 0.0395 | 0.0080 | 125 | | | |
| 0.048076 | -4 | 4.12 | 0.0466 | 0.0071 | 141 | | | |
| 0.060096 | -5 | 5.10 | 0.0589 | 0.0123 | 81 | | | |
| 0.065506 | -6 | 6.08 | 0.0646 | 0.0057 | 176 | | | |
| 0.071314 | -7 | 7.07 | 0.0706 | 0.0060 | 167 | | | |
| 0.080128 | -8 | 8.06 | 0.0795 | 0.0089 | 112 | | | |
| 0.083333 | -9 | 9.06 | 0.0828 | 0.0033 | 302 | | | |
| 0.088181 | -10 | 10.05 | 0.0877 | 0.0049 | 203 | | | |
| 0.093372 | -11 | 11.05 | 0.0930 | 0.0052 | 191 | | | |
| 0.095967 | -12 | 12.04 | 0.0956 | 0.0026 | 378 | | | |
| 0.101158 | -13 | 13.04 | 0.1009 | 0.0052 | 191 | | | |
| 0.104619 | -14 | 14.04 | 0.1044 | 0.0035 | 286 | | | |
| 0.110675 | -15 | 15.03 | 0.1104 | 0.0061 | 165 | | | |
| 0.112406 | -16 | 16.03 | 0.1122 | 0.0018 | 569 | | | |
| 0.116731 | -17 | 17.03 | 0.1165 | 0.0043 | 230 | | | |
| 0.120192 | -18 | 18.03 | 0.1200 | 0.0035 | 288 | | | |
| 0.125383 | -19 | 19.03 | 0.1252 | 0.0052 | 192 | | | |
| 0.128844 | -20 | 20.02 | 0.1287 | 0.0035 | 288 | | | |
| 0.132304 | -21 | 21.02 | 0.1322 | 0.0035 | 288 | | | |
| 0.134900 | -22 | 22.02 | 0.1348 | 0.0026 | 384 | | | |
| 0.139226 | -23 | 23.02 | 0.1391 | 0.0043 | 231 | | | |
| 0.141091 | -24 | 24.02 | 0.1410 | 0.0019 | 534 | | | |
| 0.143551 | -25 | 25.02 | 0.1434 | 0.0025 | 405 | | | |
| 0.147012 | -26 | 26.02 | 0.1469 | 0.0035 | 288 | | | |
| 0.149608 | -27 | 27.02 | 0.1495 | 0.0026 | 384 | | | |
| | | | | | | AVS 27 | 180 | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Figure 9: Shear wave velocity measurement downhole seismic test (PS Logging) at Chondroghona Kadamtali Union

SHEAR WAVE VELOCITY MEASUREMENTS DOWNHOLE SEISMIC TEST (PS LOGGING)

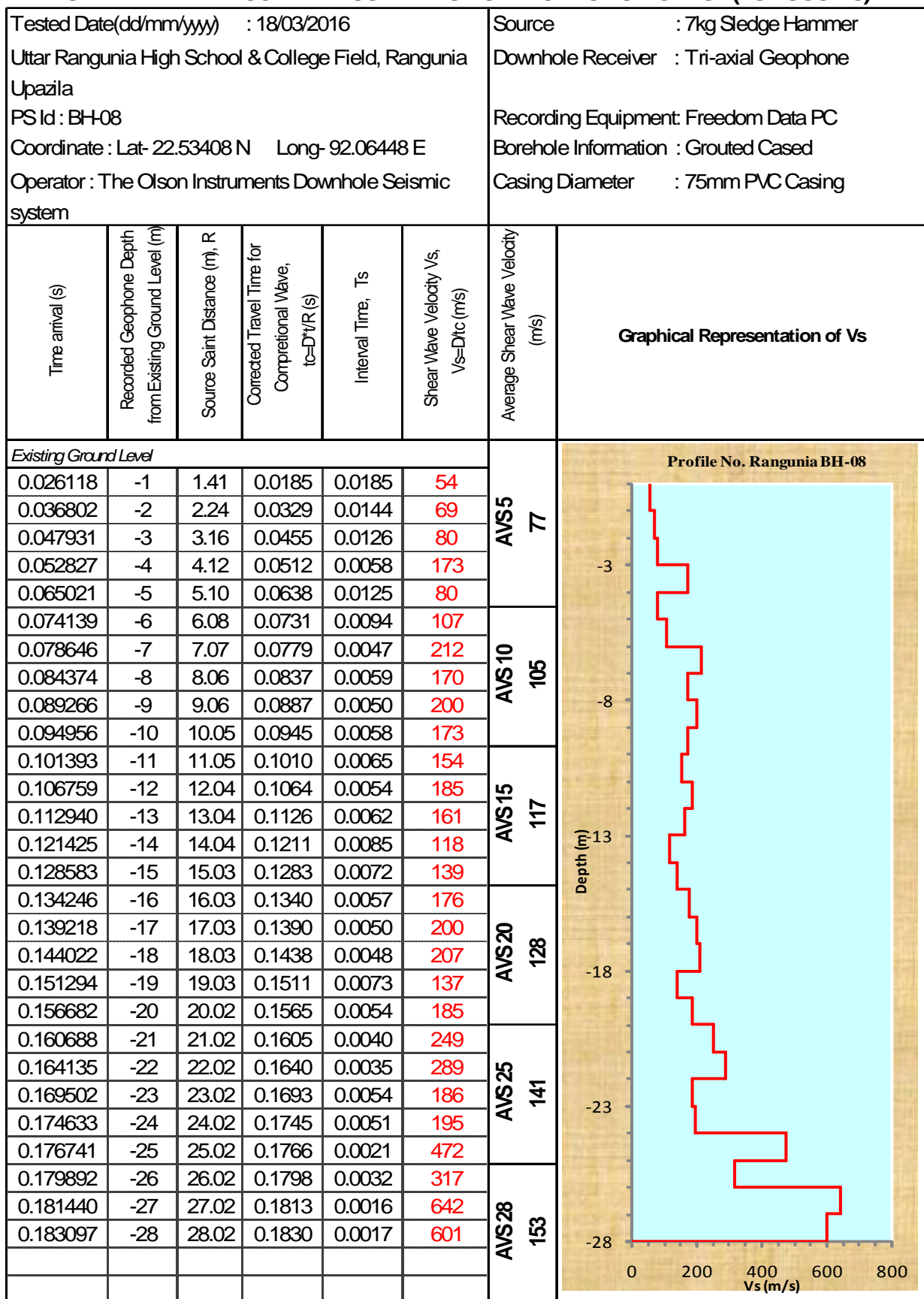


Figure 10: Shear wave velocity measurement downhole seismic test (PS Logging) at Dhamairhat

3.1.2. MASW Survey Result

According to MASW test result, shear wave velocity of the project area is showing very good soil condition for foundation at borehole location MASW-02 and MASW-5 where average velocities are 233.8 m/s and 234.1 m/s respectively. On the other hand, location MASW-3 position at Uttar Padua Govt. Primary & High School, Padua Bazar, Padua Union, is showing a soft layer (average velocity less than 80 m/s) with in 5 meter depth position but this type of soil layer does not containing other places of the project area. Location MASW-2 (Dhokhin Silok M Shalam High School, Silok Union,) and MASW-5 (Mozumdar Khali Govt. High School, Rangunia Pourashava,) are showing bed rock equivalent soil condition within the 30 meter depth position (average velocity of shear wave is more than 300 m/s). But actual subsurface soil condition will be known when all data has been integrated to produce shear wave velocity map and from which it is possible to interpret hazard condition of sub surface soil environment and seismic behavior of the project area. The MASW survey results are shown in Table 4. Details of MASW data has been shown in Figure 11 to Figure 15.

Table 4: Summary of MASW Test Results

| MASW ID | Average Shear Wave Velocity (Vs 30) |
|---------|---|
| MASW 01 | 168.2 m/s |
| MASW 02 | 233.8 m/s |
| MASW 03 | 142 m/s |
| MASW 04 | 144.2 m/s |
| MASW 05 | 234.1 m/s |

Source: Field Survey, 2016

MASW AT RANGUNIA UPAZILA

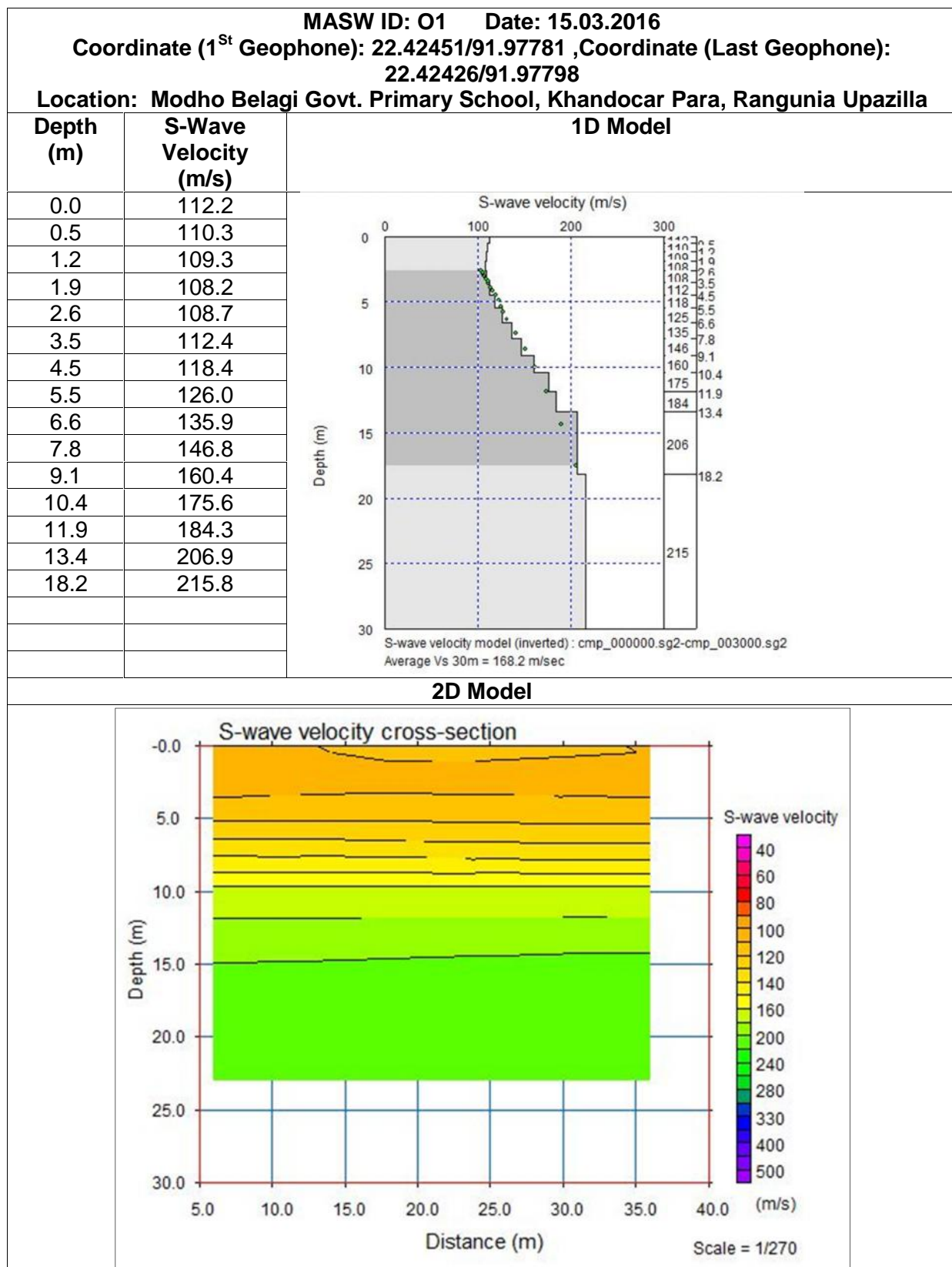


Figure 11: MASW at Betagi Union, Rangunia Upazila

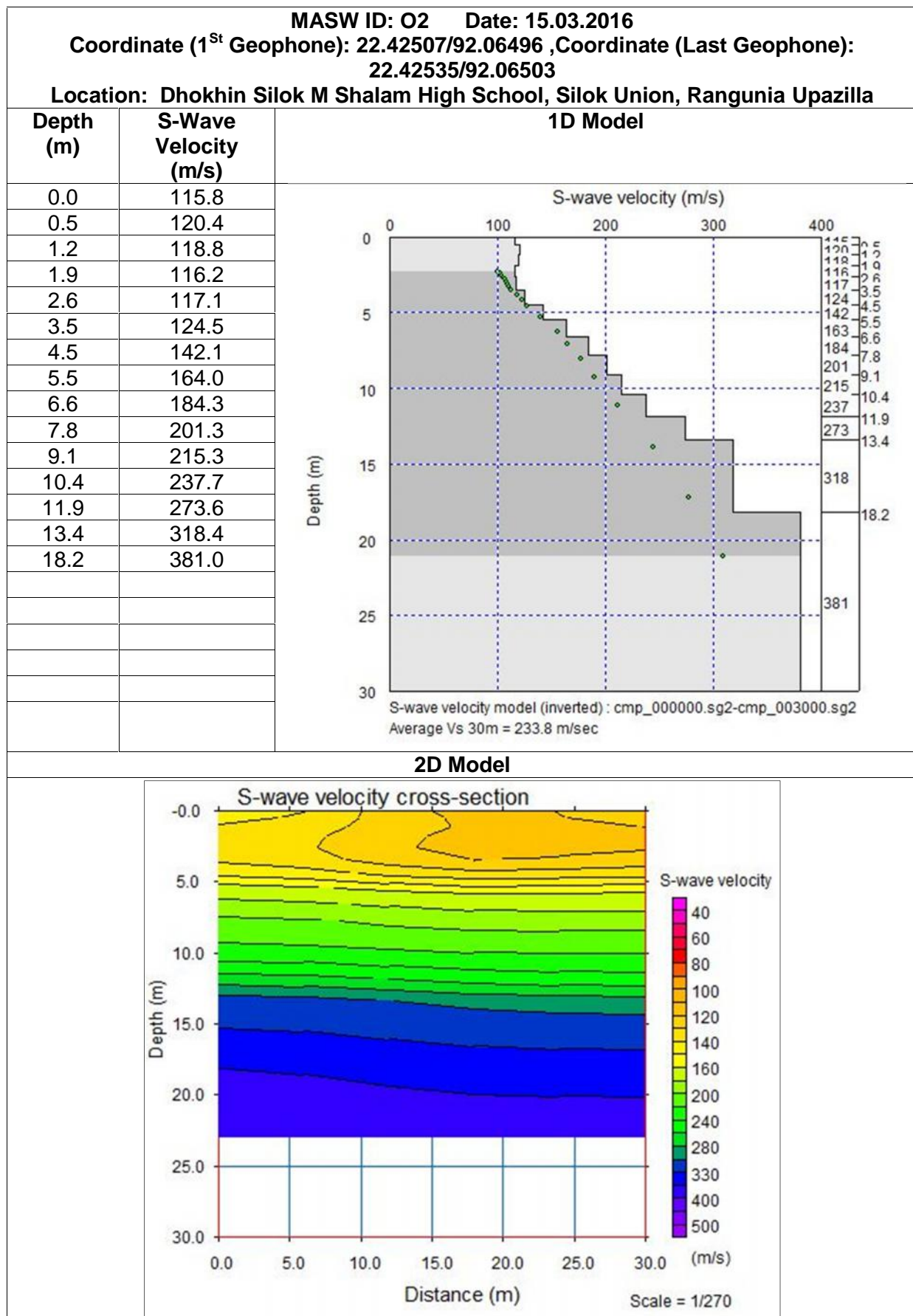


Figure 12: MASW at Shioik Union, Rangunia Upazia

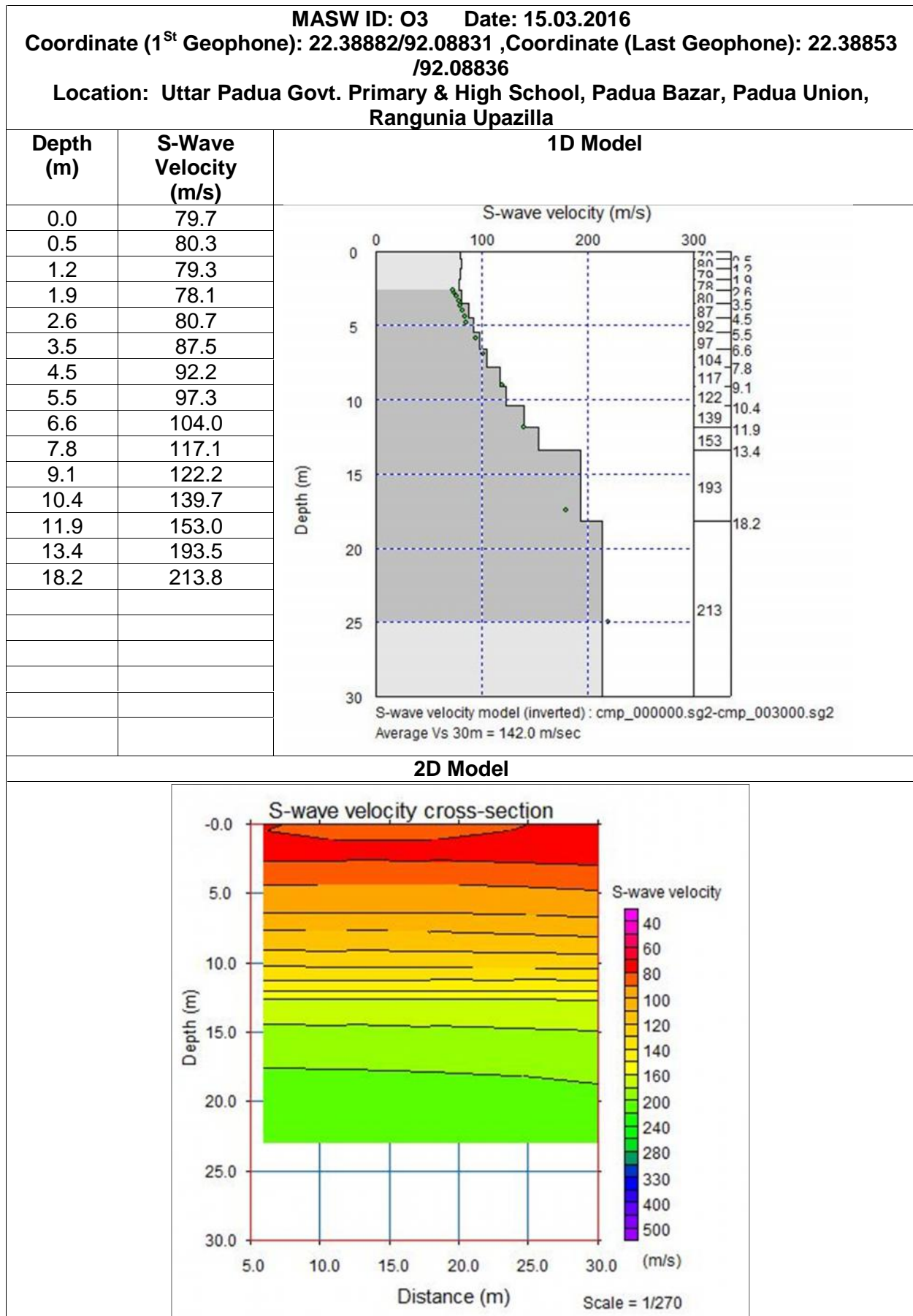


Figure 13: MASW at Padua Union, Rangunia Upazila

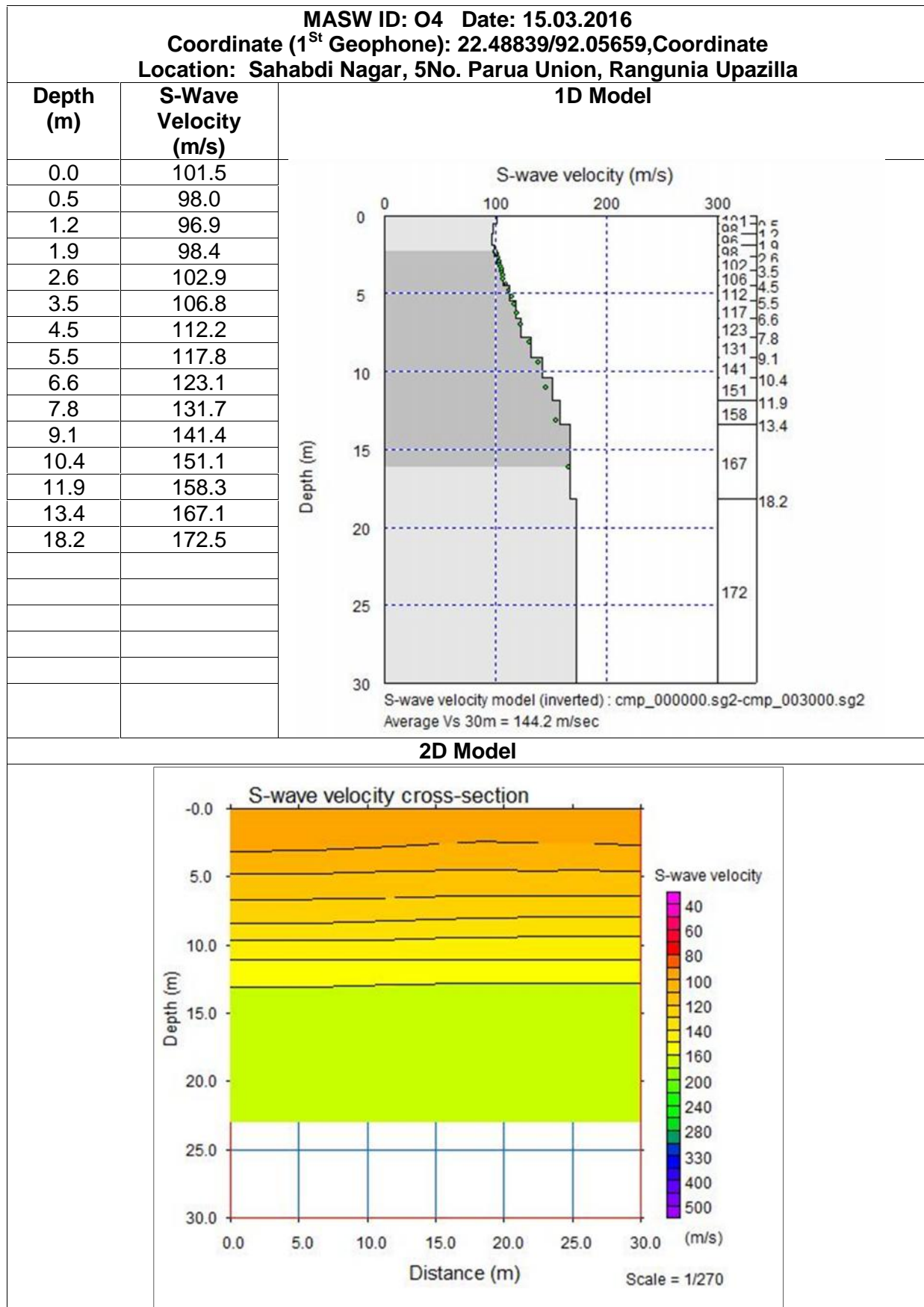


Figure 14: MASW at Parua Union, Rangunia Upazila

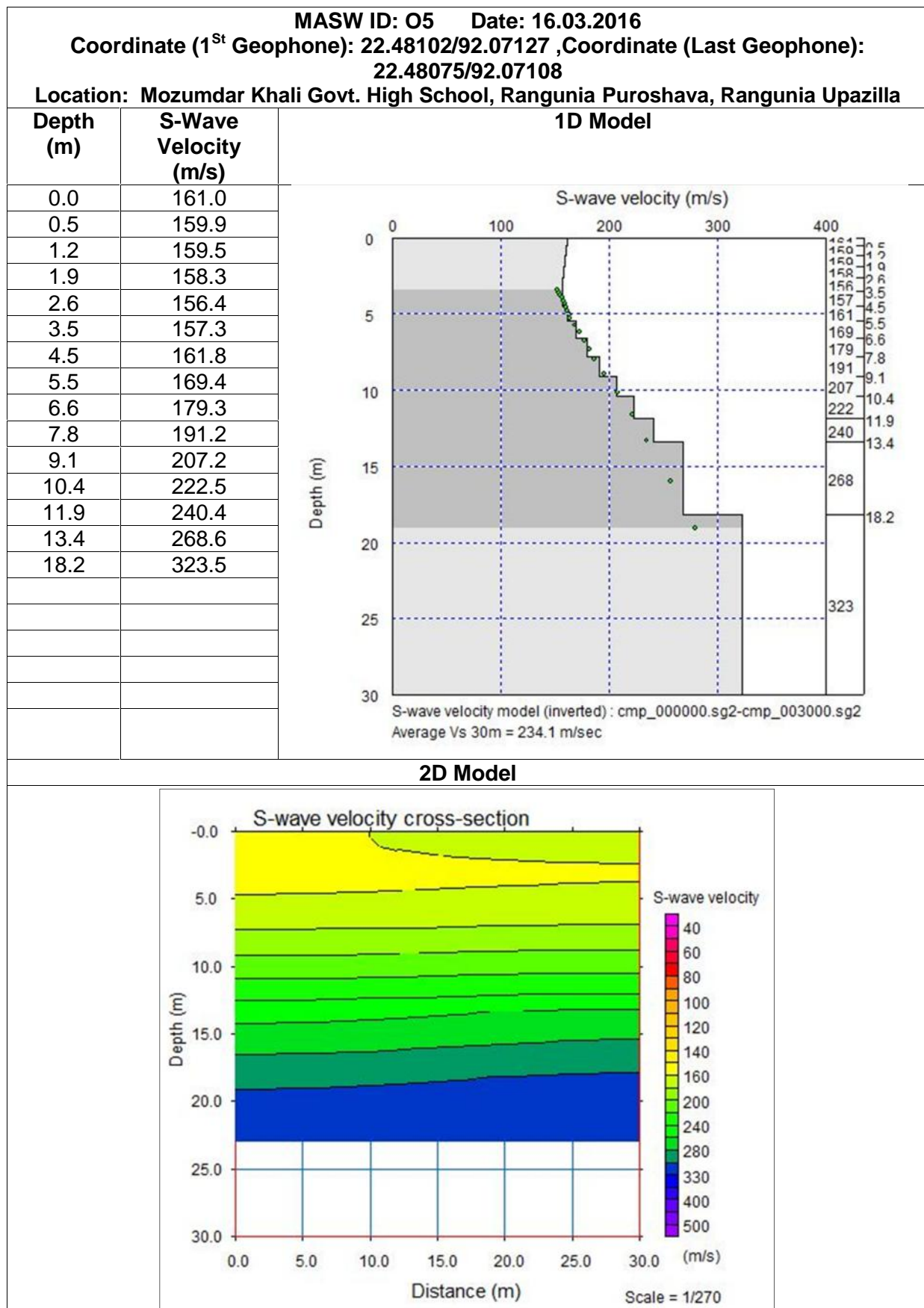
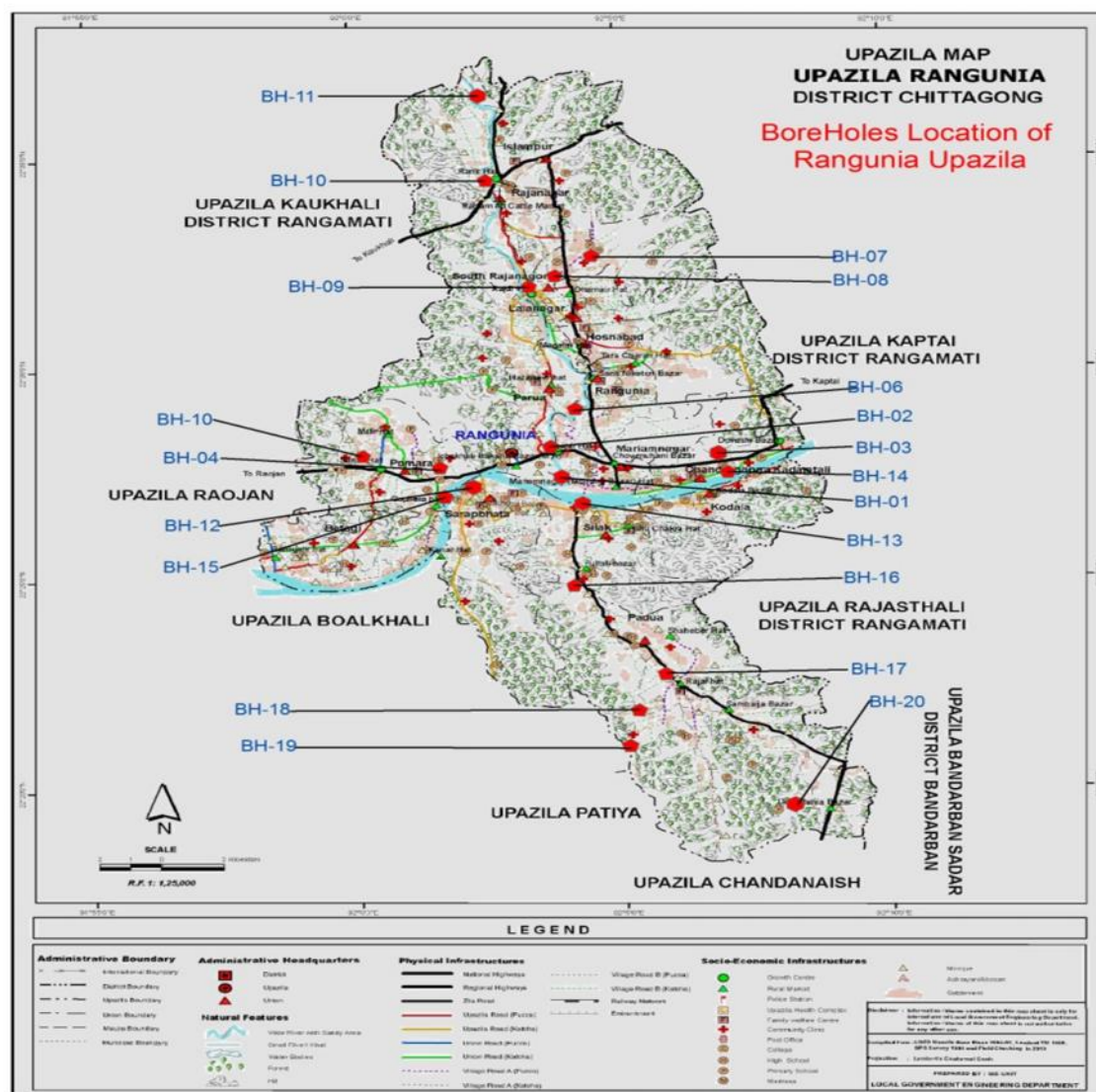


Figure 15: MASW at Rangunia Pourashava, Rangunia Upazila

3.2. Geotechnical Investigations

Geotechnical investigations have become an essential component of every construction to ensure safety of human beings and materials. It includes a detailed investigation of the soil to determine the soil strength, composition, water content, and other important soil characteristics. Investigation borings with standard penetration test were conducted in order to know vertical geological conditions. The borings with SPT were carried out at 20 points at Rangunia Upazila



Map 2: Locations Map of the Standard Penetration tests (SPT) at Rangunia Upazila



Plate 8: Standard Penetration Test Activity at Rangunia Area.

3.2.1. Standard Penetration Test (SPT) Log



According to field test result of SPT operation, some drilling position didn't possible to reach up to 30m depth due to SPT N values exist 50 blows for 150mm penetrations when reaching the foundation level or hard rock beneath. That's why; drilling has been terminated before 30m depth position. The following table is showing the summary of borehole information with minimum and maximum N values-

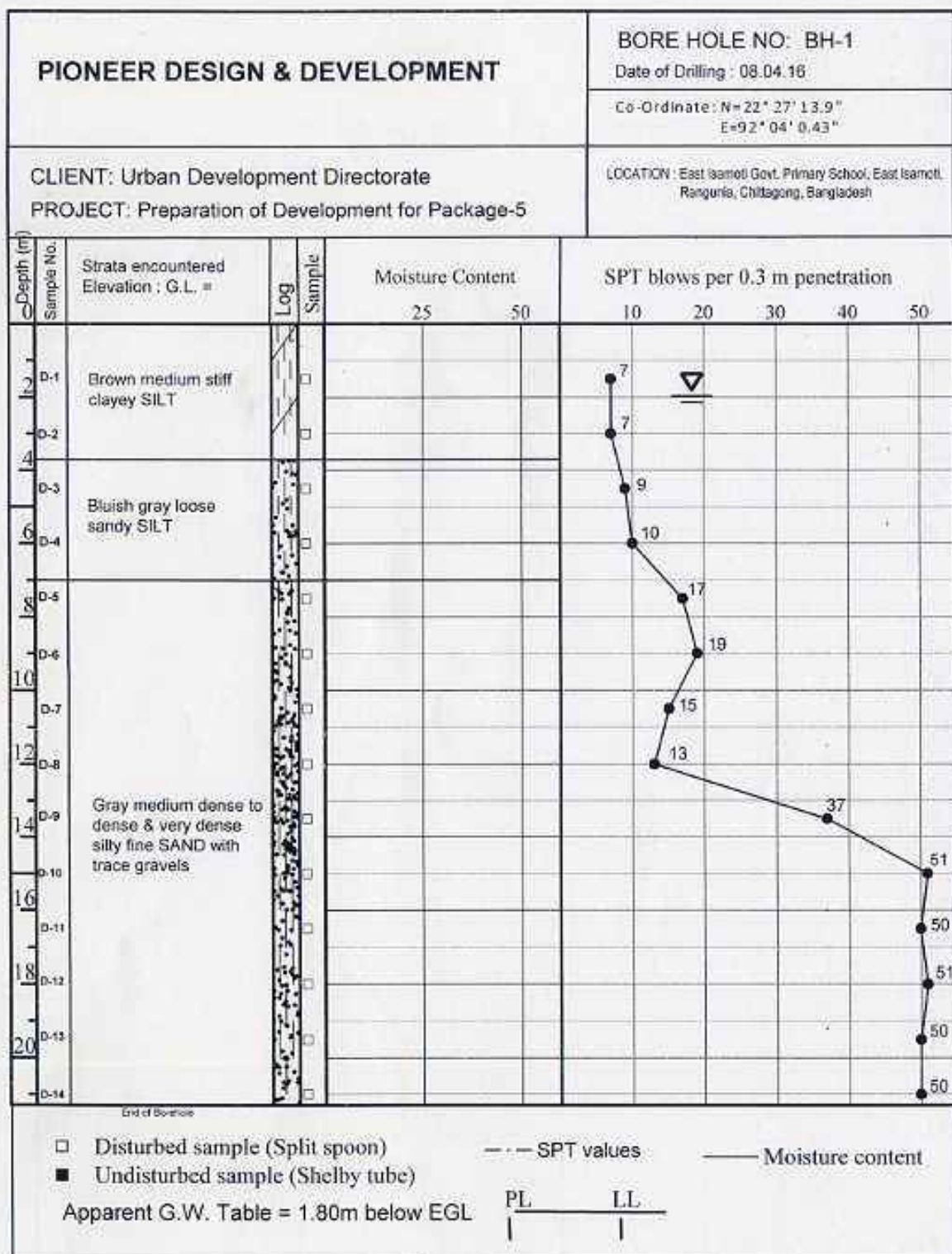
Table 5: Bore Hole Information Summary at Rangunia Upazila, Chittagong

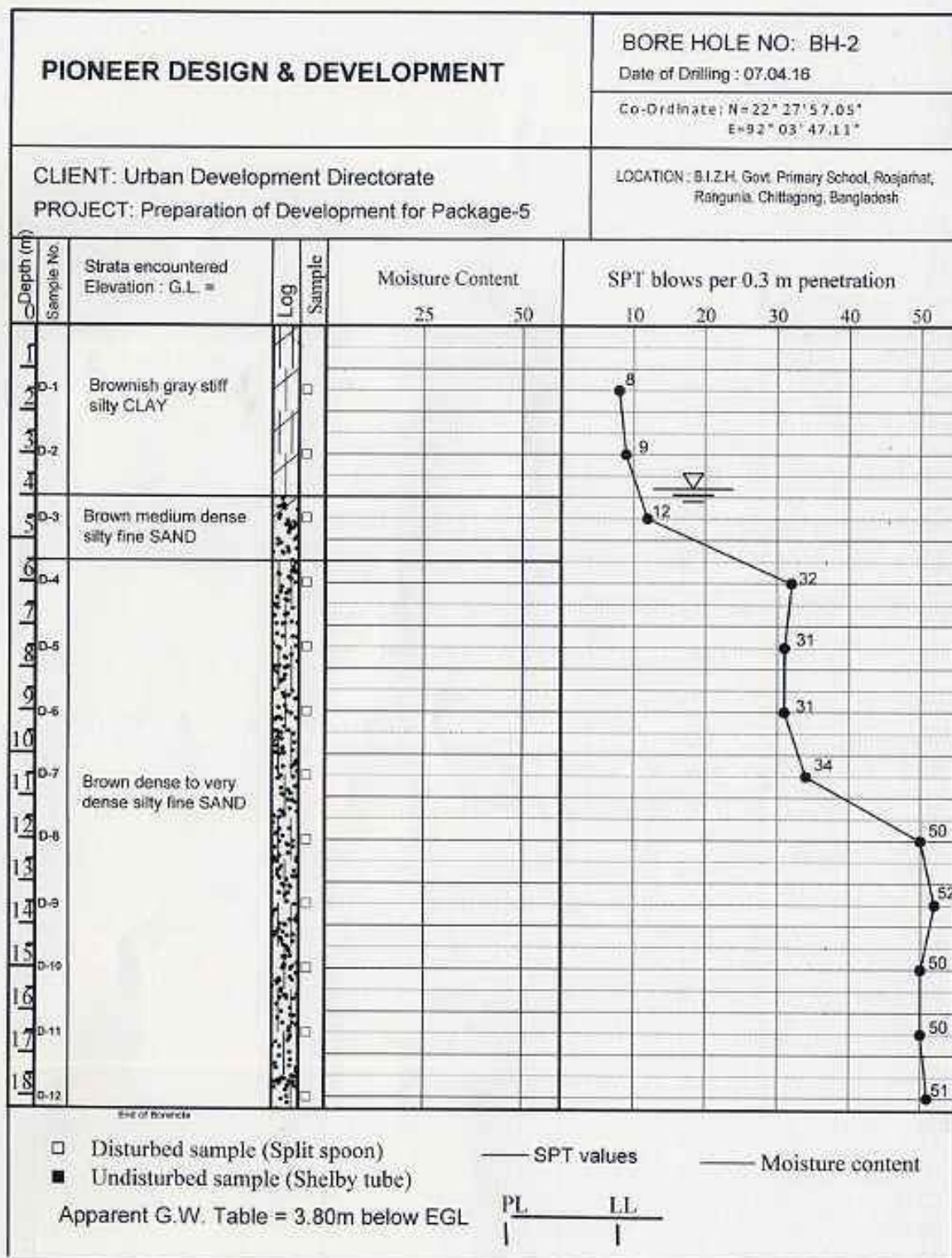
| Borehole ID | Location Name | Co-ordinate | Depth of penetration (m) | N value (min.) | N value (max.) | Picture |
|-------------|---|----------------------------------|--------------------------|----------------|----------------|---|
| BH-1 | East Isamoti Govt. Primary School, East Isamoti | N=22°27'13.9" E=92°04'0.43" | 21 | 7 | 51 |  |
| BH-2 | B. I. Z. H. Govt. Primary School, Roajarhat | N=22°27'57.05" E=92°03'47.11" | 18 | 8 | 52 |  |
| BH-3 | Chowdhury Para, Atimkhana Madrasa, Chandraghuna | N=22°27'49.08" E=92°06'58.95" | 27 | 3 | 50 |  |
| BH-4 | 06 No Pomra Union Parishad Complex, Shantir Hat | N=22°27'42.04" E=92°0'12.81" | 12 | 12 | 39 |  |
| BH-5 | 52 No South Noagaon Govt. Primary School | N=22°27'26.23" E=92°01'40.75" | 19.5 | 2 | 12 |  |
| BH-6 | Rangunia Mazumder Khil High School | N=22°28'51.13" E=92°04'15.54" | 30 | 1 | 50 |  |
| | | | | | | |

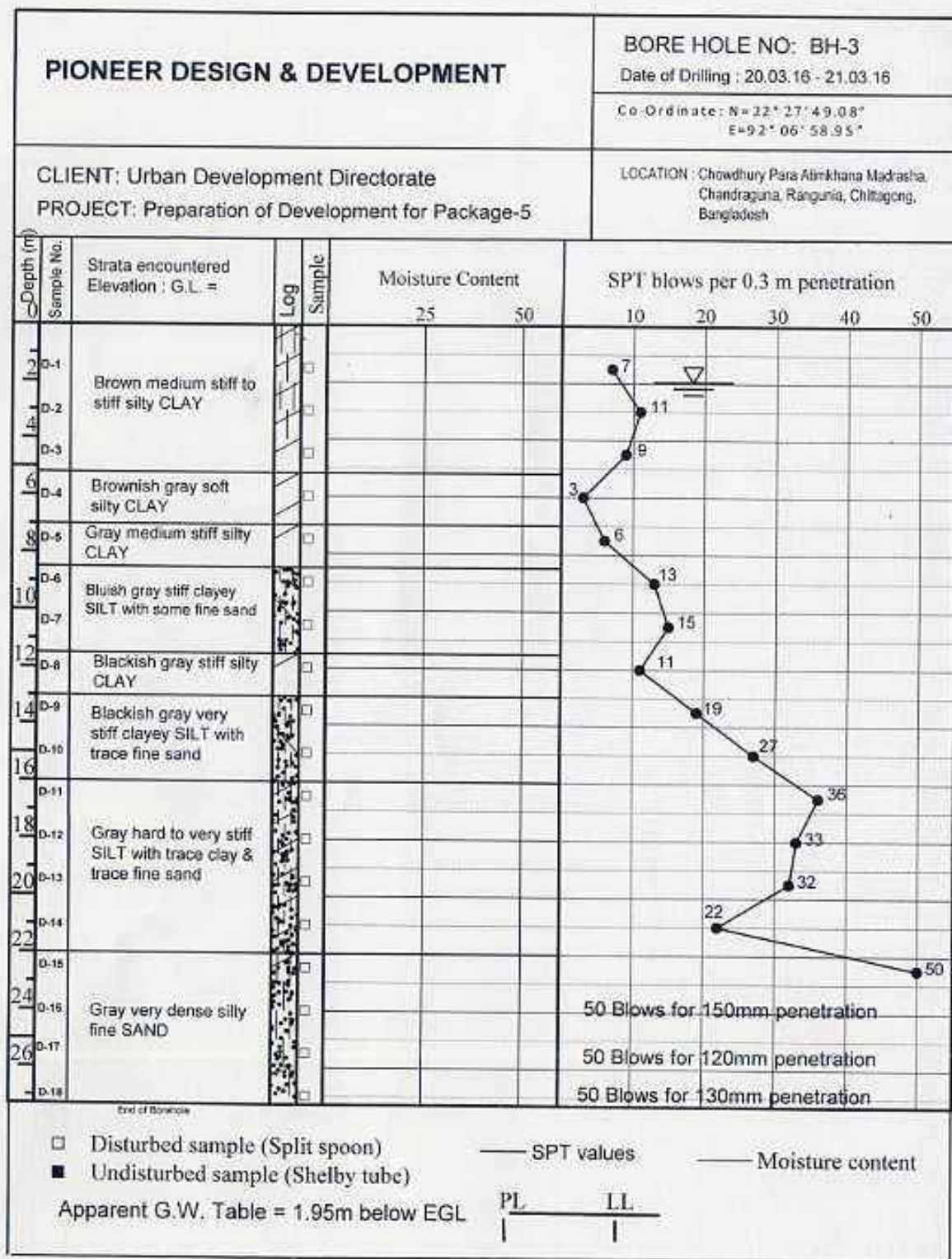
| Borehole ID | Location Name | Co-ordinate | Depth of penetration (m) | N value (min.) | N value (max.) | Picture |
|-------------|---|----------------------------------|--------------------------|----------------|----------------|---|
| BH-7 | Khorshed Taluk Govt. Primary School, South Raja Nagar | N=22°32'31.76" E=92°04'33.67" | 30 | 1 | 12 |  |
| BH-8 | North Rangunia Govt. Primary School | N=22°32'2.82" E=92°03'52.03" | 30 | 2 | 16 |  |
| BH-9 | Razabhuban Govt. primary School, Razarhat | N=22°31'47.02" E=92°03'22.50" | 30 | 3 | 51 |  |
| BH-10 | Raza Nagar R. A. B. M. Multilateral High School, Razarhat | N=22°34'19.5" E=92°02'32.17" | 30 | 1 | 50 |  |
| BH-11 | Uttar Ghagra Betchari Jahangirnagar Govt. Primary School | N=22°36'22.3" E=92°02'23.83" | 30 | 3 | 30 |  |
| BH-12 | Sarabhbata Govt. Primary School, Sarabhbata | N=22°26'58.48" E=92°02'19.59" | 15 | 5 | 49 |  |
| | | | | | | |

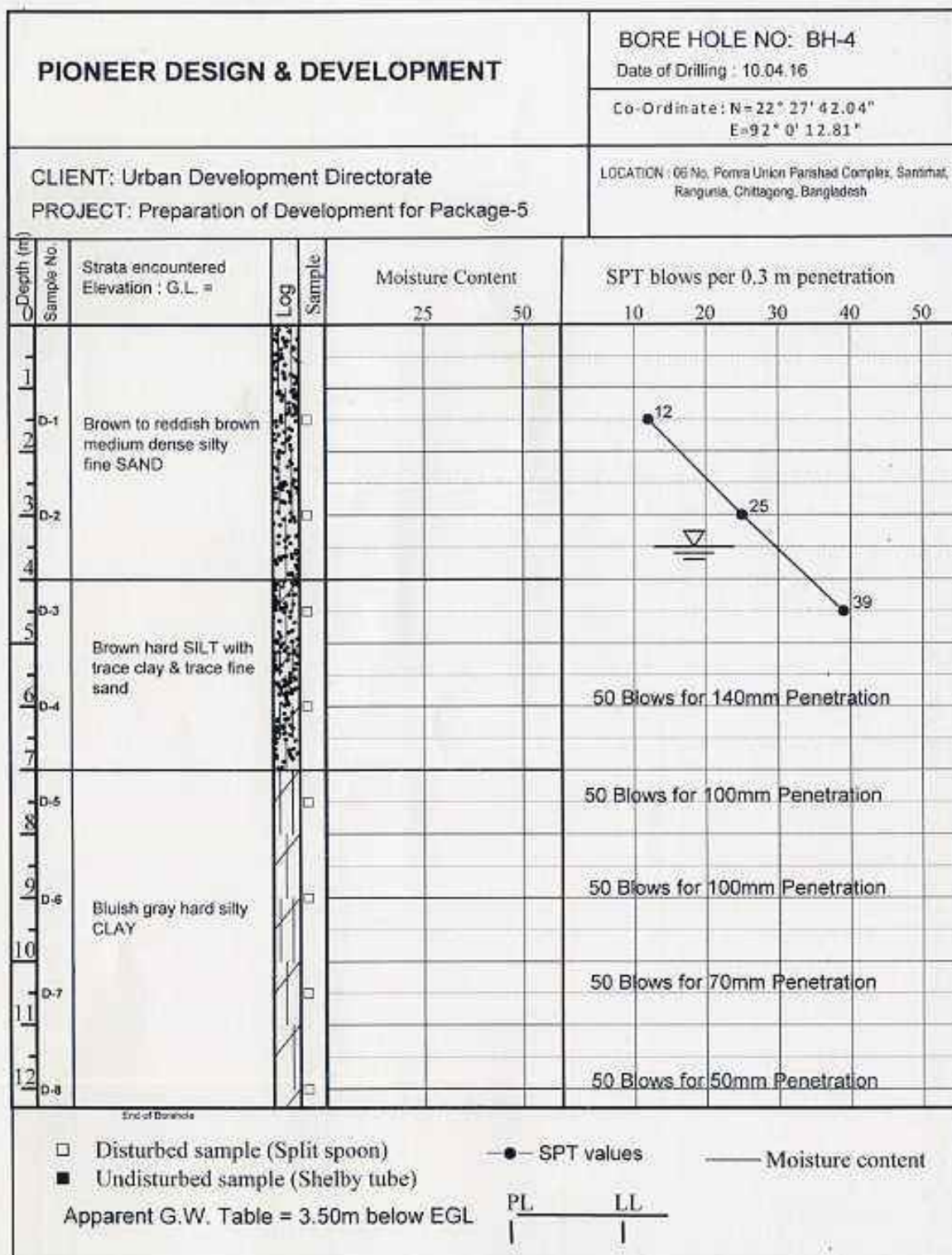
| Borehole ID | Location Name | Co-ordinate | Depth of penetration (m) | N value (min.) | N value (max.) | Picture |
|-------------|--|----------------------------------|--------------------------|----------------|----------------|---|
| BH-13 | South Rangunia Shelok Multilateral High School, Shelok | N=22°26'35.69" E=92°04'24.62" | 25.5 | 1 | 31 |  |
| BH-14 | East Kodala M. A. Taher High School, 12 No Kodala | N=22°27'21.22" E=92°07'10" | 24 | 2 | 51 |  |
| BH-15 | 63 No West Sarafbhata Govt. Primary School | N=22°26'43.81" E=92°01'46.9" | 30 | 3 | 44 |  |
| BH-16 | 84 No Narishcha Govt. Primary School, Poduia | N=22°24'37.09" E=92°04'14.94" | 27 | 1 | 51 |  |
| BH-17 | Sarasiya Govt. Primary School, Poduia | N=22°24'37.09" E=92°04'14.94" | 22.5 | 3 | 50 |  |
| BH-18 | Khurusiya Daricop High School, West Khurusiya | N=22°21'37.67" E=92°05'29.01" | 18 | 2 | 51 |  |
| | | | | | | |

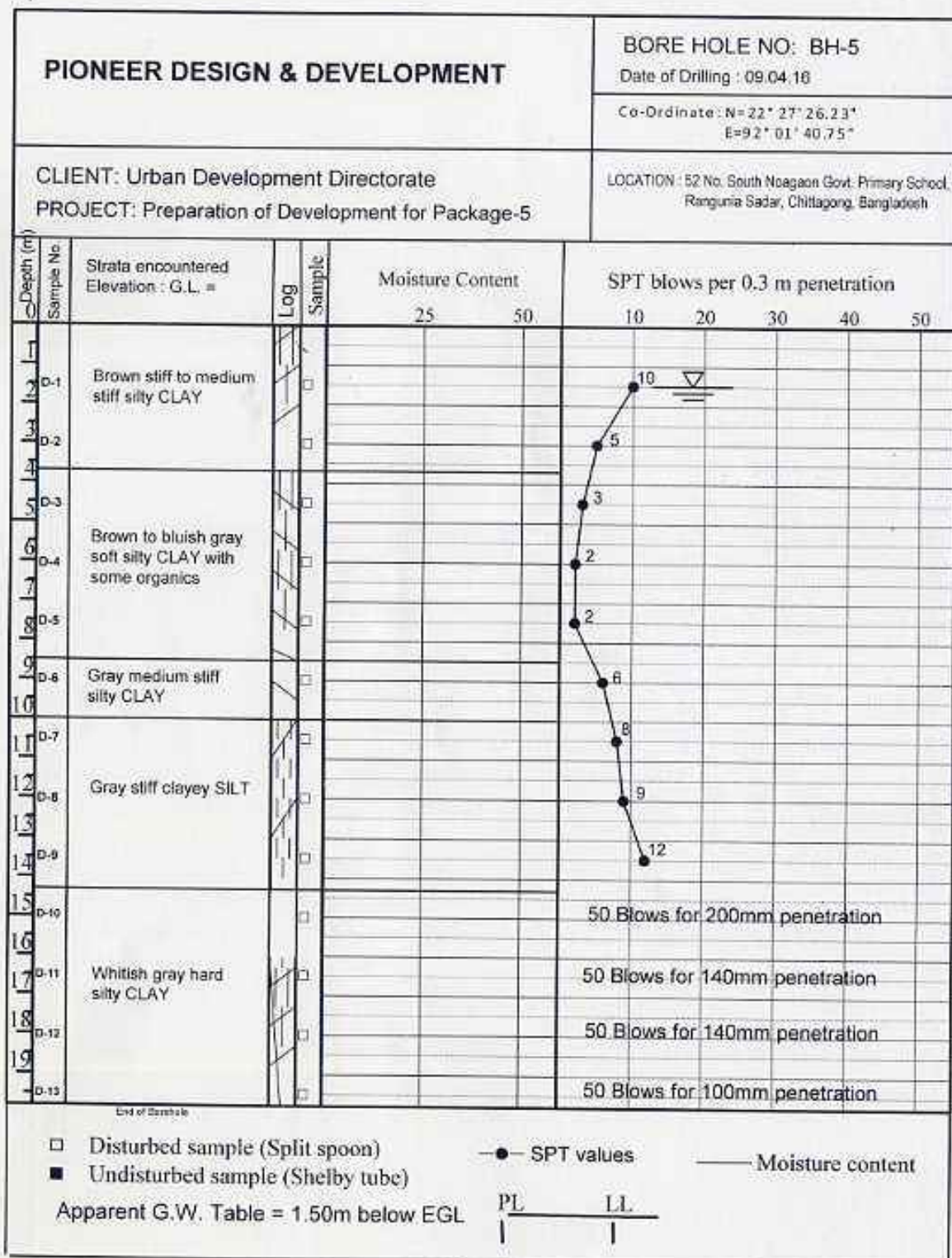
| Borehole ID | Location Name | Co-ordinate | Depth of penetration (m) | N value (min.) | N value (max.) | Picture |
|-------------|--|---------------------------------|--------------------------|----------------|----------------|---|
| BH-19 | Chip Chari Pequa Govt primary School, West khurusiya | N=22020'42.75" E=9205'0.44" | 18 | 3 | 51 |  |
| BH-20 | Dud Pukuria Hazi Abdul Hakim Govt. Primary School, Padua | N=22019'23.39" E=9208'27.34" | 21 | 2 | 50 |  |

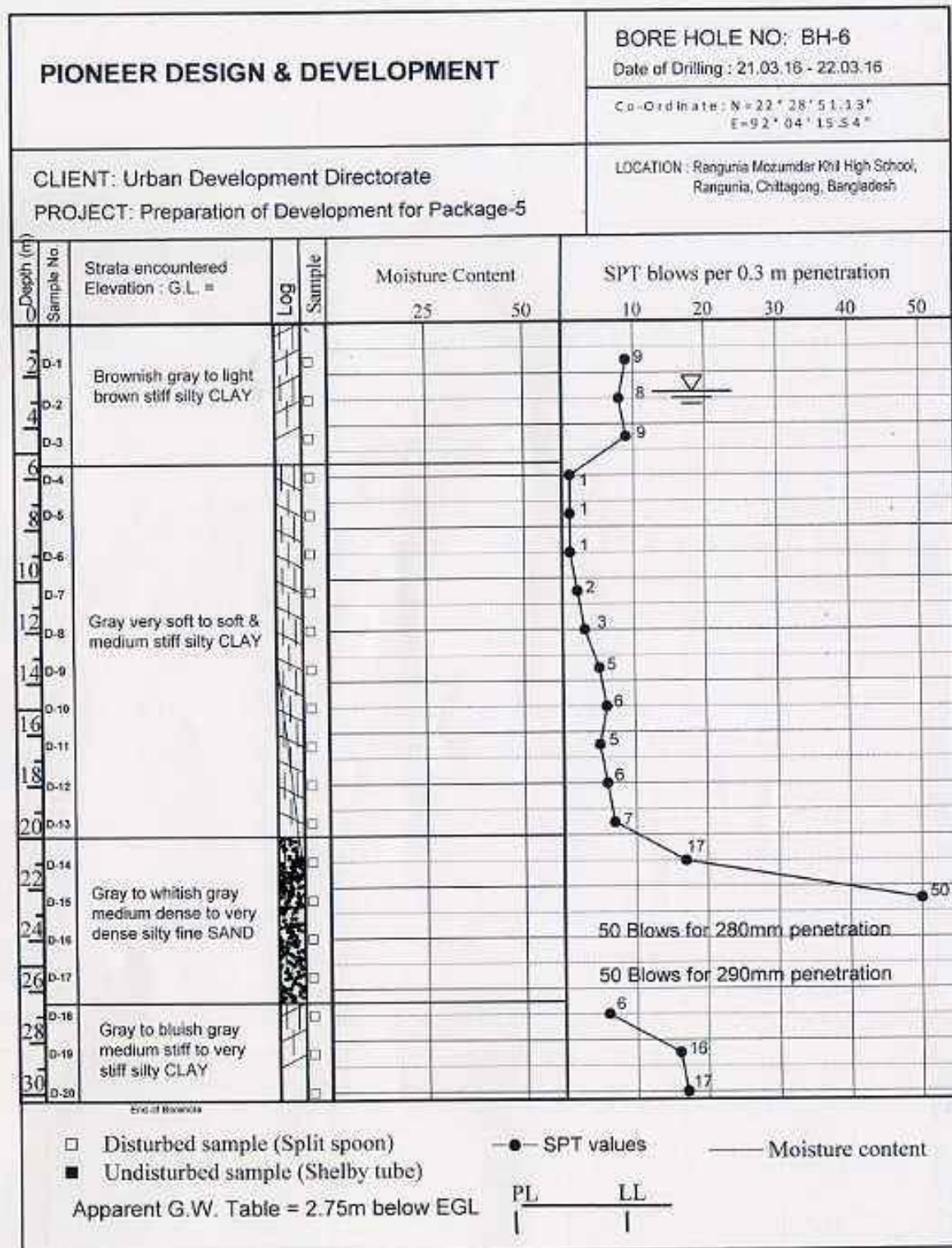


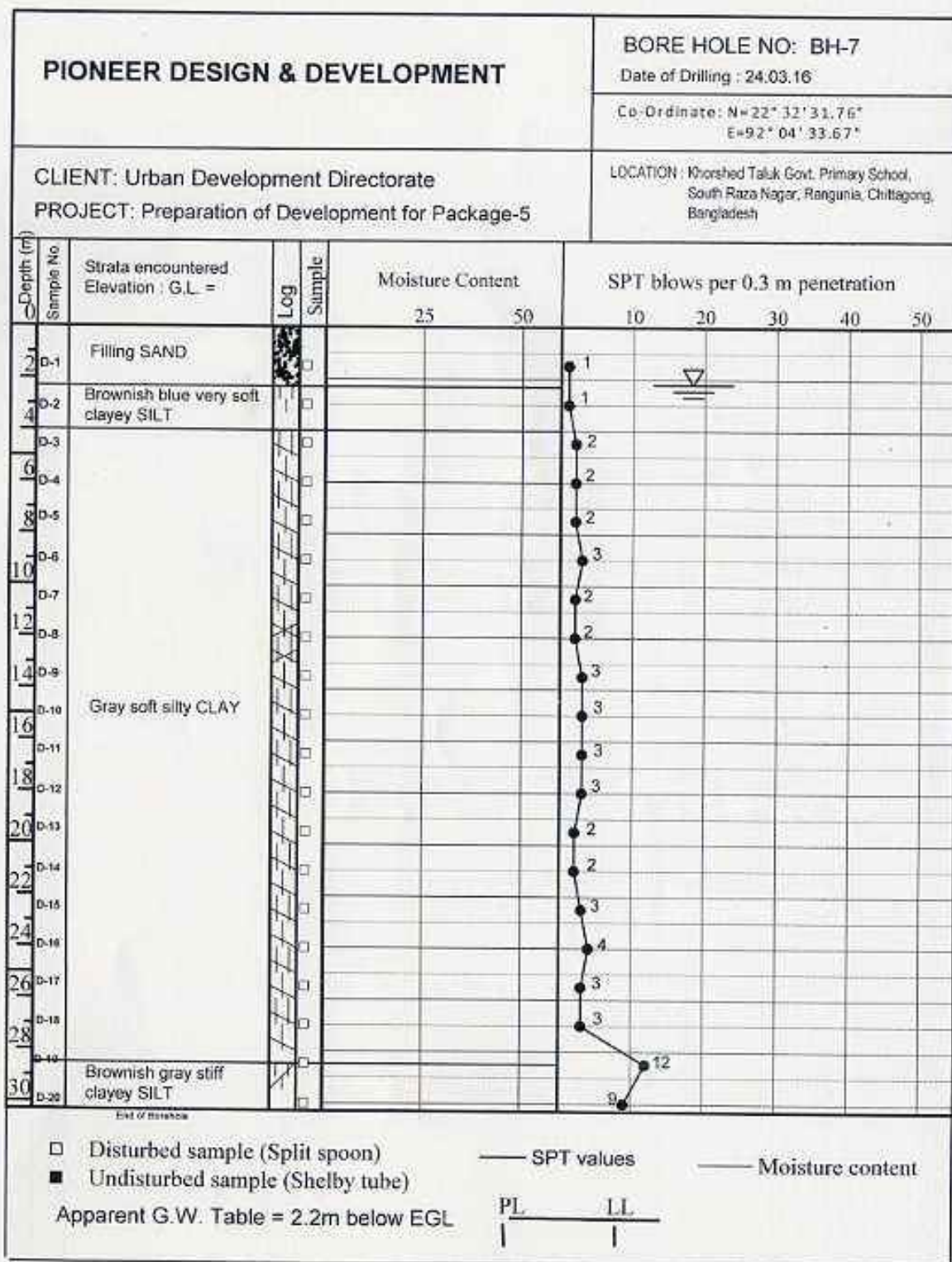


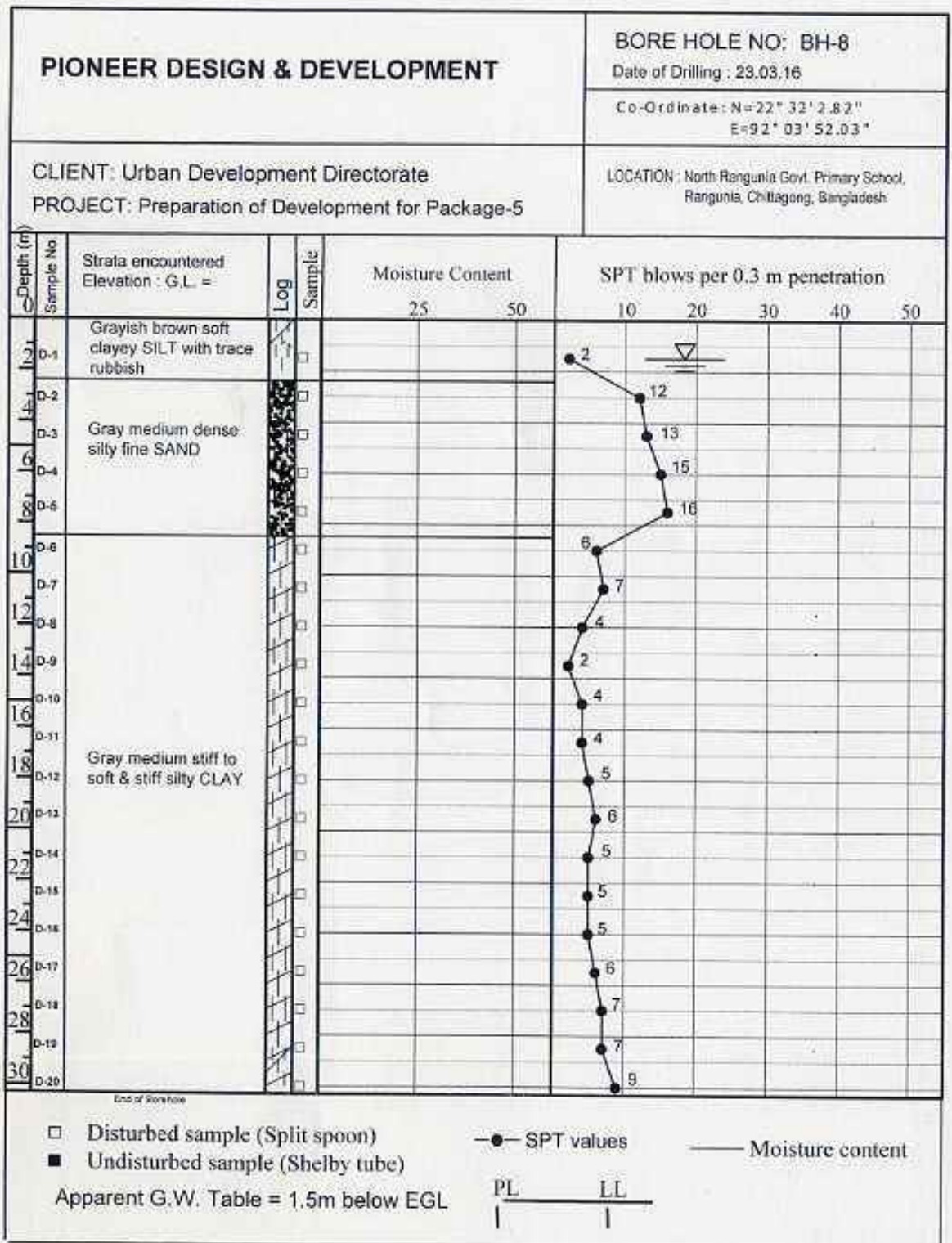


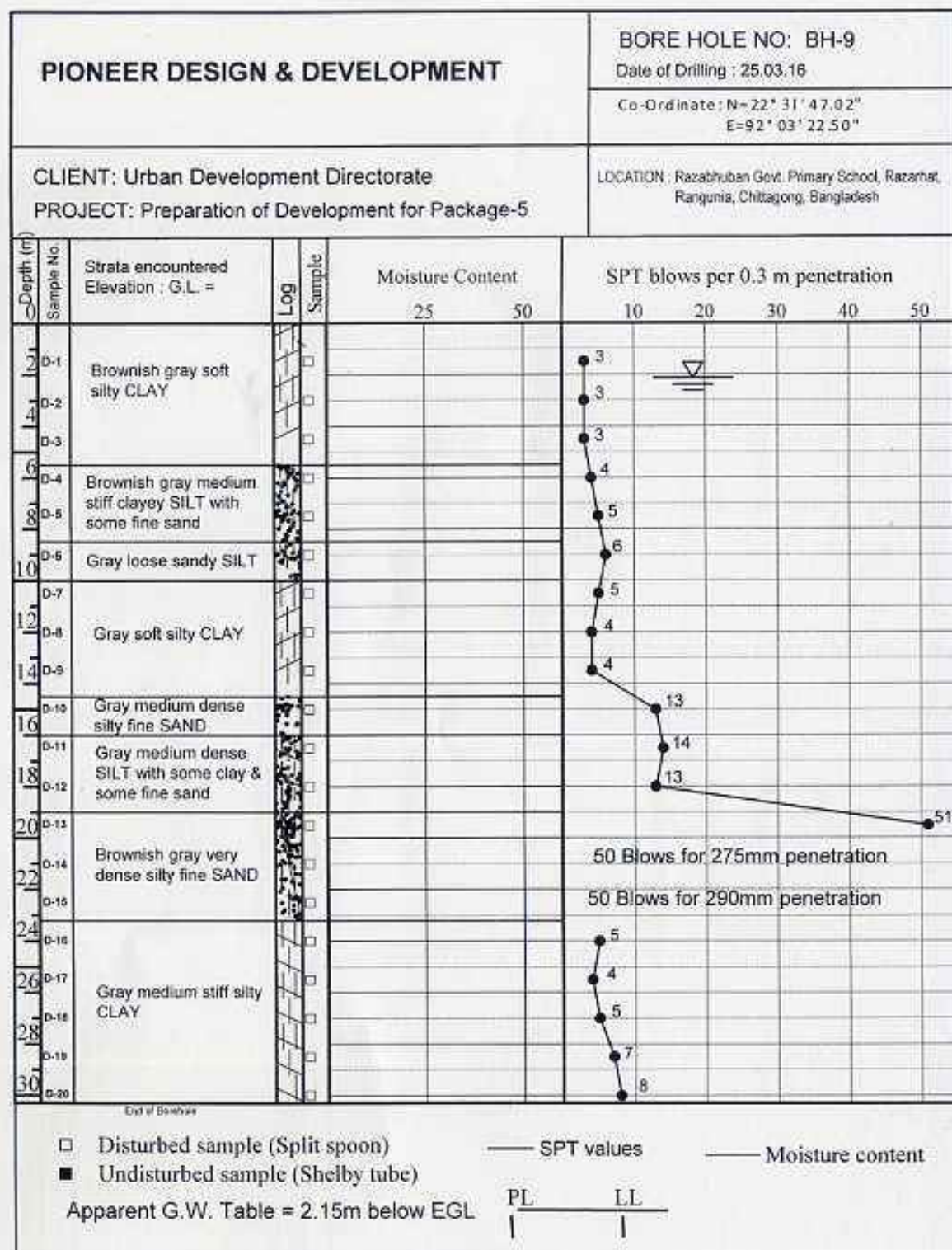


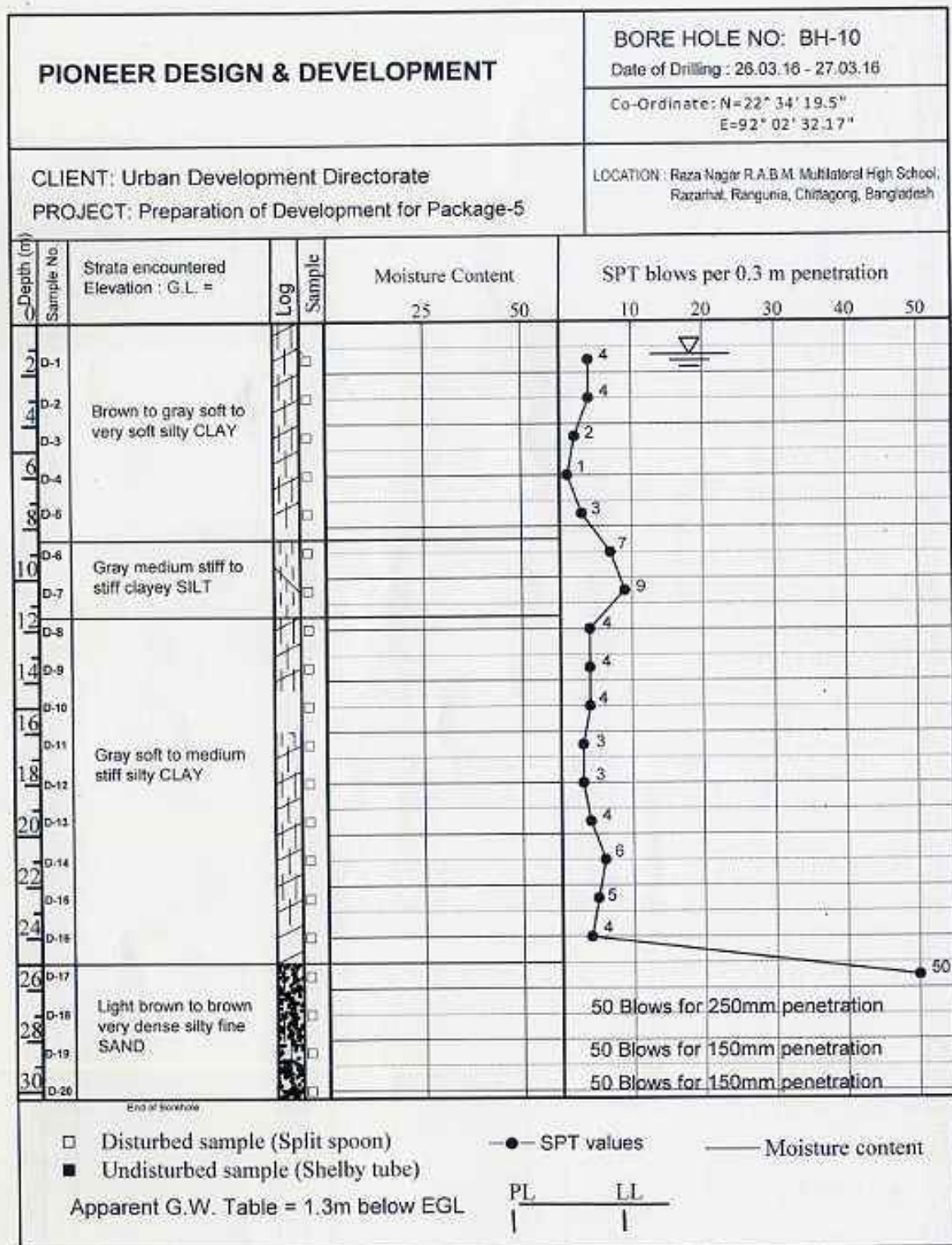


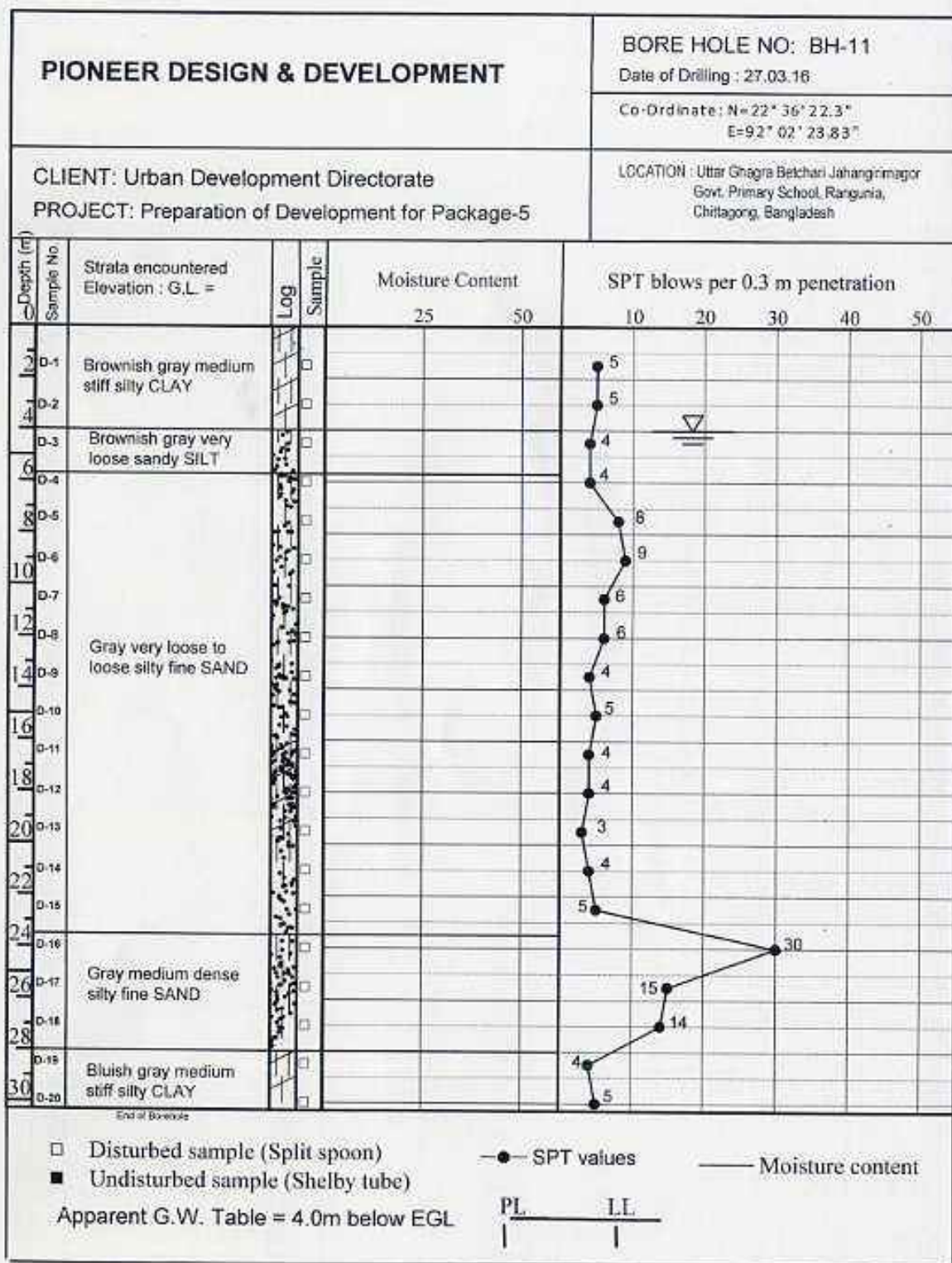


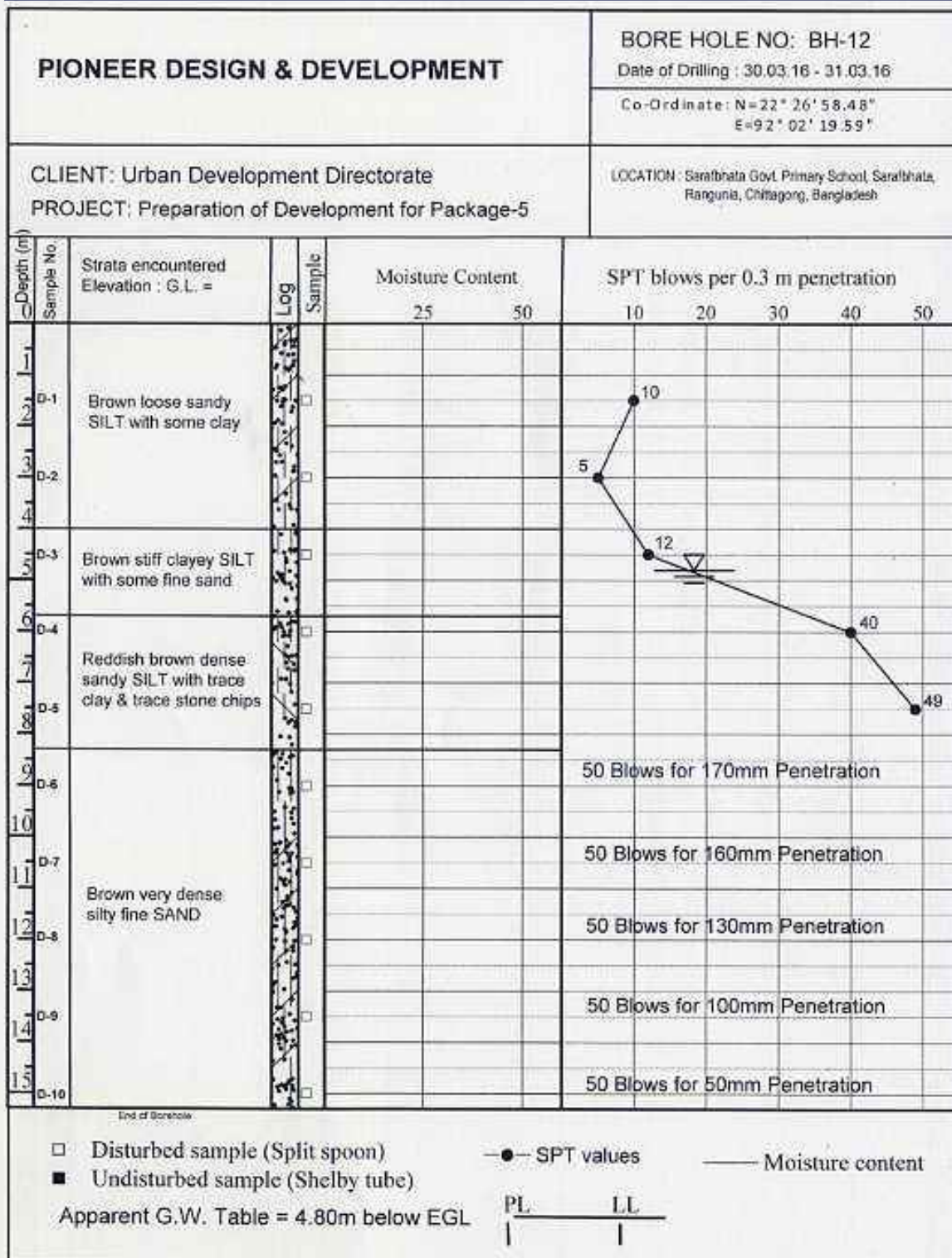


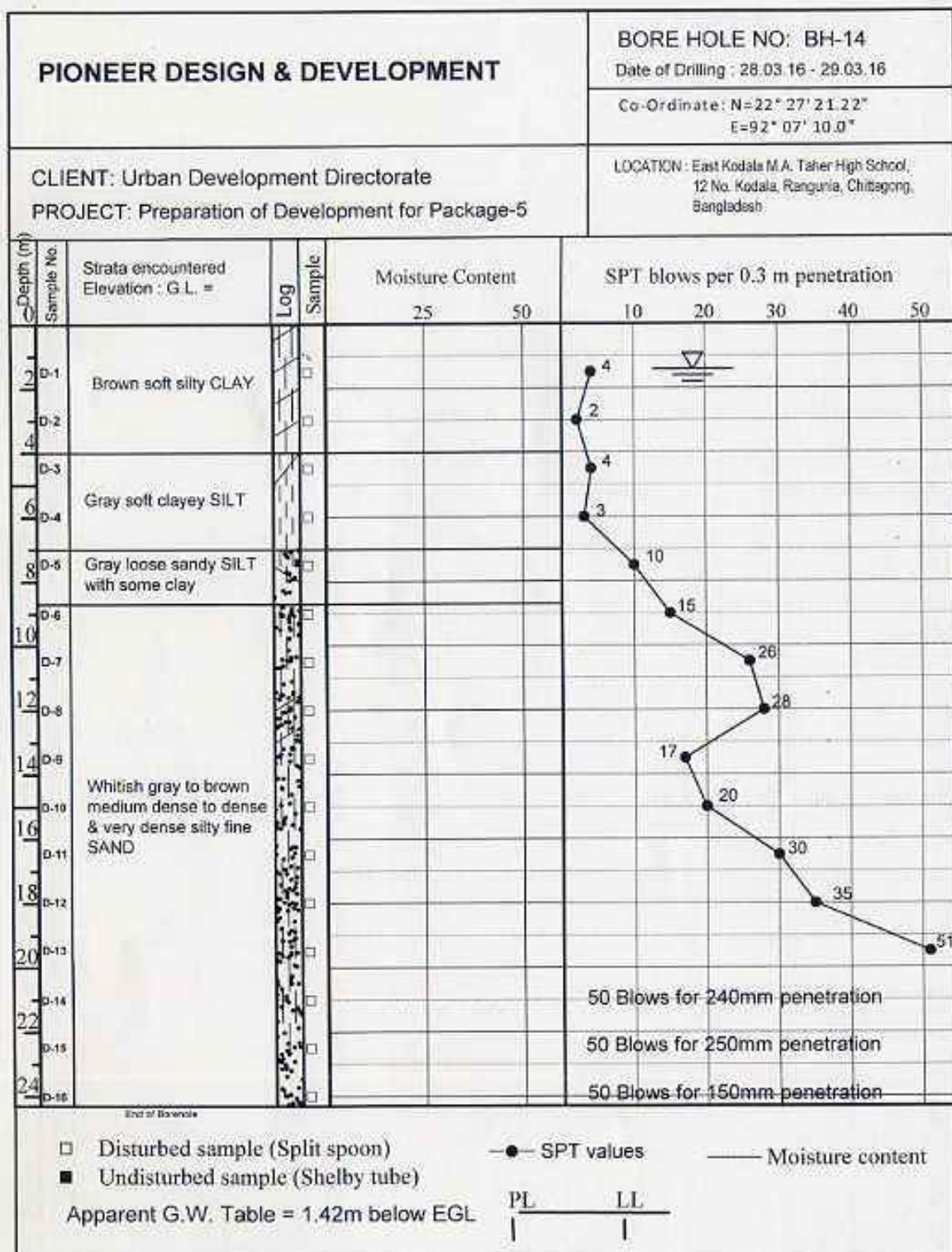


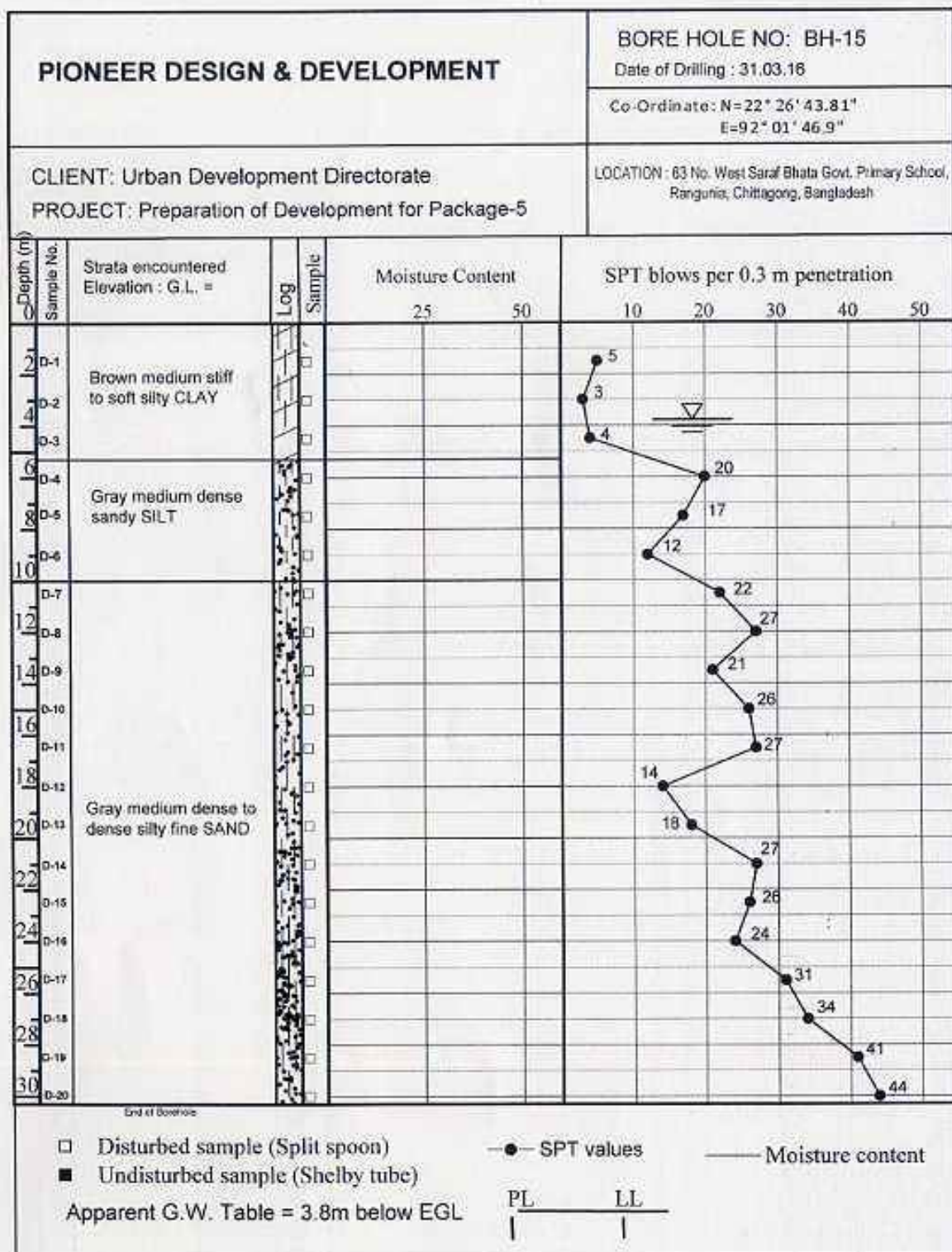


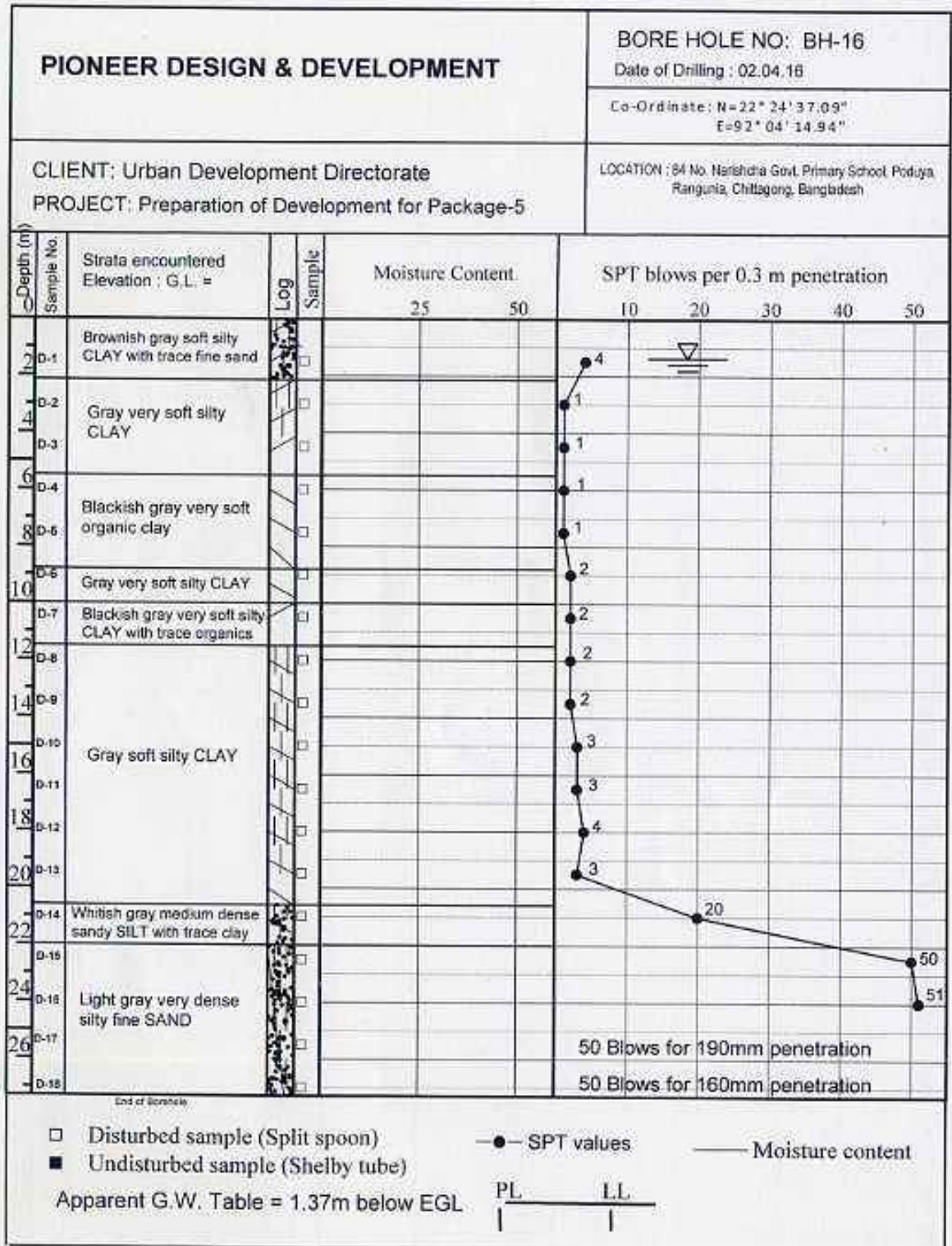


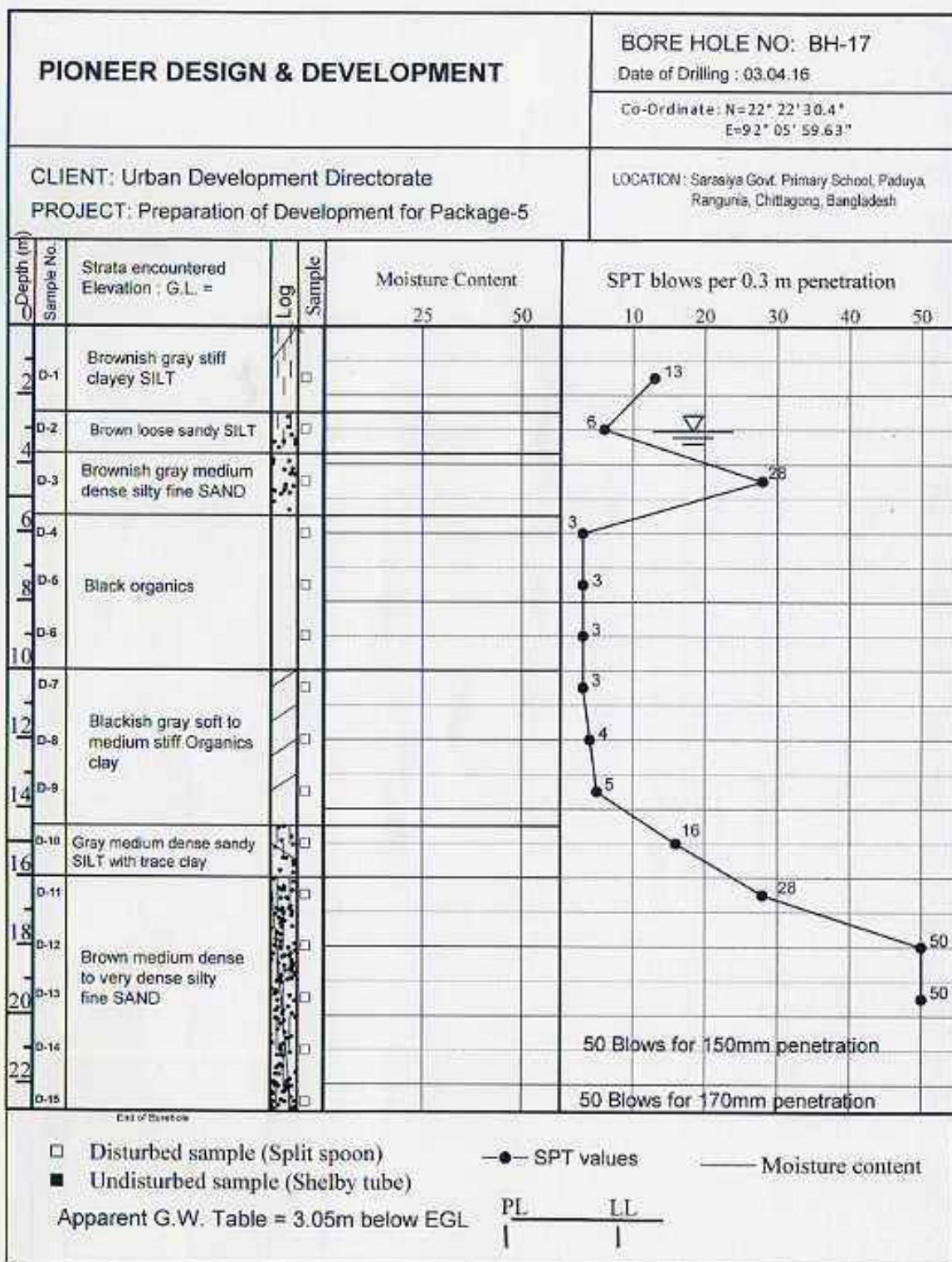


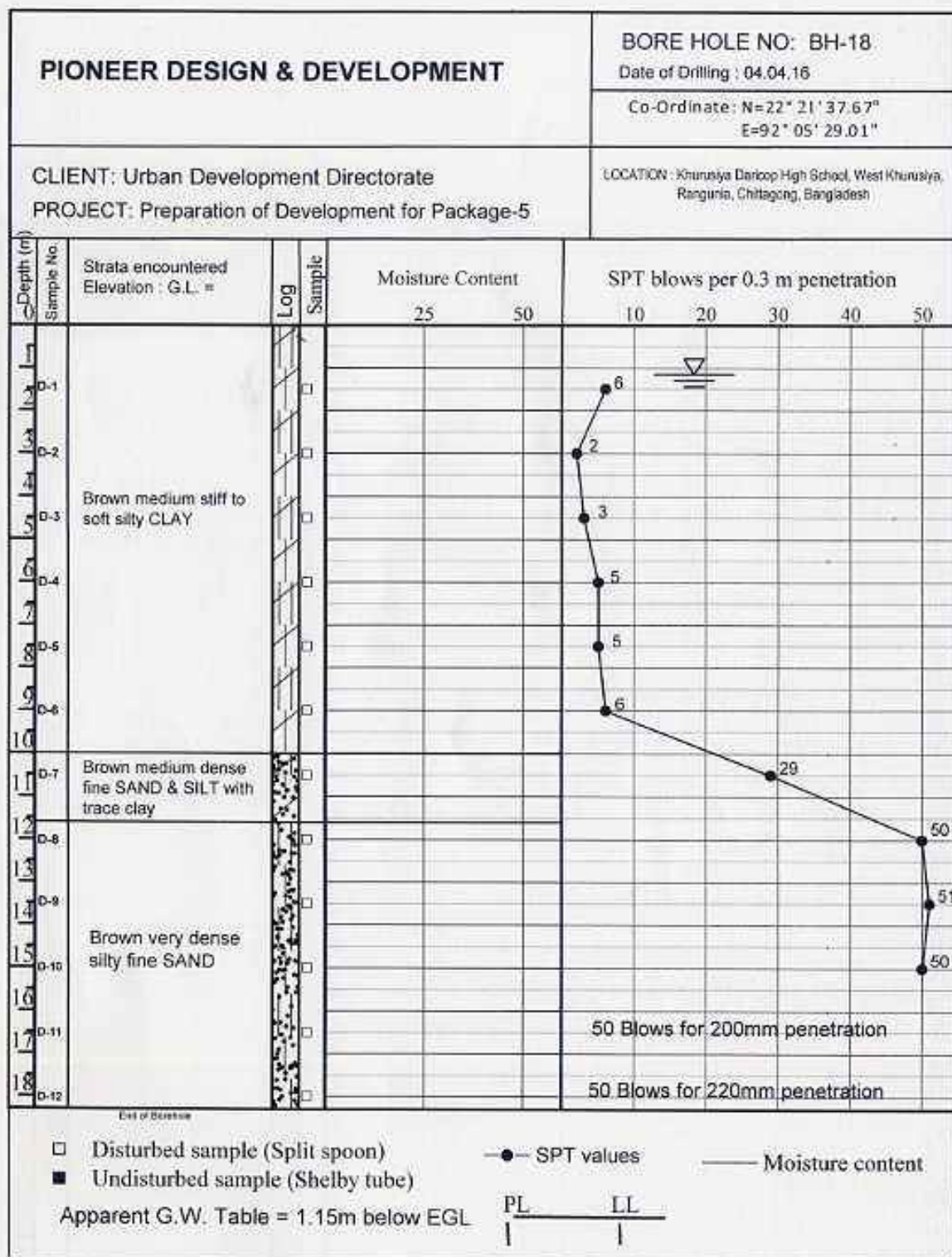


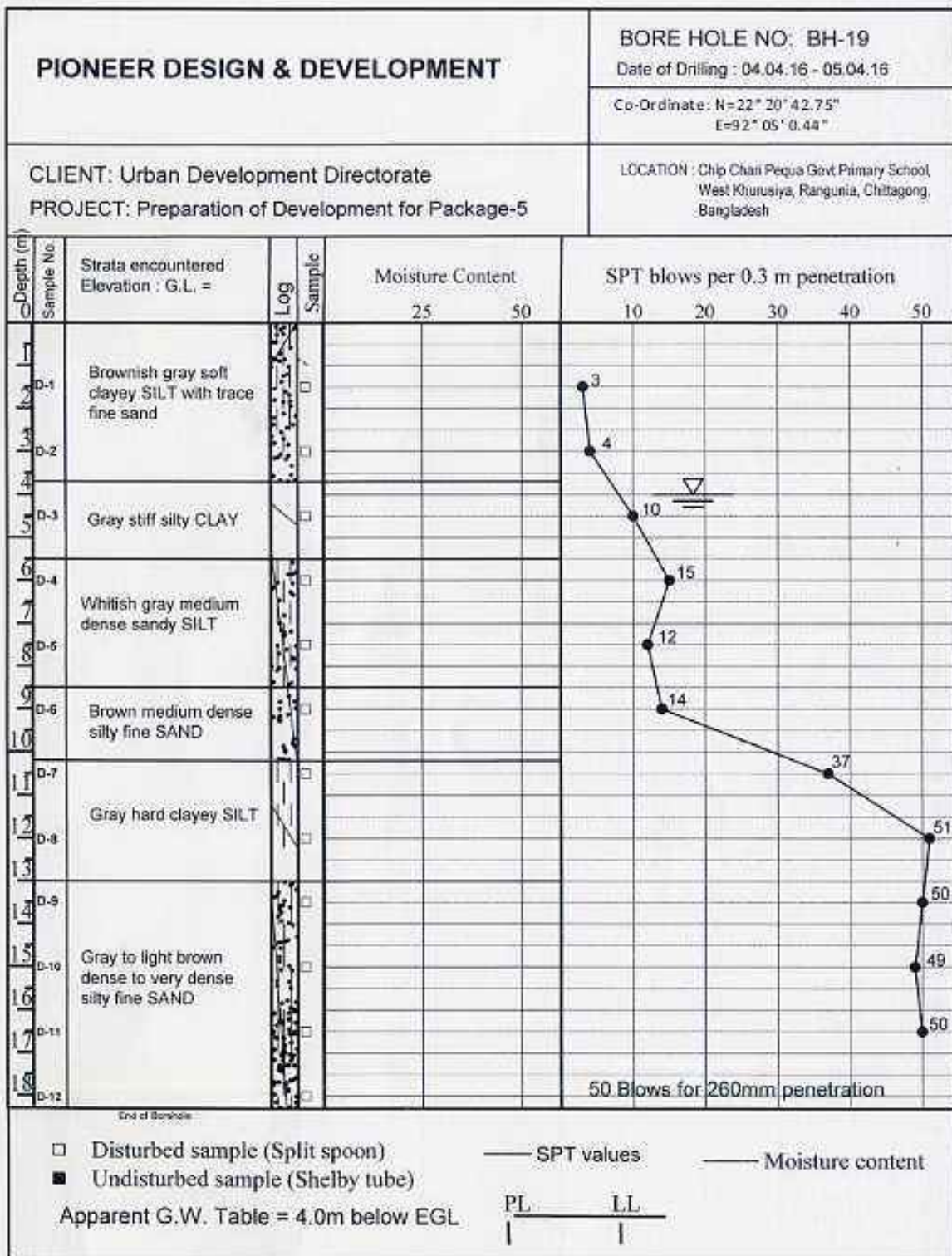


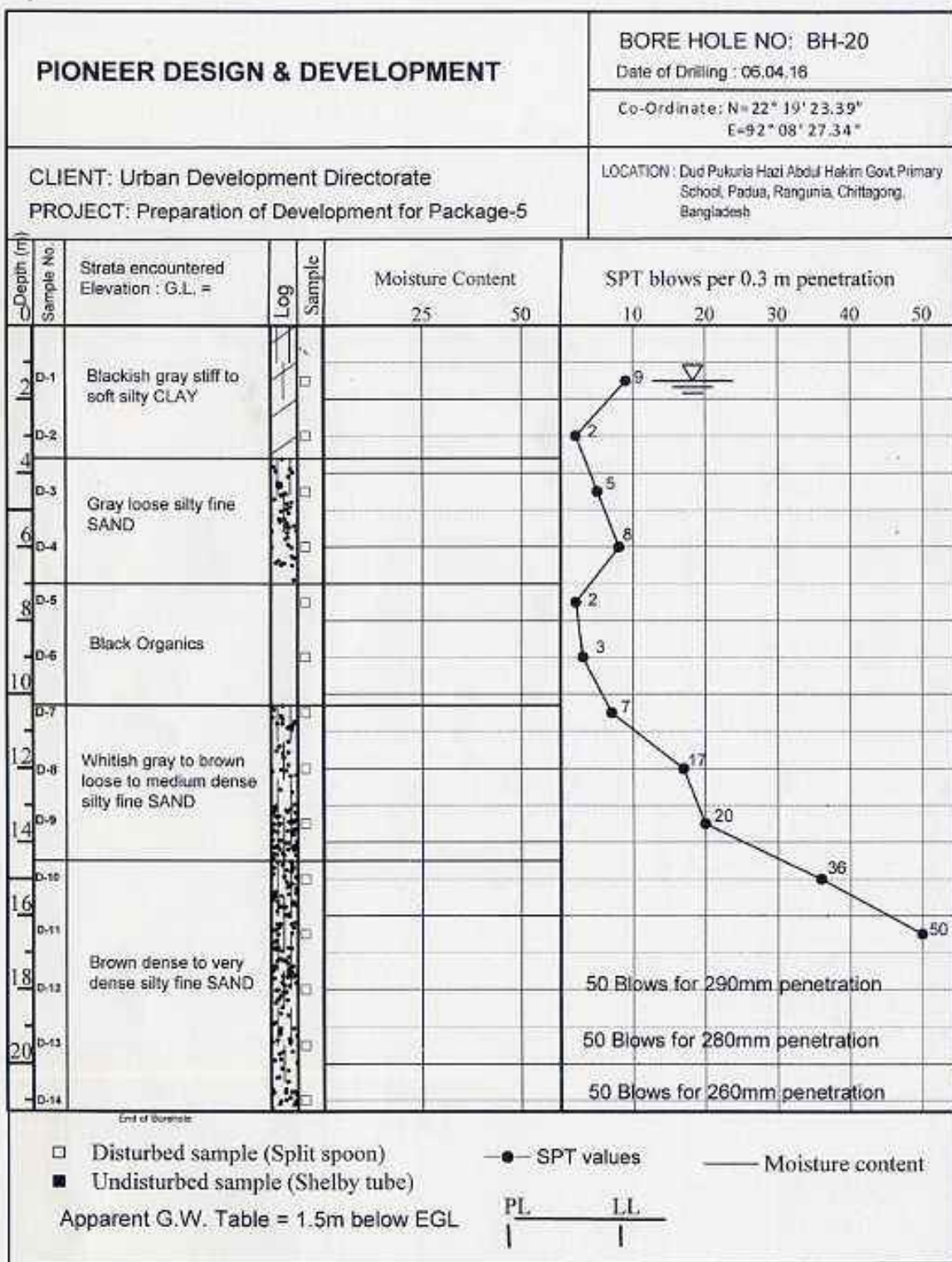












CHAPTER-04 CONCLUSION

Geologically and geo-morphologically Rangunia Upazila and its adjoining areas is very complex that's why geological, geotechnical and geophysical investigations has been carried out along the valley floor soil where most of the settlements are situated. 20 boreholes with SPT, 3 PS logging and 5 MASW program has been completed in the field as a part of this survey investigation. During this survey, soil samples (disturbed and undisturbed) are also collected for further laboratory test which will give idea about the soil engineering properties. Finally all sorts of investigation data will be analyzed and integrated in a module from which it can possible to generate geomorphologic map, sub-surface litho-logical 3D model of different layers, engineering geological mapping based on AVS30, Seismic Hazard Assessment Map (risk sensitive micro-zonation maps), soil type map, seismic intensity map, Peak Ground Acceleration (PGA) and Peak Ground Velocity (PGV) map, recommended building height maps for both high rise building and low rise building, liquefaction and Ground Failure Map etc

From this investigation and their outcomes would give a clear idea about the geo-hazard status of particular landscape where newly urban developing activities or any other mega infrastructure project is going on and this mentioned investigation also gives idea about the vulnerability of existing build up infrastructure of a particular area. Based on these results, proper management techniques as well as other necessary adaptation process could be addressed before or after the development activities in the studied area. It is to be mentioned that the long-term maintenance cost will be reduced and the developed structure will withstand against the potential natural hazards if the infrastructures are built following the risk informed physical land-use plan.

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Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas

Package 05:

**Ramu Upazila, District: Cox's Bazar &
Rangunia Upazila, District: Chittagong**

FINAL SURVEY REPORT

Physical Feature, Land Use, Topographic Survey & Photogrammetry Works of Rangunia Upazila

June 2016

Joint venture of



HOUSE OF CONSULTANTS LIMITED (HCL)

and



dm. Watch Disaster Management Watch(dm. Watch)

EXECUTIVE SUMMARY

Rangunia Upazila comprises flat and hilly areas. Therefore the area is inconvenient for direct ground surveying using traditional method. This report contains detailed activities undertaken for Physical Feature Survey, Land Use Survey and Topographic Survey based on stereo satellite imagery through photogrammetric technology. High resolution ortho-rectified satellite image along with photogrammetric data are used in preparing base map for conducting the surveys.

This report contains four separate reports these are:

1. Physical Feature Survey
2. Land Use Survey
3. Topographic Survey and
4. Photogrammetric Works

Physical Feature Survey Report covers how the features with their attribute are collected and processed for the preparation of base map for planning. Land Use Survey Report describes the methodology for acquiring and processing of land use data. Topographic Survey Report contains the acquisition and processing of topographic data by using the photogrammetric technology. The report on Photogrammetric Works contains the basic technologies of stereo satellite image processing and extraction of features.



Md. LutforRahman
GIS Expert

ABBREVIATIONS AND ACRONYMS

| | |
|---------|---|
| BM | : Bench Mark |
| BUTM | : Bangladesh Universal Transverse Mercator |
| DEM | : Digital Elevation Model |
| DGPS | : Differential Global Positioning System |
| DLRS | : Directorate of Land Records & Surveys |
| DPI | : Dot Per Inch |
| DPW | : Digital Photogrammetry Workstation |
| DTM | : Digital Terrain Model |
| GCP | : Ground Control Point |
| GIS | : Geographic Information System |
| GPS | : Global Positioning System |
| HBB | : Herring Bone Bond |
| JPEG | : Joint Photographic Experts Group |
| Km | : Kilometer |
| MSL | : Mean Sea Level |
| PD | : Project Director |
| PM | : Project Manager |
| RL | : Reduced Level |
| RMS | : Root Mean Square |
| RS | : Revisional Survey |
| RTK-GPS | : Real Time Kinematic Global Positioning System |
| SOB | : Survey of Bangladesh |
| TIN | : Triangulated Irregular Network |
| TOR | : Terms of Reference |
| UDD | : Urban Development Directorate |

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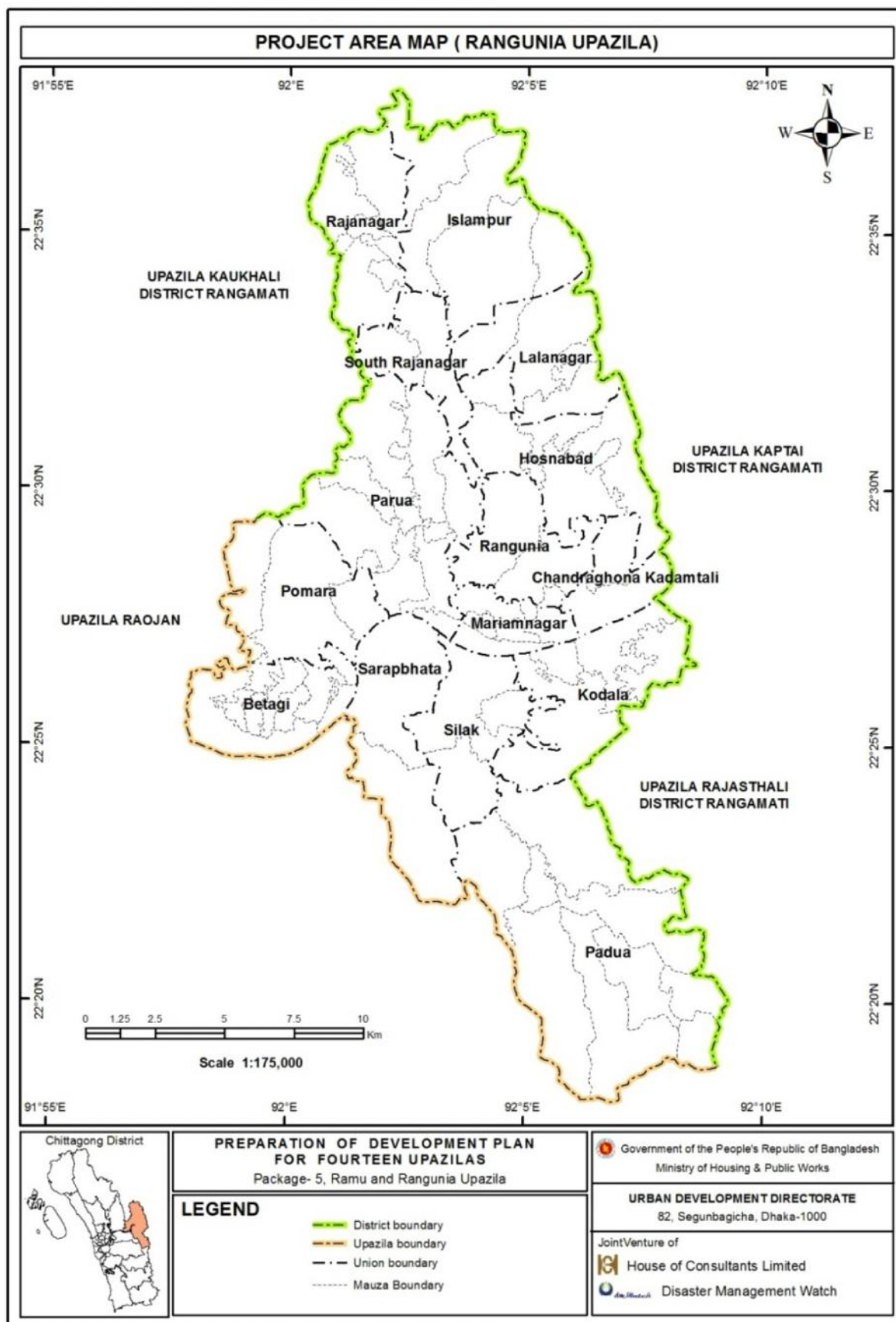
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Chapter-01 Introduction

1.0 Background

This survey report is an important part of the project 'Preparation of Development Plan for Fourteen Upazilas', for the Package-5, Ramu & Rangunia Upazila. The consultants have collected all required information for this report using the advanced technologies in the survey and data collection process. The survey was carried out according to the methodology mentioned in the TOR.

The Report contains the survey methodology and findings of physical feature survey consisting of all existing structures according to their floor height, structure type as well as uses like residential, commercial activities, industrial activities, educational facilities, health facilities, administrative uses, recreational facilities, religious facilities etc. Moreover it contains the findings of all types of road, bridge/culverts, dyke/embankment, drain/canal, sewer system, solid waste management, water supply system, utility services etc. The Project Area map has been shown in **Map-1.1**.



Map 1.1: Project Area Map of Rangunia Upazila

Chapter-02 Methodology

2.0 Reconnaissance Survey

A reconnaissance survey of the study area has been conducted to identify the existing problems, development constraints and future development potentialities of the upazilas. This reconnaissance survey has given the planning team an initial overview of the area that was necessary to set on the task of preparing a Master plan. This overview pertains not only to the physical features, prospects and problems of the area, but also the ideas, aspirations and mood of the local residents, which are very much essential to develop the methodological approach for required data collection.

2.1 Compilation and Preparation of Base Map

Preparation of base map is an important requirement for planning the project area. The base map will be used to depict the survey findings. Preparation of base map comprises the following item of works presented in sections.

Major task for the compilation and development of Geospatial data of mauza maps have been summarized in the flow diagram as shown in **Figure-2.1**:

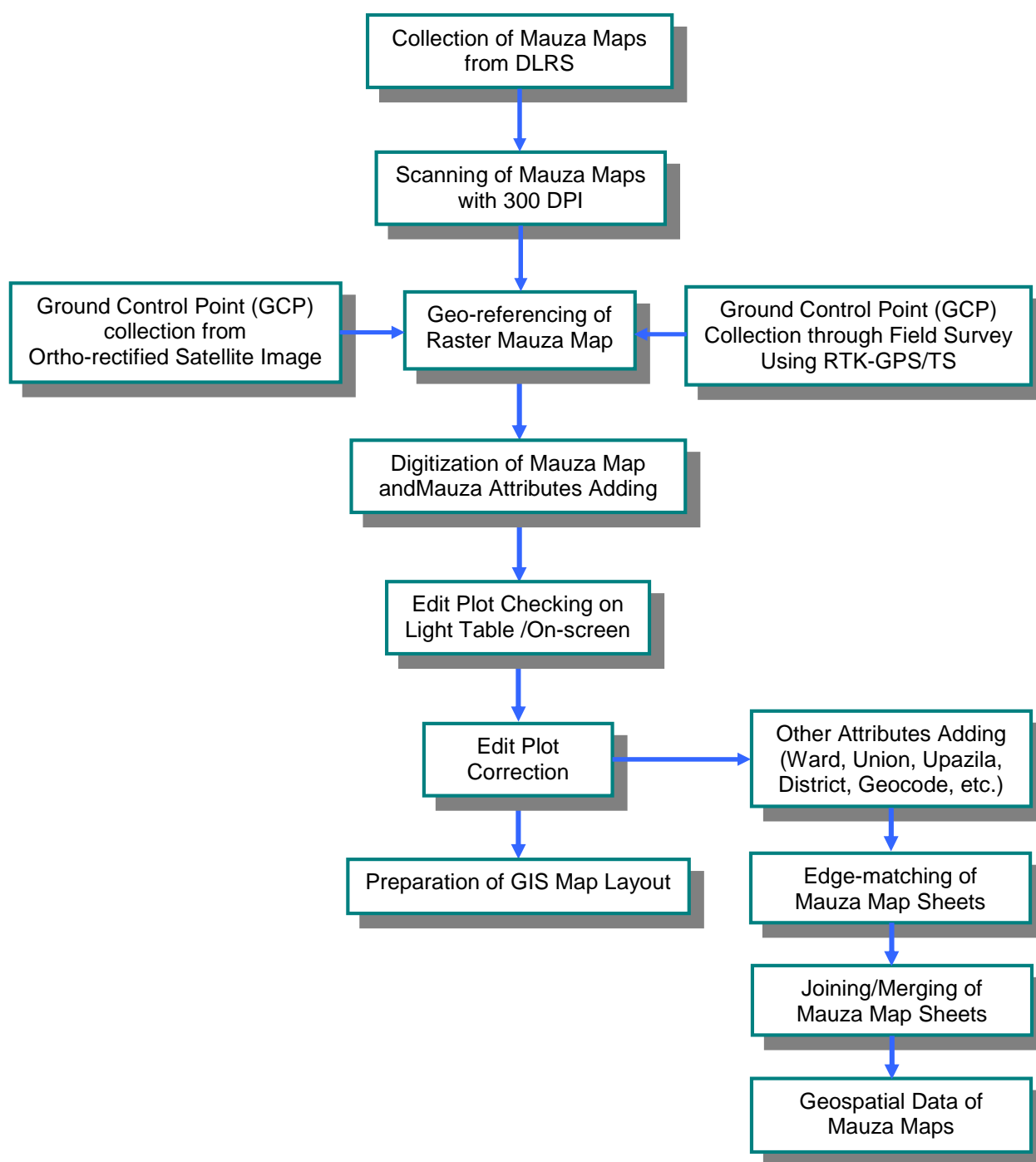


Figure-2.1: Flow Diagram for Preparation of GIS Database using RS Mauza Map

2.1.1 Collection of Mauza Maps

The Consultant has collected all the mauza maps covering the entire project area from DLRS office. The mauza sheets having distortion due to rapping or pasting cloths/tape were avoided during collection of mauza maps. The detail list of Mauza maps are provided in the **Appendix-A**.

Table 2.1: Mauza Map/Sheets Collection from DLRS

| Upazila | Mauza Version | Mauza Maps | | Collection Percentage |
|----------|---------------|--------------------|-----------------------|-----------------------|
| | | Total No. of Sheet | No of Collected Sheet | |
| Rangunia | RS | 202 | 200 | 99% |

2.1.2 Approval of Collected Mauza Maps for Scanning and Digitization

After collection of mauza maps of Rangunia Upazila from DLRS, all sheets were submitted to PM for review and quality check before scanning and digitizing. The PM of the project has approved all the mauza maps in presence of the Consultant. A sample of approved scanned mauza map is shown in **Figure-2.2**.

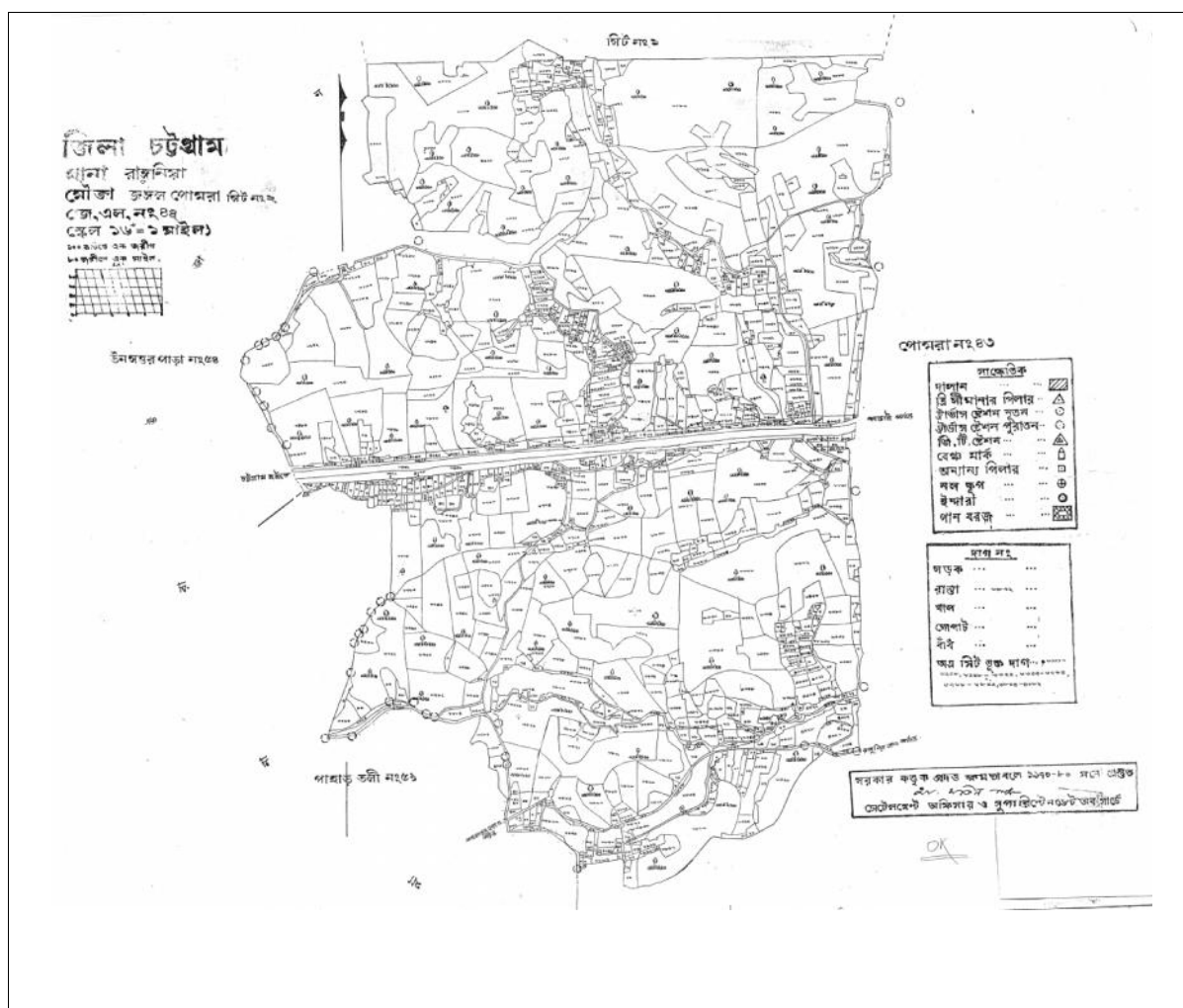


Figure-2.2: Sample of Scanned Mauza Map

2.1.3 Scanning of Mauza Maps

Scanning of all the mauza maps/sheets was started immediately after their approval by PM. As per TOR, scanning of mauza maps/sheets was carried out using drum scanner with 300 DPI to obtain good quality image and saved as JPEG format to be used later on for screen digitization. Extra care was taken during the scanning process for maintaining the proper rotation and alignment to minimize the distortion and deviation. As per TOR, the following specifications have been maintained.

Table 2.2: Specifications for Scanned Mauza Maps

| | |
|------------------|-----------|
| Image Type | Grayscale |
| Image Format | JPG |
| Image Resolution | 300 dpi |

Table 2.3: Specifications of the Scanner used for Scanning of Mauza Maps

| Brand & Model | HP Design jet 815 mfp |
|---------------------------|--|
| Scan Resolution, enhanced | 2400×2400 dpi, with variable resolution setting from 50 dpi in increments of 1 dpi |
| Scan Resolution, hardware | 800×800 dpi |
| Bit Depth | 24-bit color |
| Levels of grayscale | 256 |
| Maximum scan size | 42×unlimited in |

Table 2.4: Status of Scanning of Mauza Map

| Upazila | Mauza Maps | | Scanning Percentage |
|----------|-------------------------------|----------------------------|---------------------|
| | Total No. of Hard Copy Sheets | Total No of Scanned Sheets | |
| Rangunia | 202 | 200 | 99% |

2.1.4 Preparation of Technical Specifications for GIS Database

A document on technical specifications of GIS database was prepared for storing spatial and attribute database of all layers including mauza maps. Later this document was finalized in consultation with PM and GIS Experts of all the packages. This document is given in **Annexure-II**.

2.1.5 Digitization of Mauza Maps

The mauza maps have been digitized through On-screen Digitization process using ArcGIS software. In brief, this process involves adding a scanned mauza map in ArcMap, creating four empty shape files of three basic feature types (point, line, and polygon) in ArcCatalog, and using ArcMap's drawing tools and the mouse to trace features from the image into the shapefiles. All the features of a mauza map such as Plot boundary, Plot number, Road, Canal, Building, Mosque, Temple, Traverse Station, Iron Pillar, etc., are created and stored with attributes in four different vector layers as per the Technical Specification of GIS Database. For attaining maximum level of digitizing accuracy, the Data Frame properties have been set as Map Unit = Inch and Distance Unit = Inch to get 1:1 map scale and later zoom in to 1:30 scale during the digitization process. The **Figure-2.3** shows the on-screen digitization and a sample digitized mauza map.



Figure-2.3: On Screen Digitization and Sample Digitized Mauza Map

Table 2.5: Status of Digitizing of Mauza Map

| Upazila | Mauza Maps | | Digitization Percentage |
|----------|---------------------------|------------------------------|-------------------------|
| | Total No. of Mauza Sheets | Total No of Digitized Sheets | |
| Rangunia | 202 | 200 | 99% |

2.1.6 Edit Plot checking of the Digitized Mauza Maps

After digitization of mauza maps edit plots were produced containing all the features in different colors. The digitized mauza maps were checked and verified by superimposing on the original mauza maps using the light table to detect any kind of error for correction. This checking was done with the joint team of UDD and the GIS Expert. The observed errors normally were, wrong Id of lines, plot numbers and symbols. In some sheets, few arcs have found as missing.

After completion of edit plot checking, necessary corrections have been done using ArcGIS. After correction, the Mauza maps/sheets were printed out again and were checked to ensure that corrections were made accordingly. In this way, utmost effort has been made to ensure quality of digitization. After finalization of digitization of all the mauza maps, both soft and hard copies of them have been submitted to Project Director.

2.1.7 Geo-referencing of Raster Mauza Map

Georeferencing is the process of establishing real world coordinates or geographical coordinates of certain points of the map (at least 4 points) with great accuracy while the remaining points are calculated automatically, based on transformation formulas.

In addition to GCP survey for georeferencing mauza maps, ortho-rectified satellite image of the study area has been used as a control layer. This layer contains a rich source of real world coordinates, because it is derived by aerial triangulation of stereo images in photogrammetric environment and later ortho-rectified by the generated DEM of the area. It should be noted here that a required number of GCPs were acquired through RTK-GPS/DGPS method for the process of Aerial Triangulation that is a pre-requisite for photogrammetric works.

The Coordinate System used for both GCP and ortho-rectified satellite image is the **Bangladesh Universal Transverse Mercator (BUTM2010)** which is established by the

national mapping agency **Survey of Bangladesh** (SOB). The parameters of BUTM 2010 are as below:

| | |
|--------------------|------------|
| Spheroid | : WGS 1984 |
| Datum | : WGS 1984 |
| Unit | : Meters |
| False Easting | : 500000 |
| False Northing | : 0.0 |
| Central Meridian | : 90.0 |
| Scale Factor | : 0.9996 |
| Latitude of Origin | : 0.0 |

Since, we can pick real world coordinates (Easting, Northing) of any point on the ortho-rectified satellite image, geo-referencing of mauza map has been done by using this geometrically corrected satellite image as reference. The process of geo-referencing of mauza map using satellite image is actually parcel (plot) of mauza map matching with respect to the ortho-rectified satellite image. The **Figure 2.4** shows a sample geo-referenced raster mauza map which is overlaid on ortho-rectified satellite image.



Figure-2.4: Sample Geo-referenced Raster Mauza Map Overlaid on Satellite Image

A suitable number of GCP (minimum 4), preferably plot corners and building corners, has been taken for proper geo-referencing of mauza map depending on its size and 2nd Order Polynomial Transformation was applied. Total RMS error was kept within 0.5/1.5 meter i.e. within 1 to 3 pixels of the satellite image. Thus individual sheet of the mauza maps get properly georeferenced. Finally, permanently georeferenced images of mauza maps have been created by using 'Rectify' tool of ArcMap.

2.1.8 Geo-referencing of Vector Mauza Map

After georeferencing of scanned image of mauza maps (raster mauza maps), georeferencing of vector mauza maps have been done. The vector maps i.e. the shape files of each mauza map sheet have been spatially adjusted to the respective georeferenced raster mauza map sheet. The Spatial Adjustment Tools of ArcMap have been used to do this.

2.1.9 Edge Matching of Mauza Maps

A parcel or plot based digital map of the whole project area is a pre-requisite for planning. But edge-matching is a critical component of creating such a map. The project area encompasses many mauzas each of which contains one or more than one map sheets. The adjacent mauza maps are coincident and share the same location of coordinates, boundaries, or nodes. The problem is that, in reality, the common boundaries of adjacent Mauza map sheets actually do not match exactly with each other. Hence the edge-matching problem arises. Mauza maps are especially prone to this problem.

Edge-matching is used to align features along the edges of adjacent layers. Usually, the layer with the less accurate features is adjusted, while the other layer is used as the target layer. By superimposing the vectorized mauza maps on satellite image the accuracy of the common boundaries with respect to satellite image have been investigated. Then, edge-matching of two adjacent mauza map layers have been done by comparing the accuracy of their linear features with reference to the satellite image, identifying and keeping more accurate common features from one layer and deleting the less accurate features from other layer. In case of common roads, rivers or canals, the more accurate features have been kept entirely (both edges) from a mauza map sheet and the same features which belong to other layer have been deleted. The arisen errors such as undershoots, overshoots, etc. have been fixed immediately after deleting features.

2.1.10 Demarcation of the Project Area based on Mauza Maps

Mosaicking of all mauza maps belonged to the Upazila form the actual boundary of the project area. Before mosaicking, edge-matched mauza maps have been made as free of topological errors. Finally plot based mosaic mauza maps of the project area have been created by using 'Merge' tool of ArcGIS. The boundary of this merged mauza map becomes the Project Area Boundary with real world coordinates. Project Area Map of Rangunia Upazila is shown in **Map-1.1**.

The consultant in cooperation with UDD officials has demarcated the actual boundary of the project in the newly formed mosaic Mauza map. Later on, the project boundary was finalized by field verification, which was considered and used for the project after duly approved by UDD.

From the mosaic mauza map of the project area, the administrative boundaries such as District boundary, Upazila boundary, Union boundary, Mauza boundary and Mauza Sheet boundary have been created by using geo-processing tools of ArcGIS such as Dissolve, Erase, Intersect, Spatial Join, etc.

2.2 Establishment of Ground Control Point (GCP) / BM Pillars

A network of permanent Bench Mark (BM)/Ground Control Point has been established having real world coordinates (Easting, Northing, Elevation) within the study area to carry out

the topographic, physical features and land use survey. 16 BM pillars have been established in Rangunia Upazila. The network establishment for the survey comprises the following item of works:

2.2.1 Selection of Sites for BM Pillars with justification

Appropriate site selection is crucial for establishing BM pillars. The consultant has considered the following points in selecting sites for ground control points:

- i. The site is suitable for RTK-GPS/DGPS observation. There exists Good Sky Visibility (15 degree cut of angle above the horizon) and far from mobile tower or high voltage electric line.
- ii. The site is located on undisturbed location due to natural or human activities
- iii. The site is located on a corner of government own land, playground, school or beside of road.
- iv. The site is located on such a place that is suitable to set up Total Station equipment in future work.
- v. Two successive BM pillars are inter-visible and at least 100 meters apart.

2.2.2 Design of Pillars

BM pillars in the Study area have been constructed according to the design supplied by UDD. The approved design sheet appears at **Figure-2.5**.

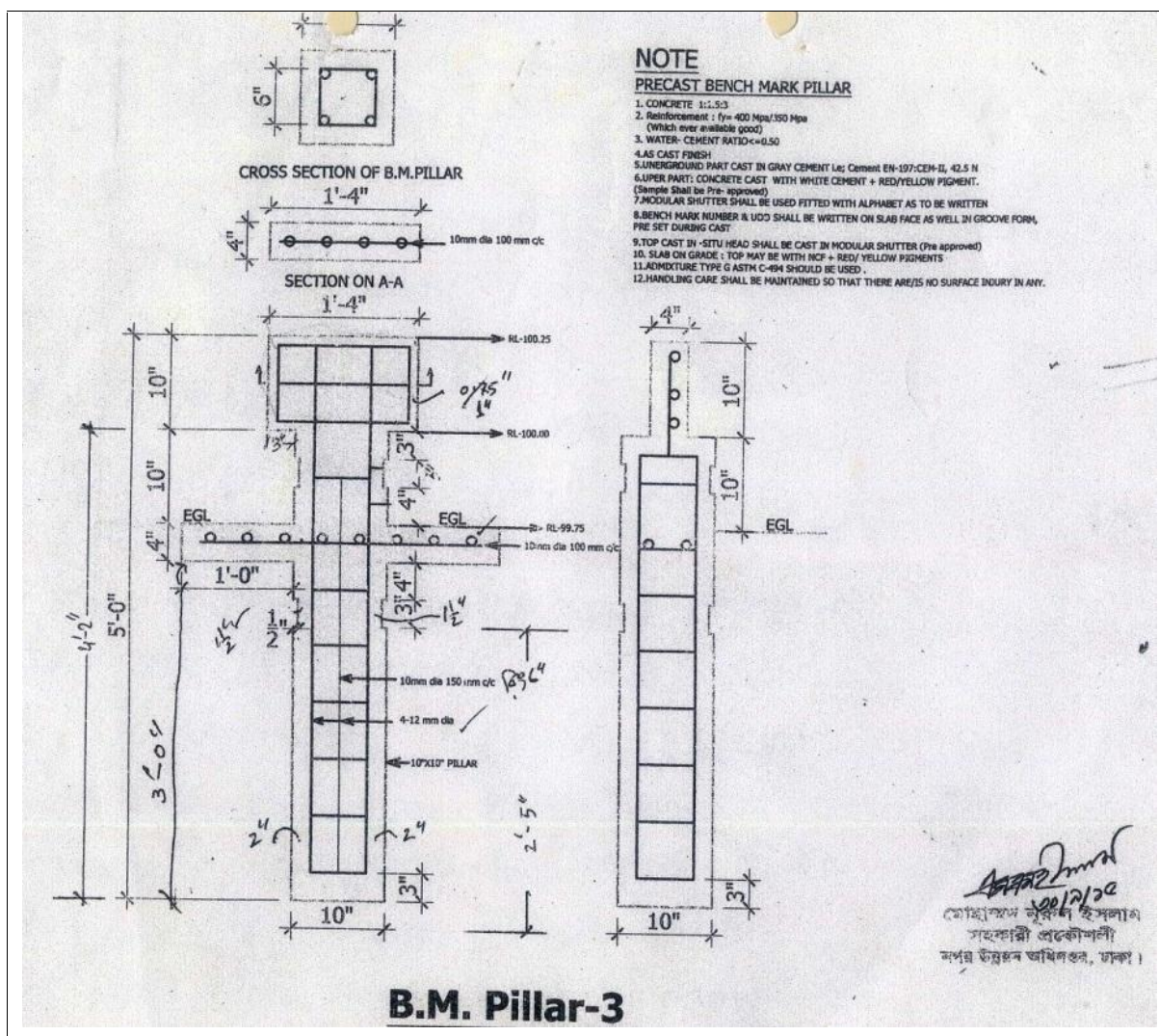


Figure-2.5: Design of BM Pillar

2.2.3 Construction of BM Pillars

Rangunia Upazila is covered by 16 BM pillars. The BMs are constructed as per approved design of BM pillar. The BM pillars have been installed in the field. Installation of the BM pillars has been monitored by UDD and the Consultant.



Plate-1: Sample of Constructed BM and Installed BM

2.2.4 Description of Reference BM Pillars

For the selection of reference BM, the survey team considered the **GPS268** and **GPS 6006** of Survey of Bangladesh (SOB) as reference BM in Rangunia Upazila. The information of Reference BM Pillars has been collected from Survey of Bangladesh.



Plate-2: Reference BM Pillars in Rangunia Upazila

The location and its x,y and z value are given in **Table-2.6**. On the basis of this reference BM, 16 BMs have been established as local reference control points within the Project Area.

Table 2.6: Location of Reference BM

| Pillar ID | Height above MSL (in meter) | Latitude (WGS 84) | Longitude (WGS 84) | Location |
|-----------|-----------------------------|---------------------|--------------------|---|
| GPS 268 | 10.42527 | 22°27'57.06130 " | 91°58'11.42000" | The pillar is situated in the compound of Chittagong University of Engineering & Technology (CUET). It is north edge of playground and north-east of School building. Vill: Pahartali, Upazila: Rangunia, District: Chittagong. |
| GPS 6006 | - | 22°27'42.55908 " | 92°04'21.63301" | The Pillar is situated west side of Rangunia Pilot High School's field. It is about 50 feet north from school boundary. Vill. Rangunia, Upaila: Rangunia, Dist: Chittagong. |

Source: Survey of Bangladesh (SOB), 2016

2.2.5 Baseline Survey by RTK-DGPS Method

The baseline survey is the instantaneous data collection in static mode at two or more fixed points using two or more dual frequency RTK-GPS receivers. The measurement network for RTK-GPS baseline survey is planned by connecting the BM points to be established and the selected reference BM (Known latitude, longitude and ellipsoidal height) near the Study Area. A line connecting two measurement points is known as baseline.

The GPS measurements consists a simultaneous static measurement with two dual frequency GPS receivers one on the known reference BM (base) and another one will be on the BM to be established (Rover). The simultaneous measurement or logging time for a session is usually 20 minutes to an hour depending on the availability of satellite and distance. During taking the measurements, the GPS receivers at the two points record the satellites information or data and the stored data is processed using software.



Plate-3: RTK-GPS Observation

The GPS Survey Team has conducted survey by RTK/DGPS methods. The Base station has been established by connecting to the Reference BMs (GPS 268 and GPS 6006 of SOB) and 10 hours of continuous observation to get precise coordinates. After establishing the base stations, the rovers are positioned on the newly installed BM Pillars one by one and observations have been made for each of the 16 BM in the project area.

2.2.6 Establishment of Coordinates (X, Y, Z) for BM Pillars

The GPS data acquired through RTK-GPS/DGPS survey has been processed by using post processing software and the co-ordinates (Northing, Easting and Elevation) of BM Pillars are achieved. Thus the coordinates of all the 16 BM pillars have been established in the Project Area along with their RL (height above MSL). The location of BM's and its x, y and z values are given in **Table-2.7** and location of BM pillars are given in **Map-2.2**.

Table- 2.7: Coordinates and Descriptions of the BM Pillars



| BM_ No | R.L (m) | Easting (dd) | Northing (dd) | Location |
|--------|---------|------------------|------------------|---|
| 1 | 8.299 | 92.007898475 | 22.4601766916667 | At Northern part of Pomra Bongobondhu School. Union: Pomra |
| 2 | 8.231 | 92.0063630527778 | 22.4608999 | At the eastern side of BoroPir Thai Aluminum and at the northern side of main road. Union: Pomra |
| 3 | 9.072 | 92.0487223305555 | 22.4649552888889 | North Side of Primary Education Building In Upazila Complex. Rangunia Paurashava |
| 4 | 8.147 | 92.0473056083333 | 22.4648779722222 | Opposite site of Upazila Woman Teacher's Hostel Boundary. Rangunia Paurashava |
| 5 | 7.435 | 92.1218350416667 | 22.4655870666667 | Near Rangunia Health Care Center, Purba Chandraghona. Union: Chandraghona Kadamtola |
| 6 | 7.828 | 92.1202618388889 | 22.4646441333333 | South side of Kaptai-Chittagong Road near Mohajoner Bottoli. Union: Chandraghona Kadamtoli |
| 7 | 12.146 | 92.0650367 | 22.5342966666667 | North Eastern Side of School along Road side, Union: Lalanagar |
| 8 | 11.799 | 92.0640731944444 | 22.5340565444444 | North Westside of School (Behind the Toilet), Union: Lalanagar |

| | | | | |
|----|--------|------------------|------------------|---|
| 9 | 17.556 | 92.0423834555556 | 22.5722372805556 | South East Side of Rajanagar High School, Ranirhat, Union: Rajanagar |
| 10 | 18.362 | 92.0412666583333 | 22.5712613472222 | North West side of Rajanagar Land Office, Ranirhat, Union: Rajanagar |
| 11 | 6.828 | 92.0565599222222 | 22.4464539944444 | East Side of Shilok Bridge Union: Shilok |
| 12 | 7.785 | 92.0546850111111 | 22.4473277055556 | West Side of Silok Bridge Union: Shilok |
| 13 | 7.716 | 91.9978344666667 | 22.432320175 | North West side of Dargha along the Road Side (Dargha Gate to Tinchadia Bazar) Union: Betagi |
| 14 | 8.153 | 91.9968111805556 | 22.4340100222222 | South East side of Culvert on Santirhat to Mirjakhil Road, Union: Betagi |
| 15 | 14.078 | 92.0987169277778 | 22.3740051694444 | East side of Bridge (North side of Foundation Memorandum), Union: Padua |
| 16 | 15.066 | 92.0968936305556 | 22.3740867 | West side of Bridge Union: Padua |

2.2.7 Marking of BM Pillars

The number of the respective BM pillars has also been inscribed on the face of each pillar as per specification provided by UDD. The team members of the consultant firm have properly supervised the marking of Bench Mark Pillars.

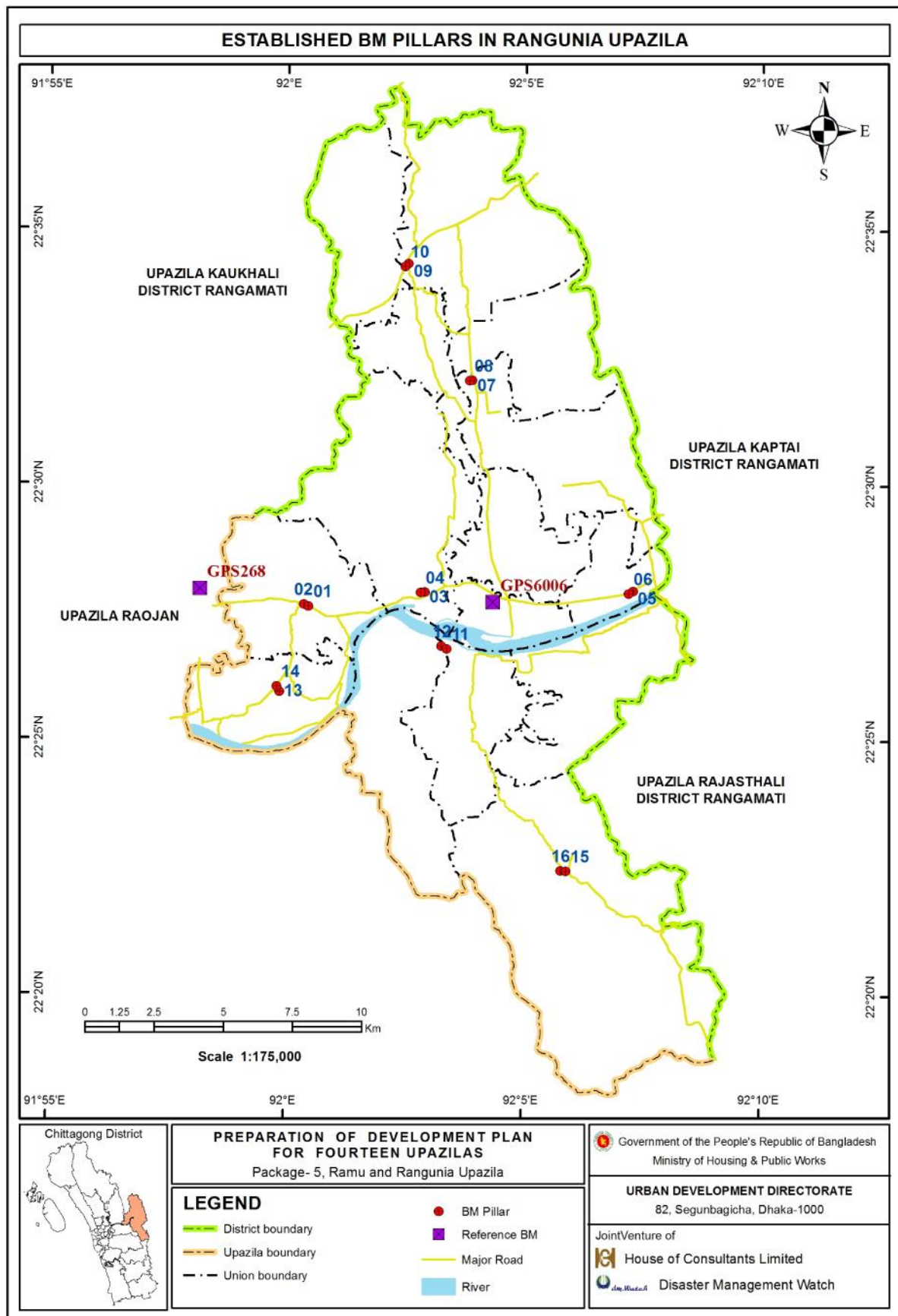
Table-2.8: Coordinates and Photographs of the BM Pillars

| BM ID | RL (meter MSL) | Easting (dd) | Northing (dd) | Land Mark | BM Photo |
|-------|----------------|------------------|------------------|------------------|--|
| 1 | 8.299 | 92.007898475 | 22.4601766916667 | Pomra Shantirhat |  |
| 2 | 8.231 | 92.0063630527778 | 22.4608999 | Pomra Shantirhat |  |

| | | | | | |
|---|--------|----------------------|----------------------|----------------------------------|--|
| 3 | 9.072 | 92.04872233 05555 | 22.464955 2888889 | Upazila Complex, Ichakhali |  |
| 4 | 8.147 | 92.04730560 83333 | 22.464877 9722222 | Upazila Complex, Ichakhali |  |
| 5 | 7.435 | 92.12183504 16667 | 22.465587 0666667 | Lichubagan |  |
| 6 | 7.828 | 92.12026183 88889 | 22.464644 1333333 | Lichubagan |  |
| 7 | 12.146 | 92.0650367 | 22.534296 6666667 | Dhamairhat |  |
| 8 | 11.799 | 92.06407319 44444 | 22.534056 5444444 | Dhamairhat |  |

| | | | | | |
|----|--------|----------------------|----------------------|--------------------------------|--|
| 9 | 17.556 | 92.04238345 55556 | 22.572237 2805556 | Ranirhat, Dhandachari. |  |
| 10 | 18.362 | 92.04126665 83333 | 22.571261 3472222 | Ranirhat, Dhandachari. |  |
| 11 | 6.828 | 92.05655992 22222 | 22.446453 9944444 | Sharafbhatta- Shilok Bridge |  |
| 12 | 7.785 | 92.05468501 11111 | 22.447327 7055556 | Sharafbhatta- Shilok Bridge |  |
| 13 | 7.716 | 91.99783446 66667 | 22.432320 175 | Betagi Tinchediya Bazar |  |
| 14 | 8.153 | 91.99681118 05556 | 22.434010 0222222 | Betagi Tinchediya Bazar |  |

| | | | | | |
|----|--------|----------------------|----------------------|---------------------------|--|
| 15 | 14.078 | 92.09871692 77778 | 22.374005 1694444 | Padua Rajar hat Bridge |  |
| 16 | 15.066 | 92.09689363 05556 | 22.374086 7 | Padua Rajar hat Bridge |  |



Map 2.1: Location of BM Pillars in Rangunia Upazila

2.3 Satellite Image Processing for Data Acquisition

Satellite image came with a certain level of processing. However, for the purpose of features extraction, further processing is needed in a number of steps. The step by step procedures has been shown in the **Figure 2.6**.

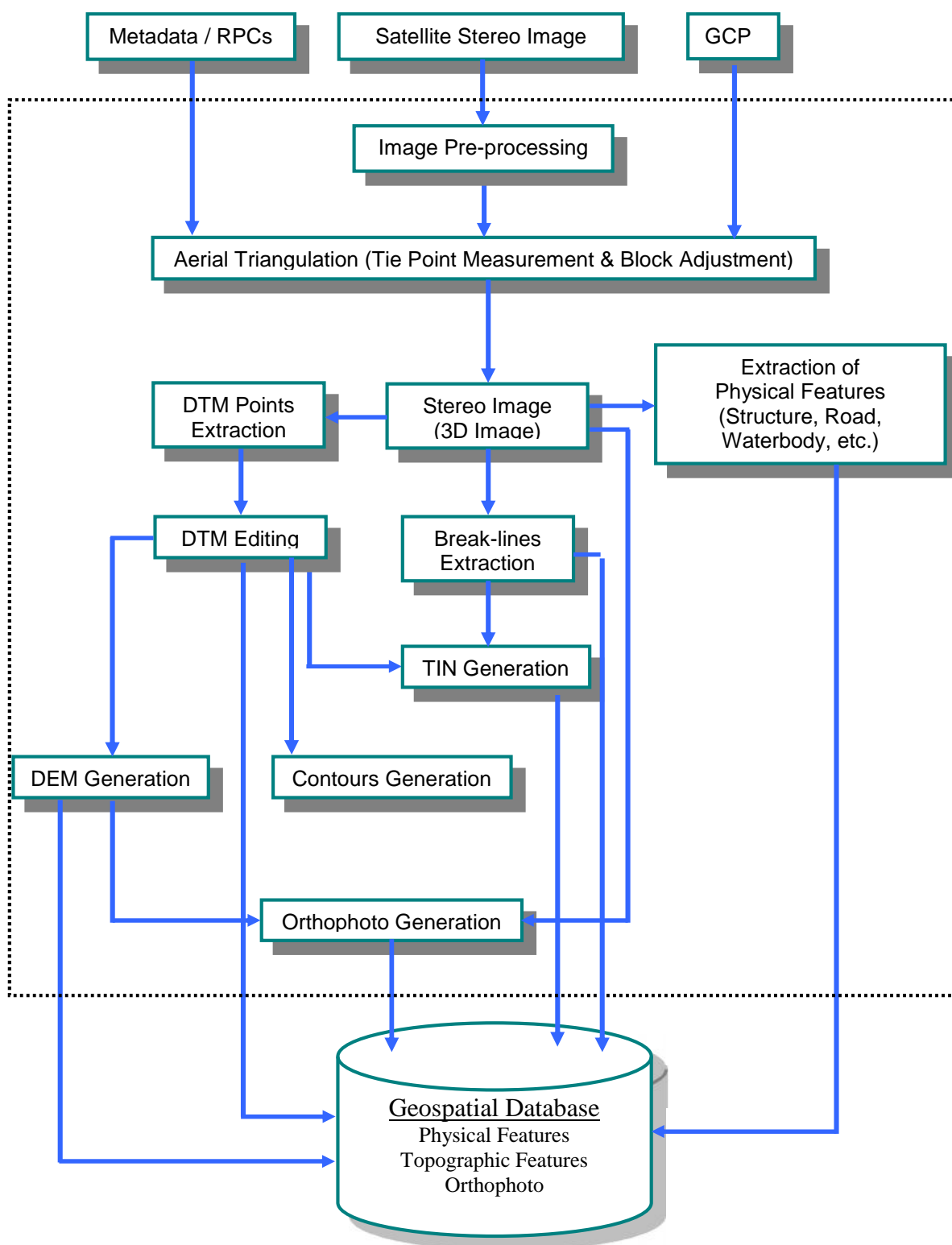


Figure 2.6: Workflow of Stereo Satellite Image Processing and Data Extraction

After collecting raw satellite imagery in stereo pairs, initial image processing has been done by performing Epi-polar Correction, Color Balance, Contrast Adjustment, Sharpening, Pyramid building and Bit Rate Setting. For geometrical correction of satellite images four reliable GCPs has been collected through RTK-GPS survey study area. Using these GCPs, Aerial Triangulation of the stereo pairs has done and stereo model has been prepared for photogrammetric works. The detail procedure has been described in the report of **Photogrammetric Works**.

2.3.1 Physical Feature Extraction from Satellite Image

After initial image processing and building up of stereo models, extraction of physical features has been done by a team of skilled photogrammetrist. All type of physical features including Structures (katcha, pucca, semi-pucca, etc.), Roads, Water bodies, etc. have been extracted as 3D features. Each vertex of features contains z-value (elevation).



Plate-4: Digitization by Digital Photogrammetry

The Photogrammetric Expert and the GIS Expert has monitored the feature extraction works examine the data for their proper registration.

2.3.2 Preparation of Survey Base Map

The survey base map has been created by superimposing Project Area Maps derived from Mauza map and Satellite Image Processed data. This superimposition is very important to form a unique map and database comprising the data collected from satellite imagery and Mauza map data (e.g. plot no, Mauza name, JL no., sheet no.). These base maps have been used to collect attributes of the physical features and missing features which could not be extracted due to dense vegetation in the project area.

Entire Rangunia Upazila has been divided into 3704 grids and survey base maps have been prepared based on these grids. The base maps have been printed on A3 paper sheet at a scale of 1:990 to make sure that all required physical features are visible enough to carry out the survey works. Total 1818 sheets have been prepared and printed. Those grids are not printed which are fully on agricultural land, on large water body or on forest lands as determined by the satellite image.

The Grids used to prepare survey base map is shown in **Figure-2.7** and Grids with photogrammetric data and satellite image is shown in **Figure-2.8**.

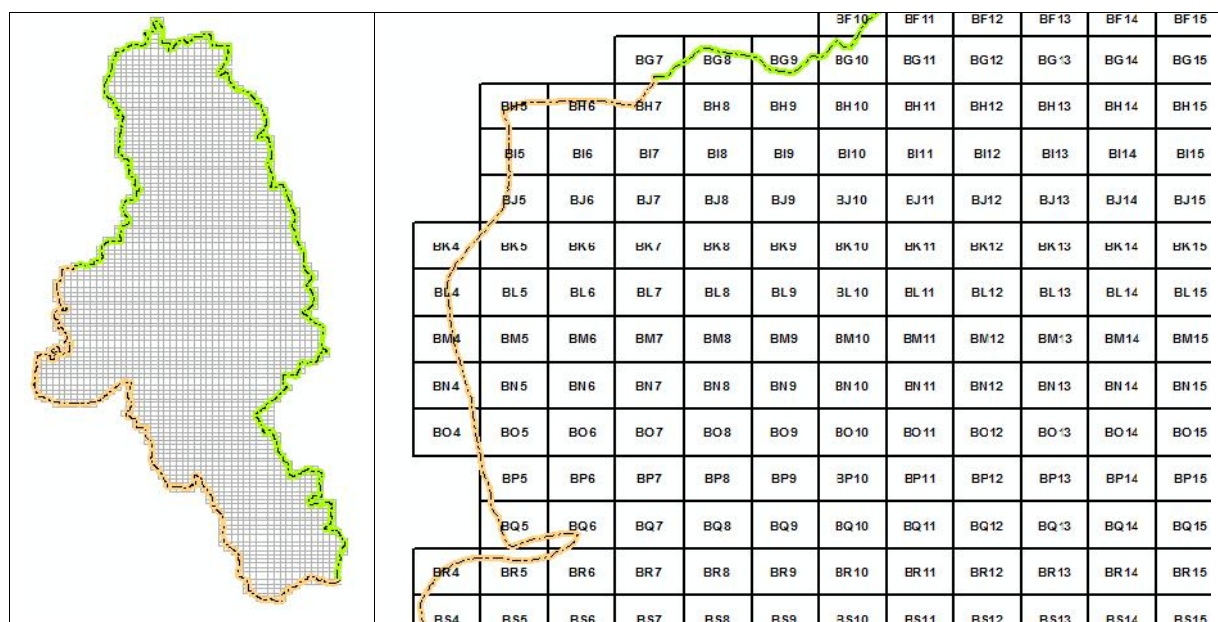


Figure-2.7: Grids for Survey Base Maps of Rangunia Upazila

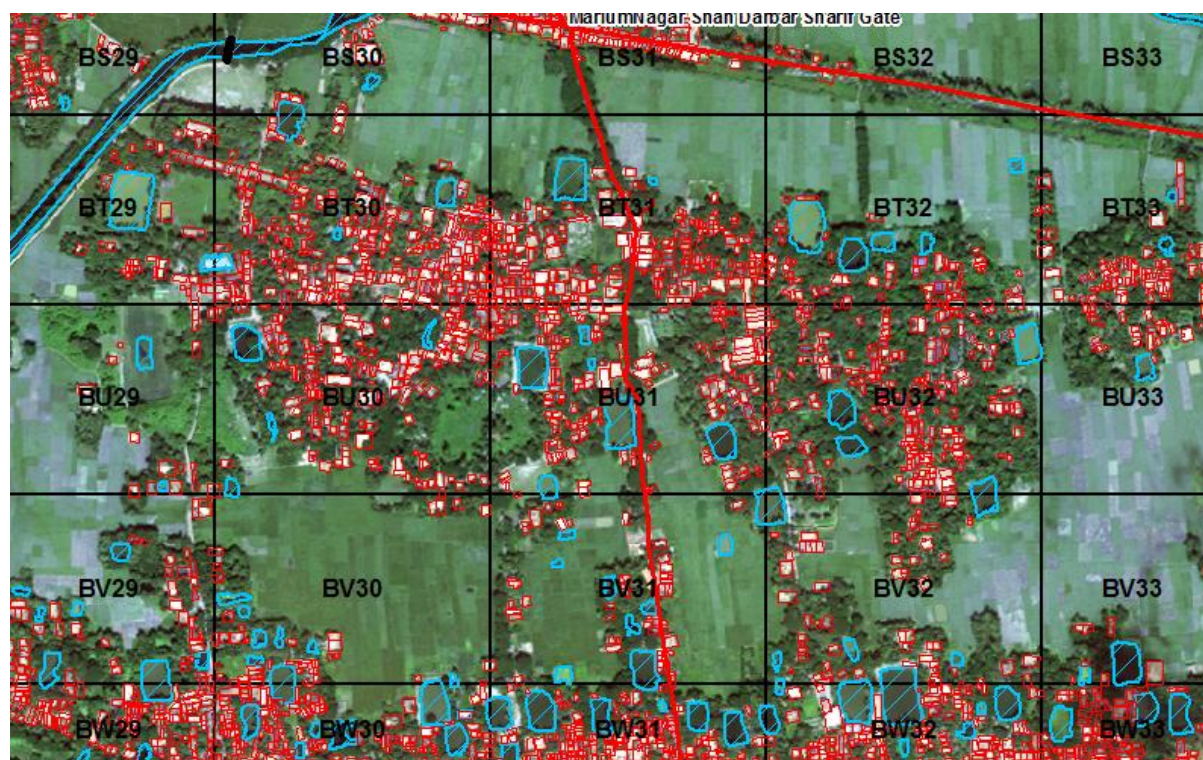


Figure-2.8: Survey Base Maps of Rangunia Upazila in Grids



Map-2.2: Sample Base Map comprising Satellite Image and Photogrammetric Data



Map-2.3: Sample Base Map comprising Mauza Map and Photogrammetric Data

2.3.3 Preparation of Log Book for Attribute Collection

To collect attributes or textual information, a Log Book comprising data collection forms has been developed. A Form of the Log Book is given in **Annexure-III**. Each page of the book contains columns for collecting following information:

- Type of structure
- Use of structure
- Name of the structure, if any
- Construction year of the structure
- Owner of the structure
- Mobile no. of the owner of the structure, if possible
- Road name beside the structure, if any
- Plot no. and Mauza name belongs to the structure
- Ward/Union belongs to the structure
- Name of the location

Chapter-03

Field Level Data Acquisition

3.0 Mobilization of Survey Team

A dynamic and qualified survey team experienced with the GPS and Satellite Image based advance technology was mobilized to carry out physical feature survey, landuse survey and topographic survey. The composition of survey team with their qualification is given **Table-3.1**:

Table 3.1: Composition of Survey Team

| Field of Expertise | Qualification | No. of Expert/ Technical Staff |
|--------------------|--|-----------------------------------|
| Survey Expert | Bachelor of Urban & Regional Planning (BURP) | 1 |
| Survey Supervisor | Bachelor of Urban & Regional Planning (BURP) | 1 |
| Surveyor | Diploma in Survey/Civil Engineering | 12 |
| Surveyor | Diploma in Survey Engineering | 10 |

For physical survey this survey team was divided into 7 groups (each group contains two surveyors) to collect all features i.e. structures, water bodies, roads, etc. with their attributes. All these groups were supervised by the Survey Expert and the Survey Supervisor.

3.1 Physical Feature Survey

The Physical Feature survey in Rangunia Upazila has been carried out using the survey base maps as described in previous section. Survey team equipped with GPS/Smart Phone, tape, color pen, map sheet, log book, etc. have gone to field and collected required information. A sample surveyed map sheet is shown in **Figure-3.1** and a sample page of log book with collected information is shown in **Figure-3.2**.



Figure-3.1: Sample Scanned Base Map for Physical Features and Land use Survey

The survey team has collected following information from field:

- Position, dimension and number of story of all structures
- Type of structures according to their construction (Pucca, semi-pucca, katcha).
- Type of structures according to their use (Residential, Commercial, Industrial, Mixed use, etc.)
- Bridge/Culverts, drain along with flow direction width and depth, location of deep tubes well, overhead water tank, electric substation, telephone exchange, Water Treatment plant, waste disposal facilities.



Plate-5: Surveyors Working on the Field in Rangunia

GRID NO. BX-30(20-03-16) Structure Information Collection Form

| ID | Type | Floor | Structure Use | Structure Name | Owner Name | Owner Cell No. | Construction Year | Holding No. | Ward No. | Plot No., Mouza Name | Road Name | Locality |
|----|------|-------|---------------|----------------|------------------|-------------------|-------------------|-------------|----------------------|-------------------------|-----------|----------|
| 1 | P | 1 | Garage | - | আব্দুল আব্বাস | - | 2010 | - | 02 কাজী আব্বাস | আব্বাস আব্বাস | আব্বাস | আব্বাস |
| 2 | K | 1 | u | - | আব্দুল আব্বাস | 01830- 199303 | 1970 | 487 | u | u | u | u |
| 3 | P | 2 | u | - | আব্দুল আব্বাস | - | 2014 | - | u | u | u | u |
| 4 | S | 1 | u | - | আব্দুল আব্বাস | 01811-61 7770 | 1995 | 422 | u | u | u | u |
| 5 | S | 1 | Garage | - | আব্দুল আব্বাস | 01816- 243920 | 1998 | - | u | u | u | u |
| 6 | P | 1 | Garage | - | আব্দুল আব্বাস | 01815-64 94946 | 2005 | 423 | u | u | u | u |
| 7 | P | 1 | u.c | - | আব্দুল আব্বাস | - | 2016 | - | u | u | u | u |
| 8 | K | 1 | Garage | - | আব্দুল আব্বাস | 01814- 105837 | 1990 | 430 | u | u | u | u |
| 9 | K | 1 | u | - | আব্দুল আব্বাস | - | 1995 | 428 | u | u | u | u |
| 10 | P | 2 | u | - | আব্দুল আব্বাস | 01890- 827633 | 2005 | 427 | u | u | u | u |

Figure-3.2: Sample Log Book Page with Information Recorded in Field

Chapter-04 Survey Data Processing & Analysis

4.1 Processing of Spatial and Attribute Data

After completion of field survey, all type of feature data is properly processed to obtain layers of physical features such as Structures, Roads, Water bodies, etc. All surveyed sheets are scanned and geo-referenced to superimpose on the satellite imagery. The surveyed features (structures, roads, water bodies, etc.) marked on the sheets were then digitized using the ArcGIS software and stored them layer by layer as per Technical Specifications on GIS Database.

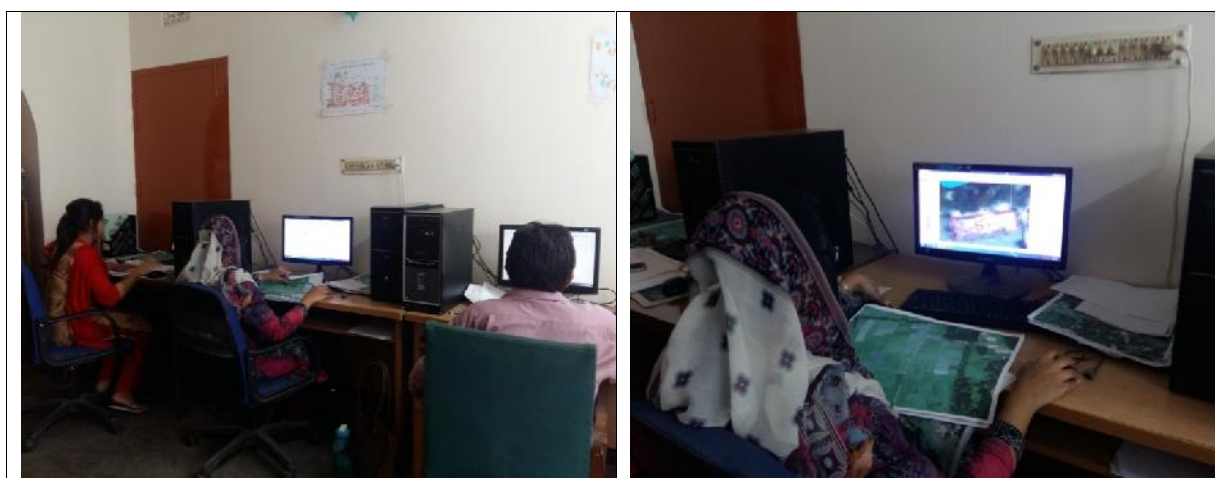


Plate-6: Updating Works through GIS

After digitizing all surveyed features, editing and merging and has been done to get complete data sets of different layers of physical features.

The attribute data collected in the Log Book during the field survey have been entered in a relational database through Microsoft Access. The **Figure-4.1** shows the interface of Data Entry and **Figure-4.2** shows the tabular view of entered data in Microsoft Access.

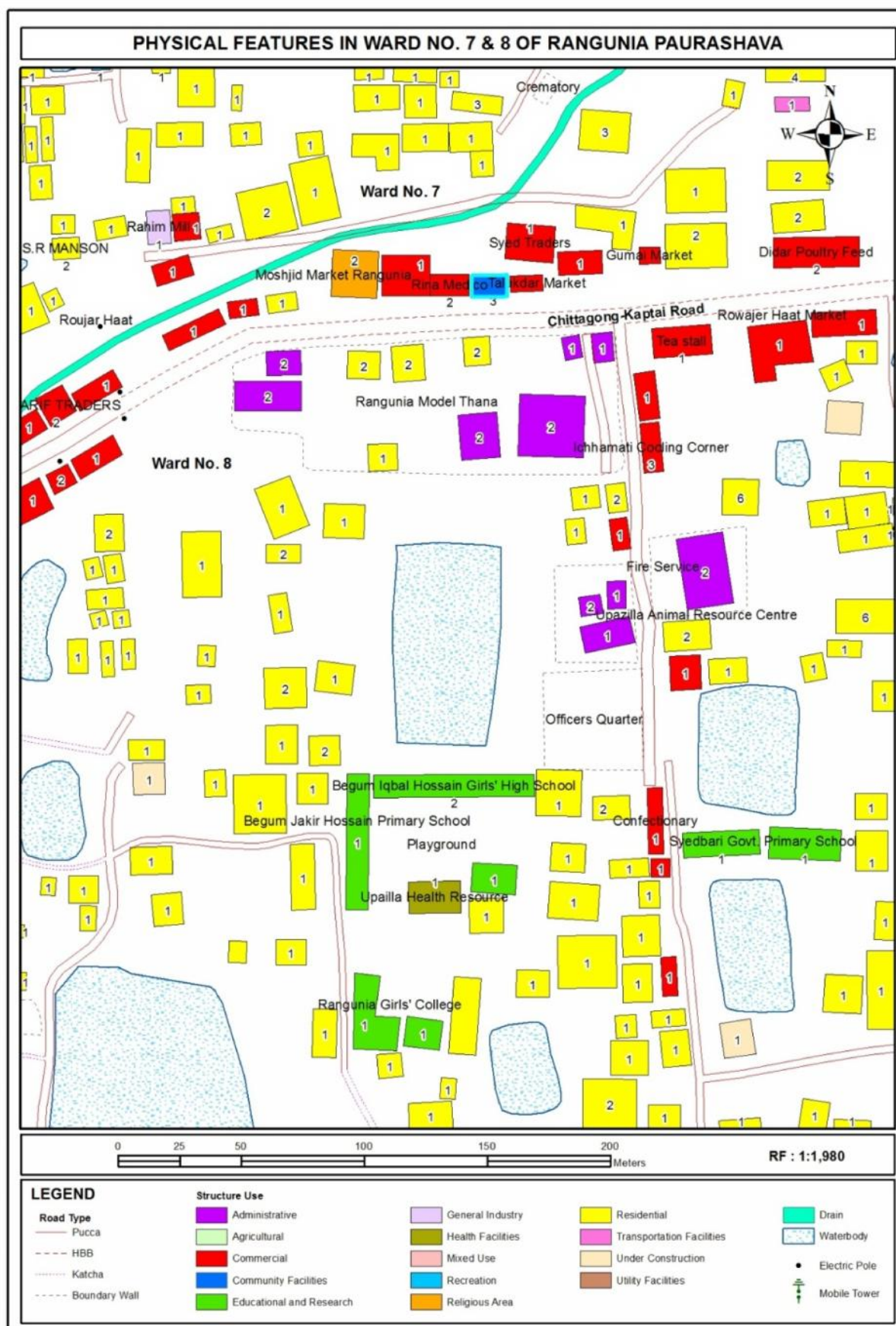
| Main | | | |
|---------------------------------------|---------------|-------------------|--------------------|
| Structure Information Collection Form | | | |
| strucID | AY24_21 | | |
| Grid No: | AY24 | Wner Cell No. | |
| ID | 21 | Construction Year | 2016 |
| Type | Pacca | Holding No. | |
| Floor | 1 | Ward No. | 3 |
| Structure Use | Residential | Plot No. | ICHAMOTI,SYEDNAGAR |
| Structure Nme | TALUKDAR BARI | Road Name | |
| Owner Name | ABDUL JALIL | Locality | SYEDNAGAR PARUA |

Figure-4.1: Log Book Data Entry Interface in Microsoft Access Software

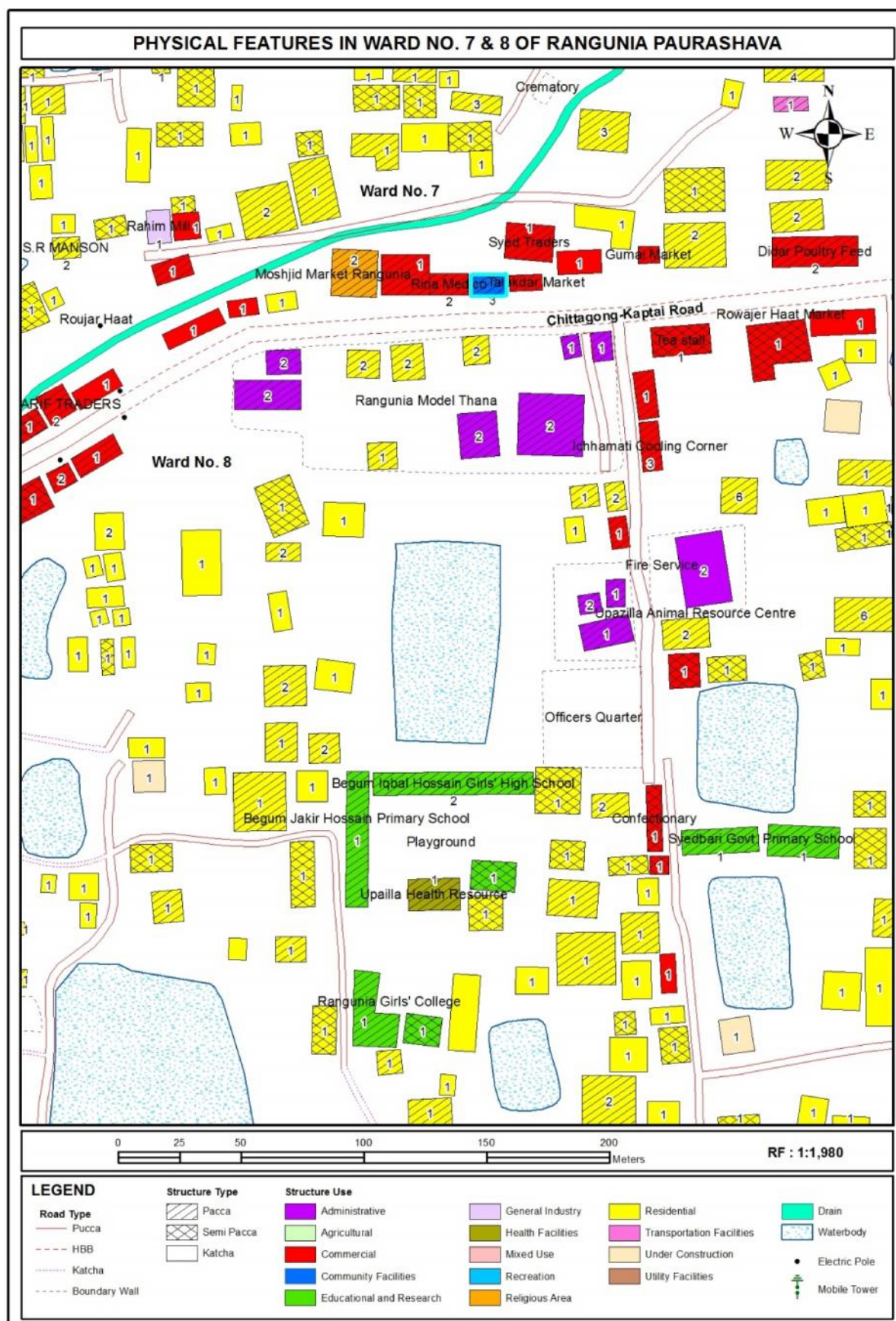
| strucID | GridN | SLid | struTyp | Floor | StrUse_1 | StrUse | StrNam | OwnerNm | WncrCell | Conty | Holdi |
|---------|-------|------|------------|-------|-----------|----------------|-------------------------------|----------------|-------------|-------|-------|
| BO14_44 | BO14 | 44 | Pacca | 1 | Mosque | Religious Area | basir mohammad jame mosq | basir mohamr | | | 1970 |
| BC31_4 | BC31 | 4 | Pacca | 1 | TEMPLE | Religious Area | SRE SRE BCKKHO KALI MANDI | | | | 1935 |
| BO25_25 | BO25 | 25 | Pacca | 2 | Mosque | Religious Area | North Ghatcheck Shahi Jame | | | | 1994 |
| BK29_2 | BK29 | 2 | Semi Pacca | 1 | temple | Religious Area | jogcnardo mordir | | | | 1995 |
| BR15_3 | BR15 | 6 | Pacca | 2 | Mosque | Religious Area | Dullober Bari Jame Mosque | | | | 2000 |
| BP27_95 | BP27 | 95 | Pacca | 1 | Temple | Religious Area | Maltra Mandir | Dharmasen Ba | 01815697679 | 2013 | |
| BC29_4 | BC29 | 4 | Pacca | 1 | Mosque | Religious Area | FOKANIA MASJID | HAFIZ MAWLA | 01819624739 | 1971 | |
| BC29_5 | BC29 | 0 | Pacca | 1 | ORPHANAGE | Religious Area | FOKANIA | SHAHDAT HOS | 01819624739 | 1971 | |
| BG31_31 | BG31 | 31 | Semi Pacca | 1 | temple | Religious Area | thakur ghor | shomcronicronj | | | |
| BR17_15 | BR17 | 15 | Pacca | 1 | Mosque | Religious Area | Mohammadie Jame Mosque | | | | 1993 |
| BA28_16 | BA28 | 16 | Pacca | 1 | Mosque | Religious Area | MOGHOL HAT JAME MOSQUE | MOGHOL BARI | | | 2014 |
| BK29_14 | BK29 | 14 | Pacca | 1 | Mosque | Religious Area | ali na mosque | | | | 2006 |
| BL31_51 | BL31 | 51 | Pacca | 1 | Mosque | Religious Area | bokhotfor jame mosque | | | | 2005 |
| BG25_61 | BG25 | 61 | Pacca | 1 | Mosque | Religious Area | baitul nur jam e mosque | | | | 2006 |
| BL31_17 | BL31 | 17 | Pacca | 1 | temple | Religious Area | sarbojonin | | | | 2002 |
| BQ21_7 | BQ21 | 7 | Katcha | 1 | Mosque | Religious Area | Khaza Gartber Newaz Jame M | | | | 2013 |
| BD24_33 | BD24 | 33 | Pacca | 1 | TEMPLE | Religious Area | | BIRENDFALALI | 01823059336 | 2003 | |
| BK31_58 | BK31 | 58 | Pacca | 1 | Mosque | Religious Area | FORKANUA JAME MASJID | | | | 1940 |
| BU38_51 | BU38 | 51 | Pacca | 1 | Mosque | Religious Area | south nischinta pur jame mos | | | | 1970 |
| BQ11_40 | BQ11 | 40 | Semi Pacca | 1 | MAZAR | Religious Area | HAZRAT ASHRAF UDDIN SHAI | HAZRAT ASHRAF | | | 2002 |
| BP26_61 | BP26 | 61 | Katcha | 1 | MAZAR | Religious Area | SAT ANI JA MAZAR | MURADNAGAF | 01868578896 | 1990 | |
| BQ11_1 | BQ11 | 1 | Pacca | 1 | Mosque | Religious Area | ROSAIPARA JAME MOSJID | AHMED HOSAI | | | 1970 |
| BN27_66 | BN27 | 66 | Semi Pacca | 1 | mazar | Religious Area | hezrat mustain muse oir auliv | | | | |

Figure-4.2: Tabular View of Log Book Data Entry in Microsoft Access Software

The data entry works have been checked and processed as usable format. These attribute data have been linked to spatial data of structures through GIS. Finally structures and all other physical data layers have been developed and finally transformed them in to Bangladesh Universal Transverse Mercator (BUTM2010) Coordinate System. The processed data have been symbolized using different attribute to visualize the physical features of the project area. Sample processed data has been shown in **Map-4.1** and **Map-4.2**. A 3D display of physical features has been shown in **Figure-4.3**.



Map-4.1: Structure Use in Ward No. 7 and 8 in Rangunia Paurashava



Map-4.2: Structure Type and Use in Ward No. 7 and 8 in Rangunia Paurashava

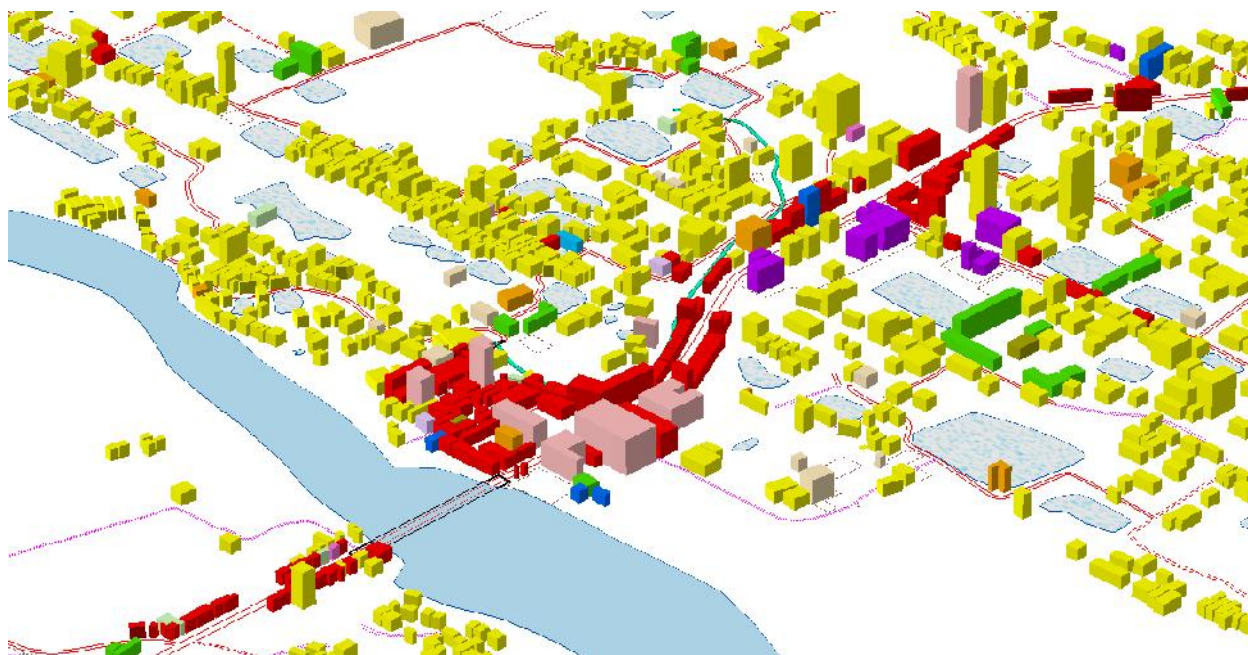


Figure4.3: 3D Display of Physical Features in Rangunia Paurashava area

4.2 Development of GIS Database

The Consultant has developed a GIS database for systematically organizing, storing and easy retrieving the information and data of the project area. ArcGIS File Geo-database has developed this purpose, since File Geo-database offers structural, performance and data management advantages over Personal Geo-database or shape files. The geo-database contains all the layers generated from the Mauza maps, satellite images and field survey.

Specifications of these layers has been developed to standardize GIS data structure such as layer name, layer type, attribute types and attribute values, and provided in **Annexure-II**.

The **Figure4.4** shows partial view of attribute table of Structure of Rangunia Upazila.

| OBJECTID | Shape | Str_ID | Struc_ID | Str_Type | Storeid | Str_Usert | Str_Usert | Str_name | Cons_Year | Struc_Owner | Owner_Cell | Hol |
|----------|-----------|--------|----------|------------|---------|-------------------------|--------------------------|------------------------------|-----------|------------------|-------------|--------|
| 755 | Polygon Z | 53 | SU27_53 | Semi Pacca | 1 | OFFICE | Educational and Research | FROTEST PRIMARY | 1984 | GOVT | <Null> | <Null> |
| 887 | Polygon Z | 56 | SU25_56 | Pecca | 2 | School | Educational and Research | RAWU PUBLIC KG & HIGH SCHOOL | 2005 | <Null> | <Null> | <Null> |
| 997 | Polygon Z | 35 | SU29_35 | Pecca | 2 | School | Educational and Research | EVAREST TEACHING INSTITUTE | 2004 | <Null> | <Null> | <Null> |
| 329 | Polygon Z | 122 | SU23_122 | Kachha | 1 | GARAGE | General Industry | KARNAFUL INDUSTRIES | 2003 | JANE ALAM | <Null> | <Null> |
| 406 | Polygon Z | 23 | SU23_23 | Semi Pacca | 1 | Commercial | General Industry | MAAYER DCYA RICE FLOOR MILL | <Null> | <Null> | <Null> | <Null> |
| 263 | Polygon Z | 12 | SU25_12 | Kachha | 1 | GARAGE | Mixed Use | <Null> | 2015 | S-CFIULLAH MONSU | 01812544253 | <Null> |
| 280 | Polygon Z | 25 | SU25_25 | Pecca | 2 | Commercial RESIDENTIAL | Mixed Use | ORCHID HOUSE | 2011 | DR HARUN | 0186178560 | <Null> |
| 289 | Polygon Z | 11 | SU27_11 | Kachha | 1 | WORKSHOP, GODOWN | Mixed Use | SARUS SALAM COMPLEX | <Null> | ABDUS SALAM | <Null> | <Null> |
| 290 | Polygon Z | 8 | SU27_8 | Semi Pacca | 1 | ABANDONED | Mixed Use | <Null> | <Null> | <Null> | <Null> | <Null> |
| 337 | Polygon Z | 102 | SU23_102 | Pecca | 5 | Commercial RESIDENTIAL | Mixed Use | <Null> | <Null> | UTPOL BARLA | <Null> | <Null> |
| 351 | Polygon Z | 140 | SU23_140 | Pecca | 2 | Residential, COMMERCIAL | Mixed Use | VICTOR PLAZA | 2001 | UTPOL BARLA | <Null> | <Null> |
| 373 | Polygon Z | 31 | SU23_31 | Kachha | 1 | ABANDONED | Mixed Use | <Null> | 2003 | <Null> | <Null> | <Null> |
| 461 | Polygon Z | 154 | SU23_154 | Semi Pacca | 1 | GARAGE | Mixed Use | <Null> | 1999 | RONCS | <Null> | <Null> |

Figure-4.4: Attribute Table of Structure Database of Rangunia Upazila

The **Figure-4.5** shows partial view of attribute table of Road Centerline of Rangunia Upazila

| Table | | | | | | | |
|-----------------|----------|--------|----------|----------------------------|---------|---------|-----------------------|
| Road_Centerline | | | | | | | |
| OBJECTID | Shape | Type | Width_ft | Road_Name | Road_No | Road_ID | Road_Class |
| 16 | Polyline | Pucca | 10 | | | | Upazila Road (Pucca) |
| 17 | Polyline | Pucca | 20 | Kaptai Road | | R163 | Upazila Road (Pucca) |
| 18 | Polyline | Pucca | 8.5 | | | | Upazila Road (Pucca) |
| 19 | Polyline | Pucca | 10.6 | | | | Upazila Road (Pucca) |
| 20 | Polyline | Pucca | 10 | | | | Upazila Road (Pucca) |
| 21 | Polyline | Pucca | 10 | | | | Upazila Road (Pucca) |
| 22 | Polyline | Katcha | 5 | | | | Upazila Road (Katcha) |
| 23 | Polyline | Pucca | 9.5 | | | | Upazila Road (Pucca) |
| 24 | Polyline | Pucca | 10.5 | MuradnagarPaschimPara Road | | | Upazila Road (Pucca) |
| 25 | Polyline | HBB | 20 | Dhaka kaptai road | | R163 | Upazila Road (HBB) |
| 26 | Polyline | Pucca | 12.5 | | | | Upazila Road (Pucca) |
| 27 | Polyline | Pucca | 15 | | | | Upazila Road (Pucca) |
| 28 | Polyline | Pucca | 12 | | | | Upazila Road (Pucca) |
| 29 | Polyline | Pucca | 7.5 | | | | Upazila Road (Pucca) |
| 30 | Polyline | Pucca | 20 | Kaptai Road | | R163 | Upazila Road (Pucca) |
| 31 | Polyline | Katcha | 10 | | | | Upazila Road (Katcha) |

Figure-4.5: Attribute Table of Road Centerline of Rangunia Upazila

The Figure-4.6 shows partial view of attribute table of Mauza Map of Rangunia Upazila.

| Table | | | | | | | | | | | | | | |
|------------|-------|------------|------------|----------|--------|--------------|-------|----------|----------------------|---------|-----------|------------------|------------|-----------|
| PN_062_002 | | | | | | | | | | | | | | |
| OBJECTID | Shape | Division | District | Upazila | Union | Mauza | JL_No | Sheet_No | Mauza_ID | Plot_No | Plot_Type | Scale | M7_Version | SV_Period |
| 1 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 70 | Plot | 16 inch = 1 mile | RS | '97C-'98D |
| 2 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 702 | Plot | 16 inch = 1 mile | RS | '97C-'98D |
| 3 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 703 | Road | 16 inch = 1 mile | RS | '97C-'98D |
| 4 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 704 | Plot | 16 inch = 1 mile | RS | '97C-'98D |
| 5 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 705 | Plot | 16 inch = 1 mile | RS | '97C-'98D |
| 6 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 706 | Plot | 16 inch = 1 mile | RS | '97C-'98D |
| 7 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 707 | Plot | 16 inch = 1 mile | RS | '97C-'98D |
| 8 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 708 | Plot | 16 inch = 1 mile | RS | '97C-'98D |
| 9 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 709 | Plot | 16 inch = 1 mile | RS | '97C-'98D |
| 10 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 710 | Plot | 16 inch = 1 mile | RS | '97C-'98D |
| 11 | Point | Chittagong | Chittagong | Rangunia | <Null> | Lot 2 Kodala | 062 | 002 | Lot 2 Kodala_062_002 | 711 | Road | 16 inch = 1 mile | RS | '97C-'98D |

Figure-4.6: Attribute Table of Mauza Map of Rangunia Upazila

The Figure-4.7 shows partial view of Scanned Mauza Map Files of Rangunia Upazila.

| Contents | Preview | Description |
|--------------------------------------|---------|--|
| Chi_Rangunia_Uttar Ghagra_13_01.jpg | | Chi_Rangunia_Dakshin Gagra_11_04.jpg |
| Chi_Rangunia lot 99 Hzar.jpg | | Chi_Rangunia_Dakshin Gagra_11_05.jpg |
| Chi_Rangunia_Andor Ghona_49_00.jpg | | Chi_Rangunia_Dakshin Ichamoti_32_00.jpg |
| Chi_Rangunia_Bainala_23_00.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_01.jpg |
| Chi_Rangunia_Baniakhola_46_00.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_02.jpg |
| Chi_Rangunia_Batagi_47_01.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_03.jpg |
| Chi_Rangunia_Batagi_47_02.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_04.jpg |
| Chi_Rangunia_Batagi_47_03.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_05.jpg |
| Chi_Rangunia_Batagi_47_04.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_06.jpg |
| Chi_Rangunia_Batagi_47_05.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_07.jpg |
| Chi_Rangunia_Batagi_47_06.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_08.jpg |
| Chi_Rangunia_Bhoron Chori_05_00.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_09.jpg |
| Chi_Rangunia_Boga Bili_02_01.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_10.jpg |
| Chi_Rangunia_Boga Bili_02_02.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_11.jpg |
| Chi_Rangunia_Boga Bili_02_03.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_12.jpg |
| Chi_Rangunia_Chang Khali_52_01.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_13.jpg |
| Chi_Rangunia_Chang Khali_52_02.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_14.jpg |
| Chi_Rangunia_Chondra Ghona_26_01.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_15.jpg |
| Chi_Rangunia_Chondra Ghona_26_02.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_16.jpg |
| Chi_Rangunia_Chondra Ghona_26_03.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_17.jpg |
| Chi_Rangunia_Dakshin Gagra_11_01.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_18.jpg |
| Chi_Rangunia_Dakshin Gagra_11_02.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_19.jpg |
| Chi_Rangunia_Dakshin Gagra_11_03.jpg | | Chi_Rangunia_Dakshin Nischintapur_22_20.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_21.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_22.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_23.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_24.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_25.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_26.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_27.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_28.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_29.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_30.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_31.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_32.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_33.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_34.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_35.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_36.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_37.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_38.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_39.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_40.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_41.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_42.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_43.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_44.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_45.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_46.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_47.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_48.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_49.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_50.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_51.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_52.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_53.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_54.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_55.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_56.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_57.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_58.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_59.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_60.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_61.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_62.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_63.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_64.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_65.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_66.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_67.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_68.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_69.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_70.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_71.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_72.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_73.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_74.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_75.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_76.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_77.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_78.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_79.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_80.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_81.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_82.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_83.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_84.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_85.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_86.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_87.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_88.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_89.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_90.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_91.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_92.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_93.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_94.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_95.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_96.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_97.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_98.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_99.jpg |
| | | Chi_Rangunia_Dakshin Nischintapur_22_100.jpg |

Figure-4.7: Catalog View of Scanned Mauza Map Files of Rangunia Upazila

The Figure-4.8 shows partial view of Geodatabase of Digitized Mauza Maps Files of Rangunia Upazila.

| Contents | Preview | Description |
|---|---|----------------------------------|
| Andor Ghona_049_000.gdb | Jangle Dakshin Nischintapur_021_002.gdb | Lot 2 Kodala_062_005.gdb |
| Eairala_023_000.gdb | Jangle Dakshin Nischintapur_021_003.gdb | Lot 2 Kodala_062_006.gdb |
| Eoga Bli_002_002.gdb | Jangle Dakshin Nischintapur_021_004.gdb | Lot 5 Jangle Kodala_061_001.gdb |
| Eoga Bli_002_003.gdb | Jangle Dakshin Nischintapur_021_005.gdb | Lot 5 Jangle Kodala_061_002.gdb |
| Eogabli_002_001.gdb | Jangle Ghat Chek_038_001.gdb | Lot 58 Nischintapur_016_001.gdb |
| Chang Khali_052_001.gdb | Jangle Parua_009_001.gdb | Lot 99 Hazzari_041_000.gdb |
| Dakshin Ghagra_011_001.gdb | Jangle Parua_009_003.gdb | Megna Chori_004_000.gdb |
| Dakshin Ghagra_011_005.gdb | Jangle Parua_009_005.gdb | Moddhe Ghagra_012_002.gdb |
| Darikop_066_000.gdb | Jangle Sorop Bhata_056_001.gdb | Moddhe Ghagra_012_003.gdb |
| Dudh Pukuria_072_000.gdb | Jangle Sorop Bhata_056_002.gdb | Napit Pukuria_071_001.gdb |
| Fula Heria_068_001.gdb | Jangle Sorop Bhata_056_003.gdb | Napit Pukuria_071_002.gdb |
| Fola Heria_068_002.gdb | Jangle Sorop Bhata_056_004.gdb | Narisha_063_001.gdb |
| Fola Heria_068_003.gdb | Jangle Sorop Bhata_056_005.gdb | Narisha_063_003.gdb |
| Gozalia_017_002.gdb | Jangle Sorop Bhata_056_006.gdb | Paschim Khurushia_069_001.gdb |
| Gozalia_017_003.gdb | Jangle Surut Singher Dhala_039_001.gdb | Paschim Khurushia_069_002.gdb |
| Gumai_025_001.gdb | Jangle Bogabli_001_001.gdb | Paschim Khurushia_069_003.gdb |
| Gumai_025_002.gdb | Lot 2 Kodala_062_002.gdb | Paschim Khurushia_069_004.gdb |
| Jangle Bogabli_001_003.gdb | Lot 2 Kodala_062_003.gdb | Paschim Khurushia_069_005.gdb |
| Jangle Dakshin Nischintapur_021_001.gdb | Lot 2 Kodala_062_004.gdb | Paschim Khurushia_069_006.gdb |
| | | Paschim Nischintapur_014_001.gdb |
| | | Paschim Nischintapur_014_002.gdb |
| | | Paschim Nischintapur_014_003.gdb |
| | | Paschim Nischintapur_014_004.gdb |
| | | Paschim Nischintapur_014_006.gdb |
| | | Podua_065_003.gdb |
| | | Podua_065_004.gdb |
| | | Pukia Lola_045_000.gdb |
| | | Purba Khurushia_070_003.gdb |
| | | Purba Khurushia_070_005.gdb |
| | | Purba Nischintapur_015_001.gdb |
| | | Purba Nischintapur_015_002.gdb |
| | | Purba Nischintapur_015_003.gdb |
| | | Purba Nischintapur_015_005.gdb |
| | | Shial Bukka_008_003.gdb |
| | | Shial Bukka_008_004.gdb |
| | | Shilok_057_006.gdb |
| | | Shiyal Bukka_008_001.gdb |
| | | Shuk Bilash_067_005.gdb |

Figure-4.8: Catalog View of Geodatabases of Digitized Mauza Maps of Rangunia Upazila

Chapter-05 Way Forward

The physical features of Rangunia Upazila have been acquired through field survey based on high resolution stereo satellite imagery and RTK-GPS. By using Digital Photogrammetry technology, physical features are been digitized having 3D coordinates, i.e. every vertex or point has x,y and z-coordinate. So these data is valuable in terms of its potentiality for planning tasks. After performing preliminary processing and analysis, the output is used in producing various thematic maps on physical features, land use and topography. More data can be derived by further processing and advanced GIS analysis like Spatial Analysis, 3D Analysis, Network Analysis, etc which may be valuable input for preparation of development plans for the Upazila.

ANNEXURE-I

RS Mouza List: Rangunia Upazila

| Zila | Upazila | Mouza Name | JL No. | Sheet No. |
|-------------|----------------|-------------------|---------------|------------------|
| Chittagong | Rangunia | Baniakhola | 046 | 00 |
| | | Dingol-longa | 050 | 01 |
| | | | | 02 |
| | | Ghatchek | 037 | 01 |
| | | | | 02 |
| | | Bainala | 023 | 00 |
| | | Kodala | 060 | 01 |
| | | | | 02 |
| | | Narishcha | 063 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | Dudhpukuria | 072 | 00 |
| | | Tripurasundori | 064 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | Gunguniabetagi | 054 | 00 |
| | | DebipurKodomtoli | 030 | 01 |
| | | | | 02 |
| | | Darikop | 066 | 00 |
| | | Toilavang | 058 | 01 |
| | | | | 02 |
| | | PoshchimKurusia | 069 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | | | 06 |
| | | Folaharia | 068 | 01 |
| | | | | 02 |
| | | Dhopaghata | 059 | 00 |
| | | JongolSoropvata | 056 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | | | 06 |
| | | Kodomtoli | 028 | 00 |
| | | Kaukhali | 053 | 00 |
| | | Lot 2 Kodala | 062 | 01 |

| Zila | Upazila | Mouza Name | JL No. | Sheet No. |
|------------|----------|--------------------|--------|-----------|
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | | | 06 |
| | | Parua | 010 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | DokkhinParua | 031 | 00 |
| | | Lot 5 JongolKodala | 061 | 01 |
| | | | | 02 |
| | | | | |
| Zila | Upazila | Mouza Name | JL No. | Sheet No. |
| Chittagong | Rangunia | Bogabil | 002 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | Padua | 065 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | Shilok | 057 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | Soropvata | 055 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | Betagi | 047 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | | | 06 |
| | | Pomra | 043 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | | | 06 |
| | | Katakhali | 029 | 07 |
| | | | | 00 |

| Zila | Upazila | Mouza Name | JL No. | Sheet No. |
|------------|----------|----------------------------|--------|-----------|
| | | Modhyaghara | 012 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | Rangunia | 034 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | Kokania | 036 | 00 |
| | | Hochnabad | 019 | 01 |
| | | | | 02 |
| | | Pukianala | 045 | 00 |
| | | DokkhinIchamoti | 032 | 00 |
| | | DokkhinNishchintopur | 2 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | |
| Zila | Upazila | Mouza Name | JL No. | Sheet No. |
| Chittagong | Rangunia | JongolParua | 009 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | UttorGhagra | 013 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | PurboKhurusia | 070 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | Sukbilas | 067 | 01 |
| | | | | 01 |
| | | | | 01 |
| | | | | 01 |
| | | Soiyodbari | 033 | 01 |
| | | | | 02 |
| | | JongolDokkhinNishchintopur | 021 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | Gojalia | 017 | 01 |
| | | | | 02 |

| Zila | Upazila | Mouza Name | JL No. | Sheet No. |
|------------|----------|----------------------|--------|-----------|
| | | PurboNishchintopur | 015 | 03 |
| | | | | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | | | 06 |
| | | | | 07 |
| | | Gumaijhil | 024 | 01 |
| | | | | 02 |
| | | NapitPukuria | 071 | 01 |
| | | | | 02 |
| | | Tin Chodia | 051 | 00 |
| | | Chondroghona | 026 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | Lalanogor | 018 | 01 |
| | | | | 02 |
| | | Andorghona | 049 | 00 |
| | | Dhemirchora | 048 | 00 |
| | | Gumai | 025 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | |
| Zila | Upazila | Mouza Name | JL No. | Sheet No. |
| Chittagong | Rangunia | PoschimNishchintopur | 014 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | | | 06 |
| | | | | 07 |
| | | | | 08 |
| | | Jongolghat Check | 038 | 01 |
| | | | | 02 |
| | | DokkhinGhagra | 011 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | | | 05 |
| | | Ichamoti | 035 | 01 |
| | | | | 02 |
| | | JongolPomra | 044 | 01 |
| | | | | 02 |

| Zila | Upazila | Mouza Name | JL No. | Sheet No. |
|------|---------|---------------------|--------|-----------|
| | | Loragaon | 042 | 01 |
| | | | | 02 |
| | | Lot 58 Nischintopur | 016 | 00 |
| | | Khargola | 020 | 00 |
| | | Sonaichori | 027 | 00 |
| | | ShurotsingherDhala | 040 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | Shiyalbukka | 008 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | | | 04 |
| | | Thandachori | 007 | 01 |
| | | | | 02 |
| | | Meghachori | 004 | 00 |
| | | Voronchori | 005 | 00 |
| | | JongolBogachili | 001 | 01 |
| | | | | 02 |
| | | | | 03 |
| | | Lot 56 Bogachili | 003 | 00 |
| | | Chengkhali | 052 | 01 |
| | | | | 02 |

ANNEXURE-II

TECHNICAL SPECIFICATIONS OF GIS DATA

This document contains the technical specifications for the development of GIS database. It has two sections: Section-A and Section-B. Specifications for mauza map scanning and digitization have been provided in Section-A and specifications of GIS layers for preparing Survey and Plan Maps have been provided in Section-B.

Section-A: Specifications for Mauza Map Scanning & Digitization

This section contains the scanning specifications and digitization of mauza maps.

A.1.0 Specifications for Mauza Map Scanning

The scanning specification of mauza maps specifies Image Type, Image Format and Image Resolution and Image scale as follows:

| | |
|------------------|--------------------|
| Image Type | Color or Grayscale |
| Image Format | JPEG |
| Image Resolution | 300 dpi |

A.1.1 Directory Structure for Storing Scanned Mauza Maps

Directory Structure for systematically storing scanned image files of the Mauza maps may be as follows:

| | |
|---------------------|--|
| Directory Structure | <p>D:\GIS_Data\Project name & Package \ Division name\District name\Upazila name(Data Type)\Union name or Ward No</p> <p>Where,</p> <ul style="list-style-type: none">- D:\GIS_Data is the root folder of the UDD's GIS database.- \Project name is the abbreviated name of the Project such as Pkg-5_14Upazila may be the abbreviated name of the project "Preparation of the Development Plan for Fourteen Upazila – Package-05".- \Division name is the name of the Division in which the project area located.- \District name is the name of the District in which the project area located.- \Upazila name is the name of the Upazila in which the project area located.- \Data_Type is the type of GIS data such as Scanned Mauza Maps, Georeferenced Raster Mauza Maps, Survey Data, Proposed Plan Data, etc.- \Union_name is the different name of the Unions of the respective Upazila or Ward number of the Paurashava. <p>Example D:\GIS_Data_UDD\Pkg-5_14Upazila\Chittagong.div\Chittagong.dis\Rangunia.upz\Scanned_Mauza\Rangunia.uni\Ward04 is the directory to store the scanned Mauza maps of Ward No-4 of RanguniaUpazila.</p> |
|---------------------|--|

A.1.2 File Naming Convention for Scanned Mauza Maps

A systematic naming convention must be followed to name the files of the scanned images of the mauza maps.

File Name: **Mauza Name+_+JL no+_+Sheet No.jpg**

Where,

- **Mauza Name** is the name of the Mauza. No space or special character is allowed, underscore must be used in case of more than one word in the name.
- **JL no** is the Jurisdiction Line/List number (JL no) of the Mauza. It must be as 3 digit number
- **Sheet No** is the particular sheet number of the Mauza. It must be as 3 digit number

Example:

| | | | |
|------------|-------|----------|-----------------------------|
| Mauza Name | JL No | Sheet No | File Name |
| Garzania | 3 | 5 | Garzania_003_005.jpg |

A.2.0 Specifications for Mauza Maps Digitization

The specifications for digitization of mauza maps specifies the settings for map and display unit, scale or zoom level and vertex spacing during the process of on-screen digitization.

| | |
|---|--|
| Map Unit | Inch |
| Display Unit | Inch |
| Scale (zoom level) | 1: 15 to 30 |
| No of vertices on linear or polygon feature | <ul style="list-style-type: none">- Only 2 vertices along a straight line (or a straight segment of the feature)- Extra vertices are not allowed between Start and End point.- Sufficiently dense vertices must be used for curved/complex linear feature.- Vertex must be inserted at the junction of plot boundaries. |
| Coordinate System | Unknown (produced by scanning process) |

A.2.1 Vector Layers for Mauza Map Digitization

Digitization of Mauza map must be done in five vector layers as the format of Shapefile, Coverage or GeodatabaseFeatureclass. The Geodatabase is preferable.

| Features of the Mauza Map | Type of Layer | Name of Layer (as Shapefile/Covergae/Featureclass) |
|---|---------------|---|
| All line features, such as plot boundary, road, waterbody, building, etc. | Polyline | ML_XXX_XXX Where, <ul style="list-style-type: none">- ML represents Mauza map's Line features.- XXX represents the JL number of the Mauza map (3 digit).- XXX represents the Sheet number of the Mauza map (3 digit). |
| Dag number (Plot no) | Point | PN_XXX_XXX Where, <ul style="list-style-type: none">- PN represents Plot Number of the Mauza map.- XXX represents the JL number of the Mauza map |

| Features of the Mauza Map | Type of Layer | Name of Layer (as Shapefile/Covergae/Featureclass) |
|---------------------------------|---------------|--|
| | | (3 digit). -XXX represents the Sheet number of the Mauza map (3 digit). |
| Plot area | Polygon | MP_XXX_XXX Where, -MP represents Mauza map as Polygon (area) features. -XXX represents the JL number of the Mauza map (3 digit). -XXX represents the Sheet number of the Mauza map (3 digit). |
| Point features (except plot no) | Point | PF_XXX_XXX Where, -PF represents Point Features of the Mauza map except plot numbers. -XXX represents the JL number of the Mauza map (3 digit). -XXX represents the Sheet number of the Mauza map (3 digit). |
| Other area features | Polygon | AF_XXX_XXX Where, -AF represents other Area Features of the Mauza map -XXX represents the JL number of the Mauza map (3 digit). -XXX represents the Sheet number of the Mauza map (3 digit). |

A.2.2 Attribute Structure of the Mauza Map Layers

Attribute structure of the above four layers must be as follows:

1) Layer name: **PN_XXX_XXX**

Feature Type: **Point**

This Layer will contain dag number (plot number) of the Mauza maps as point features. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|------------|--------------------|--|
| Division | String | 25 | To contain name of the current Division. |
| District | String | 25 | To contain name of the current District. |
| Upazila | String | 25 | To contain name of the current Upazila. |
| Union | String | 25 | To contain name of the current Union. |
| Mauza | String | 100 | To contain name of the Mauza name |
| JL_No | String | 6 | To contain JL Number of the Mauza |
| Sheet_No | String | 6 | To contain sheet no the Mauza |
| Mauza_JL_S | String | 100 | To contain Mauzaname+single space+JLno(3-digits)+single space+sheet no(3-digits) |
| Plot_No | Long | 10 | To contain <i>dag</i> number (plot number) |

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|------------|--------------------|---|
| | Integer | | |
| Plot_Type | String | 20 | To contain following plot types <ul style="list-style-type: none"> - "Plot" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Pond" - "Canal" - "River" |
| Scale | String | 20 | To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc. |
| MZ_Version | String | 20 | To contain survey version of the Mauza map; e.g. CS, RS, BS, etc. |
| Revenue_No | String | 100 | To contain revenue number of the Mauza map. |
| SV_Period | String | 20 | To contain survey period of the Mauza map; e.g 1973-85 |
| M_Geocode | String | 9 | To contain 9-digit BBS Geocode of Mauza as District code+Thanacode+Union/Ward code+Mauza code. |
| UW_Geocode | String | 6 | To contain 6-digit BBS Geocode of Union or Ward as District code+Thanacode+Union/Ward code |
| Remarks | String | 100 | To contain remarks, if any. |

2) Layername: **ML_XXX_XXX**

Feature Type: **Polyline**

This shape file/Coverage will contain all line features of the mauza map. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|---------------|--------------------|---|
| Division | String | 25 | To contain name of the current Division. |
| District | String | 25 | To contain name of the current District. |
| Upazila | String | 25 | To contain name of the current Upazila. |
| Union | String | 25 | To contain name of the current Union. |
| Mauza | String | 100 | To contain name of the Mauza name |
| JL_No | String | 6 | To contain JL Number of the Mauza |
| Sheet_No | String | 6 | To contain sheet no the Mauza |
| Mauza_JL_S | String | 100 | To contain Mauzaname+single space+JLno(3-digits)+single space+sheet no(3-digits) |
| Scale | String | 20 | To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc. |
| MZ_Version | String | 20 | To contain survey version of the Mauza map; e.g. CS, RS, BS, etc. |
| Revenue_No | String | 100 | To contain revenue number of the Mauza map |
| SV_Period | String | 20 | To contain survey period of the Mauza map; e.g 1973-85 |
| Line_Code | Short Integer | 10 | To contain feature code or unique ID of different line feature. For example 11, 12 and 14 are the codes for Mauza boundary, Sheet boundary and Plot |

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------------|------------|--------------------|---|
| | | | boundary respectively. |
| Line_Desc | String | 30 | To contain the type of plot boundaries and other line features such as <ul style="list-style-type: none"> - "Mauza boundary" - "Sheet boundary" - "Plot boundary" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Khal" - "Thoka/ Position mark of adjacent sheet" - "North line" - "Other line" |
| Remarks | String | 100 | To contain remarks, if any. |

3) Layername: **MP_XXX_XXX**

Feature Type: **Polygon**

This Layer will contain all the plots of the Mauza maps as area or polygon features. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|--------------|--------------------|---|
| Division | String | 25 | To contain name of the current Division. |
| District | String | 25 | To contain name of the current District. |
| Upazila | String | 25 | To contain name of the current Upazila. |
| Union | String | 25 | To contain name of the current Union. |
| Mauza | String | 100 | To contain name of the Mauza name |
| JL_No | String | 6 | To contain JL Number of the Mauza |
| Sheet_No | String | 6 | To contain sheet no the Mauza |
| Mauza_JL_S | String | 100 | To contain Mauzaname+single space+JLno(3-digits)+single space+sheet no(3-digits) |
| Plot_No | Long Integer | 10 | To contain <i>dag</i> number (plot number) |
| Plot_Type | String | 20 | To contain following plot types <ul style="list-style-type: none"> - "Plot" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Pond" - "Canal" - "River" |
| Scale | String | 20 | To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc. |
| MZ_Version | String | 20 | To contain survey version of the Mauza map; e.g. CS, RS, BS, etc. |
| Revenue_No | String | 100 | To contain revenue number of the Mauza map. |
| SV_Period | String | 20 | To contain survey period of the Mauza map; e.g 1973-85 |
| M_Geocode | String | 9 | To contain 9-digit BBS Geocode of Mauza as |

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|------------|--------------------|--|
| | | | District code+Thanacode+Union/Ward code+Mauza code. |
| UW_Geocode | String | 6 | To contain 6-digit BBS Geocode of Union or Ward as District code+Thanacode+Union/Ward code |
| Remarks | String | 100 | To contain remarks, if any. |

4) Layer name: PF_XXX_XXX

Feature Type: **Point**

This shape file/Coverage will contain all point features except the plot numbers of the mauza map. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|------------|--------------------|--|
| Division | String | 25 | To contain name of the current Division. |
| District | String | 25 | To contain name of the current District. |
| Upazila | String | 25 | To contain name of the current Upazila. |
| Union | String | 25 | To contain name of the current Union. |
| Mauza | String | 100 | To contain name of the Mauza name |
| JL_No | String | 6 | To contain JL Number of the Mauza |
| Sheet_No | String | 6 | To contain sheet no the Mauza |
| Mauza_JL_S | String | 100 | To contain Mauzaname+single space+JLno(3-digits)+single space+sheet no(3-digits) |
| Scale | String | 20 | To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc. |
| MZ_Version | String | 20 | To contain survey version of the Mauza map; e.g. CS, RS, BS, etc. |
| Revenue_No | String | 100 | To contain revenue number of the Mauza map. |
| SV_Period | String | 20 | To contain survey period of the Mauza map; e.g 1973-85 |
| Point_Code | String | 6 | To contain the user ID of different point features. For example: 45 is the ID of Traverse Station (New) |
| Point_Desc | String | 50 | To contain Point description of point features such as - "Traverse Station [Old]" - "Traverse Station [New]" - GT Station, etc. And also to contain texts of label features of adjacent mauza map such as "Sheet No. 2", "Shaktola No. 101", etc. |
| Remarks | String | 100 | To contain remarks, if any. |

5) Layername: AF_XXX_XXX

Feature Type: **Polygon**

This shape file will contain all other area features such as Dalan (Building), Waterbody (Pond), etc. of the mauza map. It must contain the fields as described in the following table:

| Field Name | Field Type | Field Width | Purpose of the field |
|------------|------------|-------------|----------------------|
|------------|------------|-------------|----------------------|

| | | | |
|-------------------|--------------|-----|--|
| Division | String | 25 | To contain name of the current Division. |
| District | String | 25 | To contain name of the current District. |
| Upazila | String | 25 | To contain name of the current Upazila. |
| Union | String | 25 | To contain name of the current Union. |
| Mauza | String | 100 | To contain name of the Mauza name |
| JL_No | String | 6 | To contain JL Number of the Mauza |
| Sheet_No | String | 6 | To contain sheet no the Mauza |
| Mauza_JL_S | String | 100 | To contain Mauzaname+single space+JLno(3-digits)+single space+sheet no(3-digits) |
| Scale | String | 20 | To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc. |
| MZ_Version | String | 20 | To contain survey version of the Mauza map; e.g. CS, RS, BS, etc. |
| Revenue_No | String | 100 | To contain revenue number of the Mauza map. |
| SV_Period | String | 20 | To contain survey period of the Mauza map; e.g 1973-85 |
| AF_Code | Long Integer | 6 | To contain the user ID of different polygon features. For example: 31 is the ID of Permanent Structure (Dalan), 32 is for Tinshed Structure, etc. |
| AF_Desc | String | 50 | To contain type of features such as - "Permanent Structure [Dalan]" - "Tinshed Structure" - "Other Structure" - "Pond/Waterbody" - "Pan Baraz" - "Graveyard" |
| Remarks | String | 100 | To contain remarks, if any. |

A.2.3 Feature Codes for Mauza Map Digitization

The following feature codes (Unique ID) must be assigned in appropriate fields for digitization of different features of the mauza maps.

| Feature Type/Item | Layer Name | Feature Code (ID) |
|---------------------------|------------|-------------------|
| International Boundary | ML_XXX_XXX | 10 |
| Division Boundary | | 11 |
| District Boundary | | 12 |
| Upazila Boundary | | 13 |
| Union Boundary | | 14 |
| Mauza Boundary | | 15 |
| Sheet Boundary | | 16 |
| Plot Boundary | | 17 |
| Thoka/Adjacent\Match Line | | 18 |
| Embankment | | 19 |
| Hill | | 20 |
| Road | | 21 |
| Halot | | 22 |
| Khal (Canal) | | 23 |
| River | | 24 |
| Rail Line | | 25 |
| Slope | | 26 |
| North Line | | 27 |

| Feature Type/Item | Layer Name | Feature Code (ID) |
|-------------------------------------|------------|-------------------|
| Pucca Road | | 28 |
| Semi-Pucca Road | | 29 |
| Katcha Road | | 30 |
| Unknown Line | | 99 |
| Permanent Structure [Dalan] | AF_XXX_XXX | 31 |
| Tin Shed Structure | | 32 |
| Other Structure | | 33 |
| Pan Baraz | | 34 |
| Pond/Water Body | | 35 |
| Graveyard | | 36 |
| Missing or not readable plot number | PN_XXX_XXX | 99999 |
| Boundary Pillar | PF_XXX_XXX | 41 |
| Bench Mark | | 42 |
| Iron Pillar | | 43 |
| Traverse Station(Old) | | 44 |
| Traverse Station (New) | | 45 |
| GT Station | | 46 |
| Other Pillars | | 47 |
| Pucca Well | | 51 |
| Tube Well | | 52 |
| Mosque | | 53 |
| Temple | | 54 |
| Adjacent Mauza/Sheet | | 61 |
| Otier Info | | 62 |
| Demarcation Pillar | | 71 |
| Settlement Pillar | | 72 |
| Stone | | 73 |
| Station | | 74 |
| Pucca Pillar | | 75 |
| Municipality Pillar | | 76 |
| CS Iron Pillar | | 77 |
| Other Point Feature | | 88 |
| Plot Boundary | ML_XXX_XXX | 14 |
| Katcha Road | | 30 |
| Semi-Pucca Road | | 29 |
| Pucca Road | | 28 |
| Halot | | 22 |
| Pond | | 14 |
| Canal | | 23 |
| River | | 24 |

Section-B: Specifications for the Layers of Survey and Plan Maps

This section contains the specifications of all physical features, topographical features and proposed plan features. It specifies the name of the spatial layers and the structure of their attribute tables.

B.1.0 File Naming Convention for GIS Layers

A systematic naming convention must be followed to name the layers of the physical, topographical plan features. The name is defined by abbreviated name of the layer with the geocode of the Division+District+upazila (UDD Upazila Master Plan 14 Upazila's) in the following tables:

| Sl. No. | Division Name | Division Code | District Name | District Code | Upazila Name | Upazila Code |
|---------|---------------|---------------|---------------|---------------|----------------|--------------|
| 1 | Dhaka | 30 | Dhaka | 26 | Nawabganj | 62 |
| 2 | Dhaka | | Dhaka | 26 | Dohar | 18 |
| 3 | Chittagong | 20 | Chittagong | 15 | Rangunia | 70 |
| 4 | Chittagong | 20 | Cox bazar | 22 | Ramu | 66 |
| 5 | Rajshahi | 50 | Rajshahi | 81 | Bagmara | 12 |
| 6 | Dhaka | 30 | Faridpur | 29 | FaridpurSad ar | 47 |
| | Dhaka | | Mymensingh | 61 | Ishwarganj | 31 |
| | Dhaka | | Madaripur | 54 | Shibchar | 87 |
| | Dhaka | | Narsingdi | 68 | Shibpur | 76 |
| 9 | Dhaka | 50 | Narsingdi | 68 | Raipura | 64 |
| 10 | Dhaka | | Bogra | 10 | Sariakandi | 81 |
| 11 | Rajshahi | 50 | Bogra | 10 | Sonatala | 95 |
| 12 | Rajshahi | | Gaibanda | 32 | Saghata | 88 |
| 13 | Rangpur | 55 | Meherpur | 57 | Gangni | 47 |
| 14 | Khulna | 40 | | | | |

File Name: **Layer Name+Division+District+Upazila Geocode will be added with Layer Name such as ADBL306864.**

Where,

- **Layer Name** is the abbreviated name of the layer. No space or special character is allowed.
- **Division Geocode** is the 2-digit BBS Geocode of the Division; eg. Geocode of Dhaka is 30.
- **District Geocode** is the 2-digit BBS Geocode of the Dhaka; eg. Geocode of Narsingdi is 68.
- **Upazila Geocode** is the 2-digit BBS Geocode of the upazila; eg. Geocode of RaipuraUpazila is 64.

Example:

| Layer Description | Layer name |
|---|------------|
| Administrative Boundary as line features | ADBL306864 |
| Plots of Merged Mauza maps as polygon features | MMP306864 |
| Plots of Merged Mauza maps as polyline features | MML306864 |
| Plot Numbers of Merged Mauza maps as polyline features | MMN306864 |
| Structures within the project area | STR306864 |
| Existing Roads of the project area as polygon features | RDP306864 |
| Existing Roads of the project area as polyline features | RDL306864 |

| | |
|--|------------|
| Centerlines of Existing Roads as polyline features | RDCL306864 |
| Footpaths in the project area as polygon features | RDFP306864 |
| Road Islands in the project area as polygon features | RDIL306864 |
| Waterbodies in the project area as polygon features | WBD306864 |
| Embankments in the project area as polygon features | EMB306864 |
| DTM points (Spot Heights) on the project area as point features | DTM306864 |
| BM pillars established in the project area as point features | BM306864 |
| Contour lines of the project area as polyline features | CON306864 |
| Existing Land use of the project area as polygon features | ELU306864 |
| Rural Homestead areas of the project area as polygon features | HOM306864 |
| Bridge, Culvert, etc. of the project area as polygon features | BRG306864 |
| Bridge, Culvert, etc. of the project area as polyline features | BRGL306864 |
| Bridge, Culvert, etc. of the project area as point features | BRGP306864 |
| Existing Drains of the project area as polyline features | DRN306864 |
| Boundary of the project area as polyline features | BW306864 |
| Water Supply pipe lines of the project area as polyline features | WSL306864 |
| Overhead Tanks in the project area as point features | OHT306864 |
| High voltage Electric Supply Lines in the project area as polyline features | ESL306864 |
| Utilities in the project area as point features | UTL306864 |
| Sewerage network lines in the project area as polyline features | SEW306864 |
| Other Polygon features of the project area as polygon features | OP306864 |
| All other Point features of the project area as point features | AP306864 |
| Important names of locations or structures of the project area as point features | NAM306864 |
| Important Road Names in the project area as Annotation/Polyline features | RN306864 |
| Centerlines of Proposed Roads in the project area as polyline features | PRL306864 |
| Union/Ward derived by dissolving merged mauza for Population mapping | POP306864 |
| Proposed policy (Structure Plan) of the project area as polygon features | STP306864 |

B.1.1 Attribute Structure of the Layers

Attribute structure of the above layers must be as follows:

1) Layer name: **ADBL306864**

Feature Type: **Polyline**

This Layer will contain administrative boundaries of project area. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------------|--------------|--------------------|------------------------|
| Line_Code | Long Integer | 10 | To Contain Polyline ID |

| | | | |
|-------------|--------|-----|--|
| Type | String | 100 | To contain the following administrative boundaries "International Boundary" "Division Boundary" "District Boundary" "Upazila Boundary" "Paurashava Boundary" "Union Boundary" "Ward Boundary" "Mauza Boundary" "Sheet Boundary" "Plot Boundary" "Katcha Road" "Semi-Pucca Road" "Pucca Road" "Halot" "Pond" "Canal" "River" |
|-------------|--------|-----|--|

2) Layer name: MMP306864
Feature Type: Polygon

This Layer will contain plots of edge-matched and merged Mauza maps of project area as polygon features. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|--------------|--------------------|--|
| Division | String | 25 | To contain name of the current Division. |
| District | String | 25 | To contain name of the current District. |
| Upazila | String | 25 | To contain name of the current Upazila. |
| Paurashava | String | 25 | To contain name of the Paurashava. |
| Union_Ward | String | 25 | To contain name of the current Union or Ward No. |
| Mauza | String | 100 | To contain name of the Mauza name |
| JL_No | String | 6 | To contain JL Number of the Mauza |
| Sheet_No | String | 6 | To contain sheet no the Mauza |
| Mauza_JL_S | String | 100 | To contain Mauzaname+single space+JLno(3-digits)+single space+sheet no(3-digits) |
| Plot_No | Long Integer | 10 | To contain <i>dag</i> number (plot number) |
| Plot_Type | String | 20 | To contain following plot types - "Plot" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Pond" - "Canal" - "River" |
| Scale | String | 20 | To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc. |
| MZ_Version | String | 20 | To contain survey version of the Mauza map; e.g. |

| Field Name | Field Type | Width of the field | Purpose of the field |
|--------------------|------------|--------------------|--|
| | | | CS, RS, BS, etc. |
| Revenue_No | String | 100 | To contain revenue number of the Mauza map. |
| SV_Period | String | 20 | To contain survey period of the Mauza map; e.g 1973-85 |
| M_Geocode | String | 9 | To contain 9-digit BBS Geocode of Mauza as District code+Thanacode+Union/Ward code+Mauza code. |
| UW_Geocode | String | 6 | To contain 6-digit BBS Geocode of Union or Ward as District code+Thanacode+Union/Ward code |
| Land_use | string | 50 | To contain existing land use as <ul style="list-style-type: none"> - "Administrative" - "Agriculture" - "Commercial" - "Circulation Network" - "Institutional" - "Flood Flow Zone" - "Industrial" - "Mixed Use" - "Recreational" - "Restricted / Special Use" - "Socio-Cultural" - "Transport & Communication" - "Urban Residential" - "Urban Services" - "Vacant Land" - "Water Body" |
| Single_Crop | string | 50 | To contain the single crop land |
| Double_Crop | string | 50 | To contain the double crop land |
| Triple_Crop | string | 50 | To contain triple crop land |
| Remarks | String | 100 | To contain remarks, if any. |

3) Layer name: **MML306864**

Feature Type: **Polyline**

This Layer will contain line features of edge-matched and merged Mauza maps of project area as polyline features. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|----------------|--------------|--------------------|--|
| ID | Long Integer | 16 | To Contain Mauza polyline ID. |
| Type | String | 20 | "Plot Boundary" "Sheet Boundary" "Mauza Boundary" "Katcha Road" "Semi-Pucca Road" "Pucca Road" "Halot" "Pond" "Canal" "River" |
| Remarks | String | 100 | To contain remarks, if any. |

4) Layer name: **MMN306864**

Feature Type: **Point**

This layer will contain Plot numbers of edge-matched and merged Mauza maps of project area as point features. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|--------------|--------------------|---|
| Division | String | 25 | To contain name of the current Division. |
| District | String | 25 | To contain name of the current District. |
| Upazila | String | 25 | To contain name of the current Upazila. |
| Paurashava | String | 25 | To contain name of the Paurashava. |
| Union_Ward | String | 25 | To contain name of the current Union or Ward No. |
| Mauza | String | 100 | To contain name of the Mauza name |
| JL_No | String | 6 | To contain JL Number of the Mauza |
| Sheet_No | String | 6 | To contain sheet no the Mauza |
| Mauza_JL_S | String | 100 | To contain Mauzaname+single space+JLno(3-digits)+single space+sheet no(3-digits) |
| Plot_No | Long Integer | 10 | To contain <i>dag</i> number (plot number) |
| Plot_Type | String | 20 | To contain following plot types <ul style="list-style-type: none"> - "Plot" - "Katcha Road" - "Semi-Pucca Road" - "Pucca Road" - "Halot" - "Pond" - "Canal" - "River" |
| Scale | String | 20 | To contain scale of the Mauza sheet; e.g. "16 inch = 1 mile" or "32 inch = 1 mile", etc. |
| MZ_Version | String | 20 | To contain survey version of the Mauza map; e.g. CS, RS, BS, etc. |
| Revenue_No | String | 100 | To contain revenue number of the Mauza map. |
| SV_Period | String | 20 | To contain survey period of the Mauza map; e.g 1973-85 |
| M_Geocode | String | 9 | To contain 9-digit BBS Geocode of Mauza as District code+Thanacode+Union/Ward code+Mauza code. |
| UW_Geocode | String | 6 | To contain 6-digit BBS Geocode of Union or Ward as District code+Thanacode+Union/Ward code |
| Remarks | String | 100 | To contain remarks, if any. |

5) Layer name: STR306864

Feature Type: **Polygon**

This Layer will contain the information of each structure within the project area. It must contain thirteen fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|----------------------|
|------------|------------|--------------------|----------------------|

| | | | |
|--------------------|---------------|-----|---|
| Division | String | 25 | To contain name of the current Division. |
| District | String | 25 | To contain name of the current District. |
| Upazila | String | 25 | To contain name of the current Upazila |
| Pourashava | | | To contain name of Paurashava. |
| Union_Ward | String | 25 | To contain name of the current Union\Ward. |
| ID | Long Integer | 16 | To Contain Structure ID. |
| Plot_No | Long Integer | 10 | To Contain the plot No. |
| Area_Sqft | Double | 0 | To Contain Structure area in square feet. |
| Str_Type | String | 20 | To contain the type of the structure as follows - "Pucca" - "Semi-pucca" - "Katcha" |
| Storied | Short Integer | - | To contain the number of floors of the structure. |
| Str_Use1t | String | 100 | 1. To contain the use (1 st) of the structure. 2. The attributes should be according to the given "Existing_Landuse" categories. |
| Str_Use2t | String | 100 | To contain the use (2 nd) of the structure. |
| Str_Use3t | String | 100 | To contain the use (3 rd) of the structure. |
| Str_name | String | 100 | To contain the name of the structure. |
| Cons_Year | Short Integer | - | To contain the year of construction. |
| Undercons | String | 3 | To contain the information if it was being under construction during the feature survey. - Yes/No ; True/False ; 1/0 |
| Struc_Owner | String | 100 | To contain the owner name of the structure. |
| Owner_Cell | String | 100 | To contain the owner Cell No. of the structure. |
| Struc_Use | String | 100 | To contain the structure use of the Government or private and so on. |
| Hyperlink | String | 100 | To contain the picture of the structure. |
| Holding_no | String | 50 | To contain Holding number of the structure. |
| Road_ID | String | 50 | To contain adjacent road number, It must be follow of the Road Categories. |
| Road_name | String | 100 | To contain the name of the nearby road |
| Locality | String | 50 | To contain the name of the location. |

6) Layer name: RDP306864
Feature Type: Polygon

This Layer will contain the existing roads of the project area as polygon features. It must contain three fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------------|------------|--------------------|---|
| Road_name | string | 100 | To contain the name of the road, if any |

| | | | |
|-------------------|--------|-----|--|
| Road_ID | string | 20 | To contain the ID of Road |
| Road_type | string | 20 | To contain the physical type of the road as follows - "Pucca" - "HBB" - "Katcha" |
| Road_Class | string | 100 | To contain the Class of road according to RHD & LGED in the followings: RHD Road Class - "National Highways " - "Regional Highways" - "District\Zila Road" LGED Road Class - "Upazila Road(Pucca" - "Upazila Road(Katcha)" - "Union Road(Pucca)" - "Union Road(Katcha)" - "Village Road A (Pucca)" - "Village Road A (Katcha)" - "Village Road B (Pucca)" - "Village Road B (Katcha)" |

7) Layer name: RDL306864
Feature Type: **Polyline**

This Layer will contain the existing roads of the project area as polyline features. It must contain three fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field | | | |
|-------------------|-----------------------|--------------------|--|--------------|-------------|-------------------|
| Road_name | string | 100 | To contain the name of the road, if any | | | |
| Road_ID | string | 20 | To contain the ID of Road | | | |
| Road_Type | string | 20 | To contain the physical type of the road as follows - "Pucca" - "WBM" - "HBB" - "Katcha" | | | |
| Road_Class | string | 100 | To contain the Class of road according to RHD & LGED in the followings: RHD Road Class - "National Highways " - "Regional Highways" - "District\Zila Road" LGED Road Class - "Upazila Road(Pucca" - "Upazila Road(Katcha)" - "Union Road(Pucca)" - "Union Road(Katcha)" - "Village Road A (Pucca)" - "Village Road A (Katcha)" - "Village Road B (Pucca)" - "Village Road B (Katcha)" | | | |
| Remarks | To prepare the | | Chainage in | Road_ | Type | Additional |

| Field Name | Field Type | Width of the field | Purpose of the field | | | |
|------------|---|--------------------|----------------------|------|-----------|------------------------------------|
| | inventory of road, Electricity, Telephone, drainage, Sewerage, pipe line and etc. The inventory will help for the present status of features. Please follow the example right side of the Data Table. | | Meters | | Condition | +Field |
| | | | From | To | | |
| | | | 0 | 500 | Pucca | Pucca |
| | | | 500 | 504 | Culvert | Culvert |
| | | | 504 | 1000 | Katcha | Katcha |
| | | | 1000 | 1012 | Bridge | Bridge |
| | | | | | | To add more field as per Required. |
| | | | | | | To add more field as per Required. |
| | | | | | | To add more field as per Required. |
| | | | | | | To add more field as per Required. |

8) Layer name: **RDCL306864**

Feature Type: **Polyline**

This shape file will contain the centerlines of the existing roads of the project area as polyline features. It must contain the following fields compatible to network analysis:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|------------|--------------------|--|
| Road_name | string | 100 | To contain the name of the road, if any |
| Road_no | string | 20 | To contain road number, if any |
| Road_ID | string | 20 | To contain the ID of Road |
| Road_type | string | 20 | To contain the physical type of the road as follows - "Pucca" - "WBM" - "HBB" - "Katcha" |
| Road_Class | string | 100 | To contain the Class of road according to RHD & LGED in the followings: RHD Road Class - "National Highways " - "Regional Highways" - "District\Zila Road" LGED Road Class - "Upazila Road(Pucca)" - "Upazila Road(Katcha)" - "Union Road(Pucca)" - "Union Road(Katcha)" - "Village Road A (Pucca)" - "Village Road A (Katcha)" - "Village Road B (Pucca)" |

| Field Name | Field Type | Width of the field | Purpose of the field |
|--------------------|------------|--------------------|--|
| | | | - "Village Road B (Katcha)" |
| Road_width | numeric | | To contain average width of the road segment in meter |
| Road_length | numeric | | To contain calculated length of the road segment in meter |
| Num_Lanes | numeric | | To contain number of lanes on the road segment such as 1, 2, etc. |
| Road_own | string | 100 | To contain the name of the department or organization to which the road segment belongs. |
| METERS | Double | - | To contain length of the road in meters |
| FT_MINUTES | Float | - | To contain the time duration needed to travel the arc from the start node unto the end node, measured in minutes. |
| TF_MINUTES | Float | - | To conation the time duration needed to ravel the arc from the end node unto the start node of the arc, measured in minutes, |
| Oneway | string | 2 | To contain the value to represent the possible directions to travel an arc |
| Hierarchy | Long | | To contain order or rank assigned to road network elements. |

9) Layer name: RDFP306864

Feature Type: **Polygon**

This Layer will contain footpath of project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|----------------|------------|--------------------|---------------------------------|
| Road_name | string | 50 | To contain road name |
| Road_ID | string | 20 | To contain the adjacent Road ID |
| Width | numeric | | To contain width of Footpath |
| Status | string | 50 | To contain footpath conditions. |

10) Layer name: RDIL306864

Feature Type: **Polygon**

This Layer will contain road islands of the project area. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|----------------|--------------|--------------------|---------------------------------|
| Road_name | string | 50 | To contain road name |
| Road_No | string | 20 | To contain road number if any |
| Road_ID | string | 20 | To contain the adjacent Road ID |
| Width | Long integer | 20 | To contain width of Island |
| Type | string | 50 | To contain footpath conditions. |

11) Layer name: WBD306864Feature Type: **Polygon**

This shape file will contain water bodies of project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|--------------|--------------------|---|
| WBD_ID | Long integer | 20 | To contain Water body ID. |
| Type | string | 50 | To contain following type of water bodies - "River" - "Khal" - "Irrigation Canal" - "Swamp" - "Pond" - "Ditch" - "Borrow Pits" |
| Type | string | 50 | To contain the use of water body such as Private or Public use |

12) Layer name: EMB306864Feature Type: **Polyline**

This Layer will contain embankment features of project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|--|
| Emb_name | string | 100 | To contain the name of the road, if any |
| Emb_ID | string | 20 | To contain the ID of Road |
| Emb_Type | string | 20 | To contain the physical type of the Embankment to follow the road preparing method. |
| Emb_Class | string | 100 | To contain the Class of the Embankment - "Road cum Embankment" - "Embankment" |
| Emb_width | numeric | | To contain average width of the road segment in meter |
| Emb_width | numeric | | To contain average width of the embankment segment in meter |
| Emb_length | numeric | | To contain calculated length of the road segment in meter |
| Num_Lanes | numeric | | To contain number of lanes on the road segment such as 1, 2, etc. |
| Owner | string | 100 | To contain the name of the department or organization to which the embankment segment belongs. |
| Remarks | | | To follow the Road preparing Methods. |

13) Layer name: DTM306864

Feature Type: **Point**

This shape file will contain spot heights as 3D points at regular interval (10m x 10m OR 20m x 20m or as specified) in project area. It must contain four fields as described in the following table:

| Field Name | Field Type | Width of the field | No. of Decimal Places | Purpose of the field |
|------------|--------------|--------------------|-----------------------|--|
| ID | Sort Integer | 10 | | To contain the ID |
| RL | Double | - | - | To contain Reduced Level (RL) of a point in meter as referenced with PWD |
| Easting | Double | - | - | To contain X-coordinate of the point |
| Northing | Double | - | - | To contain Y-coordinate of the point |

14) Layer name: **BM306864**

Feature Type: **Point**

This shape file will contain BM Pillars established in the project area. It must contain four fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|--------------|------------|--------------------|--|
| RL | Double | - | To contain Reduced Level (RL) of a point in meter as referenced with PWD |
| Easting | Double | - | To contain X-coordinate of the point |
| Northing | Double | - | To contain Y-coordinate of the point |
| Organization | String | 100 | To contain name of the organization |
| Cons_Year | | 10 | To contain the year of construction |
| Remarks | String | 100 | To contain remarks, if any. |

15) Layer name: **CON306864**

Feature Type: **Polyline**

This shape file will contain the contour lines of the area under project area. It must contain three fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|---|
| Contour | Double | - | To contain the value (RL) of the contours up to three decimal places. |
| Label | Double | - | To contain the value of contour up to one decimal place. This can be used to label the contours in map. |
| Type | String | 7 | To contain the value of this field as follows: - "Index" - "Intermediate" |

| | | | |
|--|--|--|--|
| | | | The purpose of this field is to symbolize and label the contours only. (The values must be calculated in such way that after successive 4 thin (Regular) contours there should be one thick (Index) contour in map. That is if 0.00 is a thick (Index) contour then 0.3, 0.6, 0.9, and 1.2 will be (Regular) contours and 1.5 will be thick contour. |
|--|--|--|--|

16) Layer name: ELU306864

Feature Type: **Polygon**

This shape file will contain existing land use of project area which will be prepared on the basis of physical feature and land use survey. It may contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|--------------------|------------|--------------------|--|
| Land_use | string | 50 | To contain existing land use as <ul style="list-style-type: none"> - "Administrative" - "Agriculture" - "Commercial" - "Circulation Network" - "Institutional" - "Flood Flow Zone" - "Industrial" - "Mixed Use" - "Recreational" - "Restricted / Special Use" - "Socio-Cultural" - "Transport & Communication" - "Urban Residential" - "Urban Services" - "Vacant Land" - "Water Body" |
| Single_Crop | string | 50 | To contain the single crop land |
| Double_Crop | string | 50 | To contain the double crop land |
| Triple_Crop | string | 50 | To contain triple crop land |
| Remarks | string | 100 | To contain remarks, if any. |

17) Layer name: HOM306864

Feature Type: **Polygon**

This shape file will contain rural homestead areas in project area as polyline features. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|--|
| Location | String | 20 | To contain the name of Mauza (Mauza_JL_Sheet) or the locality in which homestead areas lies. |

| | | | |
|------|--|--|---|
| Type | | | To contain the type of homestead area (Accordingly structures) -Urban -Rural |
|------|--|--|---|

18) Layer name: BRG306864

Feature Type: **Polygon**

This shape file will contain Bridge/Culvert/Box culvert/Over bridge/Railway Bridge etc as polygon features in project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|--------------|--------------------|---|
| Length | Double | 0 | To contain the length of the bridge/culvert |
| Width | Double | 0 | To contain the width of the bridge/culvert |
| Abutment | Long integer | 20 | To contain the number of abutment |
| Span | Double | 0 | To contain the span of the bridge/culvert |
| Location | String | 30 | To contain the area name (Mauza_JL_Sheet or locality) |
| Remarks | String | 254 | To contain comments about the bridge such as conditions of abutment, deck, wing wall, etc. *** To follow the road map preparing methods. |

19) Layer name: BRGL306864

Feature Type: **Polyline**

This shape file will contain Bridge/Culvert/Box culvert/Over bridge/Railway Bridge etc as polyline features in project area. Each feature must be a multipart feature. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|---|
| Length | Double | - | To contain the length of the bridge/culvert |
| Width | Double | - | To contain the width of the bridge/culvert |
| Abutment | Double | - | To contain the number of abutment |
| Span | Double | - | To contain the span of the bridge/culvert |
| Location | String | 20 | To contain the area name (locality) |
| Remarks | String | 254 | To contain comments about the bridge such as conditions of abutment, deck, wing wall, etc. *** To follow the road map preparing methods. |

20) Layer name: BRGP306864
Feature Type: Polygon

This shape file will contain Bridge/Culvert/Box culvert/Over bridge/Railway Bridge etc as point features in project area. It is expected that this shape file will be generated/produced from converting the Bridge_CL.shp file into centroids. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|---|
| Length | Double | - | To contain the length of the bridge/culvert |
| Angle | | | To contain the Geographic angle of the bridge/culvert |
| Width | Double | - | To contain the width of the bridge/culvert |
| Abutment | numeric | 20 | To contain the number of abutment |
| Span | Double | - | To contain the span of the bridge/culvert |
| Location | String | 20 | To contain the area name (Mauza_JL_Sheet or locality) |
| Remarks | String | 254 | To contain comments about the bridge such as conditions of abutment, deck, wing wall, etc. *** To follow the road map preparing methods. |

21) Layer name: DRN306864
Feature Type: Polyline

This shape file will contain the information of existing drains in the project area. It must contain three fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|--------------------|------------|--------------------|--|
| Type | string | 20 | To contain the (construction) type of the drain. The value of the field may be any of the following two - Surface (Katcha) - Surface (Uncovered) - Surface (Covered) - Pipe |
| Drain_width | Double | 0 | To contain the width of the drain |

| | | | |
|---------------------|--------|-----|---|
| Drain_depth | Double | 0 | To contain the depth of the drain |
| Drain_radius | Double | 0 | To contain the radius of the drain |
| Road_ID | string | 20 | To contain the adjacent Road ID |
| Remarks | String | 254 | *** To follow the road map preparing methods. |

22) Layer name: BW306864

Feature Type: **Polyline**

This shape file will contain boundary walls as line features of project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|-------------------|---------------------------|---|
| Type | string | 50 | To contain line features such as Boundary wall. |

23) Layer name: WSL306864

Feature Type: **Polyline**

This shape file will contain water distribution pipe network as line features in project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|-------------------|---------------------------|---|
| Type | string | 20 | To contain type of pipe (Steel, PVC, etc) |
| Dia | Double | 0 | Diameter of pipe in mm |
| Remarks | String | 254 | *** To follow the road map preparing methods. |

24) Layer name: OHT306864

Feature Type: **Point**

This shape file will contain overhead water tanks as point features in project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------------|-------------------|---------------------------|---|
| Capacity | Double | - | To contain the capacity of the overhead tank. |
| Catchment | Double | - | To contain the catchment area in sq. meter |
| Owner | String | 100 | Contains the owner name |

25) Layer name: ESL306864

Feature Type: **Polyline**

This shape file will contain High Voltage Electric Lines as line features in project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|--|
| capacity | string | 20 | Contains the capacity of each line as 11KV, 33 KV etc. |
| Owner | string | 20 | Contains the name of Organization |
| Remarks | String | 254 | *** To follow the road map preparing methods. |

26) Layer name: UTL306864

Feature Type: **Point**

This shape file will contain locations of various utility features as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|---|
| Type | string | 20 | To contain - "Electric Pole" - "Electric Tower" - "High Volt Electric Tower" - "Electric Box" - "Power Station" - "Power Sub-station" - "Transformer" - "Gas Transmission Center" - "Light Post" - "Telephone Pole" - "Telephone Box" - "Fire Service Station" - "Traffic Signal Pole" |
| Owner | | | Contains the name of the owner |
| Remarks | String | 100 | *** To follow the road map preparing methods. |

27) Layer name: SEW306864

Feature Type: **Polyline**

This shape file will contain sewerage network as line features in [project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|--|
| Size | string | 20 | To contain pipe diameter of sewerage line |
| Type | string | 25 | Contains type of waste water carried by the sewerage line such as storm sewerage or household sewerage line etc. |
| Location | string | 20 | Contains location of sewerage line |

| | | | |
|---------|--------|-----|--------------------------------|
| Owner | | | Contains the name of the owner |
| Remarks | String | 100 | |

28) Layer name: OP306864

Feature Type: **Polygon**

This shape file will contain various polygon features of project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|------------|------------|--------------------|---|
| Type | string | 50 | To contain boundary of following features - "Graveyard" - "Crematorium" - "Cemetery" - "Eidgah" - "Restricted Area" - "Airport" - "Brick Field" - "Rikshaw Garage" - "Automobile Garage" - "Slum" - "Monument" - "Open Space" - "Parks" - "Playground" - "Stadium" - "Golf Course" - "Botanical Garden" - "Zoological Park" - "Power Plant/Station" - "Bus Terminal" - "Truck Terminal" - "Water Treatment Plant" - "Sewerage Treatment Plant" - "Waste Disposal Plant" - "Railway Station" - "Bazaar Boundary" - "Forest Land" - "Sand Fill" - "Swimming Pool" - - <i>Other if necessary</i> |
| Owner | | | Contains the name of the owner |

29) Layer name: AP306864

Feature Type: **Point**

This shape file will contain point features of project area. It must contain the field as described in the following table:

| Field Name | Field | Width of | Purpose of the field |
|------------|-------|----------|----------------------|
|------------|-------|----------|----------------------|

| | Type | the field | |
|------|--------|-----------|---|
| Type | string | 50 | <ul style="list-style-type: none"> - "Airport" - "Bazar" - "Government Bank" - "Private Bank" - "Brickfield" - "Bridge" - "Bus Terminal" - "Cemetery" - "Church" - "Cinema Hall" - "College" - "Crematorium" - "Deep tube well" - "Dustbin" - "Filling Station" - "Graveyard" - "Growth Center" - "Hand tube well" - "Historic site" - "Government High School" - "Registered High School" - "Non-Registered High School" - "Hospital/Clinic" - "Madrassa" - "Registered Madrassa" - "Non-Registered Madrassa" - "Mazar/Dargah" - "Monument" - "Mosque" - "Museum" - "Oil Reservoir/Depot" - "Over Bridge" - "Pagoda" - "Police Box" - "Police Station" - "Post Office" - "River Port" - "Government Primary School" - "Registered Primary School" - "Non-Registered Primary School" - "Sluice gate" |

| | | | |
|-----------|--------------|----|--|
| | | | <ul style="list-style-type: none"> - "Temple" - "Theater Hall" - "Truck Terminal" - "Under Pass" - "University" - "Private University" - "Well" - "Culvert" - <i>Other if necessary</i> |
| Name | string | 50 | To contain name of the feature, if any |
| PF_ID | Long integer | 6 | To contain the point feature ID. |
| PointType | string | 50 | To contain short name "GPS" of the feature, e.g. Government Primary School (GPS) |
| Owner | | | Contains the name of the owner |
| Remark | string | | Contains Further Explanation |

30) Layer name: NAM306864

Feature Type: **Point**

This shape file will contain the names of important places and structures as point features in project area.

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------|------------|--------------------|--|
| Name | String | 100 | To contain - Name of locality, market, bazaar, important structure, historic site, university, play ground, poultry farm, river, khal, lake, pond, etc. |

31) Layer name: RN306864

Feature Type: **Annotation/Polyline**

This shape file will contain the names of important places and structures as point features in project area.

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------|------------|--------------------|--------------------------------------|
| Name | String | 100 | To contain the name of road segment. |

32) Layer name: PRL306864

Feature Type: **Polyline**

This shape file will contain center lines of proposed roads as line features in the project area.

| Field Name | Field | Width of | Purpose of the field |
|------------|-------|----------|----------------------|
|------------|-------|----------|----------------------|

| | Type | the field | |
|------------------|--------|-----------|--|
| Width_m | Double | - | To contain width of the proposed road in meter |
| Width_ft | Double | - | To contain width of the proposed road in foot |
| From_To | String | 100 | To contain the names (of road/place) from where the road starts and to where the road ends. |
| Prop_type | String | 20 | To contain any of the two - "New" - "Widening" |
| Type | String | 20 | To contain any of the following - "Underground" - "Ground" - "Flyover" - "Viaduct" |
| Remarks | String | 254 | *** To follow the road map preparing methods. |

33) Layer name: POP306864

Feature Type: **Polygon**

This shape file will contain polygon features of unions/wards derived from dissolved Mauzas of the project area. It must contain the field as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|---------------------|--------------|--------------------|--|
| Union_Ward | String | 50 | To contain name of the Mauza |
| Area_BBS | Double | - | To contain area from BBS records |
| Area_GIS | Double | - | To contain area calculated by GIS software |
| Pop_2001 | Long Integer | - | To contain Population in the year 2001 |
| Pop_2011 | Long Integer | - | To contain Population in the year 2011 |
| Pop_2021 | Long Integer | - | To contain Population in the year 2021 |
| Pop_2035 | Long Integer | - | To contain Population in the year 2035 |
| Pop_den_2011 | Double | - | To contain population density |
| Division | String | 25 | To contain name of Division |
| District | String | 25 | To contain name of District |
| Upazila | String | 25 | To contain name of Upazila |
| Union_Ward | String | 25 | To contain name of Union/Ward |
| Geocode | String | 11 | To contain BBS geocode of the Union |
| Remarks | String | 254 | Remarks, if any. |

34) Layer name: STP306864

Feature Type: **Polygon**

This shape file will contain proposed policy on the merged Mauza map of the project area. It must contain the fields as described in the following table:

| Field Name | Field Type | Width of the field | Purpose of the field |
|-------------|------------|--------------------|--|
| Policy_Zone | String | 50 | To contain proposed policy on the plots. |
| Remarks | String | 100 | To contain remark, if any. |

B.1.2 Point Feature Codes

The following feature codes (Unique ID) must be assigned in appropriate fields of the layers.

The following Point feature codes (Unique ID) will be used as follows.

| Point Feature Categories | Unique ID |
|---------------------------------------|-----------|
| - "Airport" | 255 |
| - "Bazar" | 260 |
| - "Government Bank" | 265 |
| - "Private Bank" | 270 |
| - "Brickfield" | 275 |
| - "Bridge" | 280 |
| - "Bus Terminal" | 285 |
| - "Bus Stand" | 290 |
| - "Cemetery" | 295 |
| - "Church" | 300 |
| - "Cinema Hall" | 305 |
| - "Government Medical College" | 245 |
| - "Private Medical College" | 250 |
| - "Government College" | 145 |
| - "Government Woman College" | 150 |
| - "Registered College" | 155 |
| - "Non-Registered College" | 160 |
| Government Poly Technical Institute | 165 |
| Private Poly Technical Institute | 170 |
| Vocational Institute | 175 |
| JuboUnnayan Kendra | 310 |
| Government Teacher's Training College | 235 |
| Private Teacher's Training College | 240 |
| - "Crematorium" | 315 |
| - "Deep tube well" | 320 |
| - "Dustbin" | 325 |
| - "Filling Station" | 330 |
| - "Graveyard" | 335 |
| "Growth Center" | 340 |
| - "Hand tube well" | 345 |
| - "Arsenic Hand tube well" | 350 |
| - "Tara Pump" | 355 |
| - "Historic site" | 360 |

| Point Feature Categories | Unique ID |
|------------------------------------|------------------|
| - " Government High School" | 125 |
| - " Government Girl's High School" | 130 |
| " Registered High School" | 135 |
| " Non-Registered High School" | 140 |
| - "Hospital/Clinic" | 365 |
| - "Government Kamel Madrasa" | 180 |
| - "Registered Kamel Madrasa" | 185 |
| - "Government Fazel Madrasa" | 190 |
| - "Registered Fazel Madrasa" | 195 |
| - " Government Alem Madrasa" | 200 |
| - " Registered Alem Madrasa" | 205 |
| - "Government Eftedayee Madrasa" | 210 |
| - "Registered Eftedayee Madrasa" | 215 |
| - "Non-Registered Madrasa" | 220 |
| - "Mazar/Dargah" | 370 |
| - "Monument" | 375 |
| - "Mosque" | 380 |
| - "Museum" | 385 |
| - "ASA NGO" | 390 |
| - "BRAC NGO" | 395 |
| - "Proshikha NGO" | 400 |
| - "TMSS NGO" | 405 |
| - "Other's NGO" | 410 |
| - "Insurance Company" | 415 |
| - "Life Insurance Company" | 420 |
| - "Oil Reservoir/Depot" | 425 |
| - "Over Bridge" | 430 |
| - "Pagoda" | 435 |
| - "Police Box" | 440 |
| - "Police Station" | 445 |
| - "Post Office" | 450 |
| - "River Port" | 455 |
| - "Government Primary School" | 100 |
| - "Registered Primary School" | 105 |
| - "Non-Registered Primary School" | 110 |
| - "K.G. School" | 115 |
| - "Kindergarten School" | 120 |
| - "Sluice gate" | 460 |
| - "Temple" | 465 |
| - "Theater Hall" | 470 |
| - "Truck Terminal" | 475 |

| Point Feature Categories | Unique ID |
|---------------------------------|--|
| - "Under Pass" | 480 |
| - "Government University" | 225 |
| - "Private University" | 230 |
| - "Well" | 485 |
| - "Culvert" | 490 |
| - <i>Other if necessary</i> | To put or add the Unique ID accordingly 5 interval |

Structure Attribute Collection Form

Structure Attribute Collection Form

[illegible]

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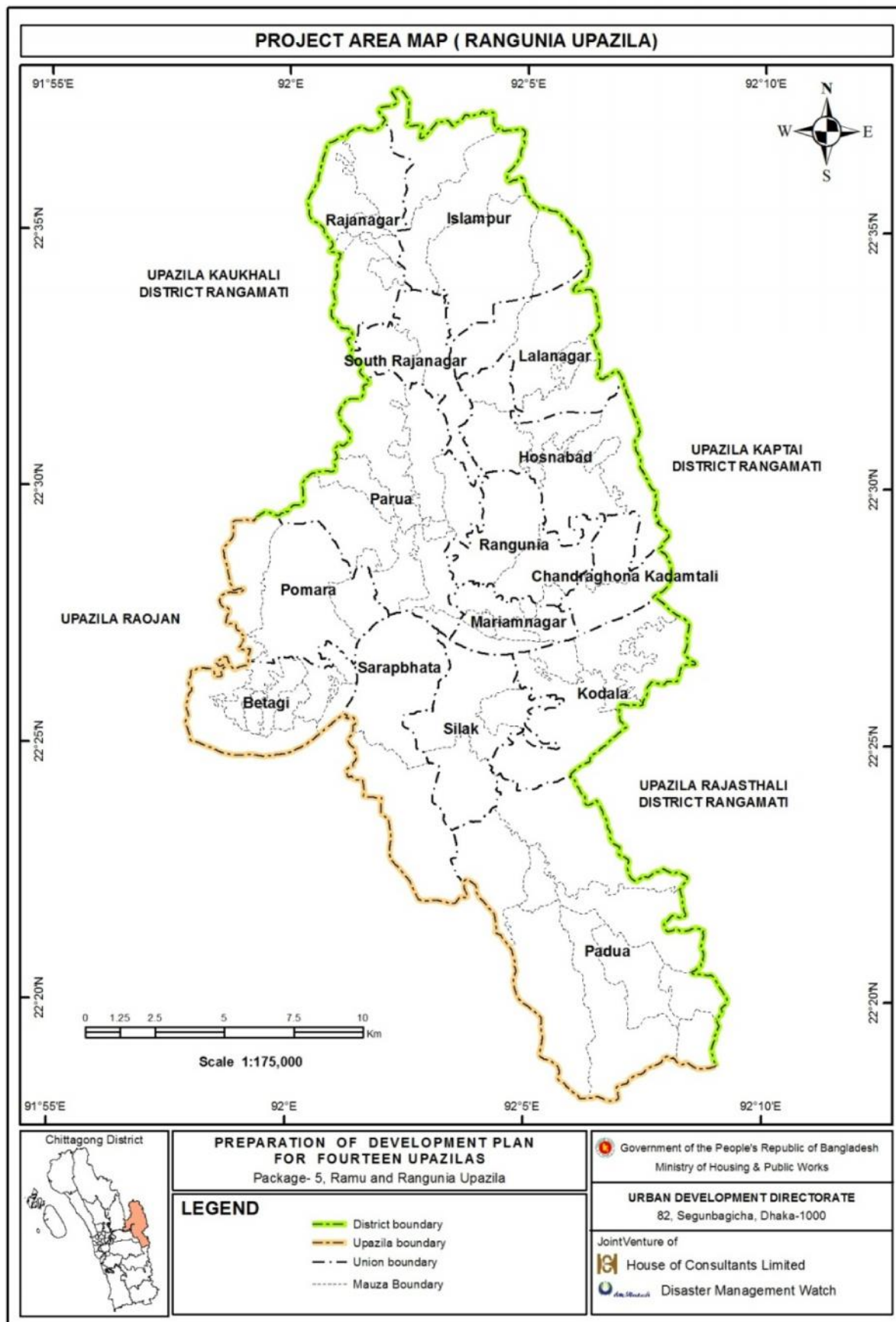
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Chapter-01 Introduction

1.0 Background

Land Use Survey is a major element in any planning endeavor. Thorough detail land use survey and collection of required information of the project area are needed that helps draw up the plan in a better way. This survey report is an important part of the project 'Preparation of Development Plan for Fourteen Upazilas', for the Package-5, Ramu & Rangunia Upazila. The consultants have collected all required information for this report using the advanced technologies in the survey and data collection process. The survey was carried out according to the methodology mentioned in the TOR.

The Report contains the land use survey methodology and findings. The Land use survey was carried out by recording the current use of the land in the study area. The current use of land was classified according to the provisions given in the TOR. Land use survey, basically, records the use of land by its functional activity such as residential, industrial, commercial etc. The maps prepared for physical survey were used as base map for land use survey. Land use features were identified and classified using the recorded code and separated in different layers during data processing stage, from where category wise land use map were drawn using the identification layers of each of the land uses features. The Project Area Map has been shown in **Map-1.1**.



Map-1.1: Project Area Map of Rangunia Upazila

Chapter-02 Methodology

2.0 Reconnaissance Survey

A reconnaissance survey of the study area has been conducted to identify the existing problems, development constraints and future development potentialities of the upazila. This reconnaissance survey has given the planning team an initial overview of the area that was necessary to set on the task of preparing a Master Plan. This overview pertains not only to the physical features, prospects and problems of the area, but also the ideas, aspirations and mood of the local residents, which are very much essential to develop the methodological approach for required data collection.

2.1 Compilation and Preparation of Base Map

Preparation of base map is an important requirement for planning the project area. The base map is used to depict the survey findings. The steps for the preparation of base map are described in the Physical Feature Survey Report.

2.1.1 Project Area Based on Mauza Maps

Project area boundary and other boundaries have been derived by processing of mauza maps which is described in detail in the **Physical Feature Survey Report**. From the mosaic mauza map of the project area, the administrative boundaries such as Division Boundary, District boundary, Upazila boundary, Paurashava Boundary, Ward/Union boundary, Mauza boundary and Mauza Sheet boundary have been created by using geo-processing tools of ArcGIS such as Dissolve, Erase, Intersect, Spatial Join, etc. Project Area Map of Rangunia Upazila is shown in **Map-1.1**.

The consultant in cooperation with UDD officials has demarcated the actual boundary of the project in the newly formed mosaic Mauza map. Later on, the project boundary was finalized by field verification, which was considered and used for the project after duly approved by UDD.

2.1.2 Satellite Image Processing

After collecting raw satellite imagery in stereo pairs, initial image processing has been done by performing Epi-polar Correction, Color Balance, Contrast Adjustment, Sharpening, Pyramid building and Bit Rate Setting. For geometrical correction of satellite images four reliable GCPs for each upazila has been collected through RTK-GPS survey in the study area. Using these GCPs, Aerial Triangulation of the stereo pairs has done and stereo model has been prepared for photogrammetric works. The processing steps of satellite imagery have been described in detail in the **Report of Photogrammetric Works**.

2.1.3 Physical Feature Extraction from Satellite Image

After initial image processing and building up of stereo models, extraction of physical features has been done by a team of skilled photogrammetrist. All type of physical features including Structures (katcha, pucca, semi-pucca, etc), Roads, Waterbodies, etc have been extracted by photogrammetric works.



Plate-1: Satellite Image Digitization by Digital Photogrammetry

The Photogrammetric Expert and the GIS Expert has monitored the feature extraction works examine the data for their proper registration.

2.1.4 Preparation of Land Use Survey Base Map

The base map for land use survey has been created by superimposing base map derived from Mauza map and Processed Satellite Image data. This superimposition is very important to form a unique map and database with the data collected from satellite imagery and Mauza map data (e.g. plot no, Mauza name, JL no., sheet no.). Preparation of survey base map has been described in detail in the Physical Feature Survey Report. The base maps have been used to collect landuse information from field. These base maps have also been used for the survey of physical feature which ultimately helps in demarcating land use boundaries.

2.1.5 Preparation of Log Book for Landuse Attribute Collection

To collect attributes or textual information of land use related physical features, a Log Book format has been developed. Each page of the book contains columns for collecting following information:

- Type of structure
- Use of structure
- Name of the structure, if any
- Construction year of the structure
- Owner of the structure
- Mobile no. of the owner of the structure, if possible
- Road name beside the structure, if any
- Plot no. and Mauza name belongs to the structure
- Ward/Union belongs to the structure
- Name of the location

Chapter-03 Field Level Data Acquisition

3.0 Mobilization of Survey Team

A dynamic and qualified survey team experienced with the GPS and Satellite Image based advance technology was mobilized to carry out land use survey and along with physical feature survey. The composition of survey team with their qualification is given below:

Table 3.1: Composition of Survey Team

| Field of Expertise | Qualification | No. of Expert/ Technical Staff |
|--------------------|--|-----------------------------------|
| Survey Expert | Bachelor of Urban & Regional Planning (BURP) | 1 |
| Survey Supervisor | Bachelor of Urban & Regional Planning (BURP) | 1 |
| Surveyor | Diploma in Survey/Civil Engineering | 12 |
| Surveyor | Diploma in Survey Engineering | 10 |

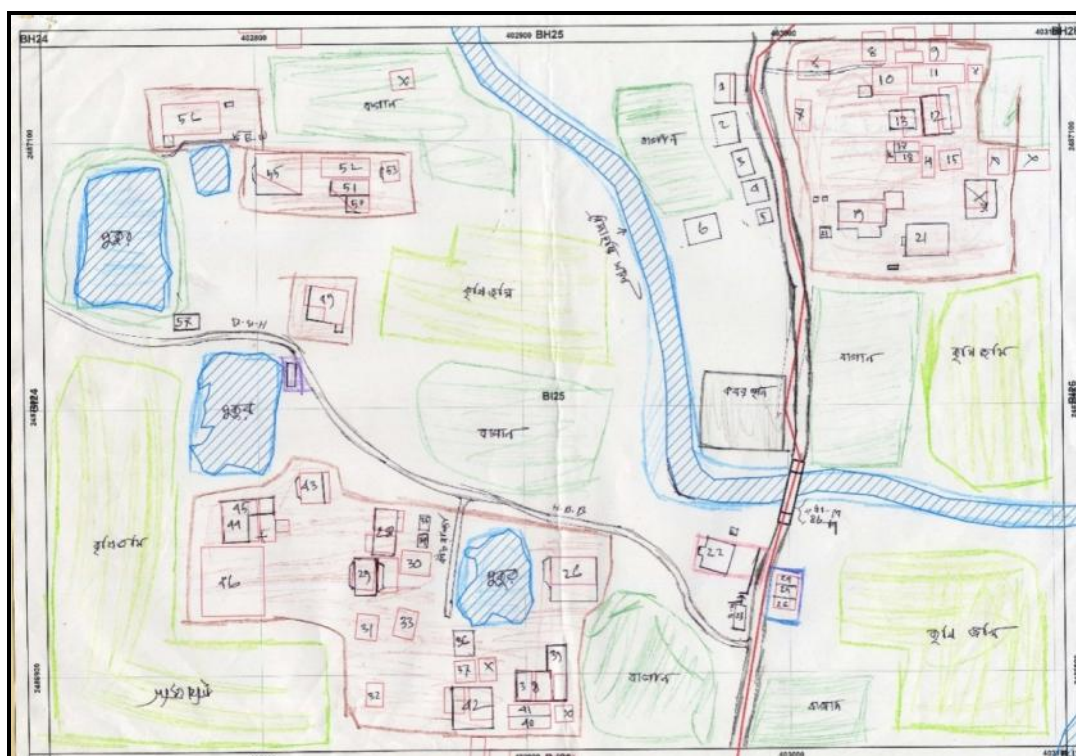
For Land use survey, this survey team was divided into 7 groups (each group contains two surveyors) to collect land use boundary and all physical features i.e. structures, water bodies, roads, etc. with their attributes. All these groups were supervised by the Survey Expert and the Survey Supervisor.

3.1 Land Use Survey

The Land use survey has been carried out by recording the current use of the land in the study area. The current use of land has been classified according to provision given in the TOR. Land use survey basically records the use of land by its functional activity such as residential, industrial or commercial. The maps prepared through physical survey have been used as base map for land use survey. Land use features were identified and classified using the recorded code and drawing the boundaries using different color pencils (**Figure 3.1**). The following color code has been applied in field work of land use map. The **Figure 3.2** shows a sample land sue base map after survey.

| Land Use Legend for Field Work | |
|-----------------------------------|-------------------|
| | Education |
| | Industry |
| | Forest/Hilly Area |
| | Agricultural Land |
| | Commercial |
| | Water Body |
| | Pucca Road |
| | Residential |
| | Administrative |
| | Religious Area |
| | Grave Yard |

**Figure-3.1: Color used by Color pencil
for Land Use Demarcation**



. Figure-3.2: Sample Land Use Surveyed Base Map of Rangunia Upazila

The methodology and technique followed are as follows:

- Checking every plot of land and demarking unique uses with color pencils
- Checking building and other structure and its current use.
- Checking infrastructure provisions
 - ✓ Social infrastructure e.g. school, hospital, etc. with location
 - ✓ Physical infrastructure e.g. housing, offices, energy, work, sanitation etc.
 - ✓ Transportation with width of roads with and without drainage links with other areas etc.
- Recording of natural physical conditions of the land like: rivers, drainage, canals etc.
- Review of topography of the area from the Topographic Maps.

Chapter-04 Survey Data Processing & Analysis

4.1 Processing of Land Use Data

During data processing stage, all type of landuse data has been properly processed to obtain the unique landuses. Firstly, survey map sheets have been scanned and georeferenced, then land use boundary have been digitized with their attributes. On the other hand, physical feature data has been used to identify land use boundaries and categorize then into respective landuse categories. The surveyed physical features (structures, roads, water bodies, etc. and landuse boundaries, etc.) marked on the sheets were then digitized using the ArcGIS software.

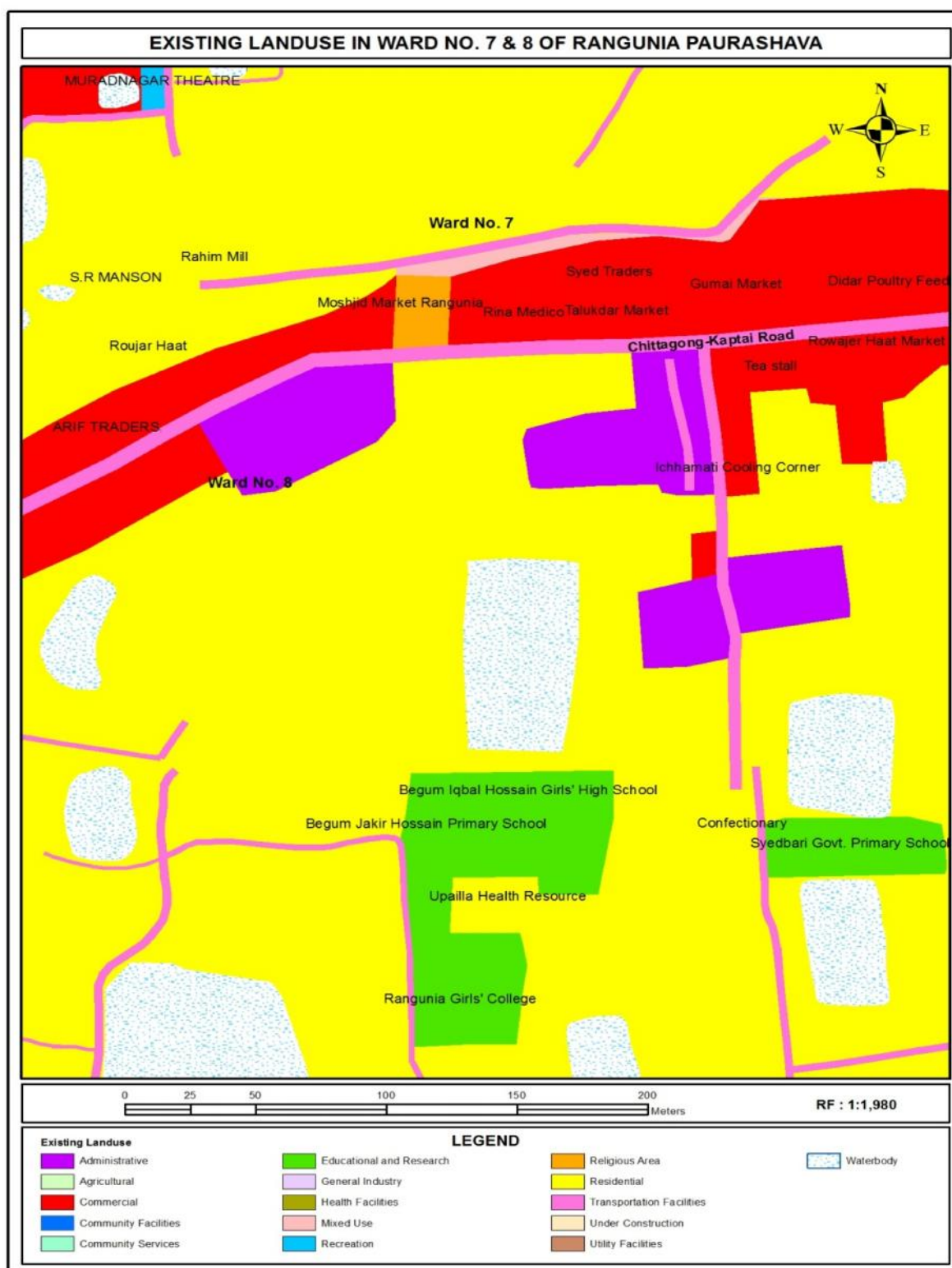


4.2 Preparation of Land Use Map

Plate-2: Updating works using Surveyed Map

Utilizing the land use and physical feature base map the land use maps were prepared showing the broad categories of land use. The characteristics of each land use area have fully been described in the survey report. The Land Use Maps were prepared at specified scale based on the data collected through land use survey and the information of the base map.

Details about land use have been provided in **Table 4.1** and generalized land use pattern of Rangunia Paurashava area has been presented in **Map-4.1**.



Map-4.1: Landuse in Rangunia Paurashava Area

Table 4.1: Land Use Categories

| Sl. No. | Land uses | Illustrated |
|---------|-----------------------------|--|
| 1. | Residential | Planned Residential Area, Govt. Quarters, Private Housing, Rest/Guest/Circuit House, Banglow, Mess, Orphanage/Old Home, Rural Homestead, Slum, Squatters. |
| 2. | Commercial | Residential Hotel/ Hotel & Restaurant, Wholesale Rice Market, Wholesale Vegetables Market, Wholesale Fish Market, Wholesale Paper Market, Wholesale Grocery Goods Market, Wholesale Fruit Market, Book Stall, Cloths Shop, Paper & Magazine, Stationery Shop, Shoe Shop, Bag & Leather Goods, Cosmetics, Spectacles, Electronic Goods, Audio Video Cassette, Utensils/Crockery, Sports Goods, Computer Goods, Motor Car Parts, Jewelry shops, Show Room, Furniture Shop, Department Store, Mobile Sales Center, Hardware Goods, Sweet Shop, Bakery Shop, Gift Shop, Press & Printing, Grocery Shop, Gun Shop, Iron & Steel Shops, Shopping Center/Mall, Shopping Mall, Super Market, Rubber Stamps, Phone-Fax-Photocopy, Cycle Store, Studio/Colour Lab, Drug/Pharmacy, Pottery shop, Electronics, Sports and Athletics, Kitchen Market, Katcha Bazar, Beauty Parlor/Hair dresser, Govt. Food Godown, Cold Storage, Others Godown. |
| 3. | Mixed Use | Commercial – Residential, Office – Residential, Commercial – Industrial, Two or More categories. |
| 4. | Transport Facilities | RHD Road/LGED Road, Primary Road/ Major Through fare, Secondary Road (Pucca), Secondary Road (Katcha), Local Road (Pucca), Local Road (Katcha), Access Road (Pucca), Access Road (Katcha), Footpath (Paved), Footpath (Unpaved), Walkway, Embankment cum Road, Airport / Bus terminal / Truck terminal / BRTC bus Depot / Tempo stand / Rickshaw stand / Railway station / BIWTA Terminal/ Launch Terminal etc, Broad gauge, Meter gauge, River, Ferry Ghat, Filling Station, Garage, Passenger shed, telephone exchange, ticket counter, transport office etc. |
| 5. | Administrative | Deputy Commissioner's Office, Zila Parishad Office, SP Office/Police Headquarter, Civil Surgeon Office, LGED Office, Upazila Headquarter, Paurashava Office, Union Parishad Office, Settlement Office, Post office, Bank, Public Works Department Office, R&H Office, DPHE Office, Police Station, Ansar Camp, Jailkhana, Statistical Bureau Office, PDB Office, BWDB Office, DoE Office, All types of Government Office, Private Bank/ Insurance Company, Mercantile & Cooperatives, Money Exchange Center, Private company/Different types of NGO/CBO/Club, Construction Office, Commercial Group Office, Trading Corporation Office, Security Service Office, Law Chamber, Doctor's Chamber, Political Party Office, Professional's Association, Labor Union. |
| 6. | General Industry | Green and Orange A categories as per The Environment Conservation Rules, 1997. |

| Sl. No. | Land uses | Illustrated |
|---------|---------------------------------|--|
| 7. | Heavy Industry | Other toxic and pollutions Industries (Orange B and Red categories as per The Environment Conservation Rules, 1997) |
| 8. | Agricultural | Single crop land, Double crop land, Triple crop land, Barren land, Mango garden/Litchi/Jackfruit/Banana/Lemon/others, fruits garden etc., Different types of flower garden, Tree cultivation, Hatchery/Gher, Livestock / Poultry Farm / Dairy Farm, Agricultural Research Area. |
| 9. | Educational and Research | Kindergarten and Nursery, Primary School, High School, College, Public University, Private University, Public Medical College, Private Medical College, Homeopathic Medical College, Engineering College/University, Law College, Social Research, Health Research, Economic Research, Vocational Training Institute, Physical Training Institute, Nursing Training Institute, Teachers Training College, Computer Training Institute, Dakhil Madrasa, Alim Madrasa, Fazil Madrasa, Kamil Madrasa, Hafezia Madrasa, Tutorial/Coaching Center, Government Training Institute, Library, Museum, Social Welfare Institution |
| 10. | Health Facilities | Govt. Hospital / Pvt Hospital / Mental Hospital/ Maternity/ Children Hospital / Clinic/ Diagnostic Center, Veterinary Hospital. |
| 11. | Recreational Facilities | Cinema Hall, Theater Hall, Museum & Art gallery, Auditorium /Community Center/Town Hall, Park/Playground/Amusement Park/Theme Park, Stadium/ Gymnasium/Swimming Pool, Tennis Complex. |
| 12. | Religious Area | Mosque, Eidgah / Mazar/ Dargha, Temple, Church, Pagoda, Graveyard, Cemetery, Cremation place. |
| 13. | Utility Facilities | Utility services include Overhead Tank, Power Office/Control Room, Public Toilet, Sewerage Office, Waste Disposal, Fire Service, Water Pump House, Water Reservoir, Water Treatment Plant, etc., |
| 14. | Community Facilities | Community Center, Social Club, Slaughter House, Monument, Shahid Minar etc. which will provide service to the community. |
| 15. | Restricted Facilities | Cantonment/BDR/Navy, TV Station, Radio Station, T&T Board, Power Supply Station. |
| 16. | Open space | Historic Sites, National Park/Botanical Garden, Zoological Park, Forest. Land/Urban Green, Ecological park/sites, River Bank |
| 17. | Water bodies | Pond, Beels, Lakes, River, Khals, Streams, Drain. |

The Legend for Existing Generalized Land use is shown in **Figure-4.1**

LEGEND

Existing Landuse

| | | | |
|---|------------------------|---|----------------------------------|
|  | Administrative |  | Mixed Use |
|  | Agriculture |  | Open Space |
|  | Commercial Activities |  | Recreational Facilities |
|  | Community Facilities |  | Residential |
|  | Education and Research |  | Restricted |
|  | Health Facilities |  | Transportation and Communication |
|  | Industrial Activities |  | Waterbody |
|  | Miscellaneous | | |

Figure-4.1: Legend for Existing Generalized Landuse

Chapter-05 Way Forward

The land use features of Rangunia Upazila have been acquired through field survey based on high resolution stereo satellite imagery and RTK-GPS. The existing land use data acquired through land use survey and photogrammetry can play vital role for preparation of development plans of Rangunia Upazila. By using these data in planning phase, decisions can be made where different socioeconomic activities such as agriculture, housing, industry, recreation, and commerce should take place and which areas should be protected from development due to environmental, cultural, historical, or similar reasons.

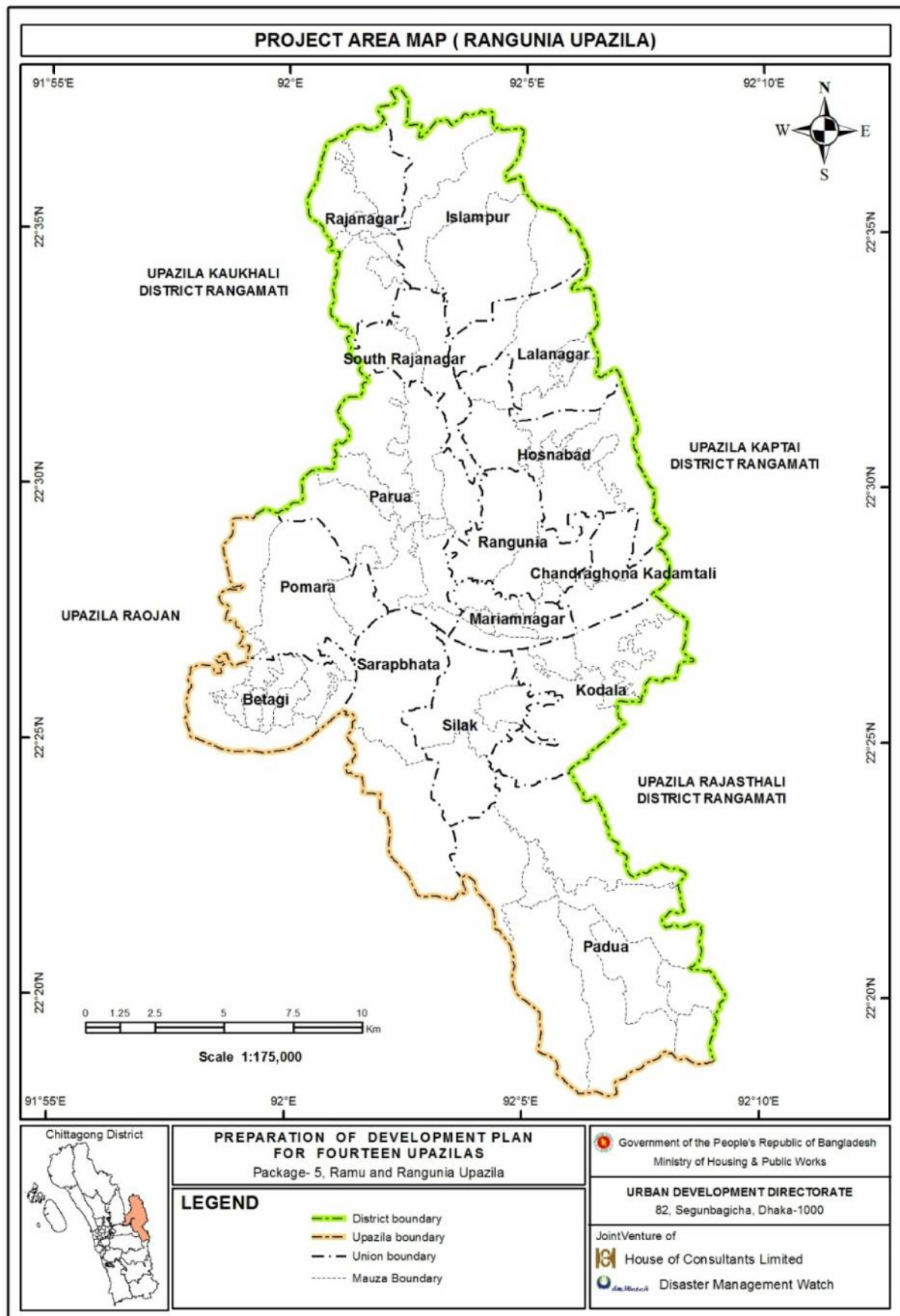
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Chapter-01 Introduction

1.0 Background

Topographic survey is a very important survey as it shows the suitable land for future development. Topographic Survey means measuring the surface of the earth of any area with standard known coordinates of X, Y, and Z value. This survey report is an important part of the project 'Preparation of Development Plan for Fourteen Upazilas', for the Package-5, Ramu & Rangunia Upazila. The consultants have collected all required information for this report using the advanced technologies in the survey and data collection process. This report contains the survey methods along with findings and analysis of the topography of the project area. The survey was carried out according to the methodology mentioned in the TOR. The Project Area Map has been shown in **Map-1.1**.



Map-1.1: Project Area Map of Rangunia Upazila

Chapter-02 Methodology

2.0 Reconnaissance Survey

A reconnaissance survey of the study area has been conducted to identify the existing problems, development constraints and future development potentialities of the upazila. This reconnaissance survey has given the planning team an initial overview of the area that was necessary to set on the task of preparing a Master Plan. This overview pertains not only to the physical features, prospects and problems of the area, but also the ideas, aspirations and mood of the local residents, which are very much essential to develop the methodological approach for required data collection.

2.1 Compilation and Preparation of Base Map

Preparation of base map is an important requirement for planning the project area. The base map is used to depict the survey findings. The steps for the preparation of base map are described in the Physical Feature Survey Report.

2.1.1 Project Area Demarcation based on Mouza Maps

Project area boundary and other boundaries have been derived by processing of mauza maps which is described in detail in the Physical Feature Survey Report. From the mosaic mauza map of the project area, the administrative boundaries such as District boundary, Upazila boundary, Union boundary, Mauza boundary and Mauza Sheet boundary have been created by using geo-processing tools of ArcGIS such as Dissolve, Erase, Intersect, Spatial Join, etc. The Project Area Map of Rangunia Upazila is shown in **Map-1.1**

The consultant in cooperation with UDD officials has demarcated the actual boundary of the project in the newly formed mosaic mouza map. Later on, the project boundary was finalized by field verification, which was considered and used for the project after duly approved by UDD.

2.1.2 Satellite Image Processing

After collecting raw satellite imagery in stereo pairs, initial image processing has been done by performing Epi-polar Correction, Color Balance, Contrast Adjustment, Sharpening, Pyramid building and Bit Rate Setting. For geometrical correction of satellite images SOB BMs and GCPs for the upazila has been used. Using the coordinates of the BMs, Aerial Triangulation of the stereo pairs has been done and stereo model has been prepared for photogrammetric works.

2.1.3 Topographic Features Extraction from Satellite Image

After initial image processing and building up of stereo models, extraction of topographic features has been done by a team of skilled photogrammetrist. Digital Photogrammetric Workstation (DPW) has been used as the platform for acquiring features from digital stereo images (model).



Plate-1: Topographic Features Extraction through Digital Photogrammetry

Feature registration has been done considering and measuring the position of the object under its accuracy level. The Summit Evolution & Stereo Plotter of DAT/EM has been used for identifying and registration of the objects and ArcGIS 9.3 of ESRI has been used for topographic data storing and editing.

Topographic features that have been extracted by Digital Photogrammetry are as below

- i. DTM Point Extraction
- ii. Break-lines Extraction
- iii. Water bodies extraction
- iv. Generation of DEM/TIN

The Photogrammetric Expert and the GIS Expert has monitored the feature extraction works examine the topographic features for their proper registration.

Chapter-03 Topographic Data Acquisition

3.0 Mobilization of Survey Team

A dynamic and qualified survey team experienced with the GPS and Satellite Image based advance technology was mobilized to carry out land use survey and along with physical feature survey. The composition of survey team with their qualification is given below:

Table 3.1: Composition of Survey Team

| Field of Expertise | Qualification | No. of Expert/ Technical Staff |
|--------------------|--|-----------------------------------|
| Survey Expert | Bachelor of Urban & Regional Planning (BURP) | 1 |
| Survey Supervisor | Bachelor of Urban & Regional Planning (BURP) | 1 |
| Surveyor | Diploma in Survey/Civil Engineering | 12 |
| Surveyor | Diploma in Survey Engineering | 10 |

For Topographic survey, the survey team was divided into 7 groups (each group contains two surveyors) to collect topographic features which could not be collected through photogrammetry due to dense vegetation, clouds, etc. All these groups were supervised by the Survey Expert and the Survey Supervisor.

3.1 Topographic Survey

The topographic survey of whole project area is inconvenient for direct ground surveying using RTK-GPS and Total Stations within a survey season. Hence, the Consultant adopted the photogrammetric surveying by which topographic data extracted from the 3D imagery (stereo imagery) of the project area.

In Photogrammetric Surveying, all topographic features are recorded in three dimensions (x, y, z coordinates) and topography is described by using mass points (spot levels) and break-lines (to describe a change of slope). Spot heights or land levels are extracted as DTM points at 10 m intervals for urban area and 20 m intervals for rural areas as described in the TOR. This data, together with 3D features (road edges, bank of river and other water bodies, etc), are used as break-lines to make Digital Terrain Models (DTMs), Digital Elevation Model (DEM), Triangulated Irregular Network (TIN), and the Contours..

In the densely vegetated area and clouded area RTK-GPS and Total Stations are used mainly to obtain 3-D data (X,Y, Z value) for enriching the photogrammetric data of roads, flood embankments and other drainage divides, drainage and irrigation channels. The Survey team carried out the survey to collect topographic features as much as possible using survey equipment and the satellite image based map sheets. The surveyors collected the following features from the field:

- Alignment of rivers, lake, canal and drainage channels etc. showing depth and direction of flow
- Alignment of roads, embankments, dykes and other drainage divides.
- Outline of bazaars, water body, swamps, barren land, low land, borrow pits, forest, open space, restricted area, etc.

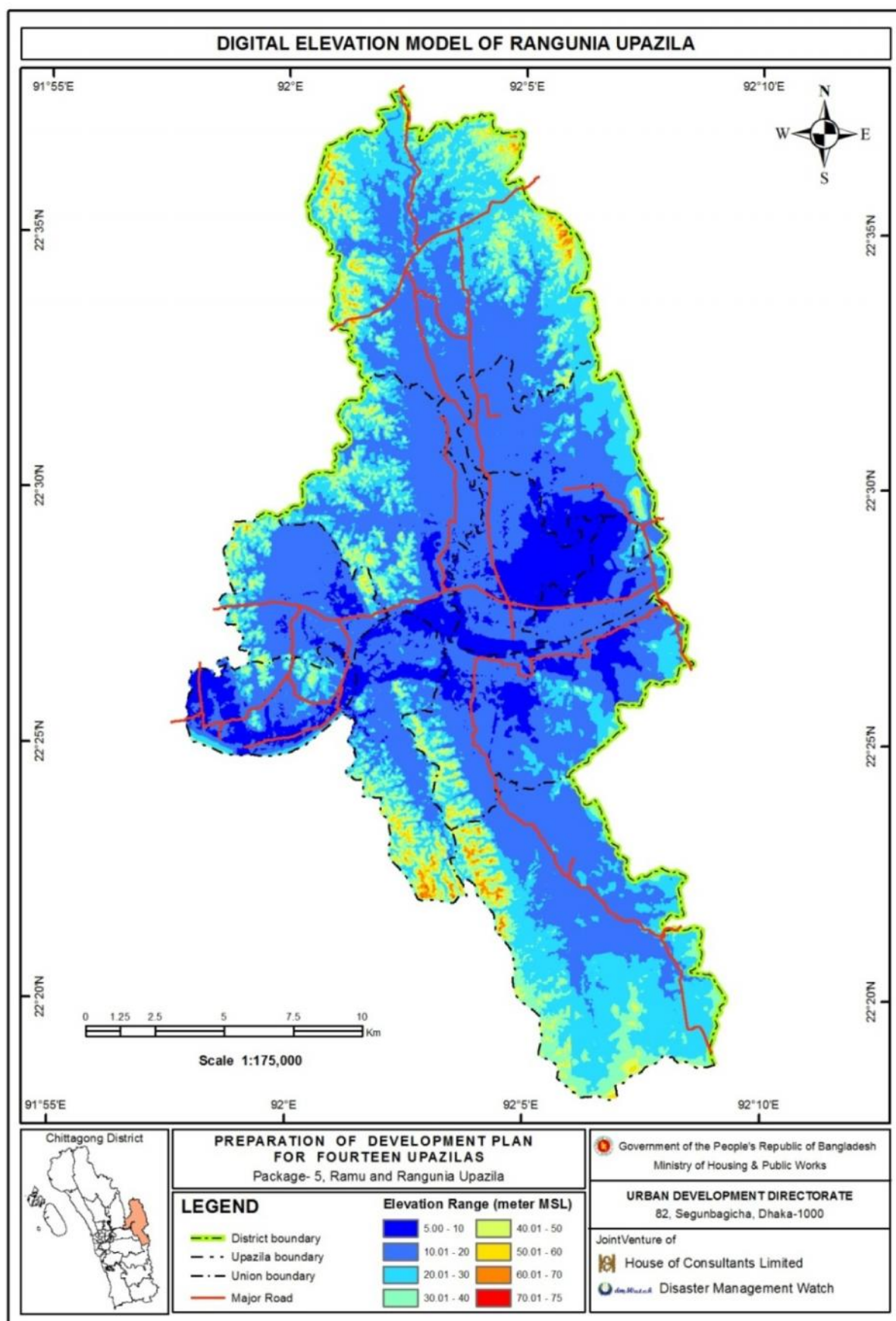
Chapter-04 Data Processing & Analysis

4.0 Processing of Topographic Data

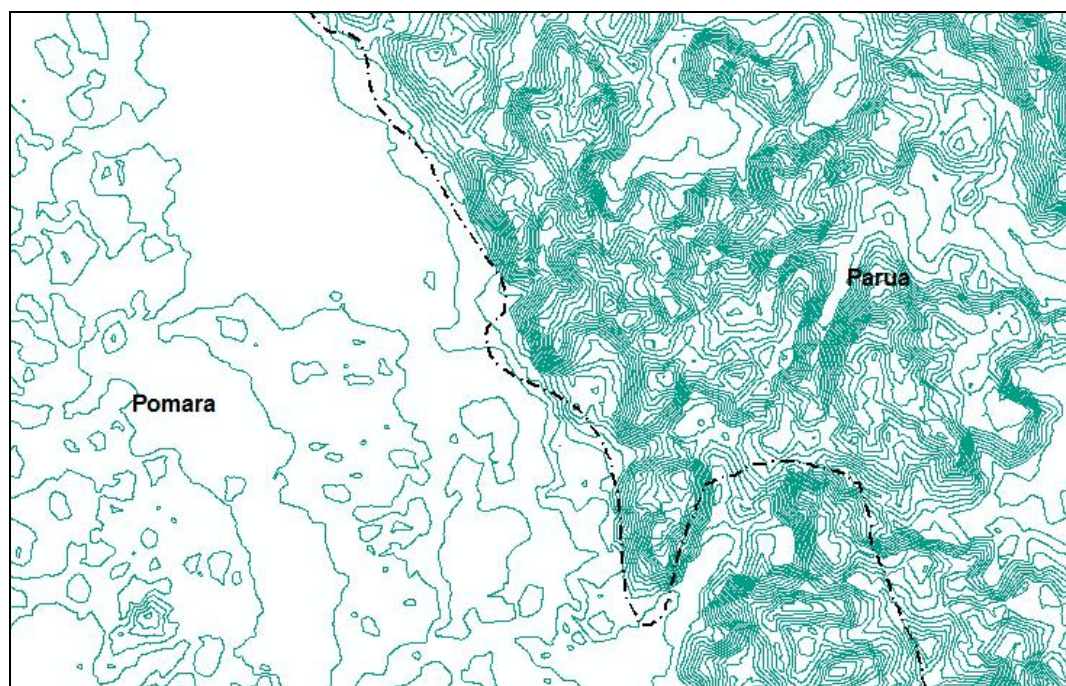
Using the DTM Points and the Break-lines Triangulated Irregular Network (TIN) and the Digital Elevation Model (DEM) has been generated. At the last stage the contour lines have been generated with 0.3 meter interval. **Map-3.1** shows the DEM of Rangunia Upazila and the **Map 3.2** shows the Contour Lines partially at Parua and Pomara Union of Rangunia Upazila.

4.1 General Topography of Rangunia Upazila

The topography of RanguniaUpazila is composed of plain land and hilly land. The general topography of the study area is ranges from 5 to 75 meter MSL.



Map-4.1: Digital Elevation Model of Rangunia Upazila



Map4.2: Contour Lines of Rangunia Upazila (Part)

4.2 Alignment and Crest Level of Major Roads

The alignment is the route of the road and crest level is the top surface of road, usually known as carriageway. Geographically, most of the study area lies above flood level and as a result road is the prime means of movement.

In Rangunia, four major highways pass through the study area connecting important places within the study area and neighboring area like Chittagong, Kaptai, Bandarban, etc. Besides, the study area is also well connected by number of arterial roads with all parts of the study area.

Table 4.1: Crest level of major roads along their alignment in Rangunia

| Name of the road | Height of crest level from MSL, in meter | | |
|------------------------------------|--|---------|---------|
| | Minimum | Maximum | Average |
| Chittagong-Kaptai Road (R163) | 8.087 | 29.912 | 12.597 |
| Hathazari-Rangamati Road (N106) | 14.2749 | 44.749 | 22.829 |
| Chandraghona-Bandarban Road (R161) | 11.794 | 40.580 | 20.715 |
| Gabtolli-Mariamnagar | 8.512 | 25.476 | 15.065 |

Source: Topographic survey, 2016

Chapter-05 Way Forward

The topographic features of Rangunia Upazila have been acquired mainly through photogrammetric method by using high resolution stereo satellite imagery. These data may be updated and fine tuned by RTK-GPS based Total Station survey especially in the vegetated and clouded area.

Topographic surveyed data and the derived data such as DEM, Contours, TIN, etc. can play important roles in hydrological analysis (watershed, stream network analysis and flood analysis, etc.), erosion and land slide analysis. Thus topographic survey data can be used to find out the suitable attributes for future developmental activities in the study area.

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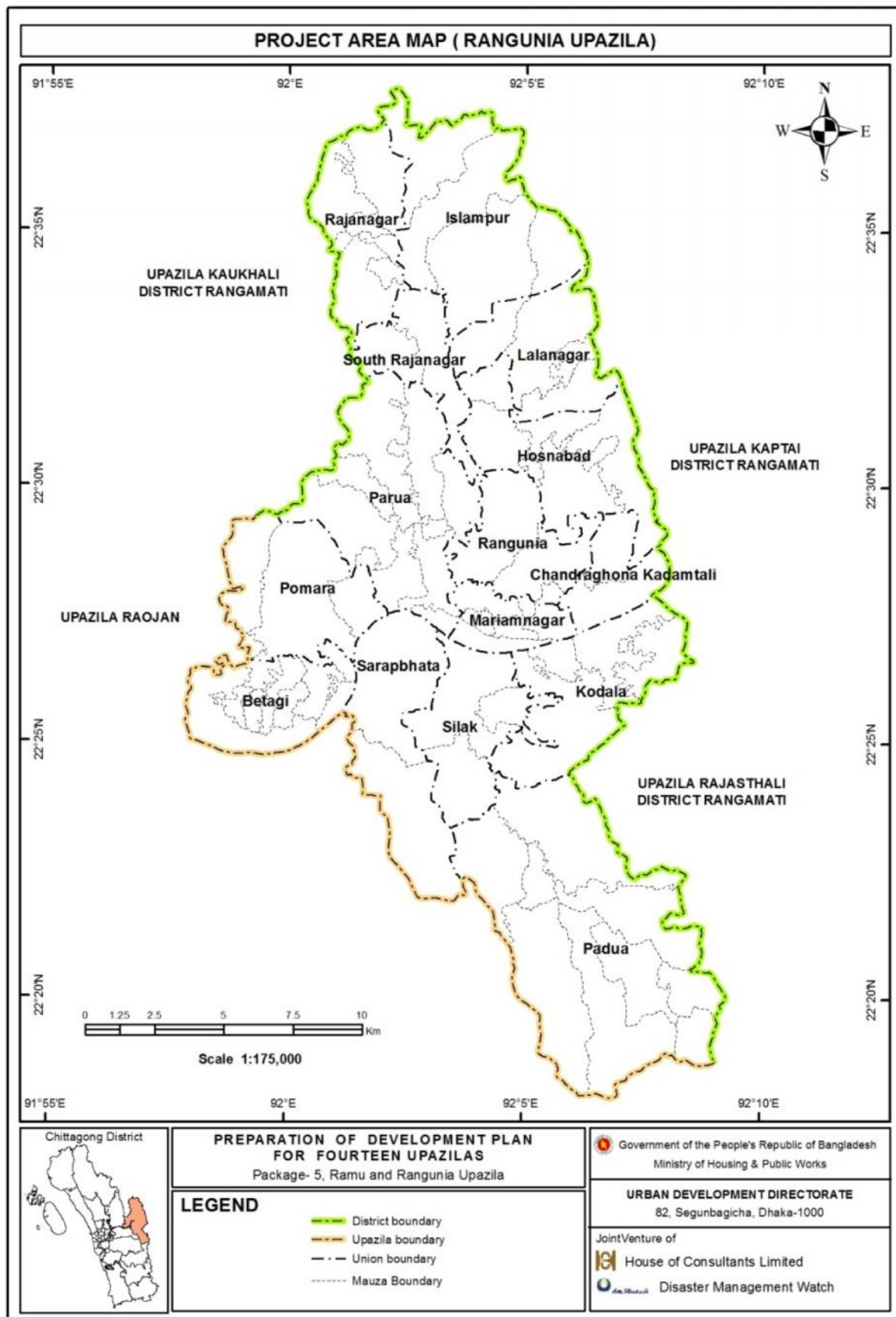
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Chapter-01 Introduction

1.0 Background

Integration of digital photogrammetry data into Geographic Information System (GIS) databases offers new possibilities for the end-users. Photogrammetry enables the conversion of multiple two dimensional (2D) images into three dimensional (3D) models of the earth's surface. Once initial 2D images are converted into 3D, three dimensional measurement applications (software) are used to extract survey data from the stereo model. Only the features which were obstructed by dense forests or group of trees, feature extraction is not possible by using photogrammetry. The photogrammetric works have been carried out according to the methodology mentioned in the TOR. The Project Area Map has been shown in **Map-1.1**.



Map-1.1: Project Area Map of Rangunia Upazila

1.1 Scope and Limitation

Digital Photogrammetry provides the facilities to capture geo data as 3D features. This means that photogrammetrist can measure height value of any object on the ground. Building height can easily be calculated from 3D image. Generation of Digital Elevation Model (DEM) has become easier and authentic. Also it solves the object tiling problem in image.

But there are some limitations of this photogrammetric technology. Generally image are captured from bird's eye view. So it is difficult to identify object under trees. Under trees, buildings height is calculated using surroundings height points.

There were two types of image resolution one is 0.5 meter image and another is 1.0 meter image. Resolution of 1.0 meter is 4 times less than 0.5 meter image. So object identification with 1.0 meter is very difficult but it is good for land use classification. It would be better if all images were 0.5 meter or higher if the image scale is same for urban and rural area.

Chapter-02 Methodology

2.0 Image Collection

The satellite image was ordered to The Decode Ltd. the authorized reseller/partner of Digital Globe Inc. The Consultant has purchased 0.5 meter stereo image for entire Rangunia Upazila. The specifications of the purchased satellite image are as below:

For Rangunia Upazila:

| | |
|----------------|--|
| Image Sensor : | World View-2 |
| Type : | Ortho ready stereo (3D) |
| Resolution : | 0.5m Panchromatic, 2.0 meter Multispectral |
| Source : | Archive 2014/11/03 |
| Total Area : | 353 Sq. km. |
| Bit Rate : | 8 Bit |
| Company : | Digital Globe Inc., USA |

2.1 Satellite Image Processing

Satellite image came with a certain level of processing. However, for the purpose of features extraction, further processing is needed in a number of steps. The step by step procedures has been shown in the **Figure 2.1**.

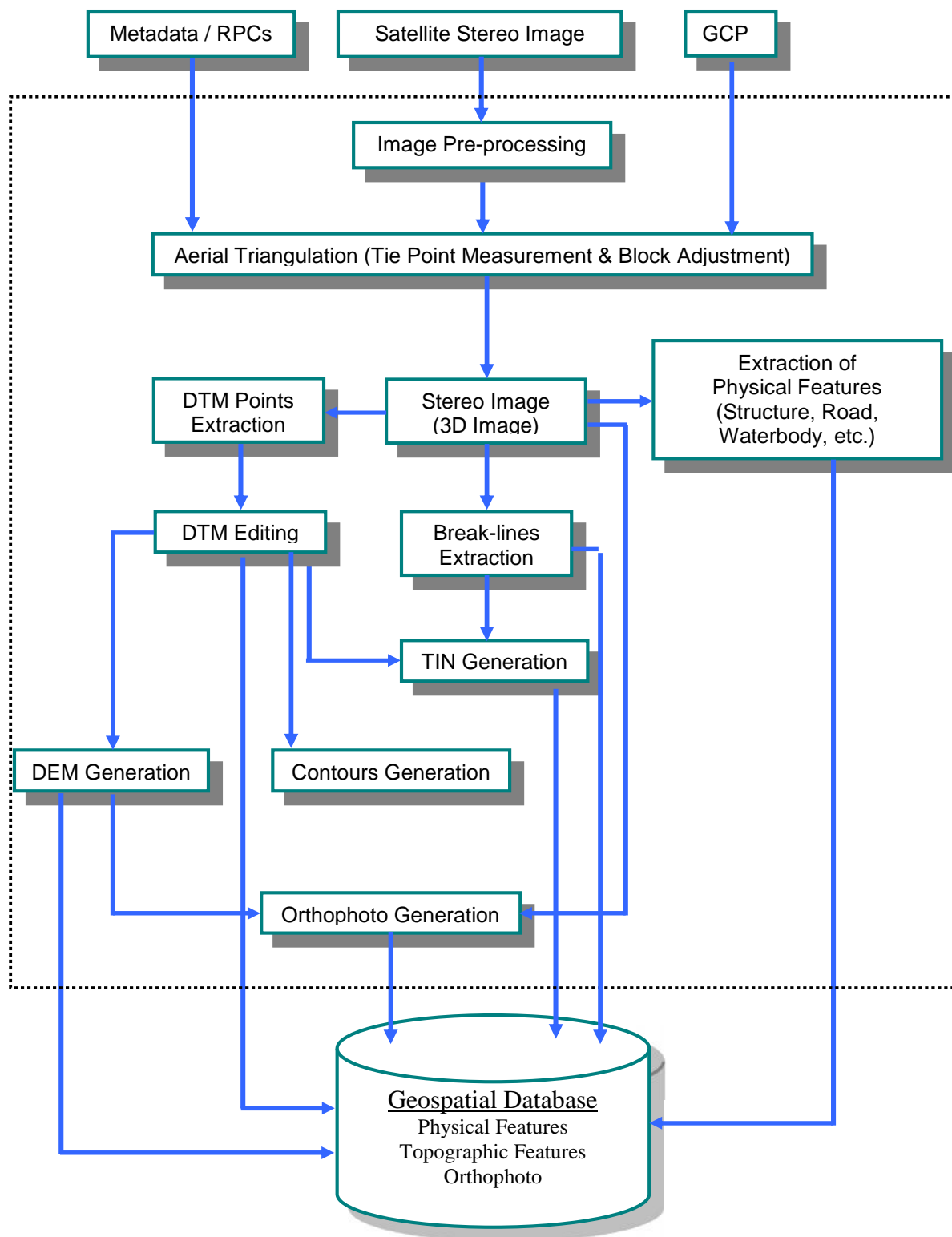


Figure 2.1: General Workflow for Satellite Image Processing and Data Extraction

2. 1.1 Image Pre-Processing

Satellite image came with two parts. One is multispectral band which resolution is 1.74 meter and another one is panchromatic which resolution is 0.5 meter. We need 0.5 meter multispectral image for feature extraction. After collecting raw digital images, the tasks involved in image processing are:

- Merge the image tile
- Color Balance
- Contrast Adjustment
- Pan-sharpening

2. 1.1.1 Merge, Color Balance and Pan-Sharpen

Satellite image comes with lots of small segment for a trip which called image tiles so that image can be sent by the provider on DVD media. The imagery for Rangunia Upazila covering whole upazila came with two different strips and there is only one segment for each strip.

The process of color balance required when there are multiple segments within a strip. As image of Rangunia was 8 bit image the satellite company did the color balance process. The Consultant only performed the Pan-sharpen process for the satellite Image of Rangunia Upazila. The Figure-2.2 shows a part of a multispectral image and Figure-2.3 shows panchromatic image of the same area. And the Figure-2.4 shows the pan-sharpen image of the same area.



**Figure 2.2: Satellite Image Multispectral
Image 2.0 meter**



**Figure 2.3: Satellite Image
Panchromatic 0.5 meter**



Figure 2.4: Pan-sharpen Image- multispectral 0.5 meter

The figure-2.5 shows pansharpen image of two strips covering whole upazila.



Figure 2.5: Pan-sharpen Image of Rangunia Upazila in two strips

2.1.1.2 Bit Rate, Pyramid and Epi-polar Correction

Bit Rate: In general practice 8 bit images are used. Satellite image can capture 11 bit image. Since the purchased satellite image is in 16 bit, it has been changed the 16 bit to 8 bit for radio metric adjustment and better handling the image.

Pyramid: To efficiently view and pan the image, the pyramid of the image has been built. The DATEM Summit Evolution software has been used for image interpretation.

Epi-polar Correction: Epi-polar geometry is the geometry of stereo vision. When two cameras view a 3D scene from two distinct positions, there are a number of geometric relations between the 3D points and their projections onto the 2D images that lead to constraints between the image points. The 3D models have been created by using the Summit Evolution software.

2.1.2 GPS/INS Processing

Raw IMU (GPS/INS) data of image is processed and adjusted to accomplish Aerial Triangulation. In case of satellite image the RPC file is replaced the GPS/INS file.

2.1.3 Aerial Triangulation

Aerial Triangulation is a mathematical process used to determine the position and orientation of each photograph at the moment of exposure.

Table 2.1: Input-output in Aerial Triangulation

| Input for AT | | Output of AT |
|--------------|----------------------------|-----------------------------|
| (1) | IMU data | Geo-referenced Stereo Model |
| (2) | GPS (on board) | |
| (3) | GCP (collected from field) | |
| (4) | Image | |
| (5) | RPC file | |

The GCP and BM collected from SOB have been used for correcting the 3D satellite image coordinate using Inpho Match-AT software.

2.2 Digital Mapping (Feature Extraction) from Stereo Model

After the orientation of stereo models, digital mapping has been carried out. ArcGIS Geo-database model has been used for storing geo-spatial data. The Geo-database and its feature classes has been designed based on ToR.

Digital Photogrammetric Workstation (DPW) has been used as the platform for acquiring features from digital stereo images (model).

Feature registration has been done considering and measuring the position of the object under its accuracy level. The Summit Evolution & Stereo Plotter of DAT/EM has been used for identifying and registration of the objects and ArcGIS 9.3 of ESRI has been used for vector data storing and editing.

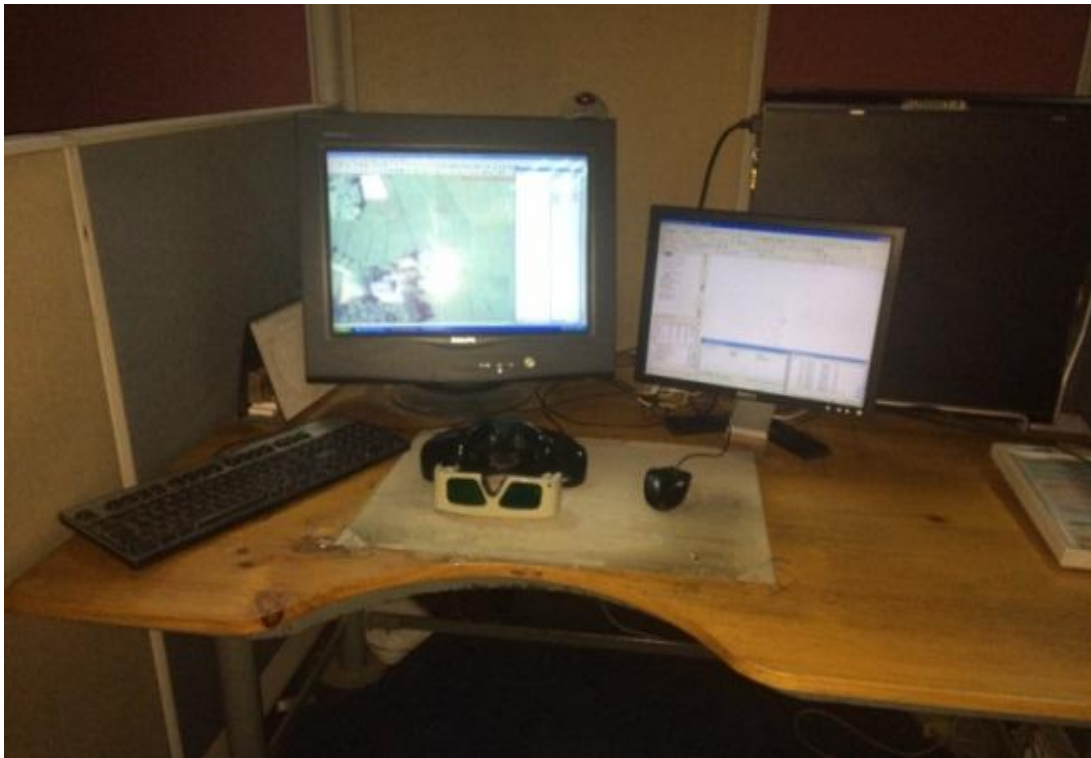


Plate-1: Digital Photogrammetric Workstation (DPW)

A team of photogrammetrists has digitized Building roof with MSL height, bridge/culvert, road, khal, pond, lake, ditch, marsh/swam, river, etc. All features have been digitized in 3-dimension (X,Y,Z). **Figure 2.7** and **Figure 2.8** shows the extracted features of Ramu Upazila at a glance.

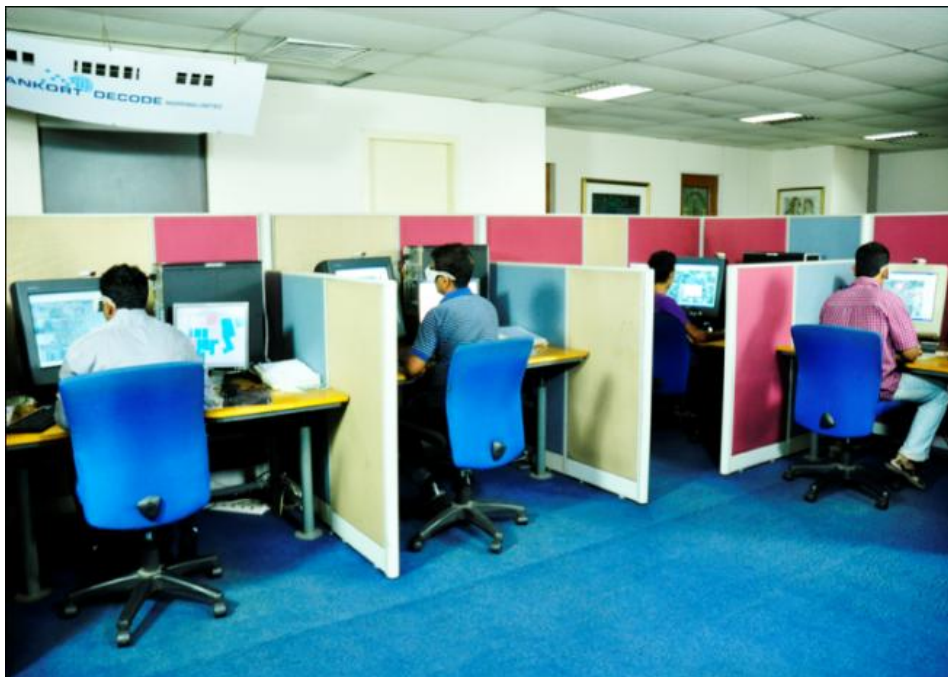


Plate-2: Photogrammetrist Extracting Features in DPW

A team of photogrammetrists has digitized Building roof with MSL height, bridge/culvert, road, khal, pond, lake, ditch, marsh/swam, river, etc. All features have been digitized in 3-

dimension (X,Y,Z). **Figure 2.6** and **Figure 2.7** shows the extracted features of Rangunia Upazila at a glance.

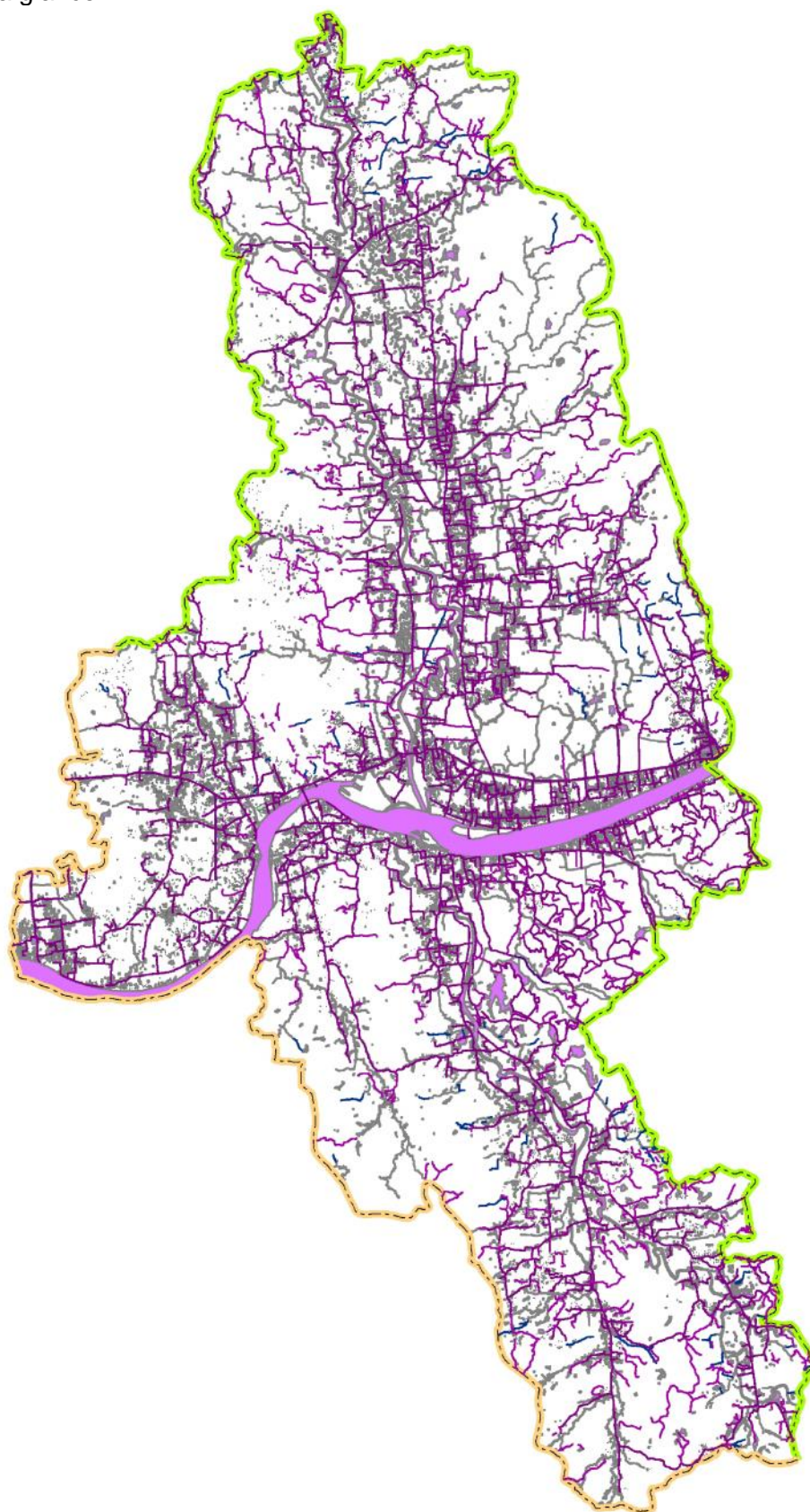


Figure 2.6: Extracted Features of Entire Rangunia Upazila by Photogrammetry

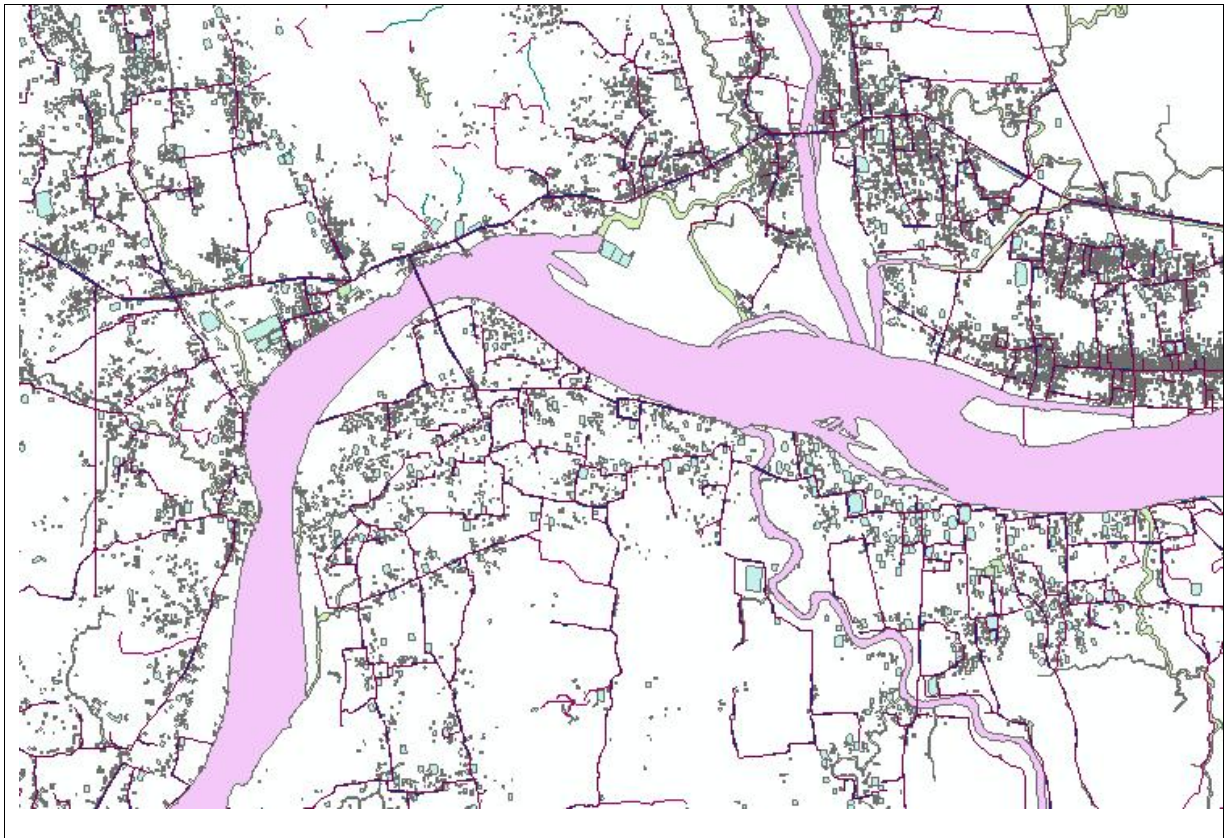


Figure 2.7: Enlarged Partial View of Extracted Features of Rangunia

For spot heights acquisition, firstly the DTM points have been generated automatically from stereo pair images by the software. Spot heights or land levels are extracted as DTM points at 10 m intervals for urban area and 20 m intervals for rural areas as described in the TOR. These automatically generated points have been then checked and edited by comparing them with stereo model in photogrammetric workstations. **Figure 2.9** shows the DTM Points in 20 meter interval in Parua and Pomara Union of Rangunia Upazila. **Figure 2.10** shows the Contour Lines partially at Parua and Pomara Union of Rangunia Upazila.

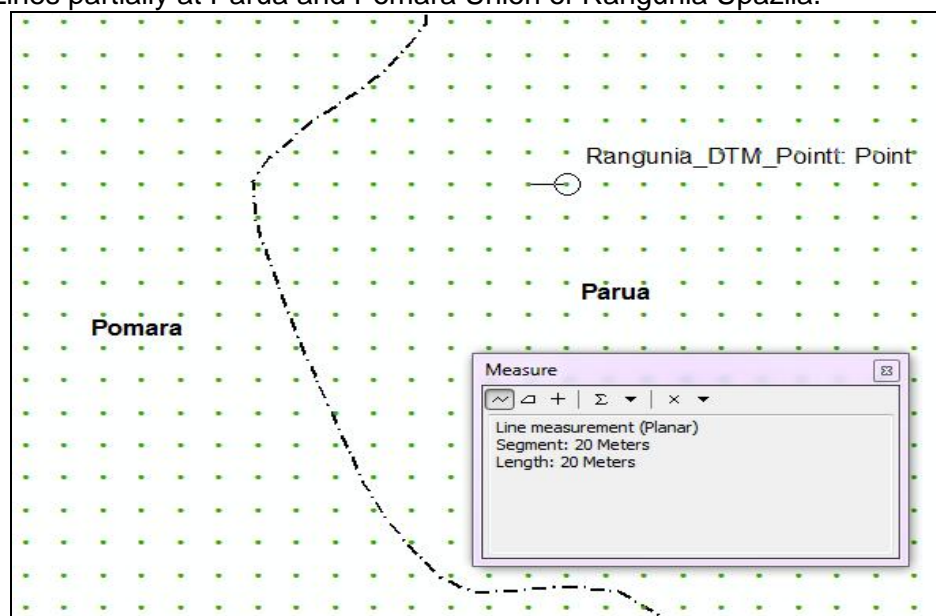


Figure 2.8: DTM Points (Spot Heights) of Rangunia Upazila (Partial)

The Break-lines have been created and edited after extraction of DTM Points.

The DTM Points and the Break-lines has been used later to create Triangulated Irregular Network (TIN), Digital Elevation Model (DEM) and the Contour Lines which is described in the Topographic Survey Report.

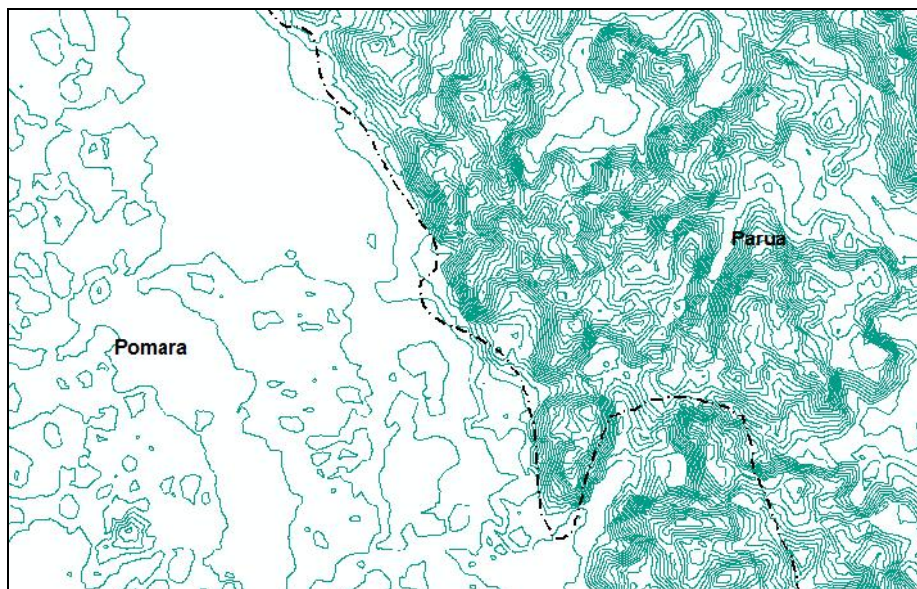


Figure 2.9: Contour Lines of Rangunia Upazila (Partial)

2.3 Generation of Ortho-rectified Image

An ortho-rectified image or ortho-photo is an image which has been “corrected” for the geometric distortions (different projection, lens/sensor distortion, relief) so that it can be used as a map.

Using the DEM of the Upazila, the Ortho-rectified image has been created using photogrammetric software. Figure-2.11 shows a part ortho-rectified satellite image of Ramu Upazila.



Figure 2.10: Ortho-Rectified Image of Rangunia Upazila (Partial)



Government of the People's Republic of Bangladesh
Ministry of Housing and Public Works
Urban Development Directorate (UDD)

Preparation of Development Plan for Fourteen Upazilas

Package 05:

**Ramu Upazila, District: Cox's Bazar &
Rangunia Upazila, District: Chittagong**

FINAL SURVEY REPORT

Hydrological Survey of Rangunia Upazila

June 2016

Joint venture of



HOUSE OF CONSULTANTS LIMITED (HCL)

and



dm.Watch Disaster Management Watch(dm. Watch)

EXECUTIVE SUMMARY

This report presents the hydrological survey data obtained during the hydrological survey works conducted at Rangunia Upazila under Chittagong district. The undertaking is a part of the project, "Preparation of Development Plan for Fourteen Upazilas" – Package – 5. Bathymetric survey of the two major drainage channels of Rangunia Upazila, namely Ichakhali and Shilok was done. During the survey works, information regarding any existing water control structure, river crossings, distributaries and tributaries were collected. It also presents the detailed survey data of the existing drains within the town area. While collecting data for existing drainage systems, information about water logging zones or water logging points were collected. For the natural perennial channels, cross sections were surveyed at the locations of existing structures on the rivers, at junctions with and of other channels or rivers. For drains, sizes were charted at starting locations, junctions and end points. The reduced levels of existing ground at those locations were measured too. To measure the reduced levels on the field, dumpy levels were used. The levels were measured with respect to nearby benchmarks or temporary benchmarks of authorized organizations like Bangladesh Water Development Board, Public Works Department, Roads and Highways Department, Local Government Engineering Department etc. GPS locations at each BM/TBM location, at the point of start of each cross section, at any structure location and at all the control points of the drains were recorded. Other collected data include flow directions, channel names, presence of tidal effects etc. The information will be incorporated with the DEM on GIS and if needed, adjusted according to the established GCPs. This will subsequently facilitate any sort of numerical watershed analysis and hence extrapolate a prediction for the future. It will also help for impact assessment, particularly for flash floods, an attribute of the hilly areas. This report also presents the analyzed data of water level gauge stations, the rainfall data analysis and the project site data deduced from them.



D S Adibul Abedin
Hydrologist

Abbreviations

| | |
|----------|--|
| ArcGIS | Spatial Data Analysis Software by ESRI |
| BADC | Bangladesh Agricultural Development Corporation |
| BM | Benchmark |
| BMD | Bangladesh Meteorological Department |
| BWDB | Bangladesh Water Development Board |
| DEM | Digital Elevation Model |
| EGL | Existing Ground Level |
| EPA SWMM | The United States Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) |
| EV I | The first asymptotic distribution of extreme values |
| GCP | Ground Control Point |
| GPS | Global Positioning System |
| HEC-HMS | The Hydrologic Modeling System is designed to simulate the precipitation-runoff processes of dendritic drainage basins. HEC-HMS is a product of the Hydrologic Engineering Center within the U.S. Army Corps of Engineers. |
| HEC-RAS | A computer program that models the hydraulics of water flow through natural rivers and other channels developed by the US Department of Defense, Army Corps of Engineers. |
| HFL | Highest Flood Level |
| IDF | Intensity Duration Frequency |
| L/B | Left bank |
| LFL | Lowest Flood Level |
| LGED | Local Government Engineering Department |
| mPWD | RL found against a PWD benchmark in meters |
| PWD | Public Works Department |
| R\B | Right Bank |
| RHD | Roads and Highway Department |
| RL | Reduced Level |
| TBM | Temporary Benchmark |
| UDD | Urban Development Directorate |

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CHAPTER 1 PROJECT OVERVIEW

1.0 Background and Objective

The project, “Preparation of Development Plan for Fourteen Upazilas” was initiated by Urban Development Directorate, Ministry of Housing and Public Works, Government of Bangladesh. The main objective of the project is upgrading the living standard of the local people. Rangunia is prone to flash flood and water logging problems. The urban areas lack proper drainage system. It is needed to assess the effects of flash floods and understand the water logging problems and propose an efficient drainage system in the development plan. Due to steep slope of the ground and being a flashy area, analyzing only the water level and rainfall data is not enough to assess the hydrology of the region. Flood modeling software should be used to understand the actual flooding conditions and identify the water logging areas. Models should also be used to assess the efficiency of the existing and proposed drainage system.

One aspect of this Hydrological Survey is the bathymetric survey of the main rivers within the project area. The purpose of bathymetric survey is to provide bathymetric information of Ichamati and Shilok rivers, the major rivers in the area. The information obtained in the field will be incorporated in the DEM through a process called “Burning”. This will be necessary for analyzing the surface water flow to assess flood through flood modeling software. It is required to assess the flood conditions during different time period and season against different water levels and discharge (*Sample results shown in Fig: 1 & Fig: 2*). If the actual cross-section of the river or channel is not obtained, the analysis will be faulty and will overstate the flood. This type of analysis will be helpful for preparation of effective and long lasting development plans for the Upazila. Hence, accuracy of the analysis is of prime importance. Although Karnafuli River is the main drainage channel at Rangunia, bathymetric survey of that river was not done. Only the water level data of that river will be used as boundary conditions for the studies of Ichamati and Shilok Rivers.

To run a flood model of the area, water level, discharge and rainfall data of the vicinity have been collected from secondary source and analyzed. Water level data of BWDB gauge stations SW 124 and SW 125 at Rangunia over Ichamati River have been collected. The rainfall data for the station CL 330 have been collected. 3-hourly rainfall data of BMD stations at Rangamati, Patenga, Chittagong and Ambagan, Chittagong has been collected. The data are to be analyzed to obtain water level, discharge and rainfall data for different return period. The water level and discharge data are needed to set the boundary condition in flood models. The rainfall data will be used to obtain runoffs to calculate discharge at pour points of the sub-catchments.

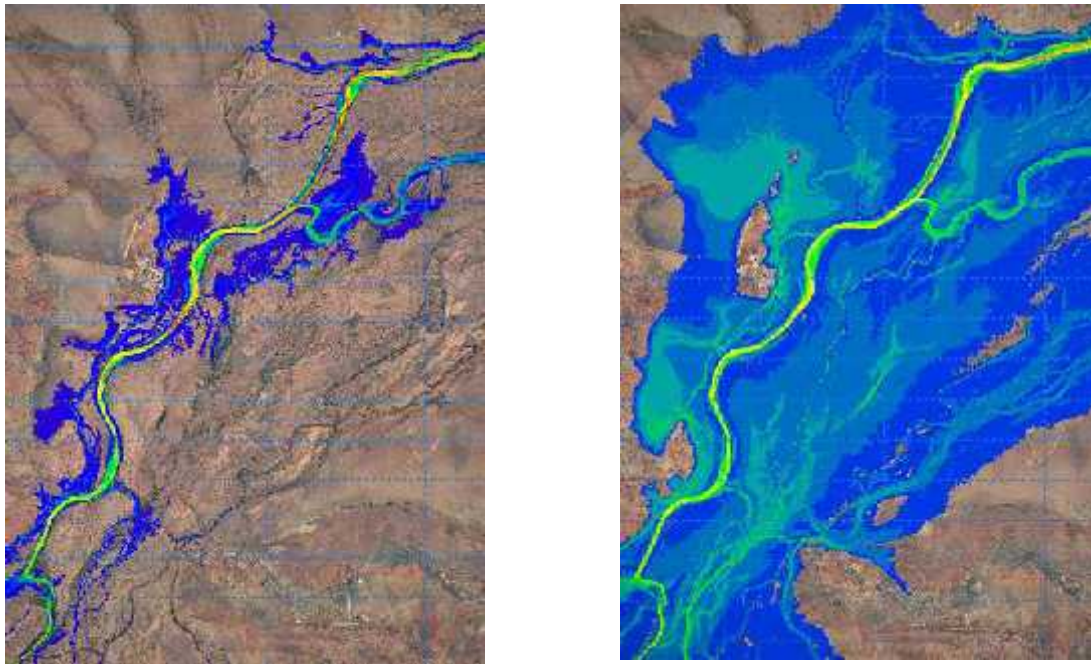


Fig-1: An integrated 1D-2D flood model on a flood plain showing flood conditions at different water level and flow time using Mike Flood (DHI)



Fig-2: An integrated 1D-2D flood model showing flood conditions in a city area using HEC-RAS

Understanding the water logging problems within the town area and proposing a comprehensive drainage system is another aspect of the survey. Drainage system development is unavoidable when it comes to sustainable urbanization. It is necessary to plan ahead for an efficient drainage system. For this, assessment of capacity and utility of the existing drainage system is essential. Information of the existing drains in the township of Rangunia have been collected. The information includes depth, width and EGL at the junction points of the drains. 3-hourly rainfall data, collected from Goddard Earth Sciences Data and Information Service Center, will be used to prepare the hourly rainfall data or the intensity duration frequency (IDF) curve for designing storm sewer system. This will be used to assess the capacity of the existing drainage system and in designing the proposed drainage system. (Fig: 3)

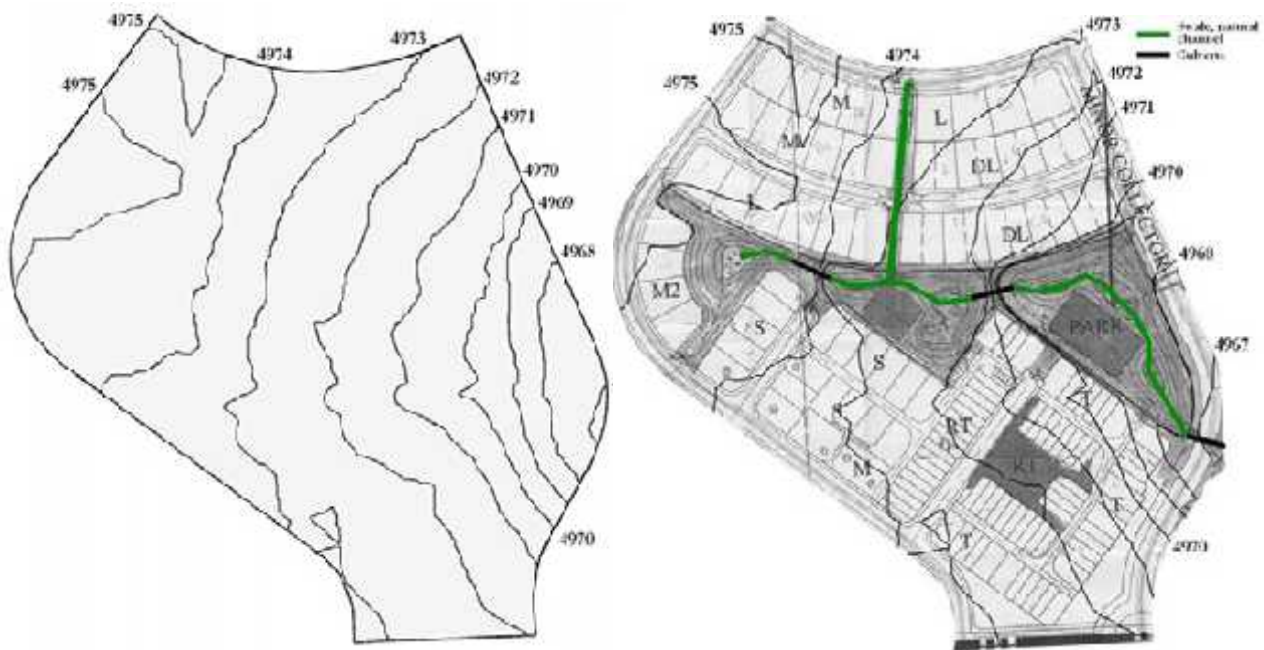


Fig-3: Model developed using EPA SWMM simulating undeveloped (left) and developed (right) conditions to calculate and compare the difference of discharge

With the above in view, the overall objectives of the survey are as listed below:

- Bathymetric survey of the major rivers.
- Identification of hydraulic structures and collecting information regarding capacity and sill levels of the structures.
- Identification of flash flood hazard locations.
- Identification of flow directions and tidal effects.
- Collection of observed flood levels in the field.
- Collecting information of any existing drainage system.
- Identification of water logging zones.
- Collecting information regarding encroachments of natural water bodies and drains.
- Collection of water level, discharge and rainfall data from secondary sources.

The analysis of the collected water level, rainfall and discharge data done using EV I method are added in ANNEXURE - I(b). The Rest of the analysis using the Normal distribution, Log normal distribution and Log Pearson III distribution along with the goodness of fit analysis will be added in the final planning report of the project, "Preparation of Development Plan for Fourteen Upazilas".

CHAPTER 2 METHODOLOGY

2.0 Survey Method

2.1 Measuring Reduced Levels

To measure the reduced levels, dumpy levels and 5m staffs were used. In case of rivers, the levels were measured with respect to the nearest known benchmarks of Bangladesh Water Development Board or temporary benchmarks of any authorized government organizations viz., Roads and Highways Department or Local Government Engineering Department etc. After establishing a horizontal line of collimation / line of sight with respect to a BM/TBM, staff readings are taken within the range of visibility of the dumpy level. For any reading beyond the visibility range, the dumpy level needs a change of station. A temporary benchmark is established and further measurements are made with respect to that. In case of a change of level of more than the height of the staff (5m generally), the levelling machine needs to be shifted and setup again. Subtracting the level of line of sight from the staff readings provides the reduced levels at the point concerned. In figure 4, a schematic diagram of survey method using Dumpy Levels is shown. In picture 1 & 2, a dumpy level, a 5m staff and a view of the cross-hair is shown.

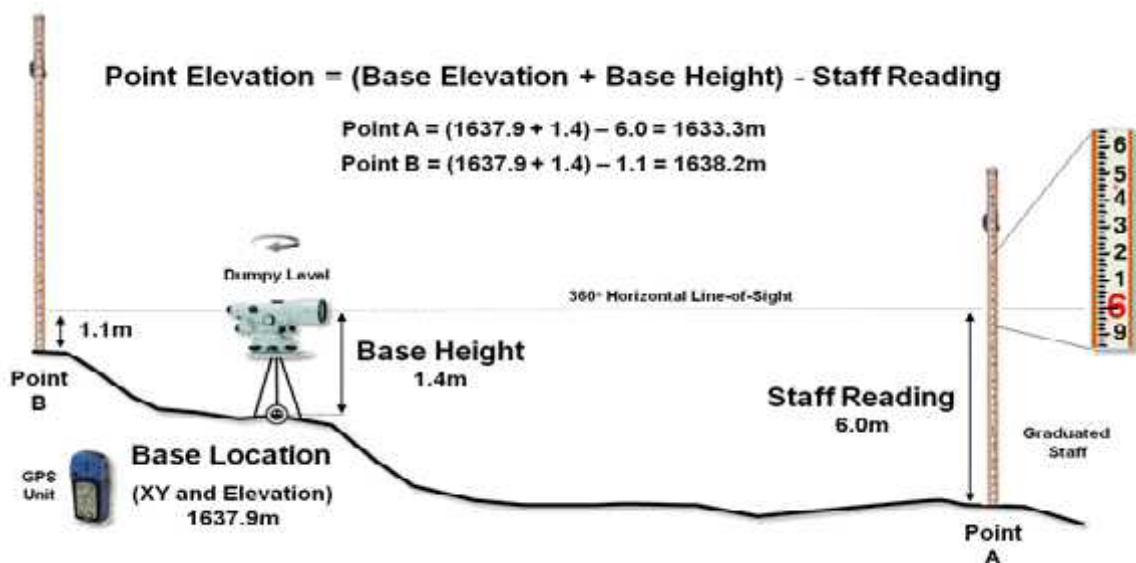


Fig-4: A Dumpy level establishes a horizontal plane to measure the relative elevation differences throughout a project area. A hand GPS is used to get the location of the base.



Plate-1 & 2: A Dumpy level being used to measure levels in the field.

2.2 Identification of Location

A hand GPS was used to identify the location of the cross-sections, structures, drain control points etc.

2.3 Data Collection

To collect information regarding water control structures in the vicinity, the government organizations that are responsible for any development works regarding water resources development were contacted. The three government organizations that are active in the area are Bangladesh Water Development Board (BWDB), Local Government Engineering Department (LGED) and Bangladesh Agricultural Development Corporation (BADC). Key information of the structures about their invert level, number and size of vents etc. were collected. *Plate-3* shows the stilling basin of Shilok Rubber Dam at Rangunia and *Plate-4* shows how the RL of the wing wall of the same rubber dam is being measured.



Plate-3 & 4: Information of Shilok Rubber dam at Rangunia being collected.

To identify locations that are prone to flash flood hazards or water logging problems, questionnaire was prepared and information was collected accordingly. The questionnaire is attached to Annexure – II(a). During the engineering survey, information like highest and normal flood levels, highest tide levels and lowest tide levels were collected from the local farmers, fishermen or boatmen.

As for the secondary data, water level data of the gauge stations SW 124 and SW 125 of Bangladesh water development are collected. The station SW 124 also provides discharge data of Ichamati River. Daily Rainfall data of BWDB gauge CL 330 have also been collected. There are no local rainfall gauge station of BMD in the area. 3-hourly Data from BMD station in Rangamati and two BMD stations at Chittagong are collected.

CHAPTER 3 FINDINGS OF SURVEY WORKS

3.0 Survey Results

3.1 Survey of Main Rivers

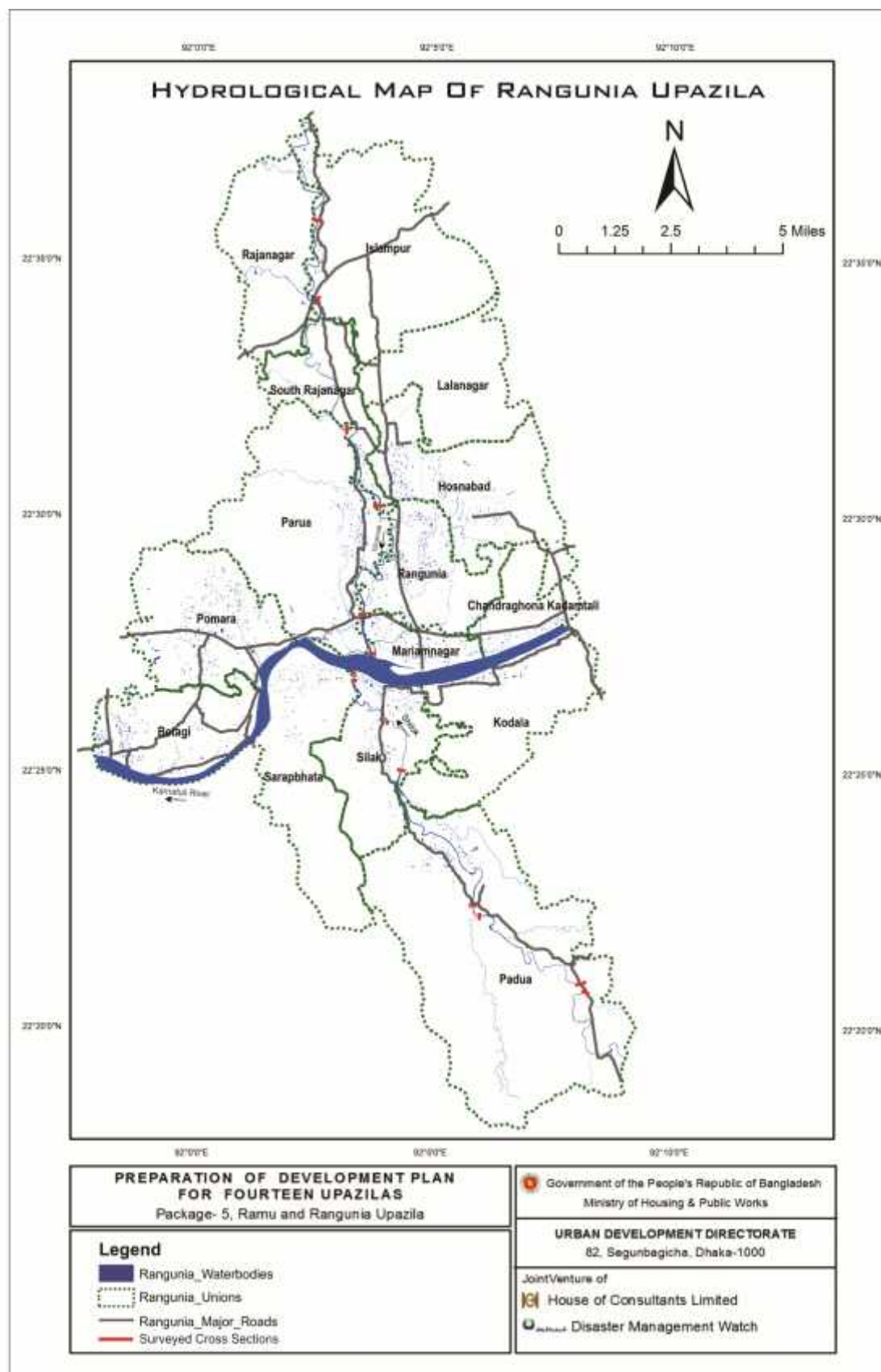
The bathymetric survey of the Ichamati River and Shilok River, the two major rivers in Rangunia Upazila have been done. Although Karnafuli River is the main river at Rangunia, the Bathymetry of that river is not necessary. This is because, the bathymetry of the major rivers are necessary for flood modeling and treating the Karnafuli as an outfall of the Ichamati and Shilok rivers will serve the purpose. Both the rivers fall into Karnafuli and together flows further west to meet the Bay of Bengal. The cross-sections (*Map -1*) have been prepared using the reduced levels obtained in the field against Bangladesh Water Development Board benchmarks. Some sample cross sections as surveyed are shown from *Fig – 5* to *Fig – 8*. In total, 11 cross sections have been done in Rangunia and its impact areas to analyze the hydrological data. During the survey, information about hydraulic structures on the rivers and along the banks of the rivers has been recorded.

3.2 Dependencies

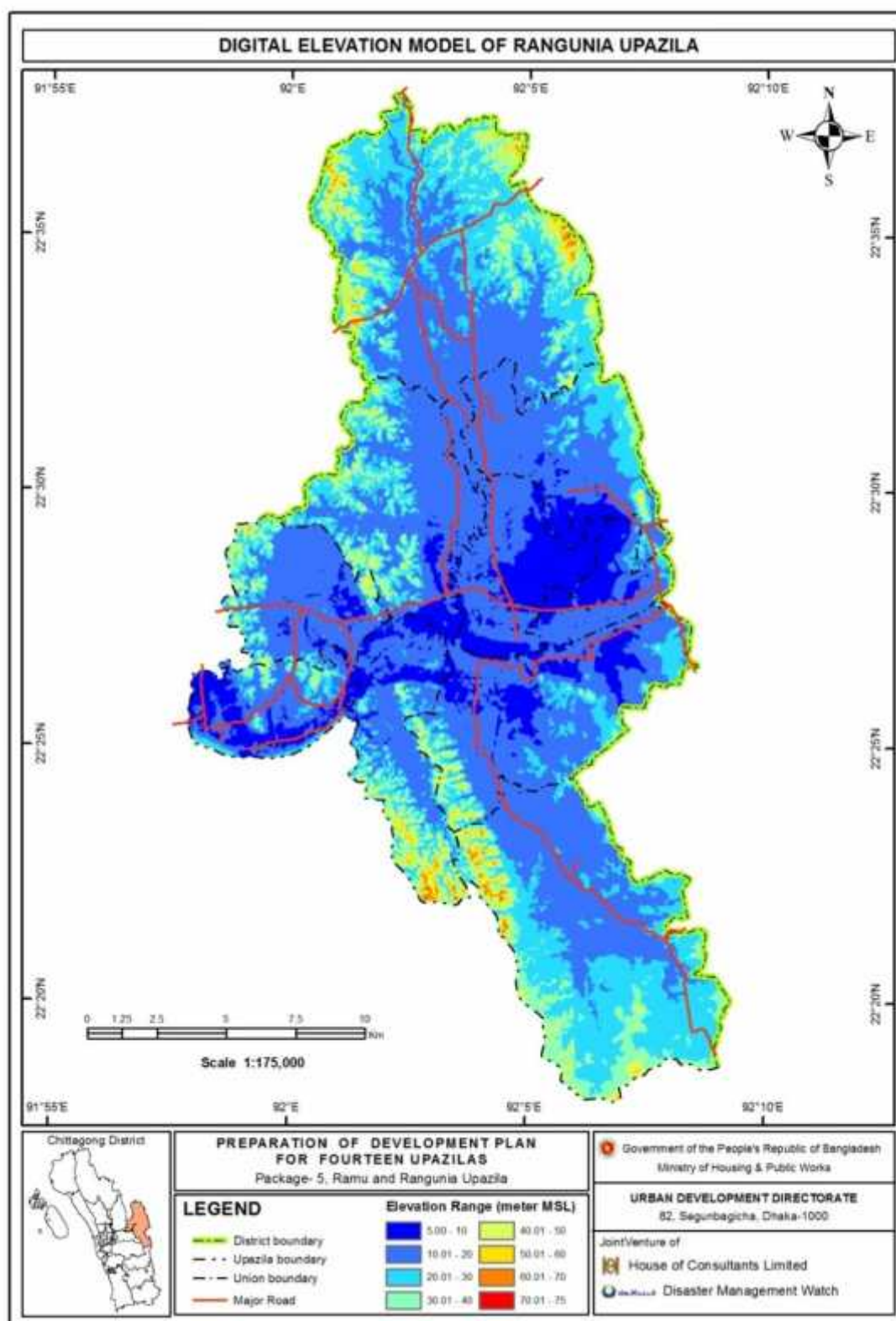
The hydrological works are dependent upon the land use survey, topographic survey and physical feature survey for the respective outcomes of those survey works done under this project. During Physical feature survey, information regarding hydraulic structures has been collected. The local offices of Government Agencies like BWDB, BADC and LGED have been contacted to get data about any irrigation projects or drainage projects that are either currently being operated or being planned by them. The responses of the local populace have been inquired to understand their attitude towards those projects.

The land use survey will be required to prepare the rainfall runoff model for Rangunia. Depending upon the use of land, the runoff over a certain segment of land will vary. On a surface exhibiting vegetation, the rainwater shall be impeded from reaching any natural or man-made drainage system. A portion of the precipitation will be intercepted by the canopy before the rain water can reach the ground, also the infiltration rate will be high. All these factors prevents the accumulation of rain water and thus reduces runoff. On the other hand, on a buildup area, much of the vegetation is gone and the land is more or less covered with impervious construction. Interception and infiltration hence reduces, resulting in an increase in net runoff.

Topographic survey is required to understand the undulations on the ground surface. On a steep slope, the water flows quicker towards drainage bodies which are vice versa for a flat land. The digital 3D stereo imageries that have been collected as a measure of the survey works were used to prepare a Digital Elevation Model (DEM) of the land (*Map -2*).



Map-1: Map showing the locations of surveyed cross-sections, direction of flow and stagnant water bodies



Map-2: Map showing DEM prepared using the 3D stereo imageries for Rangunia Upazila, Chittagong

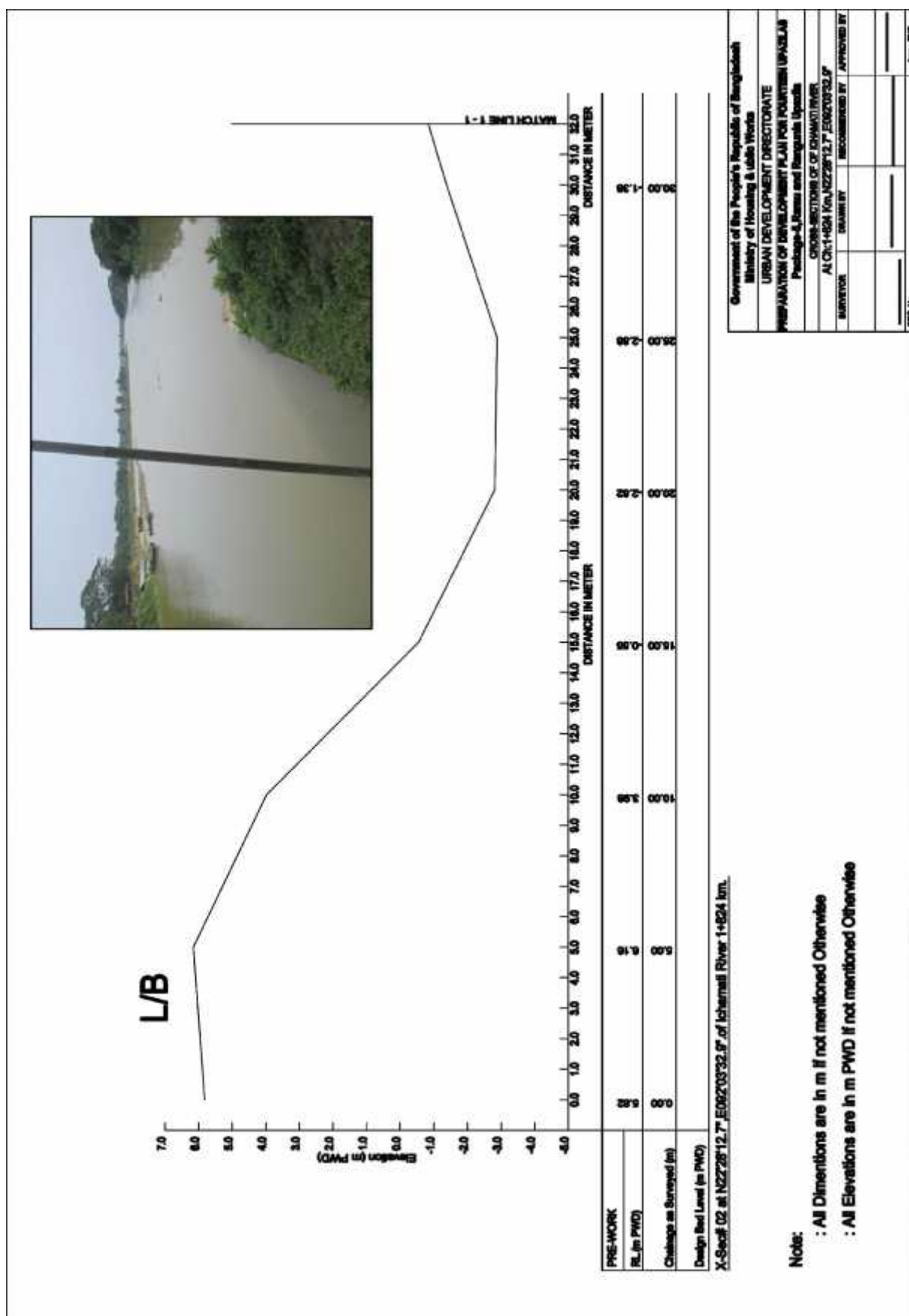
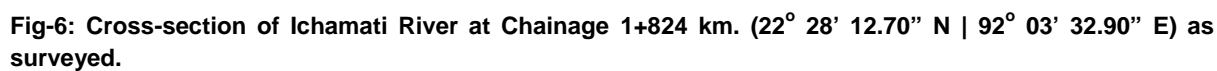
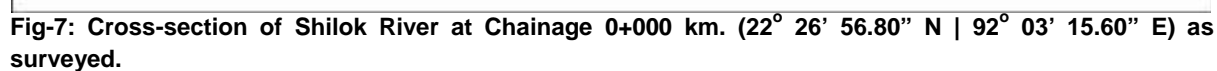
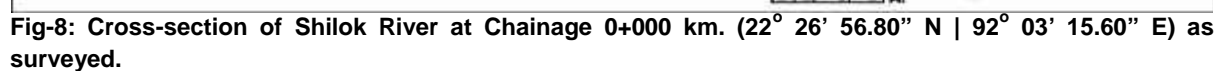


Fig-5: Cross-section of Ichamati River at Chainage 1+824 km. (22° 28' 12.70" N | 92° 03' 32.90" E) as surveyed.





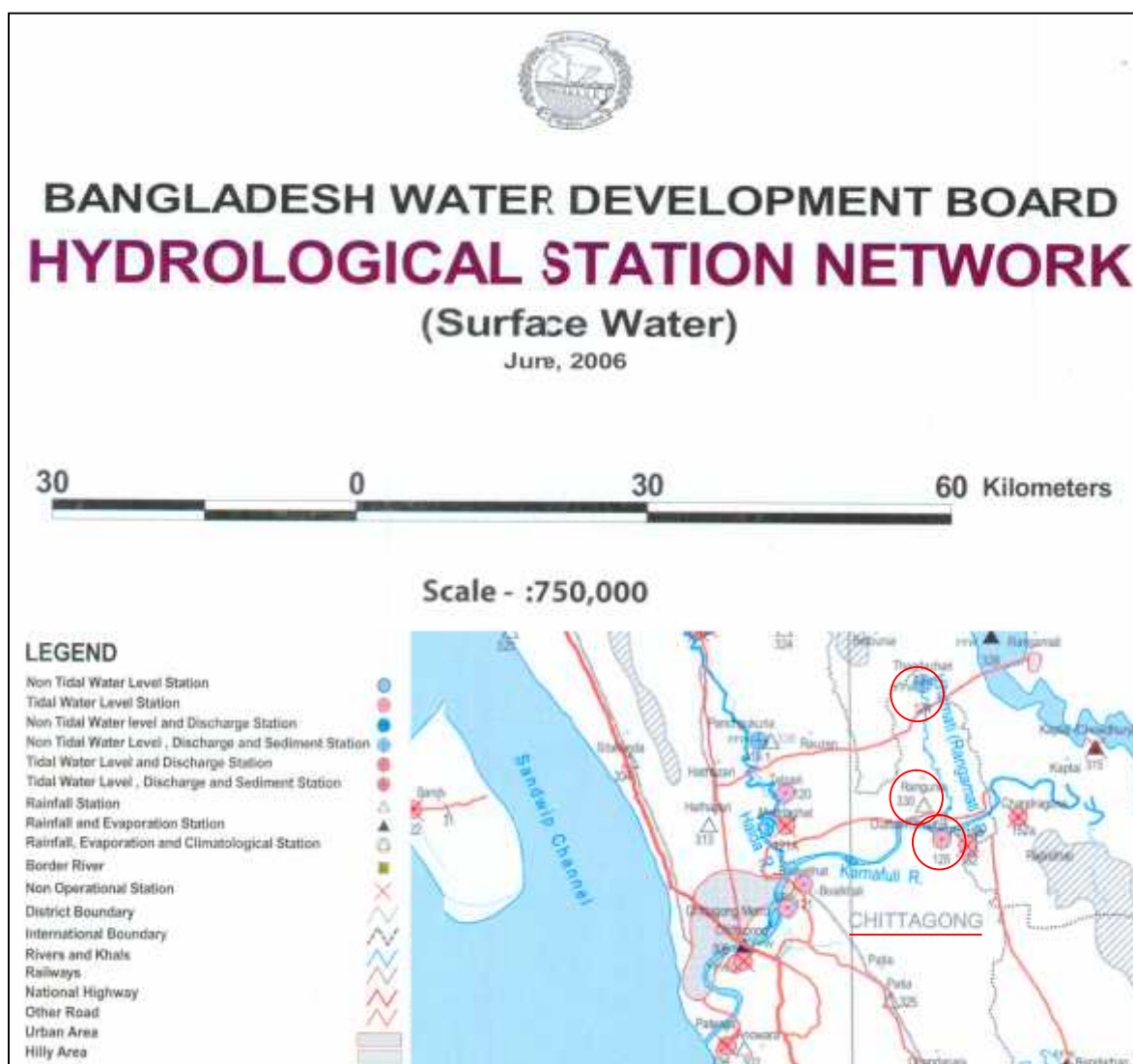


3.3 Survey of Existing Drainage Systems

Information of existing drains at Rangunia regarding depth and width, RL and GPS locations at different junction points, starting points and ending points are obtained. Names of roads alongside the drains are also collected. Lining conditions (Lined or Unlined) of the existing drains have been identified during the survey. This information would be used to prepare a drainage inventory to assess the capacity of the existing drainage system and with a view to that, a drainage improvement plan will be prepared.

3.4 Samples of Collected Data

The BWDB Water Level, Discharge and Rainfall gauge stations of which the data has been collected are shown on Map-3. The sample data are charted from Table – 3.1 to 3.4



Map-3: Locations of BWDB Water Level, Discharge and Rainfall gauge stations at and around Rangunia, Chittagong, of which the data has been collected (SW 124, SW 125, CL 330).

Table 3.1: Sample of Collected Rainfall data of BMD at Rangamati Station

| Station : Rangamati | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|------|-------|-----|--------|---|----|----|---|---|---|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 3-hourly Rainfall (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| index | year | month | UTC | Dt (01 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31) |
| 12007 | 2003 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 1 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 1 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 1 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 1 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 2 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 2 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 2 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 2 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 2 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 2 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 3 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2003 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 10 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 10 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 10 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 72 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 10 | 9 | 0 | 0 | 0 | 4 | 6 | 4 | 0 | 10 | 21 | 2 | 0 | 0 | 0 | 0 | 26 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 10 | 12 | 0 | 0 | 37 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 10 | 15 | 0 | 0 | 37 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 10 | 18 | 0 | 0 | 9 | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 10 | 21 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12007 | 2009 | 11 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 3.2: Sample of Collected Rainfall data of BMD at Chittagong (Ambagan) Station

| Station: Chittagong (Ambagan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|------|-------|-----|--------|---|----|----|---|---|----|---|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 3-hourly Rainfall(mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| index | year | month | UTC | Dt (01 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31) |
| 41977 | 2003 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2003 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2003 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2003 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2003 | 1 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2003 | 1 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2003 | 1 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2003 | 1 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2003 | 2 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 10 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 38 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 10 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 35 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 10 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 10 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 10 | 12 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 10 | 15 | 0 | 0 | 10 | 18 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 10 | 18 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 10 | 21 | 0 | 6 | 0 | 0 | 0 | 0 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 11 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 11 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41977 | 2009 | 11 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 3.3: Sample of Collected Rainfall data of BMD at Chittagong (Patenga) Station

| Station : Chittagong (Patenga) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|------|-------|-----|--------|---|---|----|---|---|---|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---|---|
| 3-hourly Rainfall(mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| index | year | month | UTC | Dt (01 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31) | | |
| 11921 | 2008 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | | |
| 11921 | 2008 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 0 | 0 | 0 | 1 | | |
| 11921 | 2008 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 2 | 0 | 0 | 0 | 1 | | |
| 11921 | 2008 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | | |
| 11921 | 2008 | 1 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | | |
| 11921 | 2008 | 1 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | | |
| 11921 | 2008 | 1 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | | |
| 11921 | 2008 | 1 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | | |
| 11921 | 2008 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11921 | 2008 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11921 | 2008 | 2 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11921 | 2008 | 2 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11921 | 2008 | 2 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11921 | 2008 | 2 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11921 | 2008 | 2 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11921 | 2008 | 2 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11921 | 2009 | 10 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 10 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 10 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 10 | 9 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 2 | 2.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 10 | 12 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 1.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 10 | 15 | 0 | 0 | 6 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 9.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 10 | 18 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 10 | 21 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 11 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 11 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 11 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 11 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 11 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11921 | 2009 | 11 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 3.4: Sample of Collected Rainfall data of BWDB station CL330 at Rangunia of Cox's Chittagong District

| District | Station ID | Station Name | Date Time | Rainfall |
|------------|------------|--------------|-----------|----------|
| Chittagong | CL330 | Rangunia | 01-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 02-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 03-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 04-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 05-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 06-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 07-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 08-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 09-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 10-Apr-83 | 21.6 |
| Chittagong | CL330 | Rangunia | 11-Apr-83 | 11.2 |
| Chittagong | CL330 | Rangunia | 12-Apr-83 | 15.7 |
| Chittagong | CL330 | Rangunia | 13-Apr-83 | 19.8 |
| Chittagong | CL330 | Rangunia | 14-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 15-Apr-83 | 38.6 |
| Chittagong | CL330 | Rangunia | 16-Apr-83 | 22.4 |
| Chittagong | CL330 | Rangunia | 17-Apr-83 | 10.7 |
| Chittagong | CL330 | Rangunia | 18-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 19-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 20-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 21-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 22-Apr-83 | 0 |
| Chittagong | CL330 | Rangunia | 23-Apr-83 | 3 |
| Chittagong | CL330 | Rangunia | 24-Apr-83 | 4.3 |
| Chittagong | CL330 | Rangunia | 25-Apr-83 | 51.1 |
| Chittagong | CL330 | Rangunia | 26-Apr-83 | 35.6 |
| Chittagong | CL330 | Rangunia | 27-Apr-83 | 27.9 |
| Chittagong | CL330 | Rangunia | 28-Apr-83 | 22.9 |
| Chittagong | CL330 | Rangunia | 29-Apr-83 | 28.4 |
| Chittagong | CL330 | Rangunia | 30-Apr-83 | 10.2 |

| District | Station ID | Station Name | Date Time | Rainfall |
|------------|------------|--------------|-----------|----------|
| Chittagong | CL330 | Rangunia | 01-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 02-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 03-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 04-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 05-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 06-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 07-Sep-15 | 14.4 |
| Chittagong | CL330 | Rangunia | 08-Sep-15 | 24.7 |
| Chittagong | CL330 | Rangunia | 09-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 10-Sep-15 | 12.5 |
| Chittagong | CL330 | Rangunia | 11-Sep-15 | 21.6 |
| Chittagong | CL330 | Rangunia | 12-Sep-15 | 48.4 |
| Chittagong | CL330 | Rangunia | 13-Sep-15 | 34.5 |
| Chittagong | CL330 | Rangunia | 14-Sep-15 | 85.7 |
| Chittagong | CL330 | Rangunia | 15-Sep-15 | 115.2 |
| Chittagong | CL330 | Rangunia | 16-Sep-15 | 30 |
| Chittagong | CL330 | Rangunia | 17-Sep-15 | 15.4 |
| Chittagong | CL330 | Rangunia | 18-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 19-Sep-15 | 27.3 |
| Chittagong | CL330 | Rangunia | 20-Sep-15 | 58.8 |
| Chittagong | CL330 | Rangunia | 21-Sep-15 | 75.7 |
| Chittagong | CL330 | Rangunia | 22-Sep-15 | 66.4 |
| Chittagong | CL330 | Rangunia | 23-Sep-15 | 52.8 |
| Chittagong | CL330 | Rangunia | 24-Sep-15 | 69.6 |
| Chittagong | CL330 | Rangunia | 25-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 26-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 27-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 28-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 29-Sep-15 | 0 |
| Chittagong | CL330 | Rangunia | 30-Sep-15 | 0 |

Table 3.5: Sample of Collected Water level Data of BWDB Station SW124 at Ichamati (Tributary to Karnafuli) & SW125 at Ichamati (Tributary to Karnafuli) of Chittagong District

| River Name | Station Name | Station ID | Date | MDWL |
|-----------------------------------|--------------|------------|-----------|-------|
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 01-Jan-81 | 12.07 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 02-Jan-81 | 12.07 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 03-Jan-81 | 12.07 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 04-Jan-81 | 12.07 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 05-Jan-81 | 12.07 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 06-Jan-81 | 12.11 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 07-Jan-81 | 12.17 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 08-Jan-81 | 12.16 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 09-Jan-81 | 12.10 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 10-Jan-81 | 12.07 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 11-Jan-81 | 12.07 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 12-Jan-81 | 12.07 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 13-Jan-81 | 12.07 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 14-Jan-81 | 12.06 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 15-Jan-81 | 12.06 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 16-Jan-81 | 12.04 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 17-Jan-81 | 12.04 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 18-Jan-81 | 12.04 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 19-Jan-81 | 12.04 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 20-Jan-81 | 12.04 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 21-Jan-81 | 12.04 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 22-Jan-81 | 12.02 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 23-Jan-81 | 12.02 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 24-Jan-81 | 12.02 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 25-Jan-81 | 12.02 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 26-Jan-81 | 12.02 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 27-Jan-81 | 12.02 |
| Ichamati (Tributary to Karnafuli) | Thandachari | SW124 | 28-Jan-81 | 12.02 |

| River Name | Station Name | Station ID | Date Time | High Tide | Low Tide |
|-----------------------------------|-------------------|------------|-----------|-----------|----------|
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 01-Dec-15 | 2.85 | 1.35 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 02-Dec-15 | 2.95 | 1.55 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 03-Dec-15 | 2.60 | 1.75 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 04-Dec-15 | 2.75 | 1.85 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 05-Dec-15 | 2.90 | 2.10 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 06-Dec-15 | 3.00 | 2.20 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 07-Dec-15 | 2.95 | 1.95 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 08-Dec-15 | 3.05 | 2.15 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 09-Dec-15 | 3.25 | 1.85 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 10-Dec-15 | 3.00 | 1.80 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 11-Dec-15 | 3.05 | 1.95 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 12-Dec-15 | 2.75 | 1.60 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 13-Dec-15 | 2.60 | 1.35 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 14-Dec-15 | 2.40 | 1.25 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 15-Dec-15 | 2.20 | 0.95 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 16-Dec-15 | 1.95 | 0.85 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 17-Dec-15 | 1.75 | 0.50 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 18-Dec-15 | 1.55 | 0.70 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 19-Dec-15 | 1.40 | 0.75 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 20-Dec-15 | 1.25 | 0.75 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 21-Dec-15 | 1.30 | 0.65 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 22-Dec-15 | 1.50 | 0.60 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 23-Dec-15 | 1.70 | 0.60 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 24-Dec-15 | 1.80 | 0.65 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 25-Dec-15 | 1.90 | 0.95 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 26-Dec-15 | 2.15 | 1.20 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 27-Dec-15 | 1.95 | 0.75 |
| Ichamati (Tributary to Karnafuli) | Outfall Karnafuli | SW125 | 28-Dec-15 | 2.30 | 1.45 |

Table 3.6: Sample of Collected Discharge Data of BWDB Station SW124 at Ichamati (Tributary to Karnafuli) River of Chittagong District

| RIVER_NAME | Station ID | Name | Date | Water Level | Discharge | Max Velocity |
|-----------------------------------|------------|-------------|-----------|-------------|-----------|--------------|
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 07-Jan-00 | 10.81 | 5.63 | 0.57 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 22-Jan-00 | 10.77 | 5.09 | 0.57 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 05-Feb-00 | 10.8 | 5.79 | 0.6 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 19-Feb-00 | 10.7 | 4.05 | 0.58 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 04-Mar-00 | 10.7 | 4.19 | 0.6 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 18-Mar-00 | 10.6 | 3.17 | 0.55 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 01-Apr-00 | 10.54 | 2.51 | 0.55 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 15-Apr-00 | 10.51 | 2.25 | 0.54 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 29-Apr-00 | 10.8 | 6.5 | 0.62 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 13-May-00 | 10.75 | 6.42 | 0.63 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 27-May-00 | 13.55 | 137.37 | 0.9 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 10-Jun-00 | 11.27 | 11.03 | 0.56 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 24-Jun-00 | 12.98 | 99.34 | 0.89 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 08-Jul-00 | 11.59 | 22.28 | 0.74 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 22-Jul-00 | 11.49 | 18.81 | 0.69 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 05-Aug-00 | 11.92 | 35.9 | 0.8 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 19-Aug-00 | 11.32 | 14.3 | 0.68 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 02-Sep-00 | 11.49 | 19 | 0.69 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 16-May-15 | 10.48 | 3.2 | 0.31 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 30-May-15 | 10.38 | 2.23 | 0.31 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 13-Jun-15 | 10.88 | 6.58 | 0.39 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 27-Jun-15 | 13.8 | 60.48 | 0.69 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 11-Jul-15 | 10.45 | 3.34 | 0.38 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 25-Jul-15 | 12.58 | 34.27 | 0.63 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 08-Aug-15 | 10.47 | 3.4 | 0.37 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 22-Aug-15 | 11.17 | 10.41 | 0.47 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 01-Sep-15 | 6.49 | 80.3 | 0.6 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 05-Sep-15 | 11.15 | 9.92 | 0.4 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 15-Sep-15 | 4.82 | 34.3 | 0.55 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 19-Sep-15 | 10.83 | 5.62 | 0.4 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 29-Sep-15 | 4.27 | 93.82 | 0.52 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 03-Oct-15 | 11.31 | 6.75 | 0.43 |
| Ichamati (Tributary to Karnafuli) | SW124 | Thandachari | 17-Oct-15 | 10.74 | 3.51 | 0.33 |

CHAPTER 4 HYDROLOGIC DATA ANALYSIS

4.0 Analysis of Hydrological Data

4.1 Estimation of Design Discharge and Water Level

Estimation of both flood discharges and high water levels are necessary for bank protection design. Careful estimation of discharge and water level is important for all sites with erodible banks. This section describes the methods of assessing flood discharge and water level at the site under consideration. The design discharge and water level are determined for selected probability of exceedance or return period.

The design discharge and water level arising from floods should be selected after due consideration of the following:

- The maximum historical discharge as recorded at the site, or as calculated on the basis of recorded water level at the site, or as calculated on the basis of measured discharge at other points on the river from which corresponding site discharge can reasonably be inferred.
- The discharge derived from a frequency analysis using a probability of exceedance or return period which is appropriate to the importance and value of the protection work.
- The maximum historical water level as recorded at the site, or as inferred from observed or recorded water level at other points on the river from which level can reasonably be transferred to the site in question.
- The water level derived from a frequency analysis using a probability of exceedance or return period which is appropriate to the importance and value of the protection work.

In estimating high flows, primary reliance should be placed on careful field investigations, local enquiries and searches of historical records. Data so obtained should be compared with recorded data for hydrometric stations, and supplemented by analytical procedure using stage-discharge curves. At most hydrometric gauging stations reasonably stable relationship exists between water level and discharge. At some sites, however, the stage discharge curve may be quite unstable because of aggradation or degradation at channel bed or backwater effect from downstream, and may change drastically during major floods. A persistent trend of rising or lowering of curve indicates progressive channel aggradation or degradation. The stage corresponding to design flood which exceeds any recorded flow obtained by extrapolating the stage-discharge relationships.

The most commonly used method for estimating design discharge and water level examines the observed discharge and water level to arrive at suitable estimates. The method, known as frequency analysis, is founded on statistical analyses of discharge and water level records. For locations where records of stream flows are available, or where flows from another basin can be transported to the design location, design flood magnitude and water level can be estimated directly from those records by means of frequency analysis.

4.2 Frequency Analysis

Frequency of a hydrological event, such as the annual peak flow is the probability that a value will be equaled or exceeded in any year. This is more appropriately called the exceedance probability, $P(F)$. The reciprocal of the exceedance probability is the return period T in years, that is, $T = \frac{1}{P(F)}$. The length of record should be sufficient to justify extrapolating the frequency relationship. For example, it might be reasonable to estimate a 50-year flood on the basis of a 30-year record, but to estimate a 100-year flood on the basis of a 10-year record would normally be absurd (Neill 1973)⁽¹⁾. Viessman and Lewis (1996)⁽²⁾ noted that as a general rule, frequency analysis is cautioned when working with shorter records and estimating frequencies of hydrological events greater than twice the record length.

Frequency analysis can be conducted in two ways: one is the analytical approach and the other is the graphical technique in which flood magnitudes are usually plotted against probability of exceedance.

Here in the following sections, procedures are given mostly for discharge frequency analysis; the similar procedures can also be followed for water level frequency analysis.

4.3 Analytical Frequency Analysis

Analytical frequency analysis is based on fitting theoretical probability distributions to given data. Numerous distributions have been suggested on the basis of their ability to 'fit' the plotted data from streams (Linsley et al. 1982)⁽³⁾. The Log-Pearson Type III (LP3) has been adopted for use in the United States Federal Agencies for flood analysis. The first asymptotic distribution of extreme values (EV1), commonly called Gumbel Distribution has been widely used and is recommended in the United Kingdom. For this project, all the collected data will be analyzed using Normal distribution, Log-Normal distribution, Log-Pearson III distribution and Extreme Variable Distribution and the best fit distribution will be adopted for analysis.

4.3.1 Extreme Value Distributions

Distributions of the extreme values selected from sets of samples of any probability distribution converge to any one of three forms of Extreme Value Distributions, called Type I, II, and III, respectively, when the number of selected extreme values is large. The three limiting forms are special cases of a single distribution called Generalized Extreme Value (GEV) Distribution (Chow et al. 1988)⁽⁴⁾. The cumulative distribution function for the GEV is:

$$F(x) = \exp \left[- \left(1 + \left| \frac{x-u}{r} \right| \right)^{\frac{1}{\alpha}} \right] \quad (1)$$

Here α , u , and r are parameters to be determined. For EVI Distribution x is unbounded, while for EVII, x is bounded from below, and for EVIII, x is bounded from above. The EVI and EVII Distributions are also known as the Gumbel and Frechet Distributions, respectively.

The Extreme Value Type I (EVI) cumulative distribution function is:

$$F(x) = \exp \left[- \exp \left(- \frac{x-u}{r} \right) \right] \quad -\infty \leq x \leq \infty \quad (2)$$

The parameters are estimated by

$$r = \frac{\sqrt{6}}{f} s \quad \text{and} \quad u = \bar{x} - 0.5772r \quad (3)$$

Eq (2) can be expressed as

$$F(x) = e^{-e^{-y}} \quad (4)$$

Where y is the reduced variate defined as

$$y = \frac{x - u}{r} \quad (5)$$

Solving Eq (4) for y:

$$y = -\ln \left[\ln \left(\frac{1}{F(x)} \right) \right] \quad (6)$$

Noting that the probability of occurrence of an event $x \geq x_T$ is the inverse of its return period T, we can write

$$\frac{1}{T} = P(x \geq x_T) = 1 - P(x \leq x_T) = 1 - F(x_T)$$

So,

$$F(x_T) = 1 - \frac{1}{T}$$

Substituting for $F(x_T)$ into Eq (6)

$$y_T = -\ln \left[\ln \left(\frac{T}{T-1} \right) \right] \quad (7)$$

For a given return period x_T is related to y_T by Eq (5), or

$$x_T = u + r y_T \quad (8)$$

4.3.2 Frequency Analysis using Frequency Factors

Calculating the magnitudes of extreme events by the method outlined in the above example requires that the probability distribution function be invertible, that is, given a value of T or $F(x_T) = 1 - \frac{1}{T}$, the corresponding value of x_T can be determined. Some probability distribution functions are not readily invertible, like the Normal and Pearson Type III Distributions. Thus an alternative method based on frequency factor is used for calculating the magnitudes of extreme events. Chow (1951) ⁽⁵⁾ has shown that most frequency functions can be generalized to

$$x_T = \bar{x} + K_T s \quad (9)$$

where x_T is a flood of specified probability or return period T, \bar{x} is the mean of the flood series, s is the standard deviation of the series; and K_T is the frequency factor and is a function of return period and type of probability distribution, as well as coefficient of skewness for skewed distributions, such as LP3.

In the event that the variable analyzed is $y = \log x$, for example as in Lognormal and LP3 Distributions, the same method is applied to the statistics for the logarithms of data using $y_T = \bar{y} + K_T s_y$, and the required value of x_T is found taking antilog of y_T .

Chow (1951) ⁽⁵⁾ proposed the frequency factor as in Eq (9), and it is applicable to many probability distributions used in hydrological frequency analysis. The K-T relationship can be expressed in mathematical terms or by a table.

Normal Distribution: From Eq (9) the frequency factor can be expressed as

$$K_T = \frac{x_T - \bar{x}}{s} = z \quad (10)$$

Thus, for Normal Distribution K_T is the same as the standard normal variable z . The value of z and hence K_T can be obtained from Table 1 in ANNEXURE – I(a).

Lognormal Distribution: The recommended procedure for use of the Lognormal Distribution is to convert the data series to logarithms and compute:

- 1) $y_i = \log x_i$
- 2) Compute the mean, \bar{y} and standard deviation s_y
- 3) Compute $y_T = \bar{y} + K_T s_y$

$$K_T = \frac{y_T - \bar{y}}{s_y} = z$$

So, K_T can be taken from Table 1 in ANNEXURE – I(a).

- 4) Finally compute $x_T = \text{anti} \log y_T$

Log-Pearson Type III (LP3) Distribution: The recommended procedure for use of the LP3 Distribution is to convert the data series to logarithms and compute:

- 1) $y_i = \log x_i$
- 2) Compute the mean, \bar{y} and standard deviation s_y
- 3) Compute coefficient of skewness

$$C_s = \frac{n \sum (y_i - \bar{y})^3}{(n-1)(n-2)s_y^3}$$

- 4) Compute $y_T = \bar{y} + K_T s_y$ (11)

Where K_T is taken from Table 2 in ANNEXURE – I(a).

- 5) Finally compute $x_T = \text{anti} \log y_T$

Table 3 in ANNEXURE – I(a). gives values of the frequency factors for the LP3 Distribution for various values of return period and coefficient of skewness, C_s . When $C_s = 0$, the frequency factor is equal to the standard normal variable z (Table 1 in ANNEXURE – I(a)).

Extreme Value I (EVI) Distribution: Chow (1951) ⁽⁵⁾ derived the following expression for frequency factor for the EVI Distribution

$$K_T = -\frac{\sqrt{6}}{f} \left[0.5772 + \ln \left\{ \ln \left(\frac{T}{T-1} \right) \right\} \right] \quad (12)$$

When $x_T = \sim$, Eq (9) (in population term) gives $K_T = 0$ and Eq (12) gives $T=2.33$ years. This is the return period of the mean of the EVI Distribution.

Table of frequency factors for the EVI Distribution, given in Table 3 in ANNEXURE – I(a), is taken from Haan (1977) ⁽⁶⁾. The values computed from the above equation are equivalent to an infinite sample size in Table 3 in ANNEXURE – I(a).

4.3.3 Goodness of Fit Test

The goodness of fit of a probability distribution can be tested by comparing the theoretical and sample values of the relative frequency or the cumulative frequency function. In the case of the relative frequency function, the χ^2 – test is used and with cumulative frequency function the Kolmogorov-Smirnov test is used.

Chi-Square Test: The test statistic is given by

$$\chi^2 = \sum_{i=1}^k \frac{n[f_s(x_i) - p(x_i)]^2}{p(x_i)} \quad (13)$$

Where, k is the number of intervals; the sample value of the relative frequency of interval i is, $f_s(x_i) = n_i/n$; the theoretical value of the relative frequency function (also called incremental probability function) is $p(x_i) = F(x_i) - F(x_{i-1})$. It may be noted that $nf_s(x_i) = n_i$, the observed number of occurrences in interval i , and $np(x_i)$ is the corresponding expected number of occurrences in interval i .

To describe the χ^2 test, the χ^2 probability distribution must be defined. A χ^2 distribution with $\nu = k-l-1$ degrees of freedom (l is the number of parameters used in fitting the proposed distribution) is the distribution for the sum of squares of ν independent standard normal random variables z_i . The critical χ^2 distribution function is tabulated (in Table 4 in ANNEXURE – I(a)) from Haan (1977) ⁽⁶⁾. A confidence level is chosen for the test; it is often expressed as $1-\alpha$, where α is termed the significance level.

Kolmogorov-Smirnov Test: The theoretical and sample values of the cumulative frequency are compared with the Kolmogorov-Smirnov (S-K) test. The test statistic D , which is based on deviations of the sample distribution function $P(x)$ from the completely specified continuous hypothetical distribution function $P_o(x)$, such that:

$$D = \max |P(x) - P_o(x)|$$

Developed by Kolmogorov (Kite 1988) ⁽⁷⁾ in 1933, the test requires that the value of D computed from the sample distribution be less than the tabulated value of D (Table 5 in ANNEXURE – I(a)) at the required confidence level. Kolmogorov-Smirnov test for Gumbel's Extremal Distribution gives better result in Bangladesh.

4.4 Disaggregation of Daily Rainfall Data

4.4.1 Rainfall Cascade Disaggregation Model

Cascade level refers to the time series at a certain resolution. The transition from one cascade level to the higher one, corresponding to a doubling of resolution, is

called *modulation*. A time interval at an arbitrary cascade level (i.e. time scale) is termed a *box*, which is characterized by an associated precipitation amount (0 if dry, >0 if wet). The break-up of a wet box into two equally sized sub-boxes is denoted *branching*. In one branching, the total amount is redistributed according to two multiplicative weights, $0 \leq W_1 \leq 1$ and $0 \leq W_2 \leq 1$ ($W_1 + W_2 = 1$). The model is a multiplicative random cascade of branching number 2 with exact conservation of mass (micro canonical property as opposed to canonical cascades where the volume is only approximately conserved). The model divides daily precipitation into non overlapping time intervals. If the precipitation in a day is P_d , $P_1 = P_d W_1$ is the precipitation amount assigned to the first half of the day, and $P_2 = P_d W_2$ the amount assigned to the second half. Similarly, each half is then branched to a doubled resolution, and so on. The implementation of cascade – based model allows the conversion of daily amount into 12-hourly (1 steps), 6-hourly (2 steps), and 3-hourly (3 steps) values.

The short-time intensity disaggregation model (Connolly et al. 1998)⁽⁸⁾, is used to have three fine-resolution time interval that are 1-hour, 1/2-hour and 10-minutes. A single Poisson distribution parameter represents the number of events, N , on a rainy day. The density function of the Poisson distribution (adjusted so that $N > 1$) has the form:

$$f(N) = \frac{\eta^{N-1} \cdot e^{-\eta}}{(N-1)!} \quad (14)$$

Where η is a fitted coefficient. Mean (μ_N) and variance (σ_N^2) are given as:

$$\mu_N = \eta + 1 \quad (15)$$

$$\sigma_N^2 = \eta \quad (16)$$

The simulated number of event N is the lowest integer to satisfy:

$$\sum_{i=1}^N \frac{\eta^{i-1} \cdot e^{-\eta}}{(i-1)!} \geq U \quad N \geq 1 \quad (17)$$

Where U is a uniform random number in the range 0–1.

The duration of each event, D , is represented with a gamma distribution. The scale parameter of the gamma distribution, α , has to be estimated and the shape parameter, β , is set held at 2. It results the following density function:

$$f(D) = \alpha^2 \cdot D \cdot e^{-\alpha D} \quad (18)$$

A uniform random number in the range 0–1, U , is generated and the event duration is simulated by solving the cumulative density function of the gamma distribution using Newton's method:

$$1 - (1 + \alpha \cdot D) \cdot e^{-\alpha D} = U \quad (19)$$

With these estimated point (10 -30 -1 h, 3 h, 6 h, 12 h and 24 h) following the procedures for the frequency distribution, it is possible to define the rainfall probability curves.

Using the above equations, daily and monthly basis analysis of water level data have been prepared which is shown in **ANNEXURE -I (b)**.

CHAPTER 5 DESIGNING STORM SEWER

5.0 Capacity Estimate and Designing of Drain Sections (Prismatic)

5.1 Manning's Formula

The Manning's formula is a widely used formula around the world to estimate capacity of an open channel or design required section. The formula is also known as Gauckler-Manning-Strickler formula. It is an empirical formula to estimate the average velocity of water flowing through an open channel. The Manning's equation is as follows:

$$V = \frac{K_n}{n} R^{\frac{2}{3}} s^{\frac{1}{2}} \quad (20)$$

Where, V = average velocity of flow (SI unit: m/s; Imperial: ft/s)

K_n = Unit conversion factor (1.00 for SI unit and 1.49 for Imperial unit)

R = Hydraulic Radius = $\frac{P}{A}$ (SI unit: m, Imperial: ft)

Here, P = Wetted Perimeter (SI unit: m, Imperial: ft)

A = Cross-sectional area of flow (SI unit: m², Imperial: ft²)

s = hydraulic gradient of flow (SI unit: m/m, Imperial: ft/ft)

n = Manning's non-dimensional roughness coefficient

Manning's roughness coefficient may be selected using the following table.

Table 5.1: Manning's n for Channels (Chow (1951))⁽⁵⁾

| Type of Channel and Description | Minimum | Normal | Maximum |
|---|---------|--------|---------|
| Natural streams - minor streams (top width at floodstage < 100 ft) | | | |
| 1. Main Channels | | | |
| a. clean, straight, full stage, no rifts or deep pools | 0.025 | 0.03 | 0.033 |
| b. same as above, but more stones and weeds | 0.03 | 0.035 | 0.04 |
| c. clean, winding, some pools and shoals | 0.033 | 0.04 | 0.045 |
| d. same as above, but some weeds and stones | 0.035 | 0.045 | 0.05 |
| e. same as above, lower stages, more ineffective slopes and sections | 0.04 | 0.048 | 0.055 |
| f. same as "d" with more stones | 0.045 | 0.05 | 0.06 |
| g. sluggish reaches, weedy, deep pools | 0.05 | 0.07 | 0.08 |
| h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush | 0.075 | 0.1 | 0.15 |
| 2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages | | | |
| a. bottom: gravels, cobbles, and few boulders | 0.03 | 0.04 | 0.05 |
| b. bottom: cobbles with large boulders | 0.04 | 0.05 | 0.07 |

Table 5.1: Manning's n for Channels (Chow (1951)) ⁽⁵⁾

| Type of Channel and Description | Minimum | Normal | Maximum |
|--|---------|--------|---------|
| 3. Floodplains | | | |
| a. Pasture, no brush | | | |
| 1. short grass | 0.025 | 0.03 | 0.035 |
| 2. high grass | 0.03 | 0.035 | 0.05 |
| b. Cultivated areas | | | |
| 1. no crop | 0.02 | 0.03 | 0.04 |
| 2. mature row crops | 0.025 | 0.035 | 0.045 |
| 3. mature field crops | 0.03 | 0.04 | 0.05 |
| c. Brush | | | |
| 1. scattered brush, heavy weeds | 0.035 | 0.05 | 0.07 |
| 2. light brush and trees, in winter | 0.035 | 0.05 | 0.06 |
| 3. light brush and trees, in summer | 0.04 | 0.06 | 0.08 |
| 4. medium to dense brush, in winter | 0.045 | 0.07 | 0.11 |
| 5. medium to dense brush, in summer | 0.07 | 0.1 | 0.16 |
| d. Trees | | | |
| 1. dense willows, summer, straight | 0.11 | 0.15 | 0.2 |
| 2. cleared land with tree stumps, no sprouts | 0.03 | 0.04 | 0.05 |
| 3. same as above, but with heavy growth of sprouts | 0.05 | 0.06 | 0.08 |
| 4. heavy stand of timber, a few down trees, little undergrowth, flood stage below branches | 0.08 | 0.1 | 0.12 |
| 5. Same as 4. with flood stage reaching branches | 0.1 | 0.12 | 0.16 |
| 4. Excavated or Dredged Channels | | | |
| a. Earth, straight, and uniform | | | |
| 1. clean, recently completed | 0.016 | 0.018 | 0.02 |
| 2. clean, after weathering | 0.018 | 0.022 | 0.025 |
| 3. gravel, uniform section, clean | 0.022 | 0.025 | 0.03 |
| 4. with short grass, few weeds | 0.022 | 0.027 | 0.033 |
| b. Earth winding and sluggish | | | |
| 1. no vegetation | 0.023 | 0.025 | 0.03 |
| 2. grass, some weeds | 0.025 | 0.03 | 0.033 |
| 3. dense weeds or aquatic plants in deep channels | 0.03 | 0.035 | 0.04 |
| 4. earth bottom and rubble sides | 0.028 | 0.03 | 0.035 |
| 5. stony bottom and weedy banks | 0.025 | 0.035 | 0.04 |
| 6. cobble bottom and clean sides | 0.03 | 0.04 | 0.05 |
| c. Dragline-excavated or dredged | | | |
| 1. no vegetation | 0.025 | 0.028 | 0.033 |
| 2. light brush on banks | 0.035 | 0.05 | 0.06 |
| d. Rock cuts | | | |
| 1. smooth and uniform | 0.025 | 0.035 | 0.04 |
| 2. jagged and irregular | 0.035 | 0.04 | 0.05 |

Table 5.1: Manning's n for Channels (Chow (1951)) ⁽⁵⁾

| Type of Channel and Description | Minimum | Normal | Maximum |
|---|---------|--------|---------|
| e. Channels not maintained, weeds and brush uncut | | | |
| 1. dense weeds, high as flow depth | 0.05 | 0.08 | 0.12 |
| 2. clean bottom, brush on sides | 0.04 | 0.05 | 0.08 |
| 3. same as above, highest stage of flow | 0.045 | 0.07 | 0.11 |
| 4. dense brush, high stage | 0.08 | 0.1 | 0.14 |
| 5. Lined or Constructed Channels | | | |
| a. Cement | | | |
| 1. neat surface | 0.01 | 0.011 | 0.013 |
| 2. mortar | 0.011 | 0.013 | 0.015 |
| b. Wood | | | |
| 1. planed, untreated | 0.01 | 0.012 | 0.014 |
| 2. planed, creosoted | 0.011 | 0.012 | 0.015 |
| 3. un-planed | 0.011 | 0.013 | 0.015 |
| 4. plank with battens | 0.012 | 0.015 | 0.018 |
| 5. lined with roofing paper | 0.01 | 0.014 | 0.017 |
| c. Concrete | | | |
| 1. trowel finish | 0.011 | 0.013 | 0.015 |
| 2. float finish | 0.013 | 0.015 | 0.016 |
| 3. finished, with gravel on bottom | 0.015 | 0.017 | 0.02 |
| 4. unfinished | 0.014 | 0.017 | 0.02 |
| 5. gunite, good section | 0.016 | 0.019 | 0.023 |
| 6. gunite, wavy section | 0.018 | 0.022 | 0.025 |
| 7. on good excavated rock | 0.017 | 0.02 | |
| 8. on irregular excavated rock | 0.022 | 0.027 | |
| d. Concrete bottom float finish with sides of: | | | |
| 1. dressed stone in mortar | 0.015 | 0.017 | 0.02 |
| 2. random stone in mortar | 0.017 | 0.02 | 0.024 |
| 3. cement rubble masonry, plastered | 0.016 | 0.02 | 0.024 |
| 4. cement rubble masonry | 0.02 | 0.025 | 0.03 |
| 5. dry rubble or riprap | 0.02 | 0.03 | 0.035 |
| e. Gravel bottom with sides of: | | | |
| 1. formed concrete | 0.017 | 0.02 | 0.025 |
| 2. random stone mortar | 0.02 | 0.023 | 0.026 |
| 3. dry rubble or riprap | 0.023 | 0.033 | 0.036 |
| f. Brick | | | |
| 1. glazed | 0.011 | 0.013 | 0.015 |
| 2. in cement mortar | 0.012 | 0.015 | 0.018 |
| g. Masonry | | | |
| 1. cemented rubble | 0.017 | 0.025 | 0.03 |
| 2. dry rubble | 0.023 | 0.032 | 0.035 |

Table 5.1: Manning's n for Channels (Chow (1951)) ⁽⁵⁾

| Type of Channel and Description | Minimum | Normal | Maximum |
|---------------------------------|---------|--------|---------|
| h. Dressed ashlar/stone paving | 0.013 | 0.015 | 0.017 |
| i. Asphalt | | | |
| 1. smooth | 0.013 | 0.013 | |
| 2. rough | 0.016 | 0.016 | |
| j. Vegetal lining | 0.03 | | 0.5 |

Estimation of capacity of the existing drains and drainage channels will be estimated using Manning's formula. Design sections of the proposed sections will also be calculated using this formula.

CHAPTER 6 CONCLUSION

6.0 Conclusion

The findings and the collected data during the survey works will be used in the subsequent planning stage of the project, "Preparation of Development Plan for Fourteen Upazilas". The prepared DEM will be used for Delineation of Catchment area and preparing contours of the project area. The collected water level, rainfall and discharge data will be analyzed and tested for fitness with observed data and successively used to predict the respective data for different time periods. These are going to be incorporated in the final planning report. The results should assist in preparing a development plan that will be sustainable from the hydrologic point of view. The surveyed cross sections, drainage inventories and list of the road name along the drains will be updated after accumulation and processing of physical feature data.

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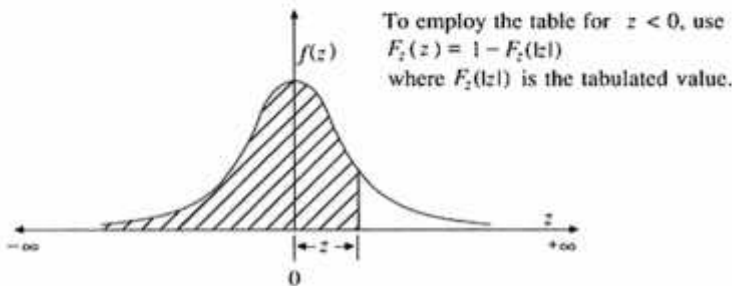
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TABELS

Table 1: Cumulative probability of the Standard Normal Distribution

| Cumulative probability of the standard normal distribution | | | | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| z | .00 | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 |
| 0.0 | 0.5000 | 0.5040 | 0.5080 | 0.5120 | 0.5160 | 0.5199 | 0.5239 | 0.5279 | 0.5319 | 0.5359 |
| 0.1 | 0.5398 | 0.5438 | 0.5478 | 0.5517 | 0.5557 | 0.5596 | 0.5636 | 0.5675 | 0.5714 | 0.5753 |
| 0.2 | 0.5793 | 0.5832 | 0.5871 | 0.5910 | 0.5948 | 0.5987 | 0.6026 | 0.6064 | 0.6103 | 0.6141 |
| 0.3 | 0.6179 | 0.6217 | 0.6255 | 0.6293 | 0.6331 | 0.6368 | 0.6406 | 0.6443 | 0.6480 | 0.6517 |
| 0.4 | 0.6554 | 0.6591 | 0.6628 | 0.6664 | 0.6700 | 0.6736 | 0.6772 | 0.6808 | 0.6844 | 0.6879 |
| 0.5 | 0.6915 | 0.6950 | 0.6985 | 0.7019 | 0.7054 | 0.7088 | 0.7123 | 0.7157 | 0.7190 | 0.7224 |
| 0.6 | 0.7257 | 0.7291 | 0.7324 | 0.7357 | 0.7389 | 0.7422 | 0.7454 | 0.7486 | 0.7517 | 0.7549 |
| 0.7 | 0.7580 | 0.7611 | 0.7642 | 0.7673 | 0.7704 | 0.7734 | 0.7764 | 0.7794 | 0.7823 | 0.7852 |
| 0.8 | 0.7881 | 0.7910 | 0.7939 | 0.7967 | 0.7995 | 0.8023 | 0.8051 | 0.8078 | 0.8106 | 0.8133 |
| 0.9 | 0.8159 | 0.8186 | 0.8212 | 0.8238 | 0.8264 | 0.8289 | 0.8315 | 0.8340 | 0.8365 | 0.8389 |
| 1.0 | 0.8413 | 0.8438 | 0.8461 | 0.8485 | 0.8508 | 0.8531 | 0.8554 | 0.8577 | 0.8599 | 0.8621 |
| 1.1 | 0.8643 | 0.8665 | 0.8686 | 0.8708 | 0.8729 | 0.8749 | 0.8770 | 0.8790 | 0.8810 | 0.8830 |
| 1.2 | 0.8849 | 0.8869 | 0.8888 | 0.8907 | 0.8925 | 0.8944 | 0.8962 | 0.8980 | 0.8997 | 0.9015 |
| 1.3 | 0.9032 | 0.9049 | 0.9066 | 0.9082 | 0.9099 | 0.9115 | 0.9131 | 0.9147 | 0.9162 | 0.9177 |
| 1.4 | 0.9192 | 0.9207 | 0.9222 | 0.9236 | 0.9251 | 0.9265 | 0.9279 | 0.9292 | 0.9306 | 0.9319 |
| 1.5 | 0.9332 | 0.9345 | 0.9357 | 0.9370 | 0.9382 | 0.9394 | 0.9406 | 0.9418 | 0.9429 | 0.9441 |
| 1.6 | 0.9452 | 0.9463 | 0.9474 | 0.9484 | 0.9495 | 0.9505 | 0.9515 | 0.9525 | 0.9535 | 0.9545 |
| 1.7 | 0.9554 | 0.9564 | 0.9573 | 0.9582 | 0.9591 | 0.9599 | 0.9608 | 0.9616 | 0.9625 | 0.9633 |
| 1.8 | 0.9641 | 0.9649 | 0.9656 | 0.9664 | 0.9671 | 0.9678 | 0.9686 | 0.9693 | 0.9699 | 0.9706 |
| 1.9 | 0.9713 | 0.9719 | 0.9726 | 0.9732 | 0.9738 | 0.9744 | 0.9750 | 0.9756 | 0.9761 | 0.9767 |
| 2.0 | 0.9772 | 0.9778 | 0.9783 | 0.9788 | 0.9793 | 0.9798 | 0.9803 | 0.9808 | 0.9812 | 0.9817 |
| 2.1 | 0.9821 | 0.9826 | 0.9830 | 0.9834 | 0.9838 | 0.9842 | 0.9846 | 0.9850 | 0.9854 | 0.9857 |
| 2.2 | 0.9861 | 0.9864 | 0.9868 | 0.9871 | 0.9875 | 0.9878 | 0.9881 | 0.9884 | 0.9887 | 0.9890 |
| 2.3 | 0.9893 | 0.9896 | 0.9898 | 0.9901 | 0.9904 | 0.9906 | 0.9909 | 0.9911 | 0.9913 | 0.9916 |
| 2.4 | 0.9918 | 0.9920 | 0.9922 | 0.9925 | 0.9927 | 0.9929 | 0.9931 | 0.9932 | 0.9934 | 0.9936 |
| 2.5 | 0.9938 | 0.9940 | 0.9941 | 0.9943 | 0.9945 | 0.9946 | 0.9948 | 0.9949 | 0.9951 | 0.9952 |
| 2.6 | 0.9953 | 0.9955 | 0.9956 | 0.9957 | 0.9959 | 0.9960 | 0.9961 | 0.9962 | 0.9963 | 0.9964 |
| 2.7 | 0.9965 | 0.9966 | 0.9967 | 0.9968 | 0.9969 | 0.9970 | 0.9971 | 0.9972 | 0.9973 | 0.9974 |
| 2.8 | 0.9974 | 0.9975 | 0.9976 | 0.9977 | 0.9977 | 0.9978 | 0.9979 | 0.9979 | 0.9980 | 0.9981 |
| 2.9 | 0.9981 | 0.9982 | 0.9982 | 0.9983 | 0.9984 | 0.9984 | 0.9985 | 0.9985 | 0.9986 | 0.9986 |
| 3.0 | 0.9987 | 0.9987 | 0.9987 | 0.9988 | 0.9988 | 0.9989 | 0.9989 | 0.9989 | 0.9990 | 0.9990 |
| 3.1 | 0.9990 | 0.9991 | 0.9991 | 0.9991 | 0.9992 | 0.9992 | 0.9992 | 0.9992 | 0.9993 | 0.9993 |
| 3.2 | 0.9993 | 0.9993 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9995 | 0.9995 | 0.9995 |
| 3.3 | 0.9995 | 0.9995 | 0.9995 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9997 |
| 3.4 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9998 |

Source: Grant, E. L., and R. S. Leavenworth, *Statistical Quality and Control*, Table A, p.643, McGraw-Hill, New York, 1972. Used with permission.



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Table 2: Frequency factors for Pearson Type III Distribution

| K_T values for Pearson Type III distribution (positive skew) | | | | | | | |
|--|------------------------|-------|-------|-------|-------|-------|-------|
| Skew coefficient C_s or C_w | Return period in years | | | | | | |
| | 2 | 5 | 10 | 25 | 50 | 100 | 200 |
| | Exceedence probability | | | | | | |
| | 0.50 | 0.20 | 0.10 | 0.04 | 0.02 | 0.01 | 0.005 |
| 3.0 | -0.396 | 0.420 | 1.180 | 2.278 | 3.152 | 4.051 | 4.970 |
| 2.9 | -0.390 | 0.440 | 1.195 | 2.277 | 3.134 | 4.013 | 4.909 |
| 2.8 | -0.384 | 0.460 | 1.210 | 2.275 | 3.114 | 3.973 | 4.847 |
| 2.7 | -0.376 | 0.479 | 1.224 | 2.272 | 3.093 | 3.932 | 4.783 |
| 2.6 | -0.368 | 0.499 | 1.238 | 2.267 | 3.071 | 3.889 | 4.718 |
| 2.5 | -0.360 | 0.518 | 1.250 | 2.262 | 3.048 | 3.845 | 4.652 |
| 2.4 | -0.351 | 0.537 | 1.262 | 2.256 | 3.023 | 3.800 | 4.584 |
| 2.3 | -0.341 | 0.555 | 1.274 | 2.248 | 2.997 | 3.753 | 4.515 |
| 2.2 | -0.330 | 0.574 | 1.284 | 2.240 | 2.970 | 3.705 | 4.444 |
| 2.1 | -0.319 | 0.592 | 1.294 | 2.230 | 2.942 | 3.656 | 4.372 |
| 2.0 | -0.307 | 0.609 | 1.302 | 2.219 | 2.912 | 3.605 | 4.298 |
| 1.9 | -0.294 | 0.627 | 1.310 | 2.207 | 2.881 | 3.553 | 4.223 |
| 1.8 | -0.282 | 0.643 | 1.318 | 2.193 | 2.848 | 3.499 | 4.147 |
| 1.7 | -0.268 | 0.660 | 1.324 | 2.179 | 2.815 | 3.444 | 4.069 |
| 1.6 | -0.254 | 0.675 | 1.329 | 2.163 | 2.780 | 3.388 | 3.990 |
| 1.5 | -0.240 | 0.690 | 1.333 | 2.146 | 2.743 | 3.330 | 3.910 |
| 1.4 | -0.225 | 0.705 | 1.337 | 2.128 | 2.706 | 3.271 | 3.828 |
| 1.3 | -0.210 | 0.719 | 1.339 | 2.108 | 2.666 | 3.211 | 3.745 |
| 1.2 | -0.195 | 0.732 | 1.340 | 2.087 | 2.626 | 3.149 | 3.661 |
| 1.1 | -0.180 | 0.745 | 1.341 | 2.066 | 2.585 | 3.087 | 3.575 |
| 1.0 | -0.164 | 0.758 | 1.340 | 2.043 | 2.542 | 3.022 | 3.489 |
| 0.9 | -0.148 | 0.769 | 1.339 | 2.018 | 2.498 | 2.957 | 3.401 |
| 0.8 | -0.132 | 0.780 | 1.336 | 1.993 | 2.453 | 2.891 | 3.312 |
| 0.7 | -0.116 | 0.790 | 1.333 | 1.967 | 2.407 | 2.824 | 3.223 |
| 0.6 | -0.099 | 0.800 | 1.328 | 1.939 | 2.359 | 2.755 | 3.132 |
| 0.5 | -0.083 | 0.808 | 1.323 | 1.910 | 2.311 | 2.686 | 3.041 |
| 0.4 | -0.066 | 0.816 | 1.317 | 1.880 | 2.261 | 2.615 | 2.949 |
| 0.3 | -0.050 | 0.824 | 1.309 | 1.849 | 2.211 | 2.544 | 2.856 |
| 0.2 | -0.033 | 0.830 | 1.301 | 1.818 | 2.159 | 2.472 | 2.763 |
| 0.1 | -0.017 | 0.836 | 1.292 | 1.785 | 2.107 | 2.400 | 2.670 |
| 0.0 | 0 | 0.842 | 1.282 | 1.751 | 2.054 | 2.326 | 2.576 |

Continued ...

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Table 2 Continued

| K_T values for Pearson Type III distribution (negative skew) | | | | | | | |
|--|------------------------|-------|-------|-------|-------|-------|-------|
| Skew coefficient C_s or C_w | Return period in years | | | | | | |
| | 2 | 5 | 10 | 25 | 50 | 100 | 200 |
| | Exceedence probability | | | | | | |
| | 0.50 | 0.20 | 0.10 | 0.04 | 0.02 | 0.01 | 0.005 |
| -0.1 | 0.017 | 0.846 | 1.270 | 1.716 | 2.000 | 2.252 | 2.482 |
| -0.2 | 0.033 | 0.850 | 1.258 | 1.680 | 1.945 | 2.178 | 2.388 |
| -0.3 | 0.050 | 0.853 | 1.245 | 1.643 | 1.890 | 2.104 | 2.294 |
| -0.4 | 0.066 | 0.855 | 1.231 | 1.606 | 1.834 | 2.029 | 2.201 |
| -0.5 | 0.083 | 0.856 | 1.216 | 1.567 | 1.777 | 1.955 | 2.108 |
| -0.6 | 0.099 | 0.857 | 1.200 | 1.528 | 1.720 | 1.880 | 2.016 |
| -0.7 | 0.116 | 0.857 | 1.183 | 1.488 | 1.663 | 1.806 | 1.926 |
| -0.8 | 0.132 | 0.856 | 1.166 | 1.448 | 1.606 | 1.733 | 1.837 |
| -0.9 | 0.148 | 0.854 | 1.147 | 1.407 | 1.549 | 1.660 | 1.749 |
| -1.0 | 0.164 | 0.852 | 1.128 | 1.366 | 1.492 | 1.588 | 1.664 |
| -1.1 | 0.180 | 0.848 | 1.107 | 1.324 | 1.435 | 1.518 | 1.581 |
| -1.2 | 0.195 | 0.844 | 1.086 | 1.282 | 1.379 | 1.449 | 1.501 |
| -1.3 | 0.210 | 0.838 | 1.064 | 1.240 | 1.324 | 1.383 | 1.424 |
| -1.4 | 0.225 | 0.832 | 1.041 | 1.198 | 1.270 | 1.318 | 1.351 |
| -1.5 | 0.240 | 0.825 | 1.018 | 1.157 | 1.217 | 1.256 | 1.282 |
| -1.6 | 0.254 | 0.817 | 0.994 | 1.116 | 1.166 | 1.197 | 1.216 |
| -1.7 | 0.268 | 0.808 | 0.970 | 1.075 | 1.116 | 1.140 | 1.155 |
| -1.8 | 0.282 | 0.799 | 0.945 | 1.035 | 1.069 | 1.087 | 1.097 |
| -1.9 | 0.294 | 0.788 | 0.920 | 0.996 | 1.023 | 1.037 | 1.044 |
| -2.0 | 0.307 | 0.777 | 0.895 | 0.959 | 0.980 | 0.990 | 0.995 |
| -2.1 | 0.319 | 0.765 | 0.869 | 0.923 | 0.939 | 0.946 | 0.949 |
| -2.2 | 0.330 | 0.752 | 0.844 | 0.888 | 0.900 | 0.905 | 0.907 |
| -2.3 | 0.341 | 0.739 | 0.819 | 0.855 | 0.864 | 0.867 | 0.869 |
| -2.4 | 0.351 | 0.725 | 0.795 | 0.823 | 0.830 | 0.832 | 0.833 |
| -2.5 | 0.360 | 0.711 | 0.771 | 0.793 | 0.798 | 0.799 | 0.800 |
| -2.6 | 0.368 | 0.696 | 0.747 | 0.764 | 0.768 | 0.769 | 0.769 |
| -2.7 | 0.376 | 0.681 | 0.724 | 0.738 | 0.740 | 0.740 | 0.741 |
| -2.8 | 0.384 | 0.666 | 0.702 | 0.712 | 0.714 | 0.714 | 0.714 |
| -2.9 | 0.390 | 0.651 | 0.681 | 0.683 | 0.689 | 0.690 | 0.690 |
| -3.0 | 0.396 | 0.636 | 0.666 | 0.666 | 0.666 | 0.667 | 0.667 |

Source: U. S. Water Resources Council (1981).

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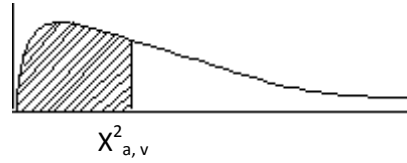
Table 3: Frequency factors for Pearson Type III Distribution

| Sample | Return Period | | | | | | | | |
|--------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 5 | 10 | 15 | 20 | 25 | 50 | 75 | 100 | 1000 |
| 15 | 0.967 | 1.703 | 2.117 | 2.410 | 2.632 | 3.321 | 3.721 | 4.005 | 6.265 |
| 20 | 0.919 | 1.625 | 2.023 | 2.302 | 2.517 | 3.179 | 3.563 | 3.836 | 6.006 |
| 25 | 0.888 | 1.575 | 1.963 | 2.235 | 2.444 | 3.088 | 3.463 | 3.729 | 5.842 |
| 30 | 0.866 | 1.541 | 1.922 | 2.188 | 2.393 | 3.026 | 3.393 | 3.653 | 5.727 |
| 35 | 0.851 | 1.516 | 1.891 | 2.152 | 2.354 | 2.979 | 3.341 | 3.598 | |
| 40 | 0.838 | 1.495 | 1.866 | 2.126 | 2.326 | 2.943 | 3.301 | 3.554 | 5.576 |
| 45 | 0.829 | 1.478 | 1.847 | 2.104 | 2.303 | 2.913 | 3.268 | 3.520 | |
| 50 | 0.820 | 1.466 | 1.831 | 2.086 | 2.283 | 2.889 | 3.241 | 3.491 | 5.478 |
| 55 | 0.813 | 1.455 | 1.818 | 2.071 | 2.267 | 2.869 | 3.219 | 3.467 | |
| 60 | 0.807 | 1.446 | 1.806 | 2.059 | 2.253 | 2.852 | 3.200 | 3.446 | |
| 65 | 0.801 | 1.437 | 1.796 | 2.048 | 2.241 | 2.837 | 3.183 | 3.429 | |
| 70 | 0.797 | 1.430 | 1.788 | 2.038 | 2.230 | 2.824 | 3.169 | 3.413 | 5.359 |
| 75 | 0.972 | 1.423 | 1.780 | 2.029 | 2.220 | 2.812 | 3.155 | 3.400 | |
| 80 | 0.788 | 1.417 | 1.773 | 2.020 | 2.212 | 2.802 | 3.145 | 3.387 | |
| 85 | 0.785 | 1.413 | 1.767 | 2.013 | 2.205 | 2.793 | 3.135 | 3.376 | |
| 90 | 0.782 | 1.409 | 1.762 | 2.007 | 2.198 | 2.785 | 3.125 | 3.367 | |
| 95 | 0.780 | 1.405 | 1.757 | 2.002 | 2.193 | 2.777 | 3.116 | 3.357 | |
| 100 | 0.779 | 1.401 | 1.752 | 1.998 | 2.187 | 2.770 | 3.109 | 3.349 | 5.261 |
| | 0.719 | 1.305 | 1.635 | 1.866 | 2.044 | 2.592 | 2.911 | 3.137 | 4.936 |

Source: Journal American Statistical Association 47:425-441, 1952.Z.W. Birnbaum.

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Table 4: χ^2 Distribution



| DOF v | $\chi^2_{.995}$ | $\chi^2_{.99}$ | $\chi^2_{.975}$ | $\chi^2_{.95}$ | $\chi^2_{.90}$ | $\chi^2_{.75}$ | $\chi^2_{.50}$ | $\chi^2_{.25}$ | $\chi^2_{.10}$ | $\chi^2_{.05}$ | $\chi^2_{.025}$ | $\chi^2_{.01}$ | $\chi^2_{.005}$ |
|----------|-----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|-----------------|
| 1 | 7.88 | 6.63 | 5.02 | 3.84 | 2.71 | 1.32 | 0.45 5 | 0.10 2 | 0.015 8 | 0.003 9 | 0.001 0 | 0.000 2 | 0.000 0 |
| 2 | 10.6 | 9.21 | 7.38 | 5.99 | 4.61 | 2.77 | 1.39 | 0.57 5 | .211 | .103 | .0506 | .0201 | .0100 |
| 3 | 12.8 | 11.3 | 9.35 | 7.81 | 6.25 | 4.11 | 2.37 | 1.21 | .584 | .352 | .216 | .115 | .072 |
| 4 | 14.9 | 13.3 | 11.1 | 9.49 | 7.78 | 5.39 | 3.36 | 1.92 | 1.06 | .711 | .484 | .297 | .207 |
| 5 | 16.7 | 15.1 | 12.8 | 11.1 | 9.24 | 6.63 | 4.35 | 2.67 | 1.61 | 1.15 | .831 | .554 | .412 |
| 6 | 18.5 | 16.8 | 14.4 | 12.6 | 10.6 | 7.84 | 5.35 | 3.45 | 2.20 | 1.64 | 1.24 | .872 | .676 |
| 7 | 20.3 | 18.5 | 16.0 | 14.1 | 12.0 | 9.04 | 6.35 | 4.25 | 2.83 | 2.17 | 1.69 | 1.24 | .989 |
| 8 | 22.0 | 20.1 | 17.5 | 15.5 | 13.4 | 10.2 | 7.34 | 5.07 | 3.49 | 2.73 | 2.18 | 1.65 | 1.34 |
| 9 | 23.6 | 21.7 | 19.0 | 16.9 | 14.7 | 11.4 | 8.34 | 5.90 | 4.17 | 3.33 | 2.70 | 2.09 | 1.73 |
| 10 | 25.2 | 23.2 | 20.5 | 18.3 | 16.0 | 12.5 | 9.34 | 6.74 | 4.87 | 3.94 | 3.25 | 2.56 | 2.16 |
| 11 | 26.8 | 24.7 | 21.9 | 19.7 | 17.3 | 13.7 | 10.3 | 7.58 | 5.58 | 4.57 | 3.82 | 3.05 | 2.60 |
| 12 | 28.3 | 26.2 | 23.3 | 21.0 | 18.5 | 14.8 | 11.3 | 8.44 | 6.30 | 5.23 | 4.40 | 3.57 | 3.07 |
| 13 | 29.8 | 27.7 | 24.7 | 22.4 | 19.8 | 16.0 | 12.3 | 9.30 | 7.04 | 5.89 | 5.01 | 4.11 | 3.57 |
| 14 | 31.3 | 29.1 | 26.1 | 23.7 | 21.1 | 17.1 | 13.3 | 10.2 | 7.79 | 6.57 | 5.63 | 4.66 | 4.07 |
| 15 | 32.8 | 30.6 | 27.5 | 25.0 | 22.3 | 18.2 | 14.3 | 11.0 | 8.55 | 7.26 | 6.26 | 5.23 | 4.60 |
| 16 | 34.3 | 32.0 | 28.8 | 26.3 | 23.5 | 19.4 | 15.3 | 11.9 | 9.31 | 7.96 | 6.91 | 5.81 | 5.14 |
| 17 | 35.7 | 33.4 | 30.2 | 27.6 | 24.8 | 20.5 | 16.3 | 12.8 | 10.1 | 8.67 | 7.56 | 6.41 | 5.70 |
| 18 | 37.2 | 34.8 | 31.5 | 28.9 | 26.0 | 21.6 | 17.3 | 13.7 | 10.9 | 9.39 | 8.23 | 7.01 | 6.26 |
| 19 | 38.6 | 36.2 | 32.9 | 30.1 | 27.2 | 22.7 | 18.3 | 14.6 | 11.7 | 10.1 | 8.91 | 7.63 | 6.84 |
| 20 | 40.0 | 37.6 | 34.2 | 31.4 | 28.4 | 23.8 | 19.3 | 15.5 | 12.4 | 10.9 | 9.59 | 8.26 | 7.43 |
| 21 | 41.4 | 38.9 | 35.5 | 32.7 | 29.6 | 24.9 | 20.3 | 16.3 | 13.2 | 11.6 | 10.3 | 8.90 | 8.03 |
| 22 | 42.8 | 40.3 | 36.8 | 33.9 | 30.8 | 26.0 | 21.3 | 17.2 | 14.0 | 12.3 | 11.0 | 9.54 | 8.64 |
| 23 | 44.2 | 41.6 | 38.1 | 35.2 | 32.0 | 27.1 | 22.3 | 18.1 | 14.8 | 13.1 | 11.7 | 10.2 | 9.26 |
| 24 | 45.6 | 43.0 | 39.4 | 36.4 | 33.2 | 28.2 | 23.3 | 19.0 | 15.7 | 13.8 | 12.4 | 10.9 | 9.89 |

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| | | | | | | | | | | | | | |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|------|------|------|------|------|------|------|
| | | | | | | | | | | | | | |
| 25 | 46.9 | 44.3 | 40.6 | 37.7 | 34.4 | 29.3 | 24.3 | 19.9 | 16.5 | 14.6 | 13.1 | 11.5 | 10.5 |
| 26 | 48.3 | 45.6 | 41.9 | 38.9 | 35.6 | 30.4 | 25.3 | 20.8 | 17.3 | 15.4 | 13.8 | 12.2 | 11.2 |
| 27 | 49.6 | 47.0 | 43.2 | 40.1 | 36.7 | 31.5 | 26.3 | 21.7 | 18.1 | 16.2 | 14.6 | 12.9 | 11.8 |
| 28 | 51.0 | 48.3 | 44.5 | 41.3 | 37.9 | 32.6 | 27.3 | 22.7 | 18.9 | 16.9 | 15.3 | 13.6 | 12.5 |
| 29 | 52.3 | 49.6 | 45.7 | 42.6 | 39.1 | 33.7 | 28.3 | 23.6 | 19.8 | 17.7 | 16.0 | 14.3 | 13.1 |
| | | | | | | | | | | | | | |
| 30 | 53.7 | 50.9 | 47.0 | 43.8 | 40.3 | 34.8 | 29.3 | 24.5 | 20.6 | 18.5 | 16.8 | 15.0 | 13.8 |
| 40 | 66.8 | 63.7 | 59.3 | 55.8 | 51.8 | 45.6 | 39.3 | 33.7 | 29.1 | 26.5 | 24.4 | 22.2 | 20.7 |
| 50 | 79.5 | 76.2 | 71.4 | 67.5 | 63.2 | 56.3 | 49.3 | 42.9 | 37.7 | 34.8 | 32.4 | 29.7 | 28.0 |
| 60 | 92.0 | 88.4 | 83.3 | 79.1 | 74.4 | 67.0 | 59.3 | 52.3 | 46.5 | 43.2 | 40.5 | 37.5 | 35.5 |
| | | | | | | | | | | | | | |
| 70 | 104. 2 | 100. 4 | 95.0 | 90.5 | 85.5 | 77.6 | 69.3 | 61.7 | 55.3 | 51.7 | 48.8 | 45.4 | 43.3 |
| 80 | 116. 3 | 112. 3 | 106. 6 | 101. 9 | 96.6 | 88.1 | 79.3 | 71.1 | 64.3 | 60.4 | 57.2 | 53.5 | 51.2 |
| 90 | 128. 3 | 124. 1 | 118. 1 | 113. 1 | 107. 6 | 98.6 | 89.3 | 80.6 | 73.3 | 69.1 | 65.6 | 61.8 | 59.2 |
| 100 | 140. 2 | 135. 8 | 129. 6 | 124. 3 | 118. 5 | 109. 1 | 99.3 | 90.1 | 82.4 | 77.9 | 74.2 | 70.1 | 67.3 |

Source: Catherine M. Thompson, Table of percentage points of the χ^2 distribution, Biometrika, Vol. 32 (1941), by permission of the author and publisher.

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Table 5: Kolmogorov-Smirnov Distribution

| Sample size (n) | Significance Level | | | | |
|--------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | .20 | 0.15 | 0.10 | 0.05 | 0.01 |
| 1 | .900 | .925 | .950 | .975 | .995 |
| 2 | .684 | .726 | .776 | .842 | .929 |
| 3 | .565 | .597 | .642 | .708 | .829 |
| 4 | .494 | .725 | .564 | .624 | .734 |
| 5 | .446 | .474 | .510 | .563 | .669 |
| 6 | .410 | .436 | .470 | .521 | .618 |
| 7 | .381 | .405 | .438 | .486 | .577 |
| 8 | .358 | .381 | .411 | .457 | .543 |
| 9 | .339 | .360 | .388 | .432 | .514 |
| 10 | .322 | .342 | .368 | .409 | .486 |
| 11 | .307 | .326 | .352 | .391 | .468 |
| 12 | .295 | .313 | .338 | .375 | .450 |
| 13 | .284 | .302 | .325 | .361 | .433 |
| 14 | .274 | .292 | .314 | .349 | .418 |
| 15 | .266 | .283 | .304 | .338 | .404 |
| 16 | .258 | .274 | .295 | .328 | .391 |
| 17 | .250 | .266 | .286 | .318 | .380 |
| 18 | .244 | .259 | .278 | .309 | .370 |
| 19 | .237 | .252 | .272 | .301 | .361 |
| 20 | .231 | .246 | .264 | .294 | .352 |
| 25 | .21 | .22 | .24 | .264 | .32 |
| 30 | .19 | .20 | .22 | .242 | .29 |
| 35 | .18 | .19 | .21 | .23 | .27 |
| 40 | | | | .21 | .25 |
| 50 | | | | .19 | .23 |
| 60 | | | | .17 | .21 |
| 70 | | | | .16 | .19 |
| 80 | | | | .15 | .18 |
| 90 | | | | .14 | |
| 100 | | | | .14 | |
| Asymptotic | 1.70 | 1.14 | 1.22 | 1.36 | 1.63 |
| Formula | $\frac{1.70}{\sqrt{n}}$ | $\frac{1.14}{\sqrt{n}}$ | $\frac{1.22}{\sqrt{n}}$ | $\frac{1.36}{\sqrt{n}}$ | $\frac{1.63}{\sqrt{n}}$ |

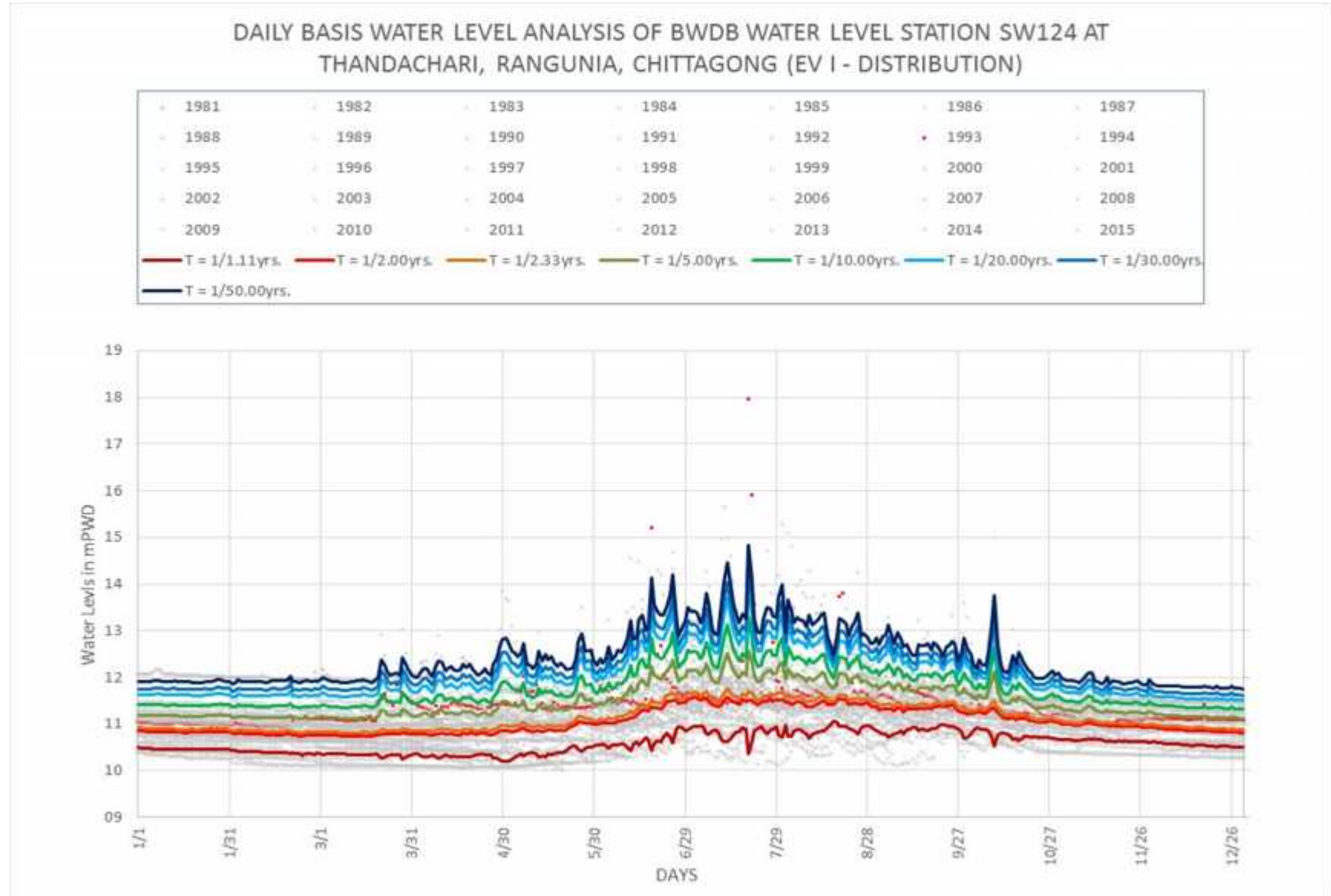
Source: Journal American Statistical Association 47:425-441, 1952.Z.W. Birnbaum.

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Table 6: Drainage Inventory

| Upazila | Ward no. | By road | Reach | GPS location | | RL (mPWD) | | Reach Length | Depth | Width | Type |
|---------|----------|---------|-------|--------------|-----|-----------|-----|--------------|-------|-------|------|
| | | | | Start | End | Start | End | (m) | (mm) | (mm) | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

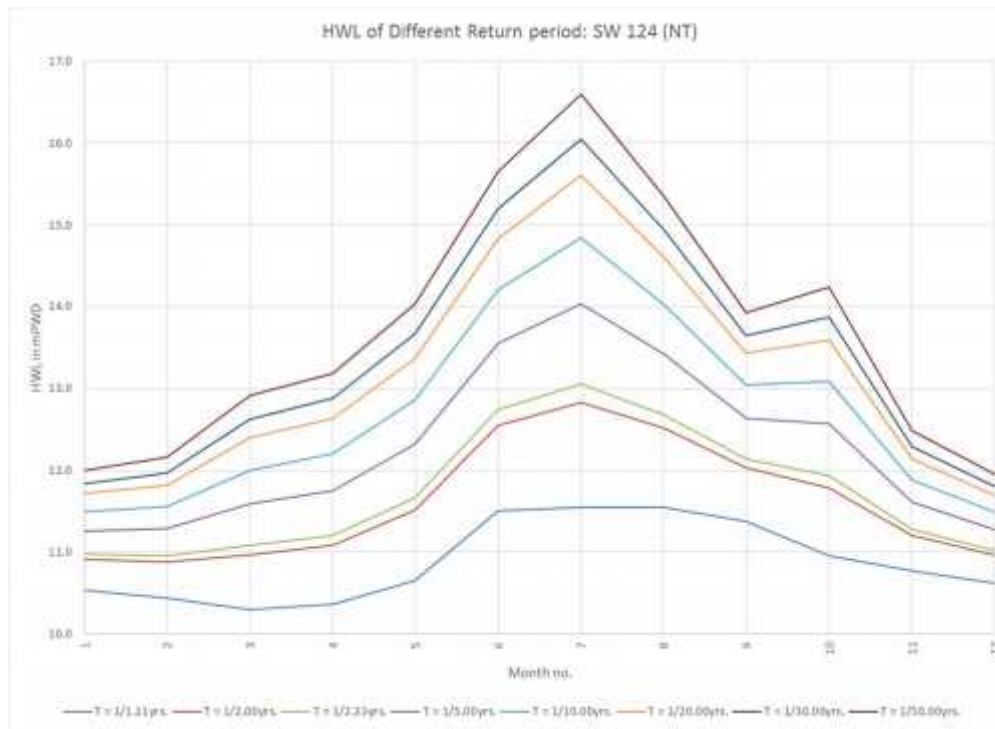
DAILY BASIS ANALYSIS OF WATER LEVEL DATA OF BWDB STATION SW124 AT THANDACHHARI, RANGUNIA (EV I)



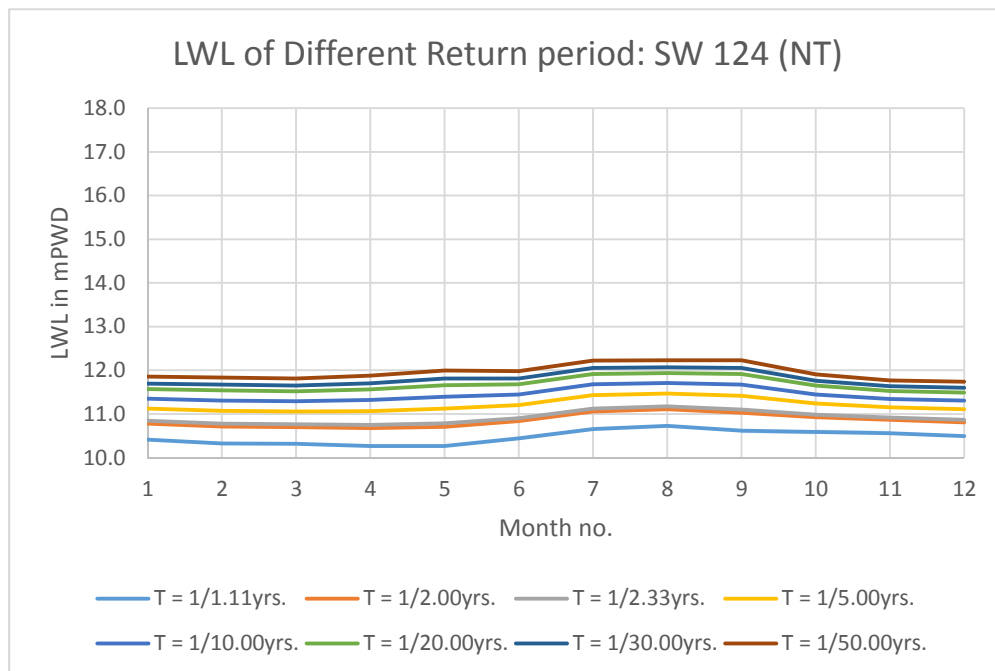
MONTHLY BASIS ANALYSIS OF WATER LEVEL DATA OF BWDB STATION SW124 AT THANDACHHARI, RANGUNIA (EV I)

| Monthly Data | | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
|--------------|--|------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| WL | | Year | Monthly Maximum WL (mPWD) | | | | | | | | | | | | | Monthly Minimum WL (mPWD) | | | | | | | | | | | | |
| | | 1981 | 12.17 | 12.11 | 12.15 | 12.41 | 12.57 | 12.38 | 13.15 | 12.63 | 12.71 | 11.68 | 11.55 | 11.54 | | 11.99 | 11.93 | 11.90 | 11.72 | 11.65 | 11.64 | 11.64 | 11.64 | 11.58 | 11.47 | 11.42 | 11.48 | |
| | | 1982 | 11.79 | 11.80 | 11.69 | 11.64 | 11.50 | 13.81 | 12.59 | 13.10 | 13.23 | 11.94 | 11.50 | 11.61 | | 11.46 | 11.45 | 11.43 | 11.47 | 11.37 | 11.36 | 11.84 | 11.76 | 11.75 | 11.49 | 11.39 | 11.32 | |
| | | 1983 | 11.32 | 11.34 | 11.71 | 11.82 | 12.30 | 12.54 | 13.20 | 15.09 | 12.34 | 13.03 | 11.76 | 11.52 | | 11.24 | 11.19 | 11.17 | 11.10 | 11.29 | 11.26 | 11.63 | 11.69 | 11.35 | 11.25 | 11.15 | 11.06 | |
| | | 1984 | 11.07 | 10.98 | 10.92 | 11.11 | 12.99 | 12.92 | 12.80 | 12.27 | 13.28 | 11.98 | 11.35 | 11.29 | | 10.98 | 10.88 | 10.85 | 10.84 | 11.02 | 11.28 | 11.47 | 11.53 | 11.48 | 11.37 | 11.29 | 11.24 | |
| | | 1985 | 11.26 | 11.19 | 11.49 | 11.23 | 12.14 | 13.44 | 13.94 | 12.27 | 11.44 | 11.40 | 11.37 | 11.25 | | 11.18 | 11.06 | 11.04 | 11.04 | 11.15 | 11.17 | 11.49 | 11.33 | 11.16 | 11.11 | 11.09 | 11.07 | |
| | | 1986 | 11.10 | 11.04 | 10.97 | 11.20 | 11.13 | 12.93 | 12.93 | 12.12 | 12.47 | 11.75 | 11.96 | 11.12 | | 11.01 | 10.92 | 10.87 | 10.88 | 10.97 | 10.94 | 11.42 | 11.44 | 11.24 | 11.15 | 11.12 | 11.06 | |
| | | 1987 | 11.11 | 11.14 | 11.19 | 11.94 | 11.44 | 13.24 | 14.18 | 14.25 | 13.30 | 11.77 | 12.04 | 11.37 | | 11.04 | 11.01 | 11.00 | 10.94 | 11.01 | 11.08 | 11.35 | 11.70 | 11.61 | 11.42 | 11.36 | 11.28 | |
| | | 1988 | 11.27 | 11.28 | 11.41 | 11.69 | 12.29 | 14.67 | 14.27 | 13.77 | 12.28 | 12.10 | 11.93 | 11.35 | | 11.21 | 11.16 | 11.12 | 11.08 | 11.13 | 11.23 | 11.35 | 11.51 | 11.49 | 11.28 | 11.19 | 11.13 | |
| | | 1989 | 11.13 | 11.10 | 11.00 | 12.78 | 11.88 | 11.99 | 13.79 | 12.93 | 12.84 | 14.99 | 11.72 | 11.49 | | 11.06 | 10.98 | 10.92 | 10.90 | 11.47 | 11.39 | 11.37 | 11.69 | 11.56 | 11.51 | 11.49 | 11.40 | |
| | | 1990 | 11.40 | 11.38 | 11.66 | 12.88 | 12.39 | 11.88 | 12.47 | 12.11 | 11.98 | 13.22 | 11.69 | 11.50 | | 11.35 | 11.27 | 11.25 | 11.32 | 11.28 | 11.28 | 11.45 | 11.50 | 11.39 | 11.35 | 11.44 | 11.42 | |
| | | 1991 | 11.44 | 11.35 | 11.37 | 13.02 | 13.85 | 12.26 | 12.53 | 15.28 | 12.09 | 11.66 | | 11.28 | | 11.36 | 11.27 | 11.25 | 11.26 | 11.38 | 11.37 | 11.47 | 11.52 | 11.44 | 11.35 | | 11.20 | |
| | | 1992 | 11.20 | 11.58 | 11.20 | 11.02 | 11.26 | 11.81 | 12.38 | 11.44 | 12.24 | 11.36 | 11.15 | 11.13 | | 11.15 | 11.15 | 10.80 | 10.92 | 10.96 | 11.00 | 11.31 | 11.07 | 11.12 | 11.15 | 11.06 | 10.88 | |
| | | 1993 | 11.05 | 11.93 | 12.00 | 11.48 | 12.02 | 15.20 | 17.96 | 13.81 | 11.81 | 11.57 | 11.21 | 11.41 | | 10.96 | 10.29 | 11.06 | 11.23 | 11.28 | 11.38 | 11.43 | 11.51 | 11.27 | 11.16 | 10.96 | 11.08 | |
| | | 1994 | 11.13 | 11.12 | 13.02 | 11.75 | 11.30 | 12.26 | 13.12 | 13.07 | 11.92 | 11.22 | 11.07 | 11.03 | | 11.05 | 10.99 | 10.95 | 11.23 | 11.04 | 10.87 | 11.35 | 11.28 | 11.15 | 11.02 | 10.97 | 10.93 | |
| | | 1995 | 11.03 | 11.02 | 10.92 | 11.38 | 12.46 | 11.44 | 12.68 | 12.75 | 11.30 | 11.78 | 11.72 | 11.27 | | 10.92 | 10.88 | 10.82 | 10.82 | 10.91 | 10.94 | 11.02 | 11.30 | 10.58 | 10.49 | 10.55 | 10.82 | |
| | | 1996 | 11.10 | 11.02 | 11.02 | 11.20 | 11.67 | 12.59 | 12.17 | 12.03 | 12.16 | 12.15 | 11.31 | 10.95 | | 10.84 | 10.95 | 10.96 | 10.98 | 11.09 | 11.00 | 11.08 | 11.16 | 11.21 | 10.89 | 10.89 | 10.79 | |
| | | 1997 | 10.80 | 10.89 | 12.92 | 11.23 | 11.12 | 11.54 | 13.15 | 11.57 | 12.84 | 11.39 | 10.92 | 10.84 | | 10.74 | 10.72 | 10.68 | 10.94 | 10.95 | 11.21 | 11.20 | 11.27 | 11.18 | 10.92 | 10.85 | 10.76 | |
| | | 1998 | 10.78 | 10.72 | 10.74 | 11.01 | 10.87 | 12.37 | 14.40 | 12.00 | 12.11 | 11.30 | 11.48 | 11.10 | | 10.72 | 10.67 | 10.65 | 10.67 | 10.64 | 10.45 | 10.61 | 11.16 | 11.25 | 11.10 | 10.94 | 10.85 | |
| | | 1999 | 10.84 | 10.73 | 10.66 | 10.48 | 11.61 | 14.29 | 15.65 | 13.55 | 12.28 | 12.46 | 11.49 | 11.06 | | 10.71 | 10.66 | 10.48 | 10.35 | 10.34 | 11.26 | 11.39 | 11.33 | 11.28 | 11.24 | 11.08 | 10.84 | |
| | | 2000 | 10.83 | 10.91 | 10.68 | 10.90 | 13.50 | 12.90 | 11.65 | 12.48 | 11.56 | 11.65 | 11.17 | | 10.76 | 10.64 | 10.53 | 10.50 | 10.69 | 11.20 | 11.24 | 11.16 | 11.16 | 11.10 | 10.75 | | | |
| | | 2001 | | | | | | | | 12.15 | 12.05 | 11.35 | 12.10 | 10.97 | | | | | | | | | 11.05 | 11.00 | 10.95 | 10.90 | 10.84 | |
| | | 2002 | 10.88 | 10.70 | 10.85 | 10.85 | 12.55 | 11.73 | 12.75 | 11.75 | 11.55 | | 11.35 | 11.00 | | 10.75 | 10.67 | 10.66 | 10.73 | 10.75 | 10.95 | 11.13 | 11.10 | 10.95 | | 10.85 | 10.80 | |
| | | 2003 | 10.90 | 11.02 | 11.02 | 11.62 | 11.37 | 12.52 | 11.70 | 11.25 | 11.70 | | | | | 10.44 | 10.80 | 10.84 | 10.88 | 10.85 | 10.87 | 10.93 | 10.93 | 10.95 | | | | |
| | | 2004 | 10.80 | 10.70 | 10.63 | 10.69 | 10.69 | 11.20 | 11.45 | 11.08 | 11.02 | 10.97 | 10.65 | 10.67 | | 10.60 | 10.67 | 10.61 | 10.60 | 10.60 | 10.70 | 11.10 | 10.90 | 10.76 | 10.70 | 10.63 | 10.65 | |
| | | 2005 | 10.64 | 10.62 | | 10.68 | 10.67 | 10.80 | 10.90 | 13.00 | 11.60 | 11.25 | 11.10 | 10.60 | | 10.61 | 10.60 | | 10.60 | 10.63 | 10.60 | 10.72 | 11.22 | 11.07 | 10.84 | 10.60 | 10.40 | |
| | | 2006 | 10.40 | 10.18 | 10.15 | 10.10 | 12.50 | 12.20 | 12.50 | 12.60 | 13.00 | 11.40 | 11.40 | 10.64 | | 10.25 | 10.10 | 10.10 | 10.06 | 10.06 | 11.00 | 11.50 | 11.60 | 12.00 | 10.65 | 10.65 | 10.47 | |
| | | 2007 | 10.47 | 10.34 | 10.11 | 10.10 | 10.20 | 14.55 | 11.27 | 12.55 | | | | 10.64 | | 10.37 | 10.10 | 10.08 | 10.07 | 10.09 | 10.20 | 10.64 | 11.05 | | | | 10.52 | |
| | | 2008 | 11.27 | 10.56 | 10.20 | 10.11 | 10.19 | 12.80 | 13.42 | 12.50 | 11.28 | 11.35 | 11.10 | 10.97 | | 10.44 | 10.21 | 10.10 | 10.08 | 10.08 | 10.19 | 10.93 | 10.78 | 11.03 | 10.85 | 10.97 | 10.86 | |
| | | 2009 | 10.85 | 10.80 | 10.73 | 11.05 | 12.52 | 11.05 | 13.45 | 13.10 | 12.80 | 13.72 | 10.97 | 10.90 | | 10.80 | 10.73 | 10.66 | 10.65 | 10.74 | 10.83 | 10.91 | 10.80 | 10.98 | 10.80 | 10.77 | 10.73 | |
| | | 2010 | 10.73 | 10.65 | 10.75 | 10.64 | 11.56 | 14.48 | 13.52 | 12.58 | 11.66 | 12.52 | 11.02 | 10.82 | | 10.65 | 10.61 | 10.56 | 10.02 | 10.07 | 10.28 | 11.32 | 10.75 | 10.70 | 10.60 | 10.82 | 10.48 | |
| | | 2011 | 10.48 | 10.42 | 10.43 | 10.51 | 11.08 | 12.28 | 13.32 | 14.28 | 13.58 | 13.28 | 10.66 | 10.62 | | 10.42 | 10.36 | 10.33 | 10.20 | 10.19 | 10.44 | 10.42 | 10.85 | 10.37 | 10.64 | 10.59 | 10.53 | |
| | | 2012 | 10.56 | 10.45 | 10.61 | 10.58 | 10.51 | 13.82 | 12.68 | 11.80 | 11.10 | 11.85 | 10.58 | 10.48 | | 10.43 | 10.39 | 10.37 | 10.15 | 10.27 | 10.38 | 10.70 | 10.58 | 10.56 | 10.38 | 10.36 | 10.42 | |
| | | 2013 | 10.42 | 10.38 | 10.50 | 10.50 | 11.38 | 13.07 | 12.02 | 10.90 | 11.15 | 11.62 | 10.80 | 10.65 | | 10.38 | 10.34 | 10.45 | 10.43 | 10.00 | 10.31 | 10.40 | 10.46 | 10.55 | 10.40 | 10.65 | 10.59 | |
| | | 2014 | 10.59 | 10.69 | 10.58 | 10.47 | 10.50 | 11.85 | 11.22 | 12.72 | 11.70 | 10.65 | 10.40 | 10.33 | | 10.52 | 10.50 | 10.45 | 10.38 | 10.30 | 10.26 | 10.10 | 10.18 | 10.10 | 10.38 | 10.33 | 10.27 | |
| | | 2015 | 10.38 | 10.28 | 10.37 | 10.98 | 10.49 | 14.32 | 14.72 | 13.12 | 12.48 | 11.50 | 10.39 | 10.38 | | 10.28 | 10.25 | 10.23 | 10.34 | 10.35 | 10.35 | 10.30 | 10.32 | 10.16 | 10.38 | 10.34 | 10.30 | |
| | | MAX | 12.17 | 12.11 | 13.02 | 13.02 | 13.85 | 15.20 | 17.96 | 15.28 | 13.58 | 14.99 | 12.10 | 11.61 | | 11.99 | 11.93 | 11.90 | 11.72 | 11.65 | 11.64 | 11.84 | 11.76 | 12.00 | 11.51 | 11.49 | 11.48 | |
| | | MIN | 10.38 | 10.18 | 10.11 | 10.10 | 10.19 | 10.80 | 10.90 | 10.90 | 11.02 | 10.65 | 10.39 | 10.33 | | 10.25 | 10.10 | 10.08 | 10.02 | 10.00 | 10.19 | 10.10 | 10.18 | 10.10 | 10.38 | 10.33 | 10.27 | |
| | | N | 34 | 34 | 33 | 34 | 34 | 34 | 34 | 35 | 34 | 32 | 32 | 33 | | 34 | 34 | 33 | 34 | 34 | 34 | 34 | 35 | 34 | 32 | 32 | 33 | |
| | | AVE. | 10.98 | 10.95 | 11.08 | 11.21 | 11.66 | 12.74 | 13.06 | 12.68 | 12.14 | 11.93 | 11.28 | 11.02 | | 10.84 | 10.78 | 10.76 | 10.75 | 10.78 | 10.90 | 11.12 | 11.17 | 11.10 | 10.98 | 10.92 | 10.86 | |
| | | σ | 00.40 | 00.47 | 00.71 | 00.76 | 00.92 | 01.12 | 01.37 | 01.03 | 00.69 | 00.89 | 00.46 | 00.36 | | | | | | | | | | | | | | |

MONTHLY BASIS ANALYSIS OF HIGHEST WATER LEVEL DATA OF BWDB STATION SW124 AT THANDACHHARI, RANGUNIA (EV I)

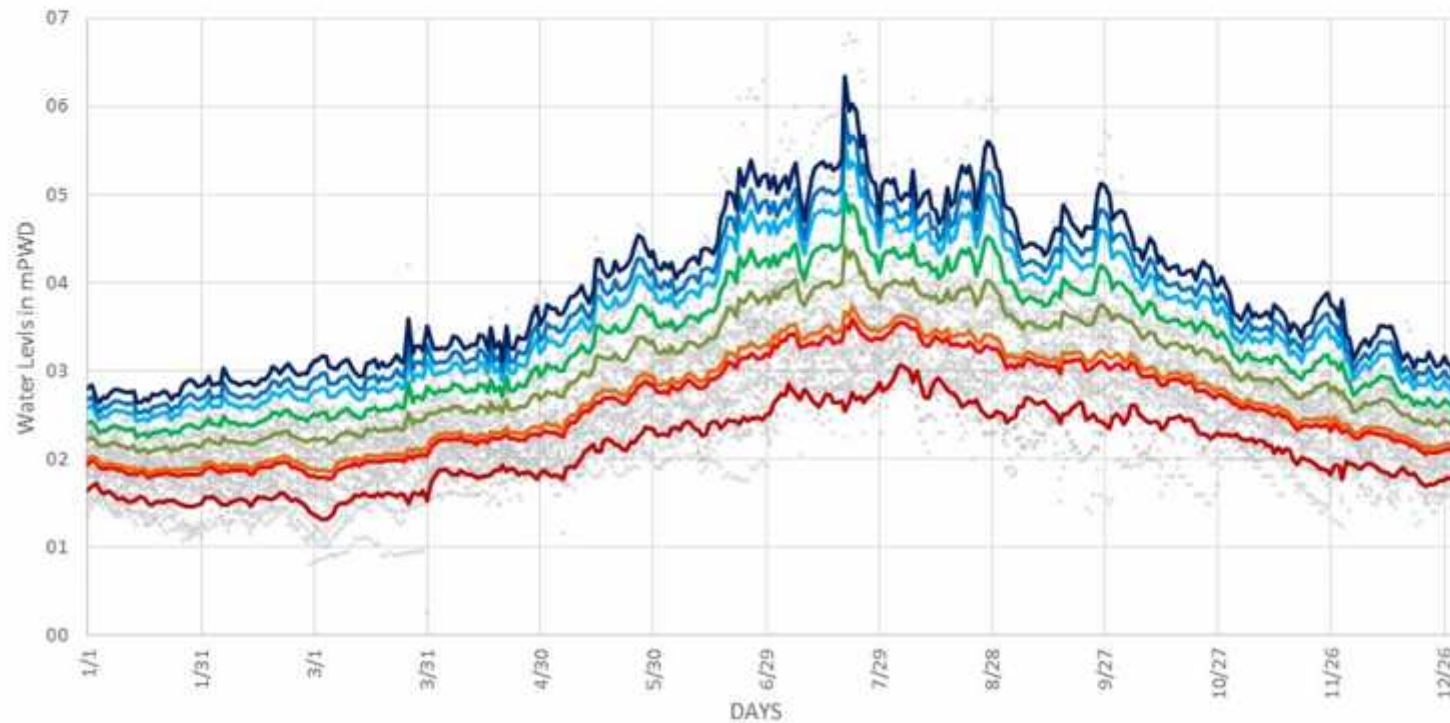
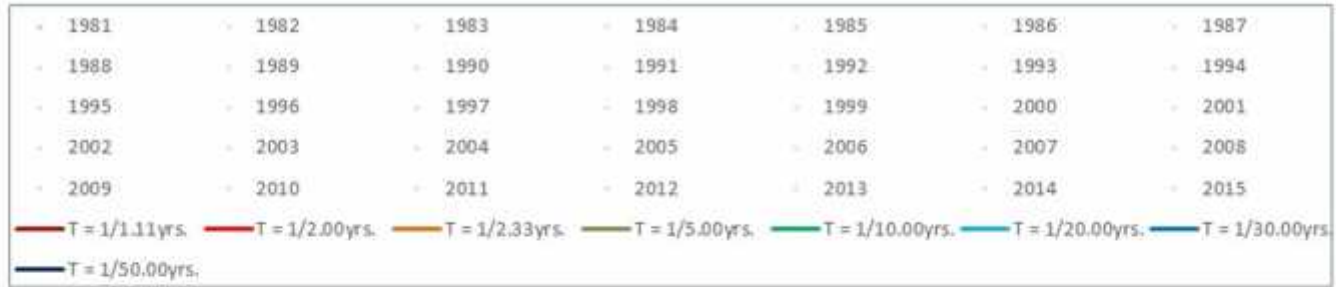


MONTHLY BASIS ANALYSIS OF LOWEST WATER LEVEL DATA OF BWDB STATION SW124 AT THANDACHHARI, RANGUNIA (EV I)

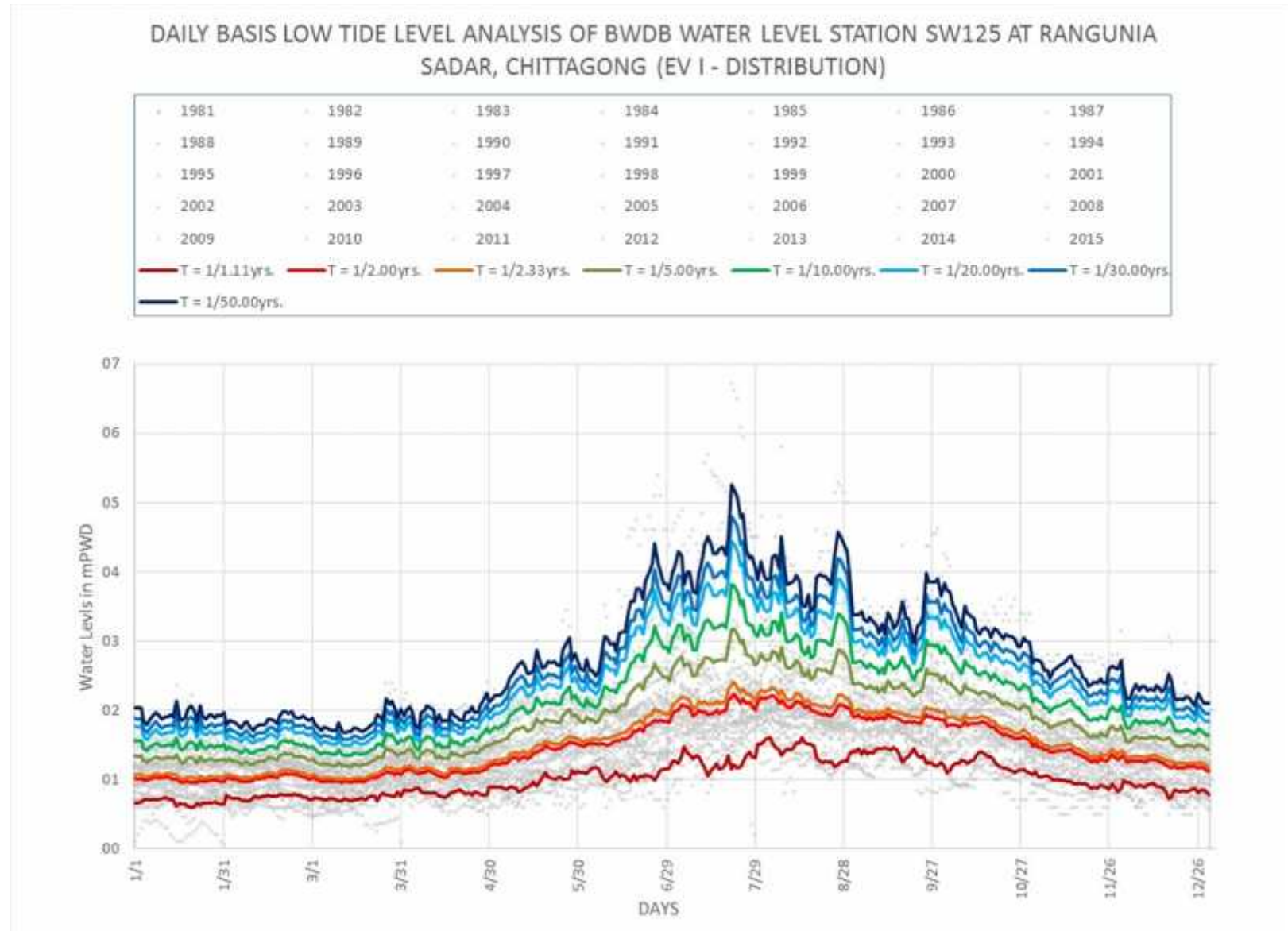


DAILY BASIS ANALYSIS OF HIGH TIDE LEVEL DATA OF BWDB STATION SW125 AT RANGUNIA (EV I)

DAILY BASIS HIGH TIDE LEVEL ANALYSIS OF BWDB WATER LEVEL STATION SW125 AT RANGUNIA SADAR, CHITTAGONG (EV I - DISTRIBUTION)



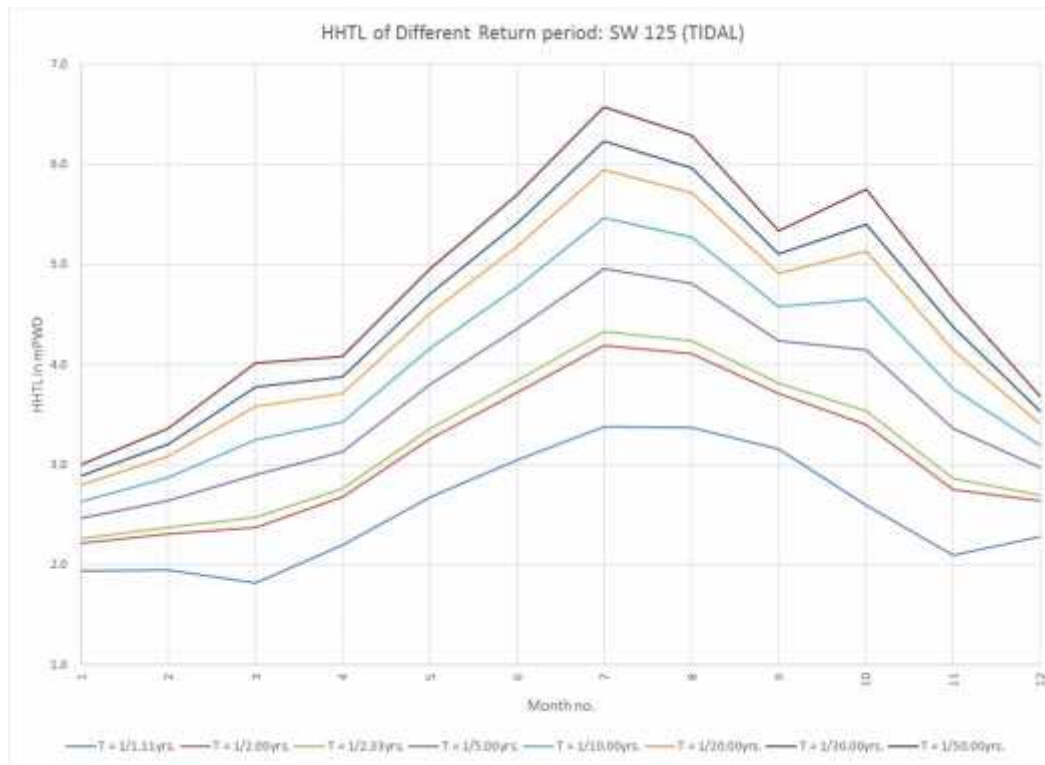
DAILY BASIS ANALYSIS OF LOW TIDE LEVEL DATA OF BWDB STATION SW125 AT RANGUNIA (EV I)



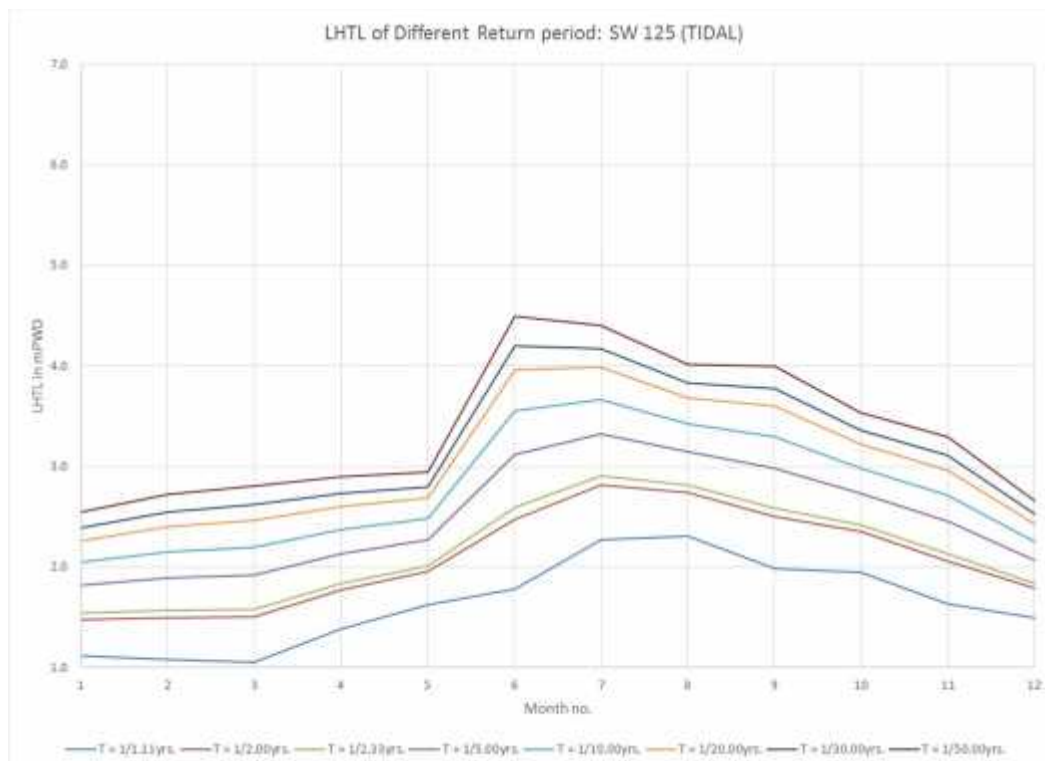
MONTHLY BASIS ANALYSIS OF HIGH TIDE LEVEL DATA OF BWDB STATION SW125 AT RANGUNIA (EV I)

| Monthly Data | | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|----------------|-------------------|------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| WL | | Year | Monthly Maximum HTL (mPWD) | | | | | | | | | | | | Monthly Minimum HTL (mPWD) | | | | | | | | | | | |
| | | 1981 | | | | 02.80 | 03.05 | 03.17 | 04.15 | 03.51 | 02.74 | 02.90 | 02.50 | 03.20 | 00.00 | 00.00 | 00.00 | 01.77 | 01.77 | 01.98 | 03.05 | 02.29 | 01.98 | 02.04 | 01.98 | 01.98 |
| | | 1982 | 02.44 | 02.32 | 02.59 | 02.65 | 02.45 | 03.80 | 03.50 | 03.60 | 03.20 | 02.60 | 02.10 | 02.20 | 01.46 | 01.68 | 01.83 | 00.24 | 01.15 | 02.00 | 02.20 | 02.30 | 02.00 | 01.50 | 01.40 | 01.40 |
| | | 1983 | 02.04 | 02.00 | 02.55 | 03.01 | 02.60 | 02.55 | 04.50 | 06.10 | 02.90 | 03.25 | 02.50 | 02.20 | 01.60 | 01.52 | 01.46 | 02.18 | 02.00 | 02.30 | 02.30 | 02.40 | 02.28 | 01.90 | 01.90 | 01.75 |
| | | 1984 | 02.30 | 02.45 | 03.05 | 03.05 | 03.70 | 03.70 | 03.75 | 03.90 | 03.65 | 03.80 | 02.85 | 02.80 | 01.75 | 01.15 | 02.09 | 02.05 | 02.15 | 03.00 | 02.70 | 02.72 | 02.80 | 02.23 | 02.48 | 01.85 |
| | | 1985 | 01.94 | 02.65 | 02.20 | 02.80 | 04.65 | 03.80 | 04.50 | 03.80 | 03.80 | 02.90 | 02.90 | 02.90 | 01.50 | 01.68 | 01.62 | 01.60 | 02.10 | 02.75 | 02.60 | 02.75 | 02.70 | 01.90 | 02.00 | 02.00 |
| | | 1986 | 02.00 | 02.15 | 02.20 | 02.50 | 03.40 | 03.50 | 04.50 | 03.80 | 03.80 | 03.70 | 02.90 | 02.76 | 01.50 | 01.78 | 01.62 | 01.60 | 01.60 | 02.01 | 02.75 | 02.70 | 02.75 | 02.58 | 02.45 | 01.95 |
| | | 1987 | 02.50 | 02.65 | 02.67 | 02.97 | 02.70 | 03.90 | 03.85 | 06.08 | 05.70 | 03.55 | 02.97 | 02.65 | 01.60 | 01.98 | 01.97 | 01.96 | 01.95 | 02.34 | 02.80 | 03.15 | 02.58 | 02.60 | 02.28 | 02.08 |
| | | 1988 | 02.47 | 02.65 | 02.80 | 03.10 | 03.80 | 04.90 | 04.95 | 03.95 | 03.85 | 03.88 | 03.75 | 03.67 | 01.90 | 01.83 | 01.80 | 02.20 | 02.30 | 03.40 | 03.50 | 02.00 | 01.82 | 02.75 | 02.15 | 02.11 |
| | | 1989 | 02.86 | 02.75 | 03.11 | 03.81 | 02.75 | 03.45 | 03.85 | 03.85 | 03.85 | 03.90 | 03.45 | 02.65 | 01.75 | 01.75 | 01.20 | 01.83 | 01.81 | 02.30 | 02.05 | 02.55 | 02.75 | 02.65 | 01.85 | 01.75 |
| | | 1990 | 02.20 | 02.15 | 02.35 | 02.55 | 03.90 | 04.05 | 04.45 | 03.80 | 03.30 | 04.00 | 02.80 | 02.30 | 01.45 | 01.45 | 01.55 | 01.50 | 01.75 | 02.85 | 02.60 | 02.55 | 02.45 | 02.25 | 01.65 | 01.60 |
| | | 1991 | 02.20 | 02.55 | 02.75 | 03.80 | 04.46 | 05.30 | 04.50 | 05.15 | 04.10 | 03.75 | 03.52 | 03.30 | 01.50 | 01.50 | 01.65 | 01.85 | 02.90 | 02.96 | 03.40 | 02.95 | 02.75 | 02.75 | 02.55 | 02.10 |
| | | 1992 | 02.62 | 03.00 | 02.55 | 02.53 | 02.95 | 03.72 | 03.95 | 03.80 | 03.80 | 03.50 | 02.87 | 02.54 | 01.82 | 01.86 | 01.94 | 01.90 | 01.92 | 02.25 | 02.90 | 02.90 | 02.75 | 02.80 | 02.30 | 02.00 |
| | | 1993 | 02.22 | 02.32 | 02.73 | 03.40 | 03.80 | 04.90 | 06.82 | 04.90 | 04.28 | 03.85 | 03.05 | 02.85 | 01.62 | 01.54 | 01.38 | 02.10 | 02.68 | 03.10 | 03.30 | 03.85 | 03.02 | 02.65 | 02.08 | 01.90 |
| | | 1994 | 02.75 | 02.60 | 03.50 | 03.42 | 03.55 | 03.60 | 03.80 | 03.98 | 03.58 | 03.22 | 02.96 | 02.70 | 02.10 | 02.20 | 01.73 | 02.60 | 02.24 | 02.42 | 02.82 | 02.75 | 02.68 | 02.25 | 02.05 | 01.51 |
| | | 1995 | 02.55 | 02.45 | 02.48 | 02.83 | 04.50 | 03.50 | 04.30 | 04.44 | 03.72 | 03.68 | 03.55 | 03.21 | 01.43 | 01.55 | 01.60 | 01.65 | 01.72 | 02.32 | 03.20 | 02.82 | 03.12 | 02.70 | 02.52 | 01.97 |
| | | 1996 | 02.38 | 02.25 | 04.20 | 02.95 | 03.37 | 04.18 | 04.42 | 04.18 | 03.84 | 03.62 | 02.97 | 02.82 | 01.65 | 01.62 | 01.64 | 02.18 | 02.25 | 02.52 | 02.59 | 03.05 | 02.80 | 02.65 | 02.61 | 02.24 |
| | | 1997 | 02.45 | 02.41 | 02.45 | 02.36 | 03.15 | 03.56 | 06.00 | 04.32 | 03.90 | 04.30 | 02.45 | 02.35 | 01.85 | 01.62 | 01.57 | 01.85 | 01.80 | 02.85 | 03.16 | 02.82 | 02.70 | 01.93 | 01.87 | 01.60 |
| | | 1998 | 02.34 | 02.56 | 02.77 | 03.50 | 03.85 | 04.17 | | | | | | | 01.60 | 01.75 | 02.14 | 01.96 | 01.74 | 02.87 | | | | | | |
| | | 1999 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2000 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2001 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2002 | 02.15 | 02.95 | 01.12 | 02.55 | 03.66 | 03.43 | 05.04 | 04.31 | 03.54 | 00.00 | 03.09 | 02.20 | 01.50 | 01.05 | 00.81 | 01.80 | 02.00 | 01.90 | 02.16 | 02.39 | 01.51 | | 01.58 | 01.42 |
| | | 2003 | 02.10 | 02.10 | 01.85 | 02.15 | 03.00 | 06.30 | 06.00 | 05.40 | 04.20 | 03.90 | 00.00 | 02.60 | 01.15 | 01.20 | 01.15 | 01.80 | 02.05 | 05.80 | 04.90 | 04.20 | 03.70 | 03.50 | 02.10 | |
| | | 2004 | | | | | | | | | | 05.19 | 03.53 | 02.95 | | | | | | | | | | 02.74 | 03.20 | 01.45 |
| | | 2005 | 01.90 | 01.45 | 01.80 | 02.20 | 03.28 | 03.48 | 03.85 | 03.80 | 03.44 | 03.40 | 03.00 | 02.15 | 01.07 | 01.10 | 00.90 | 01.80 | 01.90 | 02.10 | 02.40 | 02.47 | 01.90 | 02.05 | 01.51 | 01.50 |
| | | 2006 | 01.81 | 01.50 | 01.62 | 02.10 | 02.90 | 03.25 | 03.30 | 03.35 | 02.95 | | | | 01.10 | 01.20 | 01.00 | 01.60 | 02.00 | 02.30 | 02.45 | 02.45 | 01.77 | | | |
| | | 2007 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2008 | 02.25 | 02.88 | 02.64 | 03.19 | 03.26 | 03.74 | 04.02 | 04.03 | 03.74 | 03.94 | 02.69 | 02.47 | 01.74 | 01.74 | 01.94 | 02.24 | 02.74 | 02.64 | 03.04 | 02.94 | 02.61 | 01.96 | 01.24 | 01.71 |
| | | 2009 | 02.27 | 02.14 | 02.07 | 02.14 | 02.11 | 03.44 | 03.01 | 04.07 | 03.91 | 04.09 | 02.99 | 02.41 | 01.49 | 01.19 | 01.62 | 01.79 | 01.60 | 01.75 | 02.49 | 02.79 | 03.09 | 02.27 | 02.14 | 02.09 |
| | | 2010 | 02.45 | 02.65 | 02.65 | 02.90 | 03.02 | 03.89 | 03.96 | 03.87 | 03.61 | 03.00 | 02.77 | 02.79 | 01.94 | 02.45 | 02.33 | 02.46 | 02.34 | 02.59 | 03.11 | 03.10 | 03.09 | 02.50 | 02.39 | 02.49 |
| | | 2011 | 02.55 | 02.44 | 02.38 | 02.35 | 03.45 | 03.77 | 04.04 | 03.89 | 04.92 | 03.29 | 02.29 | 02.35 | 01.99 | 02.29 | 02.09 | 02.09 | 02.05 | 02.84 | 03.49 | 03.49 | 01.39 | 01.91 | 01.76 | 01.45 |
| | | 2012 | 02.19 | 01.87 | 02.59 | 02.34 | 03.06 | 03.59 | 03.67 | 03.74 | 03.96 | 03.57 | 02.97 | 02.97 | 01.74 | 01.59 | 01.97 | 01.54 | 02.23 | 02.97 | 03.34 | 02.59 | 03.09 | 02.92 | 02.49 | 02.44 |
| | | 2013 | 01.99 | 01.94 | 01.61 | 01.85 | 04.02 | 03.09 | 03.24 | 03.29 | 03.74 | 03.71 | 03.39 | 02.41 | 01.75 | 01.59 | 01.40 | 01.52 | 01.85 | 02.25 | 02.71 | 02.72 | 02.99 | 02.97 | 02.44 | 01.79 |
| | | 2014 | 02.00 | 02.32 | 02.14 | 02.19 | 02.65 | 03.89 | 04.30 | 04.05 | 03.74 | 03.49 | 02.49 | 02.63 | 01.61 | 01.57 | 01.92 | 01.94 | 02.09 | 02.54 | 03.69 | 02.79 | 02.97 | 02.49 | 01.97 | 01.87 |
| | | 2015 | 01.60 | 02.59 | 02.25 | 02.90 | 03.75 | 03.55 | 05.45 | 06.04 | 04.69 | 04.54 | 03.69 | 03.25 | 01.15 | 01.64 | 01.50 | 01.50 | 01.80 | 01.85 | 02.75 | 03.29 | 02.99 | 02.39 | 02.84 | 01.25 |
| | | MAX | 02.86 | 03.00 | 04.20 | 03.81 | 04.65 | 06.30 | 06.82 | 06.10 | 05.70 | 05.19 | 03.75 | 03.67 | 02.10 | 02.45 | 02.33 | 02.60 | 02.90 | 05.80 | 04.90 | 04.20 | 03.70 | 03.50 | 03.20 | 02.49 |
| | | MIN | 01.60 | 01.45 | 01.12 | 01.85 | 02.11 | 02.55 | 03.01 | 03.29 | 02.74 | 00.00 | 00.00 | 02.15 | 00.00 | 00.00 | 00.00 | 00.24 | 01.15 | 01.75 | 02.05 | 02.00 | 01.39 | 01.50 | 01.24 | 01.25 |
| | | N | 29 | 29 | 29 | 30 | 30 | 30 | 29 | 29 | 29 | 29 | 29 | 29 | 30 | 30 | 30 | 30 | 30 | 30 | 29 | 29 | 29 | 28 | 28 | 29 |
| | | AVE. | 02.26 | 02.37 | 02.47 | 02.76 | 03.36 | 03.84 | 04.33 | 04.24 | 03.81 | 03.54 | 02.86 | 02.70 | 01.54 | 01.57 | 01.58 | 01.84 | 02.02 | 02.59 | 02.91 | 02.82 | 02.59 | 02.42 | 02.13 | 01.84 |
| | | σ | 00.29 | 00.38 | 00.59 | 00.51 | 00.62 | 00.72 | 00.87 | 00.79 | 00.59 | 00.85 | 00.69 | 00.38 | 00.39 | 00.45 | 00.47 | 00.41 | 00.36 | 00.73 | 00.58 | 00.46 | 00.55 | 00.43 | 00.45 | 00.31 |
| ANALYSED DATA: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T = 1/1.11yrs. | K _{1.11} | = | -1.10 | 01.94 | 01.95 | 01.82 | 02.20 | 02.68 | 03.05 | 03.38 | 03.37 | 03.16 | 02.59 | 02.10 | 01.12 | 01.08 | 01.06 | 01.38 | 01.62 | 01.78 | 02.28 | 02.31 | 01.99 | 01.95 | 01.64 | 01.49 |
| T = 1/2.00yrs. | K _{2.00} | = | -0.16 | 02.21 | 02.31 | 02.37 | 02.68 | 03.26 | 03.72 | 04.19 | 04.11 | 03.71 | 03.39 | 02.75 | 01.48 | 01.50 | 01.50 | 01.77 | 01.96 | 02.47 | 02.82 | 02.74 | 02.50 | 02.35 | 02.06 | 01.79 |
| T = 1/2.33yrs. | K _{2.33} | = | 0.00 | 02.26 | 02.37 | 02.47 | 02.76 | 03.36 | 03.84 | 04.33 | 04.24 | 03.81 | 03.54 | 02.86 | 01.54 | 01.57 | 01.58 | 01.84 | 02.02 | 02.59 | 02.91 | 02.82 | 02.59 | 02.42 | 02.13 | 01.84 |
| T = 1/5.00yrs. | K _{5.00} | = | 0.72 | 02.47 | 02.64 | 02.90 | 03.13 | 03.80 | 04.35 | 04.96 | 04.81 | 04.23 | 04.15 | 03.36 | 02.05 | 02.15 | 02.20 | 02.37 | 02.48 | | | | | | | |

MONTHLY BASIS ANALYSIS OF HIGHEST HIGH TIDE LEVEL DATA OF BWDB STATION SW125 AT RANGUNIA (EV I)



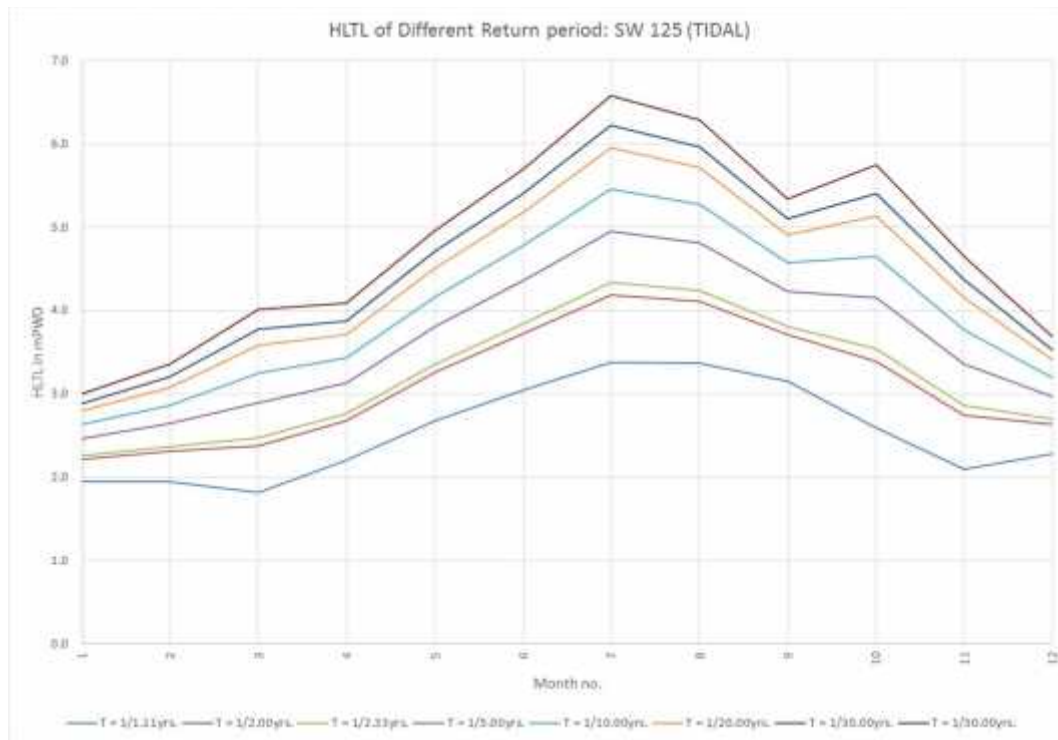
MONTHLY BASIS ANALYSIS OF LOWEST HIGH TIDE LEVEL DATA OF BWDB STATION SW125 AT RANGUNIA (EV I)



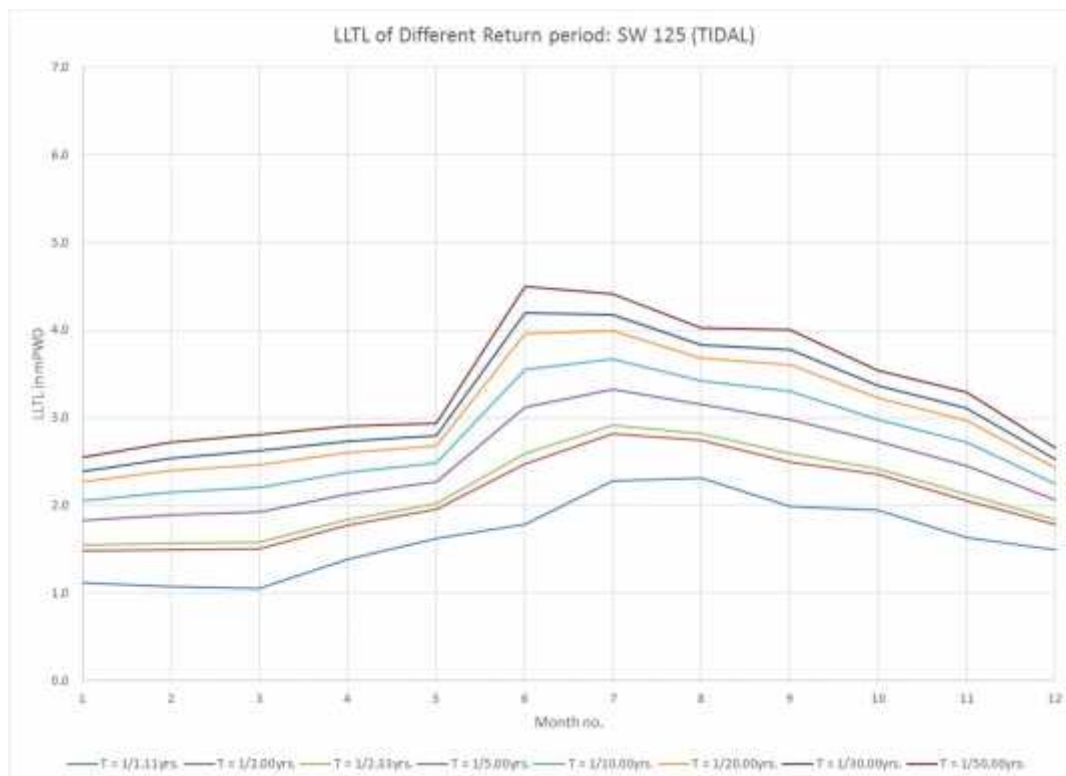
MONTHLY BASIS ANALYSIS OF LOW TIDE LEVEL DATA OF BWDB STATION SW125 AT RANGUNIA (EV I)

| Monthly Data | | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|----------------|--|--|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| WL | | Year | Monthly Maximum HTL (mPWD) | | | | | | | | | | | | | Monthly Minimum HTL (mPWD) | | | | | | | | | | | |
| | | 1981 | | | | 02.80 | 03.05 | 03.17 | 04.15 | 03.51 | 02.74 | 02.90 | 02.50 | 03.20 | | 00.00 | 00.00 | 00.00 | 01.77 | 01.77 | 01.98 | 03.05 | 02.29 | 01.98 | 02.04 | 01.98 | 01.98 |
| | | 1982 | 02.44 | 02.32 | 02.59 | 02.65 | 02.45 | 03.80 | 03.50 | 03.60 | 03.20 | 02.60 | 02.10 | 02.20 | | 01.46 | 01.68 | 01.83 | 00.24 | 01.15 | 02.00 | 02.20 | 02.30 | 02.00 | 01.50 | 01.40 | 01.40 |
| | | 1983 | 02.04 | 02.00 | 02.55 | 03.01 | 02.60 | 02.55 | 04.50 | 06.10 | 02.90 | 03.25 | 02.50 | 02.20 | | 01.60 | 01.52 | 01.46 | 02.18 | 02.00 | 02.30 | 02.30 | 02.40 | 02.28 | 01.90 | 01.90 | 01.75 |
| | | 1984 | 02.30 | 02.45 | 03.05 | 03.05 | 03.70 | 03.70 | 03.75 | 03.90 | 03.65 | 03.80 | 02.85 | 02.80 | | 01.75 | 01.15 | 02.09 | 02.05 | 02.15 | 03.00 | 02.70 | 02.72 | 02.80 | 02.23 | 02.48 | 01.85 |
| | | 1985 | 01.94 | 02.65 | 02.20 | 02.80 | 04.65 | 03.80 | 04.50 | 03.80 | 03.80 | 02.90 | 02.90 | 02.90 | | 01.50 | 01.68 | 01.62 | 01.60 | 02.10 | 02.75 | 02.60 | 02.75 | 02.70 | 01.90 | 02.00 | 02.00 |
| | | 1986 | 02.00 | 02.15 | 02.20 | 02.50 | 03.40 | 03.50 | 04.50 | 03.80 | 03.80 | 03.70 | 02.90 | 02.76 | | 01.50 | 01.78 | 01.62 | 01.60 | 01.60 | 02.01 | 02.75 | 02.70 | 02.75 | 02.58 | 02.45 | 01.95 |
| | | 1987 | 02.50 | 02.65 | 02.67 | 02.97 | 02.70 | 03.90 | 03.85 | 06.08 | 05.70 | 03.55 | 02.97 | 02.65 | | 01.60 | 01.98 | 01.97 | 01.96 | 01.95 | 02.34 | 02.80 | 03.15 | 02.58 | 02.60 | 02.28 | 02.08 |
| | | 1988 | 02.47 | 02.65 | 02.80 | 03.10 | 03.80 | 04.90 | 04.95 | 03.95 | 03.85 | 03.88 | 03.75 | 03.67 | | 01.90 | 01.83 | 01.80 | 02.20 | 02.30 | 03.40 | 03.50 | 02.00 | 01.82 | 02.75 | 02.15 | 02.11 |
| | | 1989 | 02.86 | 02.75 | 03.11 | 03.81 | 02.75 | 03.45 | 03.85 | 03.85 | 03.85 | 03.90 | 03.45 | 02.65 | | 01.75 | 01.75 | 01.20 | 01.83 | 01.81 | 02.30 | 02.05 | 02.55 | 02.75 | 02.65 | 01.85 | 01.75 |
| | | 1990 | 02.20 | 02.15 | 02.35 | 02.55 | 03.90 | 04.05 | 04.45 | 03.80 | 03.30 | 04.00 | 02.80 | 02.30 | | 01.45 | 01.45 | 01.55 | 01.50 | 01.75 | 02.85 | 02.60 | 02.55 | 02.45 | 02.25 | 01.65 | 01.60 |
| | | 1991 | 02.20 | 02.55 | 02.75 | 03.80 | 04.46 | 05.30 | 04.50 | 05.15 | 04.10 | 03.75 | 03.52 | 03.30 | | 01.50 | 01.50 | 01.65 | 01.85 | 02.90 | 02.96 | 03.40 | 02.95 | 02.75 | 02.75 | 02.55 | 02.10 |
| | | 1992 | 02.62 | 03.00 | 02.55 | 02.53 | 02.95 | 03.72 | 03.95 | 03.80 | 03.80 | 03.50 | 02.87 | 02.54 | | 01.82 | 01.86 | 01.94 | 01.90 | 01.92 | 02.25 | 02.90 | 02.90 | 02.75 | 02.80 | 02.30 | 02.00 |
| | | 1993 | 02.22 | 02.32 | 02.73 | 03.40 | 03.80 | 04.90 | 06.82 | 04.90 | 04.28 | 03.85 | 03.05 | 02.85 | | 01.62 | 01.54 | 01.38 | 02.10 | 02.68 | 03.10 | 03.30 | 03.85 | 03.02 | 02.65 | 02.08 | 01.90 |
| | | 1994 | 02.75 | 02.60 | 03.50 | 03.42 | 03.55 | 03.60 | 03.80 | 03.98 | 03.58 | 03.22 | 02.96 | 02.70 | | 02.10 | 02.20 | 01.73 | 02.60 | 02.24 | 02.42 | 02.82 | 02.75 | 02.68 | 02.25 | 02.05 | 01.51 |
| | | 1995 | 02.55 | 02.45 | 02.48 | 02.83 | 04.50 | 03.50 | 04.30 | 04.44 | 03.72 | 03.68 | 03.55 | 03.21 | | 01.43 | 01.55 | 01.60 | 01.65 | 01.72 | 02.32 | 03.20 | 02.82 | 03.12 | 02.70 | 02.52 | 01.97 |
| | | 1996 | 02.38 | 02.25 | 04.20 | 02.95 | 03.37 | 04.18 | 04.42 | 04.18 | 03.84 | 03.62 | 02.97 | 02.82 | | 01.65 | 01.62 | 01.64 | 02.18 | 02.25 | 02.52 | 02.59 | 03.05 | 02.80 | 02.65 | 02.61 | 02.24 |
| | | 1997 | 02.45 | 02.41 | 02.45 | 02.36 | 03.15 | 03.56 | 06.00 | 04.32 | 03.90 | 04.30 | 02.45 | 02.35 | | 01.85 | 01.62 | 01.57 | 01.85 | 01.80 | 02.85 | 03.16 | 02.82 | 02.70 | 01.93 | 01.87 | 01.60 |
| | | 1998 | 02.34 | 02.56 | 02.77 | 03.50 | 03.85 | 04.17 | | | | | | | | 01.60 | 01.75 | 02.14 | 01.96 | 01.74 | 02.87 | | | | | | |
| | | 1999 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2000 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2001 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2002 | 02.15 | 02.95 | 01.12 | 02.55 | 03.66 | 03.43 | 05.04 | 04.31 | 03.54 | 00.00 | 03.09 | 02.20 | | 01.50 | 01.05 | 00.81 | 01.80 | 02.00 | 01.90 | 02.16 | 02.39 | 01.51 | | 01.58 | 01.42 |
| | | 2003 | 02.10 | 02.10 | 01.85 | 02.15 | 03.00 | 06.30 | 06.00 | 05.40 | 04.20 | 03.90 | 00.00 | 02.60 | | 01.15 | 01.20 | 01.15 | 01.80 | 02.05 | 05.80 | 04.90 | 04.20 | 03.70 | 03.50 | | 02.10 |
| | | 2004 | | | | | | | | | | 05.19 | 03.53 | 02.95 | | | | | | | | | | | 02.74 | 03.20 | 01.45 |
| | | 2005 | 01.90 | 01.45 | 01.80 | 02.20 | 03.28 | 03.48 | 03.85 | 03.80 | 03.44 | 03.40 | 03.00 | 02.15 | | 01.07 | 01.10 | 00.90 | 01.80 | 01.90 | 02.10 | 02.40 | 02.47 | 01.90 | 02.05 | 01.51 | 01.50 |
| | | 2006 | 01.81 | 01.50 | 01.62 | 02.10 | 02.90 | 03.25 | 03.30 | 03.35 | 02.95 | | | | | 01.10 | 01.20 | 01.00 | 01.60 | 02.00 | 02.30 | 02.45 | 02.45 | 01.77 | | | |
| | | 2007 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 2008 | 02.25 | 02.88 | 02.64 | 03.19 | 03.26 | 03.74 | 04.02 | 04.03 | 03.74 | 03.94 | 02.69 | 02.47 | | 01.74 | 01.74 | 01.94 | 02.24 | 02.74 | 02.64 | 03.04 | 02.94 | 02.61 | 01.96 | 01.24 | 01.71 |
| | | 2009 | 02.27 | 02.14 | 02.07 | 02.14 | 02.11 | 03.44 | 03.01 | 04.07 | 03.91 | 04.09 | 02.99 | 02.41 | | 01.49 | 01.19 | 01.62 | 01.79 | 01.60 | 01.75 | 02.49 | 02.79 | 03.09 | 02.27 | 02.14 | 02.09 |
| | | 2010 | 02.45 | 02.65 | 02.65 | 02.90 | 03.02 | 03.89 | 03.96 | 03.87 | 03.61 | 03.00 | 02.77 | 02.79 | | 01.94 | 02.45 | 02.33 | 02.46 | 02.34 | 02.59 | 03.11 | 03.10 | 03.09 | 02.50 | 02.39 | 02.49 |
| | | 2011 | 02.55 | 02.44 | 02.38 | 02.35 | 03.45 | 03.77 | 04.04 | 03.89 | 04.92 | 03.29 | 02.29 | 02.35 | | 01.99 | 02.29 | 02.09 | 02.09 | 02.05 | 02.84 | 03.49 | 03.49 | 01.39 | 01.91 | 01.76 | 01.45 |
| | | 2012 | 02.19 | 01.87 | 02.59 | 02.34 | 03.06 | 03.59 | 03.67 | 03.74 | 03.96 | 03.57 | 02.97 | 02.97 | | 01.74 | 01.59 | 01.97 | 01.54 | 02.23 | 02.97 | 03.34 | 02.59 | 03.09 | 02.92 | 02.49 | 02.44 |
| | | 2013 | 01.99 | 01.94 | 01.61 | 01.85 | 04.02 | 03.09 | 03.24 | 03.29 | 03.74 | 03.71 | 03.39 | 02.41 | | 01.75 | 01.59 | 01.40 | 01.52 | 01.85 | 02.25 | 02.71 | 02.72 | 02.99 | 02.97 | 02.44 | 01.79 |
| | | 2014 | 02.00 | 02.32 | 02.14 | 02.19 | 02.65 | 03.89 | 04.30 | 04.05 | 03.74 | 03.49 | 02.49 | 02.63 | | 01.61 | 01.57 | 01.92 | 01.94 | 02.09 | 02.54 | 03.69 | 02.79 | 02.97 | 02.49 | 01.97 | 01.87 |
| | | 2015 | 01.60 | 02.59 | 02.25 | 02.90 | 03.75 | 03.55 | 05.45 | 06.04 | 04.69 | 04.54 | 03.69 | 03.25 | | 01.15 | 01.64 | 01.50 | 01.50 | 01.80 | 01.85 | 02.75 | 03.29 | 02.99 | 02.39 | 02.84 | 01.25 |
| | | MAX | 02.86 | 03.00 | 04.20 | 03.81 | 04.65 | 06.30 | 06.82 | 06.10 | 05.70 | 05.19 | 03.75 | 03.67 | | 02.10 | 02.45 | 02.33 | 02.60 | 02.90 | 05.80 | 04.90 | 04.20 | 03.70 | 03.50 | 03.20 | 02.49 |
| | | MIN | 01.60 | 01.45 | 01.12 | 01.85 | 02.11 | 02.55 | 03.01 | 03.29 | 02.74 | 00.00 | 00.00 | 02.15 | | 00.00 | 00.00 | 00.00 | 00.24 | 01.15 | 01.75 | 02.05 | 02.00 | 01.39 | 01.50 | 01.24 | 01.25 |
| | | N | 29 | 29 | 29 | 30 | 30 | 30 | 29 | 29 | 29 | 29 | 29 | 29 | | 30 | 30 | 30 | 30 | 30 | 30 | 29 | 29 | 29 | 28 | 28 | 29 |
| | | AVE. | 02.26 | 02.37 | 02.47 | 02.76 | 03.36 | 03.84 | 04.33 | 04.24 | 03.81 | 03.54 | 02.86 | 02.70 | | 01.54 | 01.57 | 01.58 | 01.84 | 02.02 | 02.59 | 02.91 | 02.82 | 02.59 | 02.42 | 02.13 | 01.84 |
| | | σ | 00.29 | 00.38 | 00.59 | 00.51 | 00.62 | 00.72 | 00.87 | 00.79 | 00.59 | 00.85 | 00.69 | 00.38 | | 00.39 | 00.45 | 00.47 | 00.41 | 00.36 | 00.73 | 00.58 | 00.46 | 00.55 | 00.43 | 00.45 | 00.31 |
| ANALYSED DATA: | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | T = 1/1.11yrs. K _{1.11} = -1.10 | 01.94 | 01.95 | 01.82 | 02.20 | 02.68 | 03.05 | 03.38 | 03.37 | 03.16 | 02.59 | 02.10 | 02.28 | | 01.12 | 01.08 | 01.06 | 01.38 | 01.62 | 01.78 | 02.28 | 02.31 | 01.99 | 01.95 | 01.64 | </ |

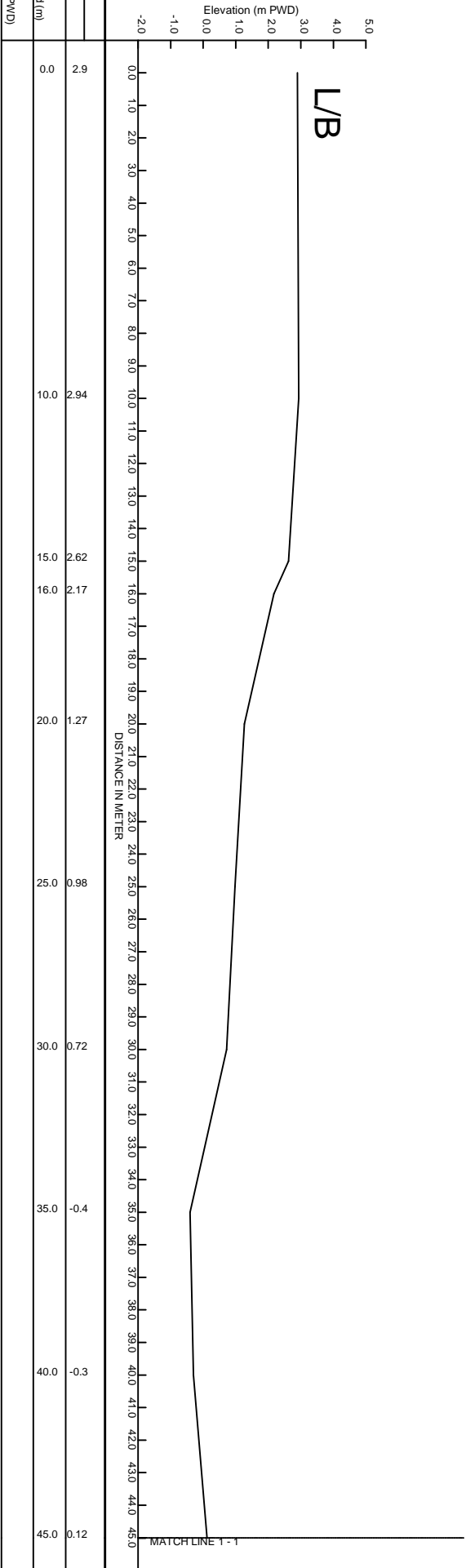
MONTHLY BASIS ANALYSIS OF HIGHEST LOW TIDE LEVEL DATA OF BWDB STATION SW125 AT RANGUNIA (EV I)



MONTHLY BASIS ANALYSIS OF LOWEST LOW TIDE LEVEL DATA OF BWDB STATION SW125 AT RANGUNIA (EV I)



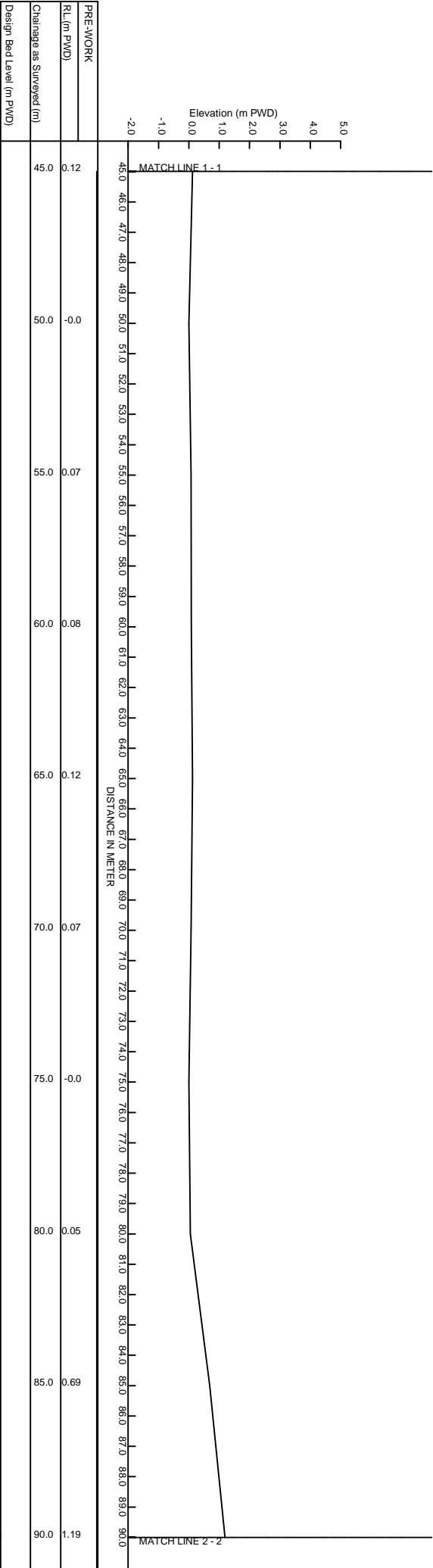
HTL: 2.38 mPVD
LTL: 0.21 mPVD
NFL: 2.18 mPVD
HFL: 2.95 mPVD



X-Sec# 01 at N22°27'16.8", E092°03'44.7" of Ichamati River 0+000 km.

Note:
: All Dimensions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

HTL: 2.38 mPVD
LTL: 0.21 mPVD
NFL: 2.18 mPVD
HFL: 2.95 mPVD

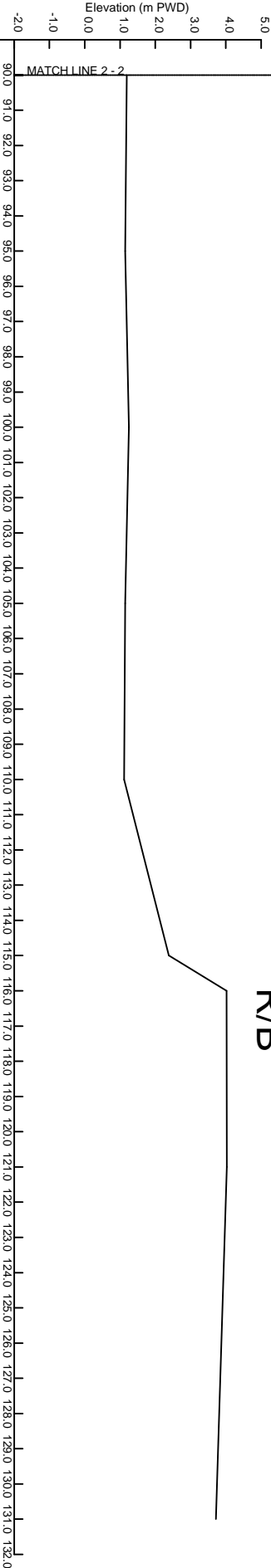


X-Sec# 01 at N22°27'16.8" E092°03'44.7" of Ichamati River 0+000 Km.

Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

HTL: 2.38 mPVD
LTL: 0.21 mPVD
NFL: 2.18 mPVD
HFL: 2.95 mPVD

R/B



| PRE-WORK | |
|--------------------------|-------|
| RL (m PWD) | 1.19 |
| Chainage as Surveyed (m) | 90.0 |
| | 95.0 |
| | 100.0 |
| | 105.0 |
| | 110.0 |
| | 115.0 |
| | 116.0 |
| | 121.0 |
| | 131.0 |

Design Bed Level (m PWD)

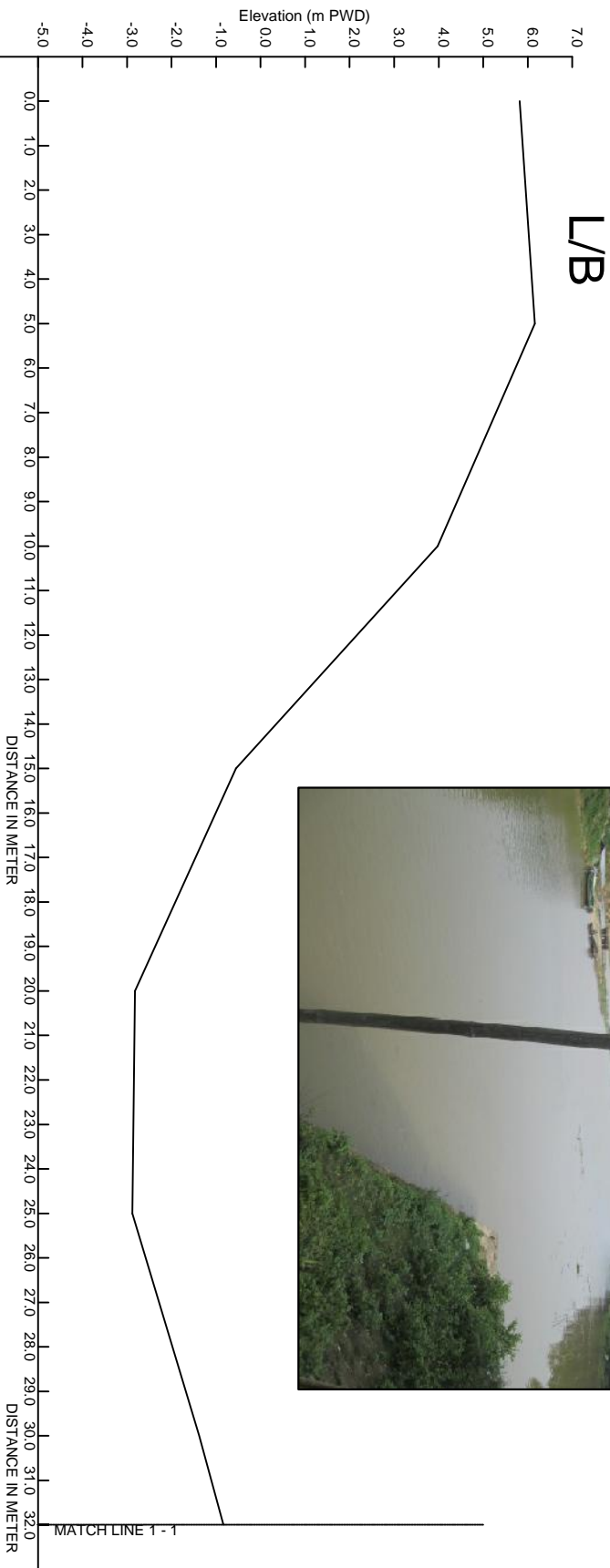
X-sec# 01 at N22 27'16.8", E092 03'44.7" of Ichamail River 0+000 km.

Note:

: All Dimensions are in m If not mentioned Otherwise

: All Elevations are in m PWD If not mentioned Otherwise

| | |
|---|-------------|
| Government of the People's Republic of Bangladesh | |
| Ministry of Housing & Public Works | |
| URBAN DEVELOPMENT DIRECTORATE | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | |
| Package-5 (Ramul and Rangunia Upazila) | |
| CROSS-SECTIONS OF OF ICHAMAIL RIVER | |
| Upazila: Rangunia, District: Chittagong | |
| At Ch:0+000 Km,N22 27'16.8", E092 03'44.7" | |
| SURVEYOR | DRAWN BY |
| RECOMMENDED BY | APPROVED BY |
| DRG. No. | |
| June - 2016 | |



| | |
|------------|-------|
| PRE-WORK | |
| RL (m PWD) | 5.82 |
| | 6.16 |
| | 5.00 |
| | 3.98 |
| | 10.00 |
| | -0.55 |
| | 15.00 |
| | -2.82 |
| | 20.00 |
| | -2.88 |
| | 25.00 |
| | -1.38 |
| | 30.00 |

X-Sec# 02 at N22'28"12.7", E092'03'32.9" of Ichamati River 1+824 km.

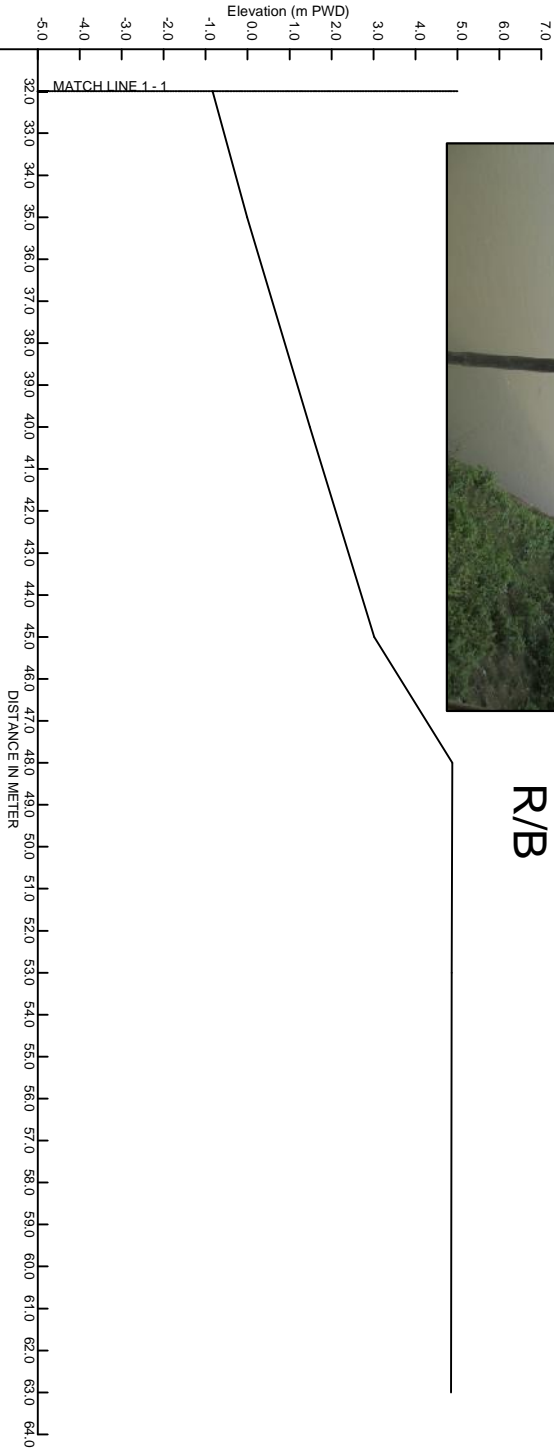
Note:

- : All Dimentionations are in m If not mentioned Otherwise
- : All Elevations are in m PWD If not mentioned Otherwise

| | |
|---|-------------|
| Government of the People's Republic of Bangladesh | |
| Ministry of Housing & Public Works | |
| URBAN DEVELOPMENT DIRECTORATE | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | |
| Package-5 (Ramti and Rangunia Upazila) | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | |
| Upazila: Rangunia, District: Chittagong | |
| At Ch:1+824 Km,N22'28"12.7", E092'03'32.9" | |
| SURVEYOR | DRAWN BY |
| RECOMMENDED BY | APPROVED BY |
| DRG. No. | June - 2016 |



R/B



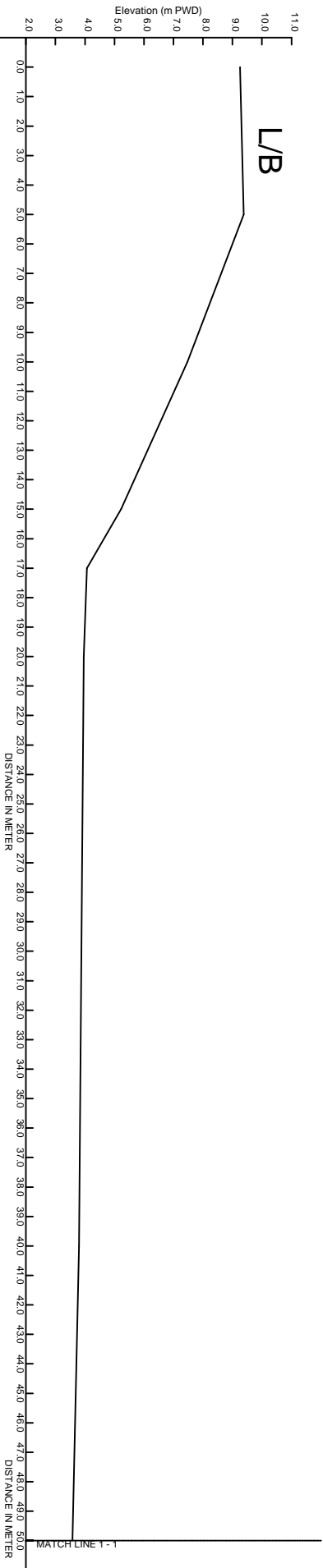
| PRE-WORK | |
|--------------------------|-------|
| RL (m PWD) | -0.01 |
| Change as Surveyed (m) | 1.48 |
| Design Bed Level (m PWD) | 3.02 |
| | 4.88 |
| | 4.86 |
| | 4.85 |

X-Section 02 at N22°28'12.7" E092°03'32.9" of Ichamati River 1+824 km

Note:
: All Dimentionations are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | | | |
|---|-------------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:1+824 Km,N22°28'12.7" E092°03'32.9" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| DRG. No. | June - 2016 | | |

NFL: 5.11 mPVD
HFL: 6.91 mPVD



| PRE-WORK | |
|---|------|
| RL (m PWD) | 6.26 |
| Changeage as Surveyed (m) | 0.00 |
| Design Bed Level (m PWD) | |
| X- Sec# 03 at N22 30' 12" E092 03 49.3" of Ichamati River 8+861 km. | |
| | 6.38 |
| | 7.47 |
| | 5.23 |
| | 4.07 |
| | 3.96 |
| | 3.88 |
| | 3.80 |
| | 3.58 |

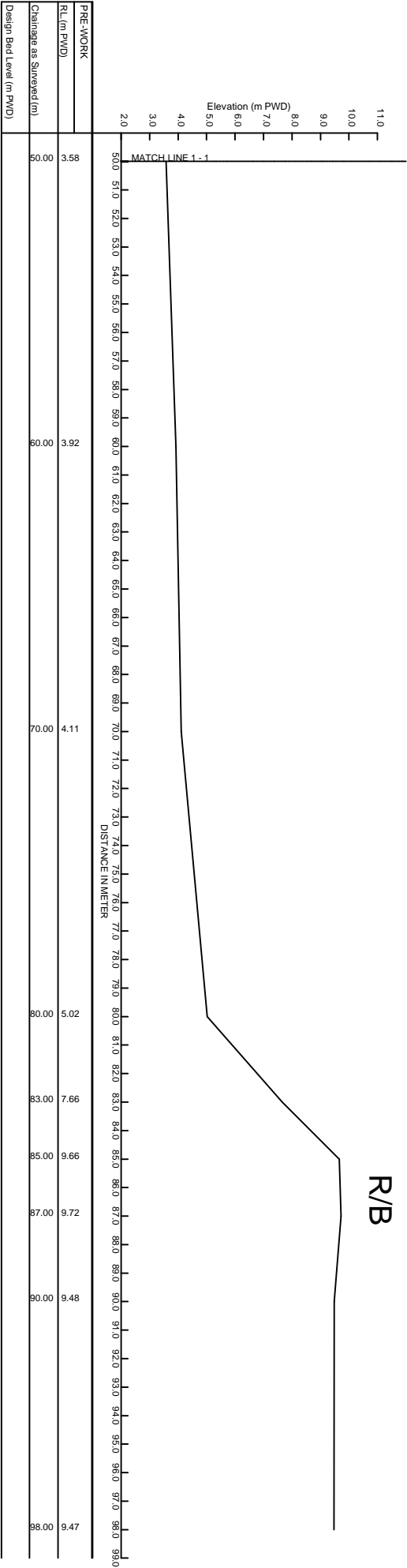
Note:

: All Dimentions are in m If not mentioned Otherwise

: All Elevations are in m PWD If not mentioned Otherwise

| | |
|---|-------------|
| Government of the People's Republic of Bangladesh | |
| Ministry of Housing & Public Works | |
| URBAN DEVELOPMENT DIRECTORATE | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | |
| Package-5 (Raimu and Rangunia Upazila) | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | |
| Upazila: Rangunia, District: Chittagong | |
| At Ch:8+861 Km, N22 30' 12" E092 03 49.3" | |
| SURVEYOR | DRAWN BY |
| RECOMMENDED BY | APPROVED BY |
| DRG. No. | |
| June - 2016 | |

NFL: 5.11 mPVD
HFL: 6.91 mPVD

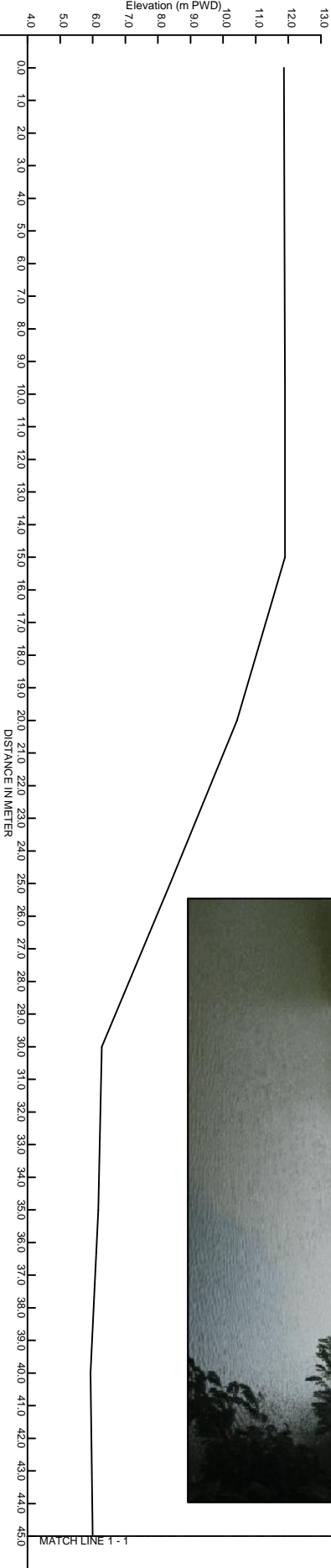


Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | |
|---|-------------|
| Government of the People's Republic of Bangladesh | |
| Ministry of Housing & Public Works | |
| URBAN DEVELOPMENT DIRECTORATE | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | |
| Package-5 (Raimu and Rangunia Upazila) | |
| CROSS-SECTIONS OF OF ICHHAMATI RIVER | |
| Upazila: Rangunia, District: Chittagong | |
| At Ch:8+861 Km, N22 30 12. E092 03 49.3 | |
| SURVEYOR | DRAWN BY |
| RECOMMENDED BY | APPROVED BY |
| DRG. No. | |
| June - 2016 | |

NFL: 8.45 mPWD
HFL: 10.76 mPWD

L/B



| PRE-WORK | |
|--------------------------|-------|
| RL (m PWD) | 11.87 |
| Chainage as Surveyed (m) | 0.00 |
| Design Bed Level (m PWD) | 11.90 |
| | 10.00 |
| | 11.90 |
| | 15.00 |
| | 11.90 |
| | 20.00 |
| | 10.43 |
| | 25.00 |
| | 8.38 |
| | 30.00 |
| | 6.28 |
| | 35.00 |
| | 6.17 |
| | 40.00 |
| | 5.93 |
| | 45.00 |
| | 6.00 |

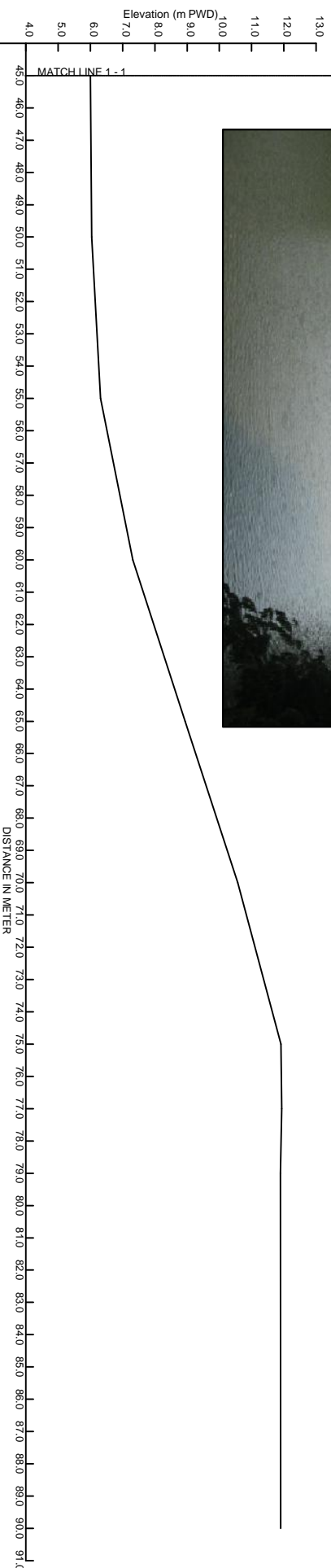
X-Sec# 04 at N22°31'44.1"E092°03'11.7" of Ichamati River 12+830 km.

Note:
: All Dimentionations are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

NFL: 8.45 mPVD
HFL: 10.76 mPVD



R/B



| PRE-WORK | |
|--------------------------|-------|
| RL (m PWD) | 6.00 |
| Change as Surveyed (m) | 45.00 |
| Design Bed Level (m PWD) | 6.04 |
| | 50.00 |
| | 55.00 |
| | 60.00 |
| | 65.00 |
| | 70.00 |
| | 75.00 |
| | 77.00 |
| | 79.00 |
| | 90.00 |

X-Sec# 04 at N22°31'44.1" E092°03'11.7" of Ichamati River 12+830 km.

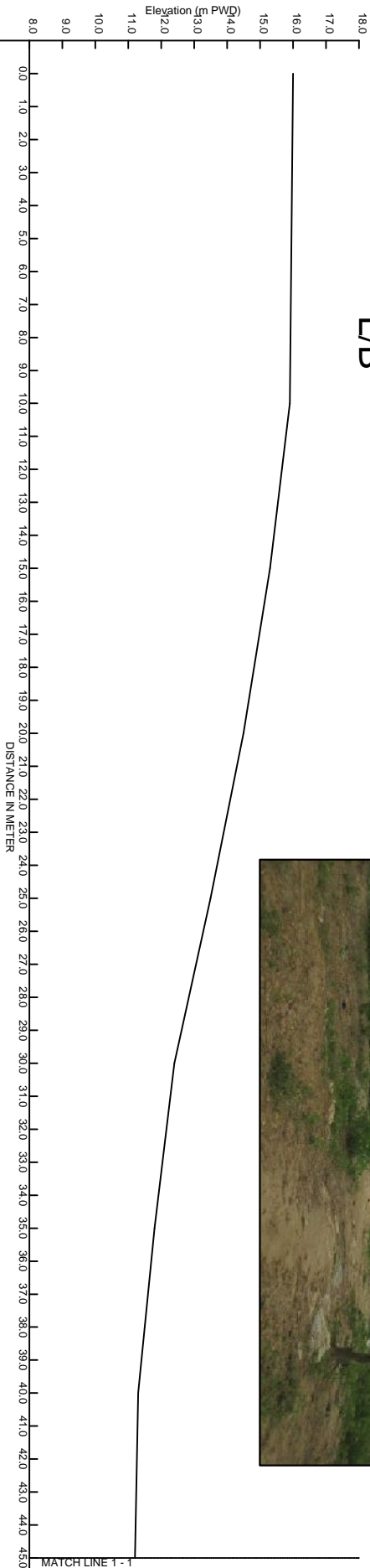
Note:

- : All Dimention are in m If not mentioned Otherwise
- : All Elevations are in m PWD If not mentioned Otherwise

| | | | |
|---|----------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:12+830 Km,N22°31'44.1" E092°03'11.7" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| | | | |
| DRG. No. | | | June - 2016 |

NFL: 11.67 mPWD
HFL: 14.49 mPWD

L/B



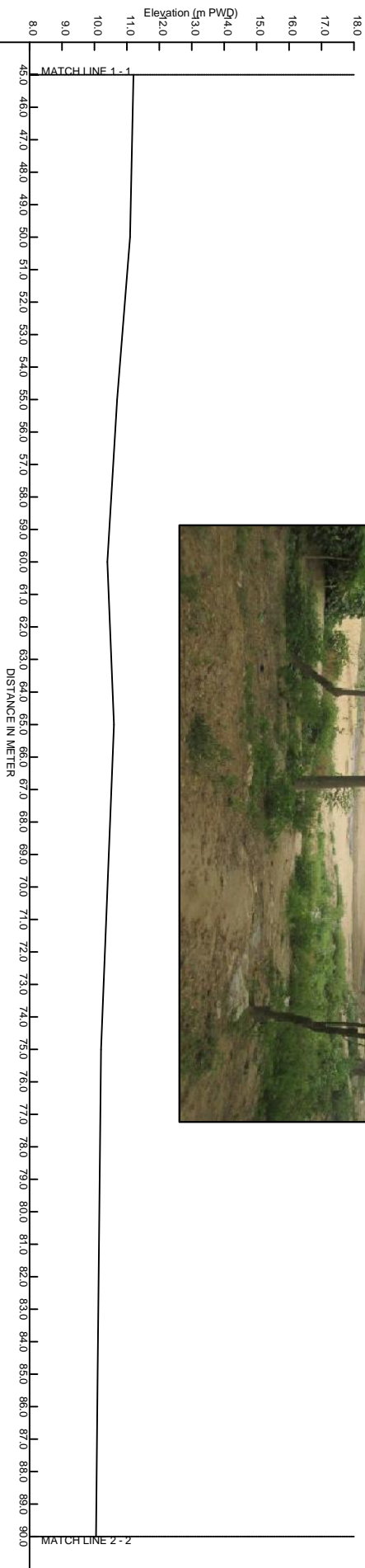
| PRE-WORK | |
|--------------------------|------|
| RL (m PWD) | 16.0 |
| Chainage as Surveyed (m) | 0.0 |
| | 10.0 |
| | 15.0 |
| | 20.0 |
| | 25.0 |
| | 30.0 |
| | 35.0 |
| | 40.0 |

Design Bed Level (m PWD) X-Set# 05 at N22 34'14.4", E092 02'28.1" of Ichamati River 20+215 km.

Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | | | |
|---|----------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:20+215 Km,N22 34'14.4", E092 02'28.1" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| | | | |
| DRG. No. | | | June - 2016 |

NFL: 11.67 mPWD
HFL: 14.49 mPWD



| | |
|--------------------------|-----------|
| PRE-WORK | |
| RL (m PWD) | |
| Chainage as Surveyed (m) | 50.0 11.1 |
| | 55.0 10.7 |
| | 60.0 10.4 |
| | 65.0 10.6 |
| | 75.0 10.2 |
| | 85.0 10.1 |

X-Section 05 at CN223414.4, E092 02 28, 1" of Ichamati River 20+215 km.

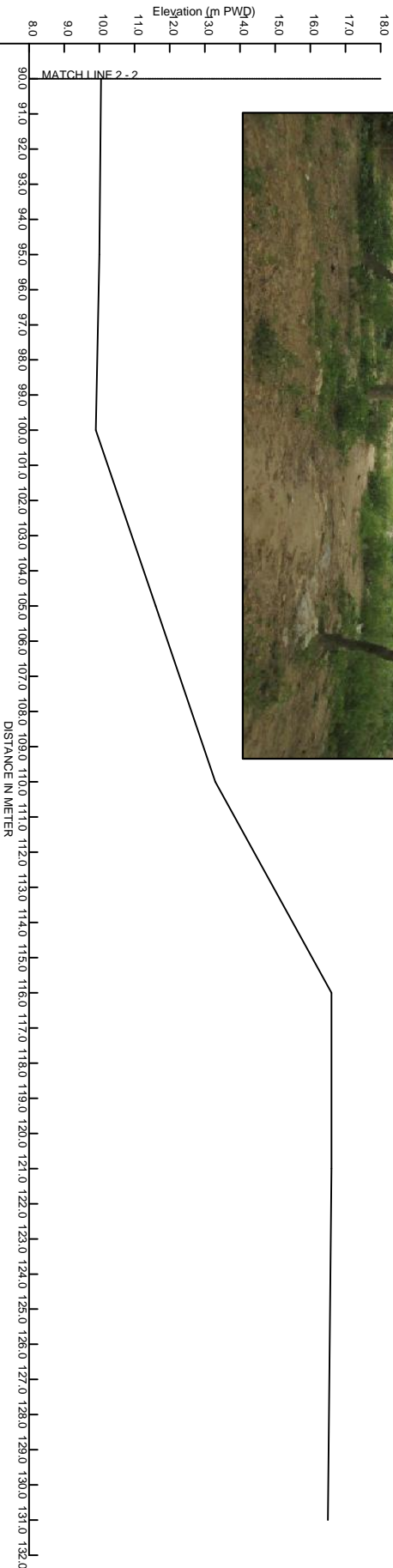
Note:
: All Dimensions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | | | |
|---|----------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:20+215 Km,N223414.4,E0920228.1" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| | | | |
| DRG. No. | | | June - 2016 |

NFL: 11.67 mPVD
HFL: 14.49 mPVD



R/B



| PRE-WORK | |
|---|-------|
| RL (m PWD) | 10.0 |
| Chainage as Surveyed (m) | 95.0 |
| Design Bed Level (m PWD) | 100.0 |
| X-sec# 05 at CN223414.4",E0920228.1" of Ichamati River 20+215 km. | |
| | 9.9 |
| | 11.6 |
| | 13.3 |
| | 16.6 |
| | 121.0 |
| | 16.5 |
| | 131.0 |

Note:

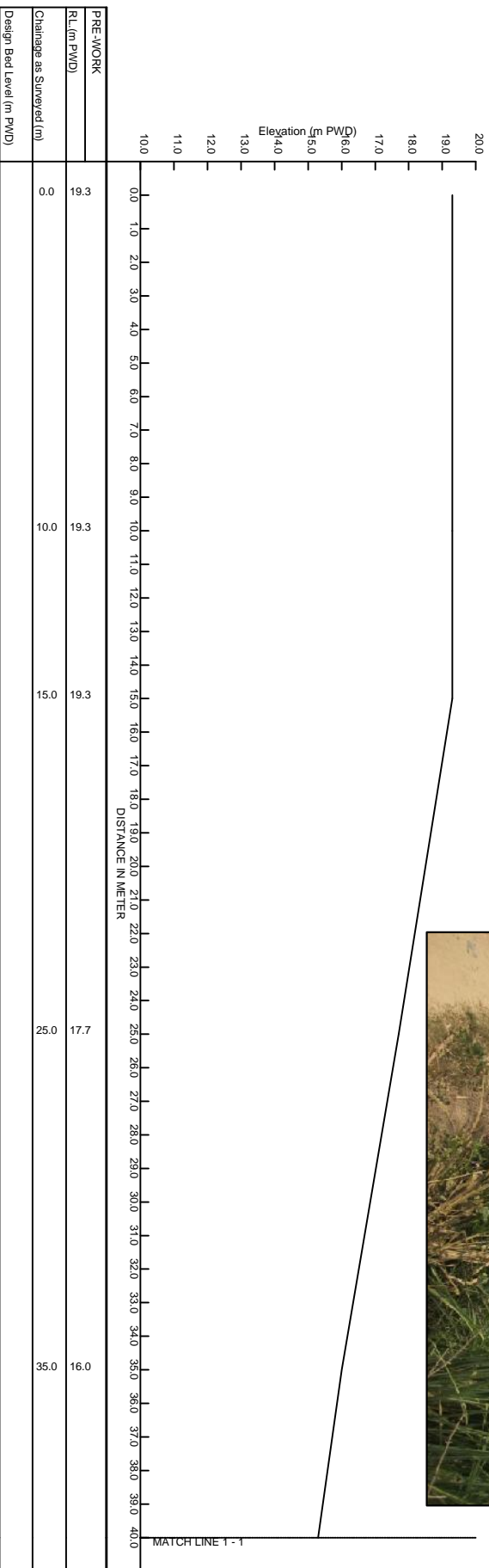
: All Dimentions are in m If not mentioned Otherwise

: All Elevations are in m PWD If not mentioned Otherwise

| Government of the People's Republic of Bangladesh | | | |
|---|----------|----------------|-------------|
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:20+215 Km,N223414.4",E0920228.1" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| | | | |
| DRG. No. | | | June - 2016 |

NFL: 14.41 mPWD
HFL: 15.91 mPWD

L/B



X-Sec# 06 at N22°35'35.7", E092°02'29.1" of Ichamati River 23+831 km.

Note:

- : All Dimentiones are in m If not mentioned Otherwise
- : All Elevations are in m PWD If not mentioned Otherwise

| | | | |
|---|----------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramtul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:23+831 Km,N22°35'35.7",E092°02'29.1" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| DRG. No. | | June - 2016 | |

NFL: 14.41 mPWD
HFL: 15.91 mPWD



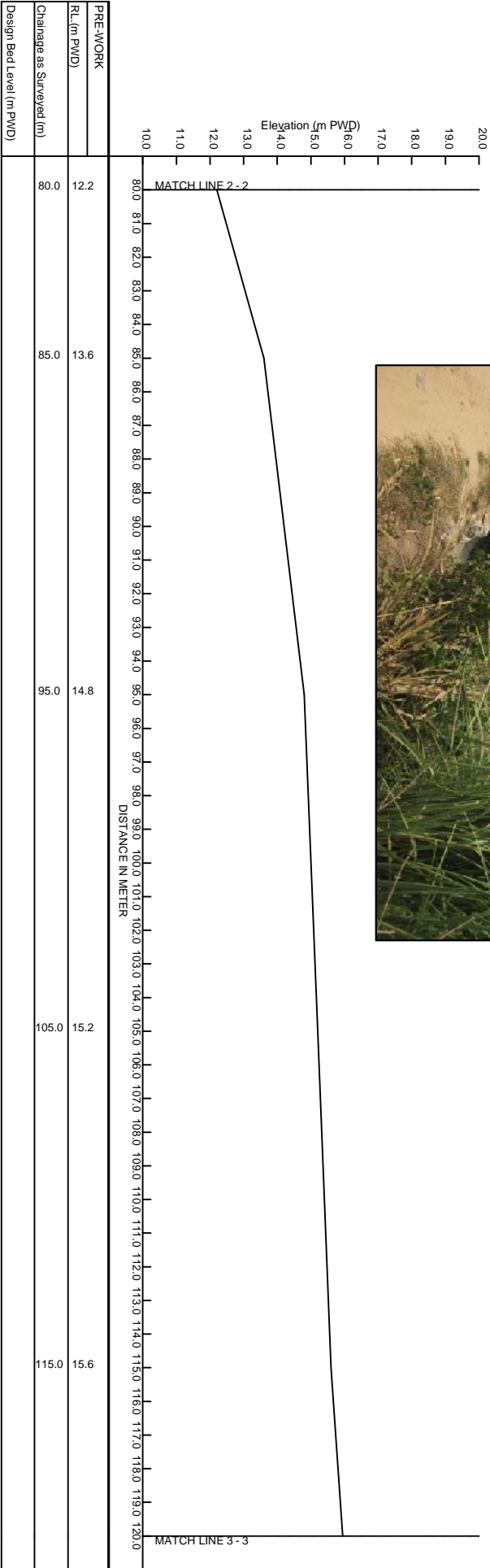
| | |
|--------------------------|------|
| PRE-WORK | |
| RL (m PWD) | 14.6 |
| Chainage as Surveyed (m) | 45.0 |
| | 50.0 |
| | 60.0 |
| | 70.0 |
| | 80.0 |
| Design Bed Level (m PWD) | |

X-Section 06 at N22 35 35.7" E 092 02 29.1" of Ichamati River 23+831 km.

Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | | | |
|---|----------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Raimu and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:23+831 Km,N22 35 35.7" E092 02 29.1" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| | | | |
| DRG. No. | | | June - 2016 |

NFL: 14.41 mPWD
HFL: 15.91 mPWD



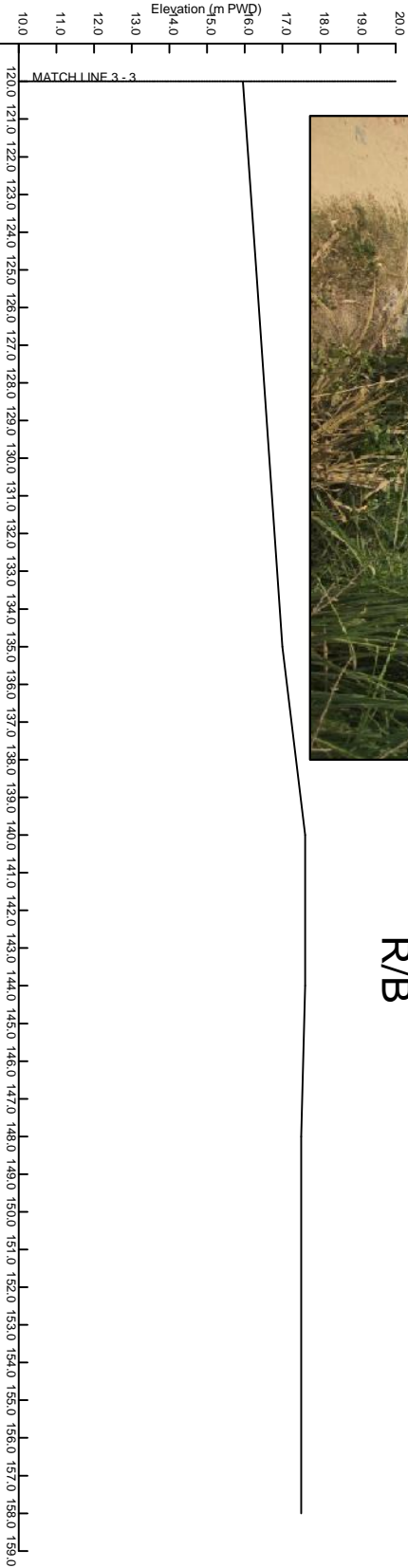
Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | | | |
|---|----------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:23+831 Km,N223535.7',E0920229.1" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| | | | |
| DRG. No. | | | June - 2016 |

NFL: 14.41 mPVD
HFL: 15.91 mPVD



R/B



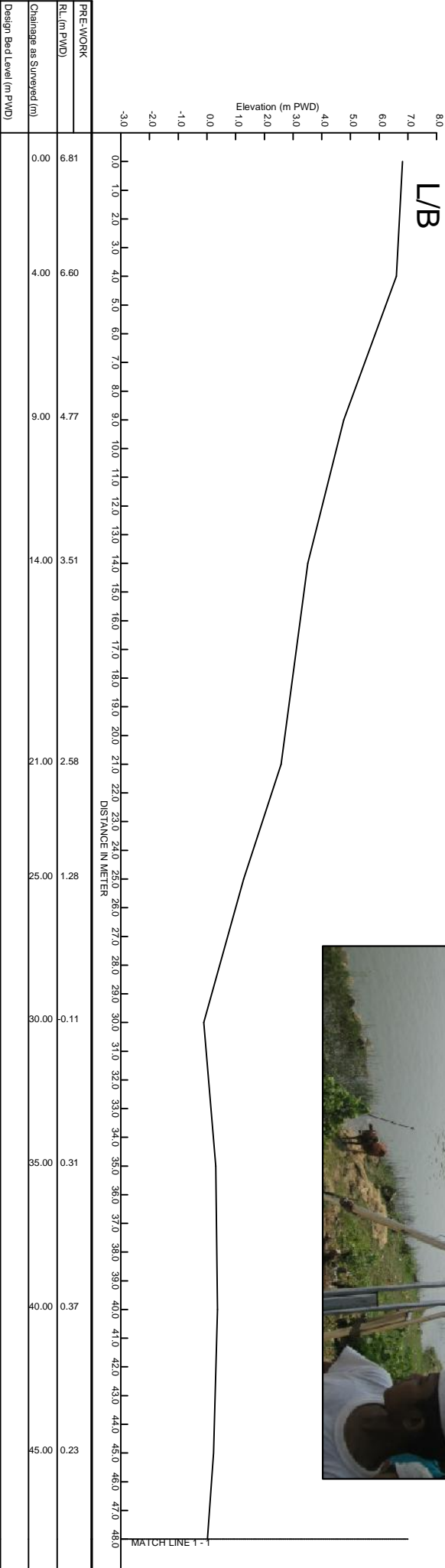
| PRE-WORK | |
|--------------------------|-------|
| RL (m PWD) | |
| | 16.3 |
| Chainage as Surveyed (m) | 125.0 |
| | 135.0 |
| | 140.0 |
| | 144.0 |
| | 148.0 |
| | 158.0 |
| Design Bed Level (m PWD) | |

X- Sec# 06 at N22°35'35.7", E092°02'29.1" of Ichamati River 23+831 km.

Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | | | |
|---|----------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF ICHAMATI RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:23+831 Km,N22°35'35.7",E092°02'29.1" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| | | | |
| DRG. No. | | | June - 2016 |

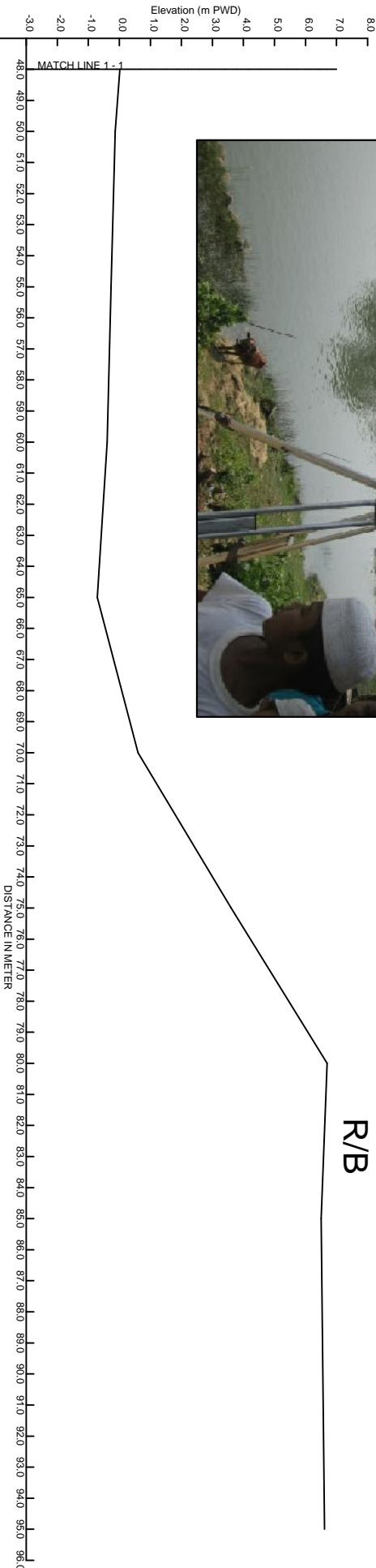
HTL: 2.95 mPWD
LTL: 1.12 mPWD
NFL: 3.42 mPWD
HFL: 4.88 mPWD



X-sec# 01 at N222656.8', E092'03'15.6", of Shilok River 0+000km.

Note:
: All Dimentionns are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

HTL: 2.95 mPWD
LTL: 1.12 mPWD
NFL: 3.42 mPWD
HFL: 4.88 mPWD

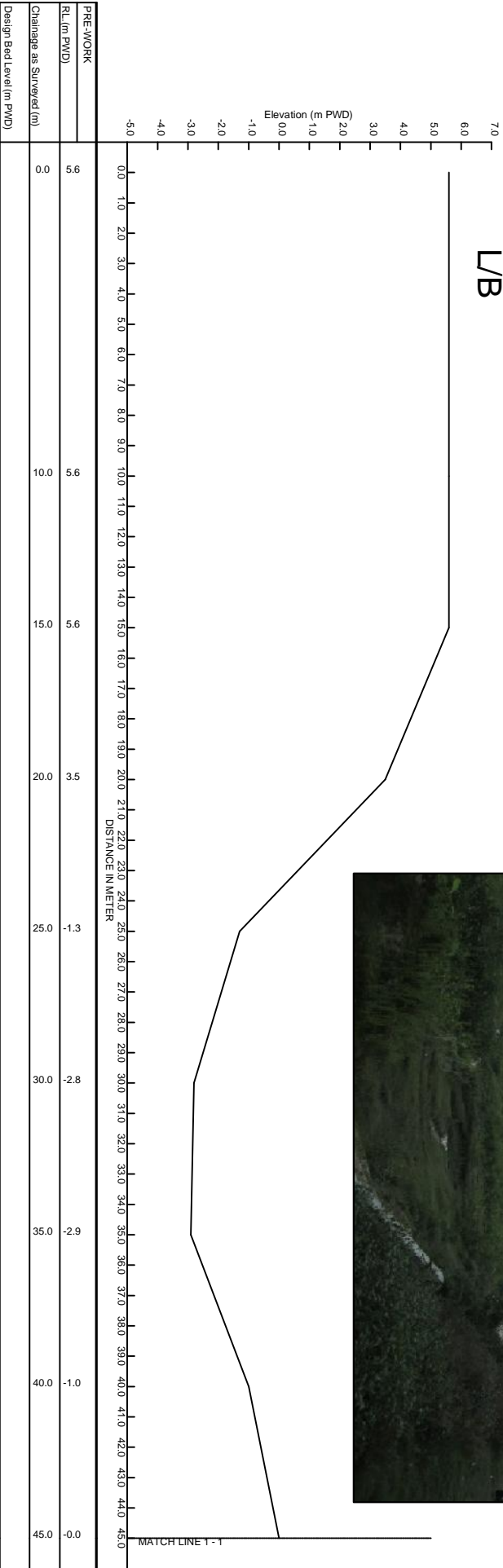


| PRE-WORK | |
|--|--|
| RL (m PWD) | |
| Chainage as Surveyed (m) | |
| Design Bed Level (m PWD) | |
| X-Sec# 01 at N22 26'56.8" E092 03'15.6" of Shilok River 0+000km. | |

Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | |
|---|----------------|
| Government of the People's Republic of Bangladesh | |
| Ministry of Housing & Public Works | |
| URBAN DEVELOPMENT DIRECTORATE | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | |
| Package-5 (Raimu and Rangunia Upazila) | |
| CROSS-SECTIONS OF OF SHILOK RIVER | |
| Upazila: Rangunia, District: Chittagong | |
| At Ch:0+000 Km,N N22 26'56.8" E092 03'15.6" | |
| SURVEYOR | DRAWN BY |
| | RECOMMENDED BY |
| | APPROVED BY |
| DRG. No. | |
| June - 2016 | |

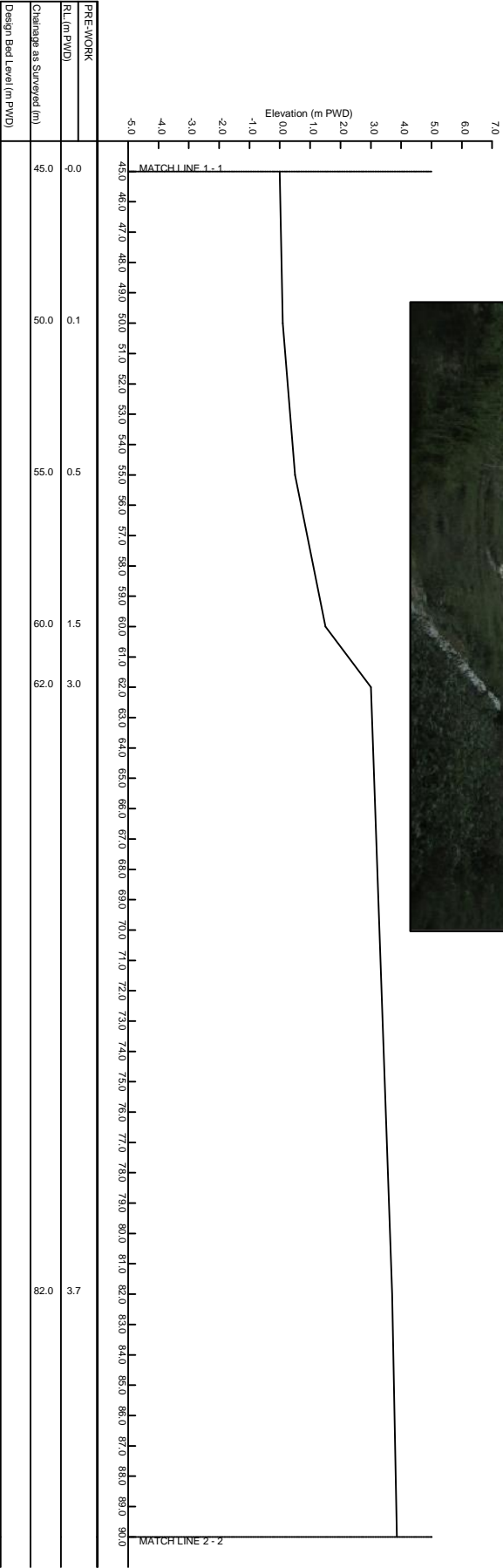
HTL: 2.42 mPWD
LTL: 1.42 mPWD
NFL: 3.34 mPWD
HFL: 4.4.78 mPWD



Note:
: All Dirmentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise



HTL: 2.42 mPWD
LTL: 1.42 mPWD
NFL: 3.34 mPWD
HFL: 4.4.78 mPWD



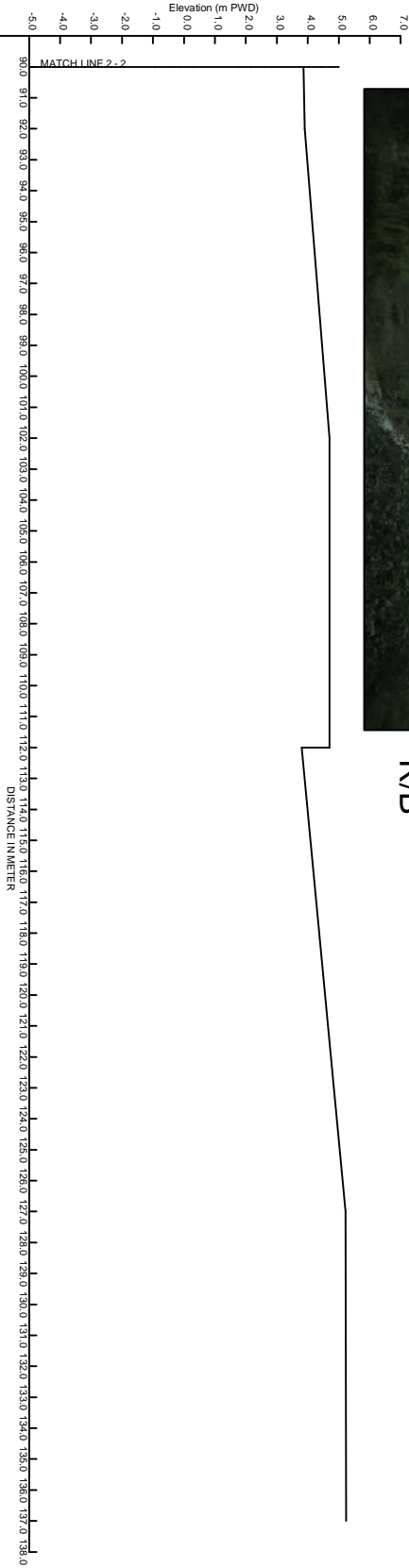
Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | |
|---|-------------|
| Government of the People's Republic of Bangladesh | |
| Ministry of Housing & Public Works | |
| URBAN DEVELOPMENT DIRECTORATE | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | |
| Package-5 (Raimul and Rangunia Upazila) | |
| CROSS-SECTIONS OF OF SHILOK RIVER | |
| Upazila: Rangunia, District: Chittagong | |
| At Ch:0+402 Km,N22°26'48.5" E092°03'19.4" | |
| SURVEYOR | DRAWN BY |
| RECOMMENDED BY | APPROVED BY |
| DRG. No. | June - 2016 |

HTL: 2.42 MPWD
LTL: 1.42 MPWD
NFL: 3.34 MPWD
HFL: 4.4.78 MPWD



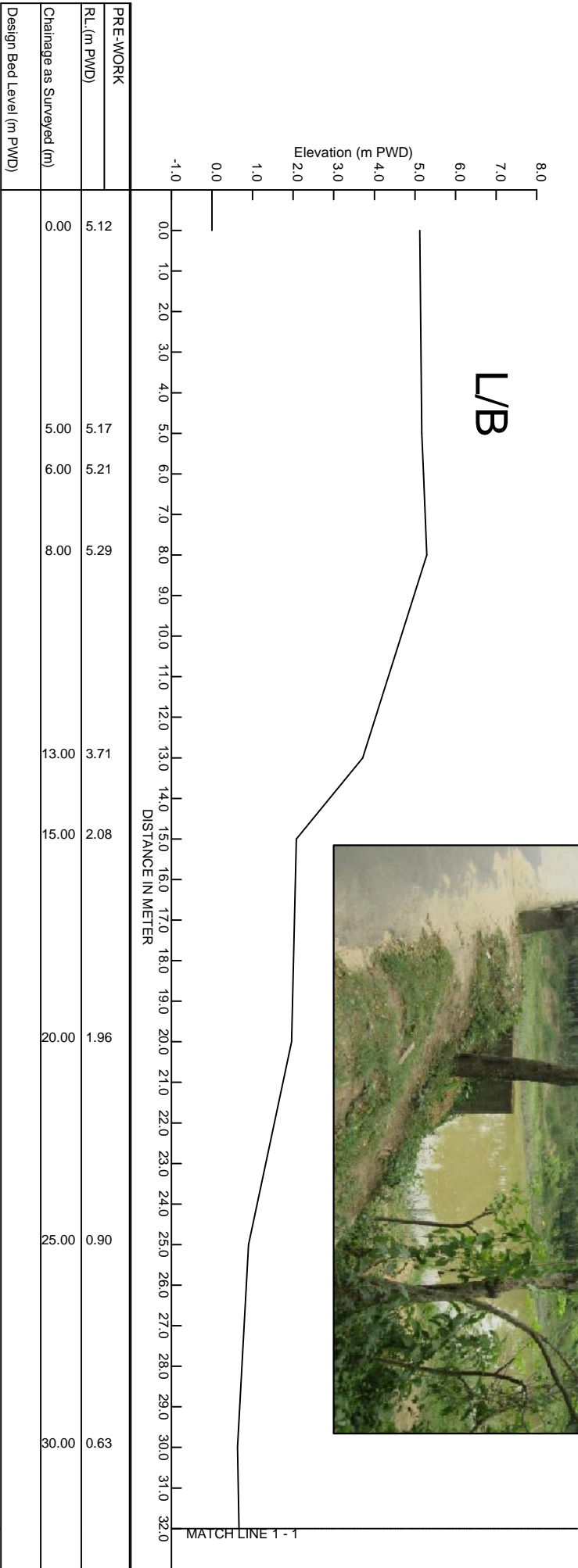
R/B



| PRE-WORK | |
|---|-------|
| RL (m PWD) | 3.9 |
| Change as Surveyed (m) | 92.0 |
| Design Bed Level (m PWD) | 102.0 |
| X-Section 02 at N22 26'48.5" E092 03'19.4" of Shilok River 0+402km. | |
| | 112.0 |
| | 127.0 |
| | 137.0 |

Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

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|---|----------------|
| Government of the People's Republic of Bangladesh | |
| Ministry of Housing & Public Works | |
| URBAN DEVELOPMENT DIRECTORATE | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | |
| Package-5 (Raimu and Rangunia Upazila) | |
| CROSS-SECTIONS OF OF SHILOK RIVER | |
| Upazila: Rangunia, District: Chittagong | |
| At Ch:0+402 Km,N22 26'48.5" E092 03'19.4" | |
| SURVEYOR | DRAWN BY |
| | RECOMMENDED BY |
| | APPROVED BY |
| DRG. No. | June - 2016 |



X-Sec# 03 at N22°25'57.8", E092°03'57.6". of Shilok River 3+075km.

Note:

- : All Dimentiones are in m If not mentioned Otherwise
- : All Elevations are in m PWD If not mentioned Otherwise



R/B



| PRE-WORK | |
|--------------------------|-------|
| RL (m PWD) | 0.72 |
| Chainage as Suveyed (m) | 35.00 |
| Design Bed Level (m PWD) | 2.34 |
| | 40.00 |
| | 45.00 |
| | 4.02 |
| | 50.00 |
| | 5.53 |
| | 53.00 |
| | 6.31 |
| | 58.00 |
| | 6.08 |
| | 62.00 |
| | 6.13 |

X-Sec# 03 at N22'25'57.8", E092'03'57.6". of Shilok River 3+075km.

Note:

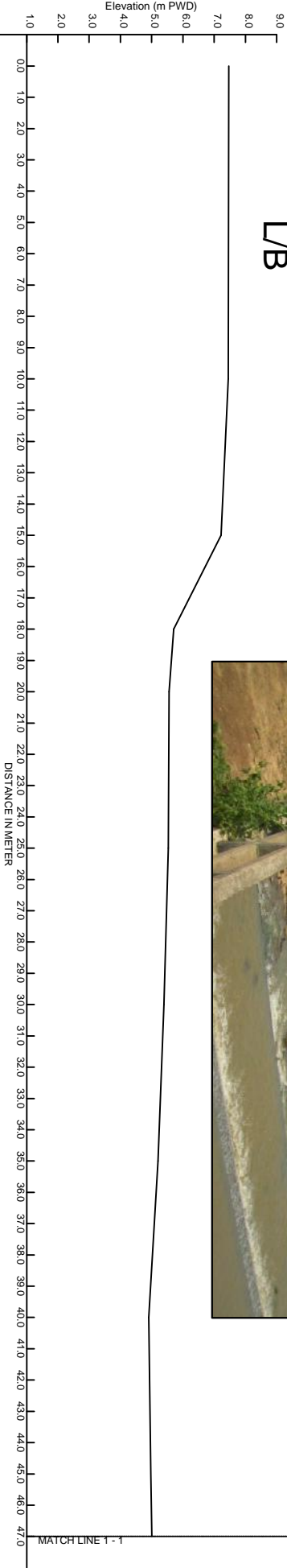
- : All Dimentions are in m If not mentioned Otherwise
- : All Elevations are in m PWD If not mentioned Otherwise

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|---|----------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF SHILOK RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:3+075 Km,N22'25'57.8" ,E092'03'57.6" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| DRG. No. | | | June - 2016 |

NFL: 6.69 MPWD
HFL: 8.22 MPWD



L/B



| | |
|--------------------------|------|
| PRE-WORK | |
| RL (m PWD) | 7.47 |
| Change as Surveyed (m) | 0.00 |
| Design Bed Level (m PWD) | |

| | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 7.45 | 7.22 | 5.71 | 5.56 | 5.53 | 5.39 | 5.20 | 4.91 | 4.97 |
| 10.00 | 15.00 | 18.00 | 20.00 | 25.00 | 30.00 | 35.00 | 40.00 | 45.00 |

X-Section 04 at N22 25 3.6' E092 04 18.5' of Shilok River 5+402km.

Note:

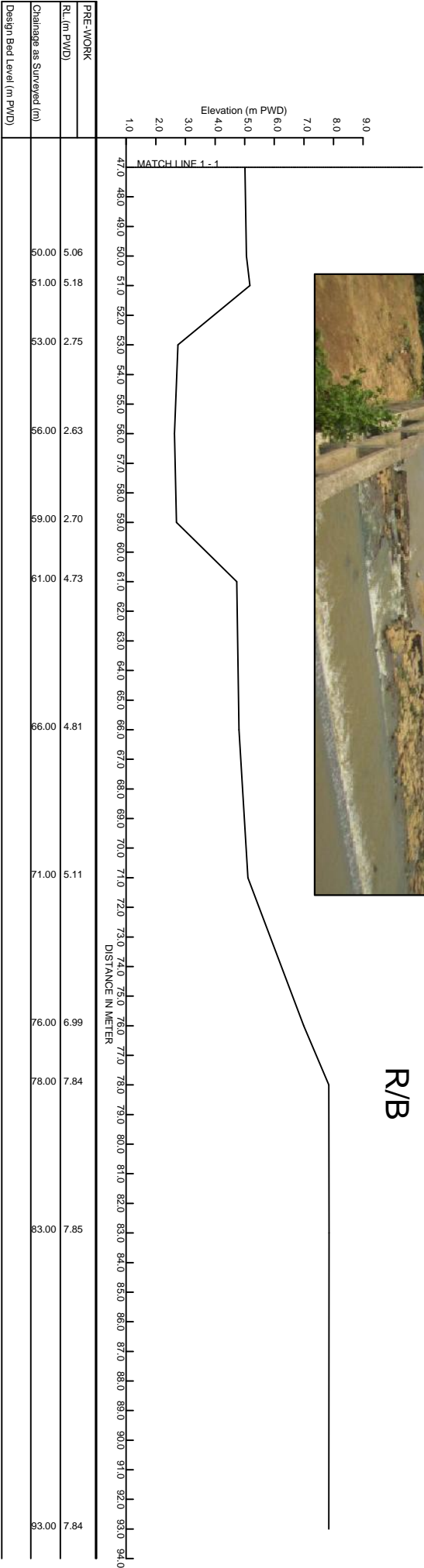
- : All Dimentions are in m If not mentioned Otherwise
- : All Elevations are in m PWD If not mentioned Otherwise

| | | | |
|---|----------|----------------|-------------|
| Government of the People's Republic of Bangladesh | | | |
| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Ramul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF SHILOK RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:5+402 Km,N22 25 3.6' E092 04 18.5' | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| DRG. No. | | June - 2016 | |

NFL: 6.69 mPWD
HFL: 8.22 mPWD



R/B



X- Sec# 04 at N22°25'3.6" E092°04'18.5" .of Shilok River 5+402km.

Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

| | |
|---|-------------|
| Government of the People's Republic of Bangladesh | |
| Ministry of Housing & Public Works | |
| URBAN DEVELOPMENT DIRECTORATE | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | |
| Package-5 (Raimul and Rangunia Upazila) | |
| CROSS-SECTIONS OF OF SHILOK RIVER | |
| Upazila: Rangunia, District: Chittagong | |
| At Ch:5+402 Km,N22°25'3.6" E092°04'18.5" | |
| SURVEYOR | DRAWN BY |
| RECOMMENDED BY | APPROVED BY |
| DRG. No. | |
| June - 2016 | |

NFL: 13.02 mPWD
HFL: 13.92 mPWD



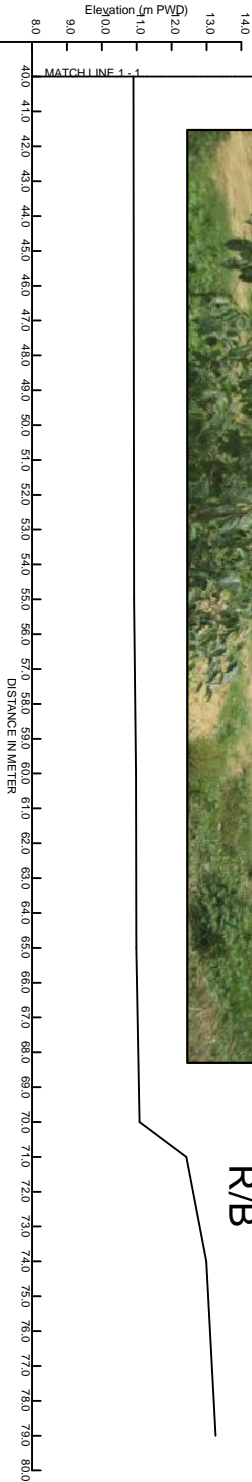
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| Ministry of Housing & Public Works | | | |
| URBAN DEVELOPMENT DIRECTORATE | | | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | | | |
| Package-5 (Raimul and Rangunia Upazila) | | | |
| CROSS-SECTIONS OF OF SHILOK RIVER | | | |
| Upazila: Rangunia, District: Chittagong | | | |
| At Ch:12+584 Km, N22 22'25.8" E092 05'52.4" | | | |
| SURVEYOR | DRAWN BY | RECOMMENDED BY | APPROVED BY |
| | | | |
| DRG. No. | | June - 2016 | |

NFL: 13.02 mPWD
HFL: 13.92 mPWD



R/B



| PRE-WORK | |
|--------------------------|-------|
| RL (m PWD) | 10.91 |
| Chainage as Surveyed (m) | 40.00 |
| Design Bed Level (m PWD) | 10.93 |
| | 10.98 |
| | 10.99 |
| | 11.08 |
| | 12.42 |
| | 12.99 |
| | 13.26 |
| | 79.00 |

X-sec# 05 at N22 22 25.8" E092 05 52.4" of Shilok River 12+584km.

Note:
: All Dimentions are in m If not mentioned Otherwise
: All Elevations are in m PWD If not mentioned Otherwise

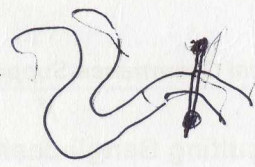
| | |
|---|----------------|
| Government of the People's Republic of Bangladesh | |
| Ministry of Housing & Public Works | |
| URBAN DEVELOPMENT DIRECTORATE | |
| PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS | |
| Package-5 (Raimul and Rangunia Upazila) | |
| CROSS-SECTIONS OF OF SHILOK RIVER | |
| Upazila: Rangunia, District: Chittagong | |
| At Ch:12+584 Km, N22 22 25.8" E092 05 52.4" | |
| SURVEYOR | DRAWN BY |
| | RECOMMENDED BY |
| | APPROVED BY |
| DRG. No. | June - 2016 |

INSTRUCTIONS TO SURVEYORS:

INFORMATION TO BE COLLECTED DURING BATHYMETRIC SURVEY AND PHYSICAL FEATURE SURVEY:

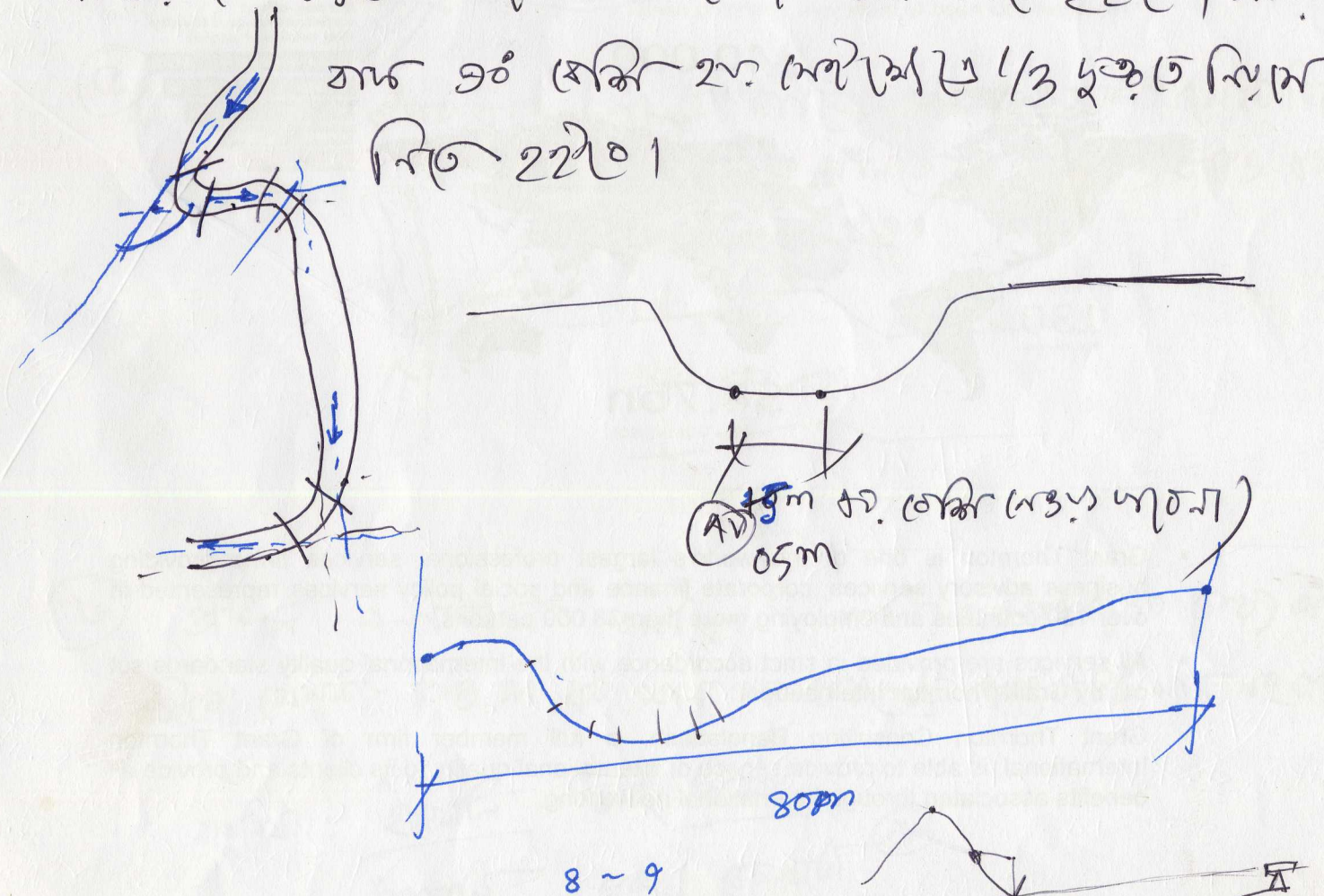
1. During survey works, information regarding water levels should be collected. Information should include:
 - a. Notable highest flood level (HFL) and lowest flood level (LFL) in the past. (ASK LOCALS)
 - b. Notable Highest tide level (HTL) and lowest tide level (LTL) in the past. (ASK LOCALS)
 - c. Present water level (PWL) during survey at the point of surveyed section should be measured.
2. Cross-sections should be collected at entry and exit of a bends of rivers, at centers of riffles of rivers at junctions with tributaries and distributaries and mouths of rivers, near locations of water level gauges and at locations of hydraulic structures.
3. GPS location of the surveyed section should be collected.
4. Local names of the rivers being surveyed and their tributaries (If any) should be collected. (ASK LOCALS)
5. Information regarding hydraulic structures have to be collected consulting with the government agencies like BWDB, BADCL, LGED and RHD. Information should include:
 - a. Sill level of regulators, rubber dams, weirs and culverts.
 - b. Opening of the structures.
 - c. Storage level of water retention structures and dams.
 - d. Information of the projects that funded the construction of the structures if possible to collect.
6. Consulting with the local people, information regarding flash flood have to be collected. Information should include:
 - a. Number of incident(s) of flash flood in a year.
 - b. Probable time(s) of flash flood(s) to occur.
 - c. Duration(s) of flash flood(s).
 - d. Areas that are more prone to damage inflicted by flash flood.
7. Information regarding water logging should be collected. Local people should be consulted in this regard. Information should include:
 - a. Name of the areas experiencing frequent water logging problems.
 - b. Duration of water logging.
 - c. Local idea about cause of water logging.

8. Information regarding drains should include:
 - a. Size of drains: (Depth X Width)
 - b. RL of drains at different locations.
 - c. Construction type of drains:
 - i. Lined / Unlined
 - ii. Man-made / Natural
 - d. Method of connection of households to the drains.
 - e. Location of different point of the drains:
 - i. Starting points
 - ii. Junction points
 - iii. End points
 - f. Name of roads alongside the drains, ward no. / name of village.
 - g. Use of drains:
 - i. Sewer
 - ii. Storm-sewer
 - iii. Mixed
9. Information regarding encroachment of drains and natural channels should be collected.



୧। ଏକାଠି ମାଙ୍କା ମାଙ୍କ ଆମେ 1000m ଓ ଡିଡ଼ିଓ ପାଖରେ
 ଥିବେ। ଏଠା ଥାଏ 1/3 ହିସାବ ଦୁଇଟି ମାଙ୍କା ମିତ ଥିବେ।
 H.F.L, N.F.L, P.W.L ତଥା ଡିଡ଼ିଓ ଡିମ୍ବର ଲମ୍ବ 1500m
 ଓ ଡିଡ଼ିଓ ଡିଡ଼ିଓ-ତଥା-ମିତ ଥିବେ। ମାଙ୍କ ମାଙ୍କ
 ଓ ମାଙ୍କ ମାଙ୍କେତ ଦାମି ମାଙ୍କ ମାଙ୍କା ମାଙ୍କା ଥିବେ।

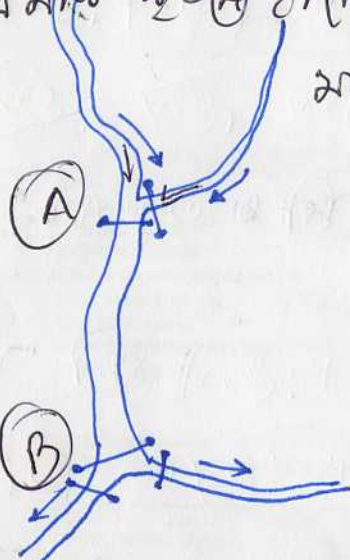
2। ମାଙ୍କା ମିତ ମାଙ୍କା ମାଙ୍କା:- ଥାଏ ଥାଏ ୨୦୦୦
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 ମିତ ଥିବେ।



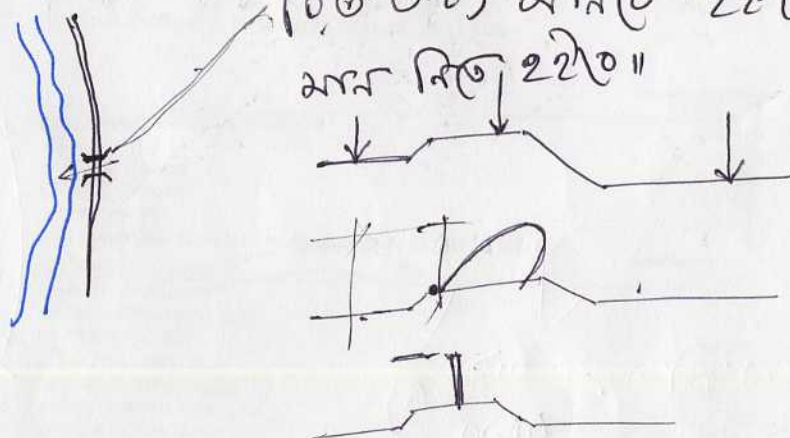
୩। ମାଙ୍କା ଓ ଏକାଠି ଦୁଇ ମାଙ୍କା ଓ P.S ମାଙ୍କା ମାଙ୍କା
 ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା
 ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା ମାଙ୍କା

ତଥା) ନିତ ୧୧୦୦।

୪। ଏହା ଦ୍ଵାରା / ନିମ୍ନ ମେଢ଼ା ନିତ ୧୧୦୦ ଏହି ଦ୍ଵାରା / ନିମ୍ନ
 ଅନ୍ତର୍ଗତ କ୍ଷମା-ଦ୍ଵାରା ଓ ସ୍ଥାନ ମେଢ଼ା ନିତ ୧୧୦୦ ,
 (ସମାପ୍ତି:- ଏହି କ୍ଷମା ହେଉଛି ନିମ୍ନ ମେଢ଼ା ନିତ ୧୧୦୦ ଓ ୧୧୦୦
 ଏବଂ ଏହା ସ୍ଥାନ ମେଢ଼ା ନିତ ୧୧୦୦)



୫) ଦ୍ଵାରା ଓ ନିମ୍ନ କ୍ଷମା ନିମ୍ନ ମେଢ଼ା ନିତ ୧୧୦୦ ଏହି କ୍ଷମା ନିତ ୧୧୦୦
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 କ୍ଷମା ନିତ ୧୧୦୦



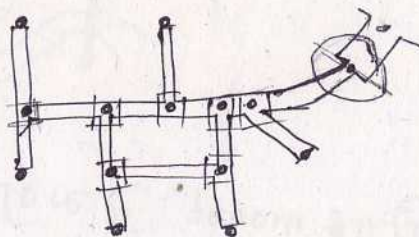
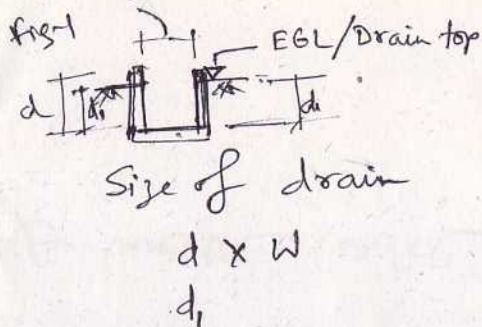
୬) ଏହା ଦ୍ଵାରା ନିମ୍ନ ମେଢ଼ା ନିତ ୧୧୦୦ ଏହି କ୍ଷମା ନିତ ୧୧୦୦
 ଏହି କ୍ଷମା ନିତ ୧୧୦୦ T.B.M କ୍ଷମା ନିତ ୧୧୦୦ ଏହି କ୍ଷମା ନିତ ୧୧୦୦

ସାଧାରଣ : ସାଧାରଣ କ୍ଷମା ନିତ ୧୧୦୦
 କ୍ଷମା : ସାଧାରଣ କ୍ଷମା ନିତ ୧୧୦୦

* 125, 124 (40) ଏହା ନିତ ୧୧୦୦ X-Section ନିତ ୧୧୦୦
 ନିତ ୧୧୦୦ ନିତ ୧୧୦୦

⑦ 7.1

7.2



GPS coordinate

- ① Start + section
- ② Intermediate
- ③ Change of section
- ④ End

Drainage network system

କିପରି ଏହା କରାଯାଇଥାଏ? କିପରି ଏହା କରାଯାଏ?

କିପରି ଏହା କରାଯାଇଥାଏ? କିପରି ଏହା କରାଯାଏ?

⑧

Water logging କେବଳ

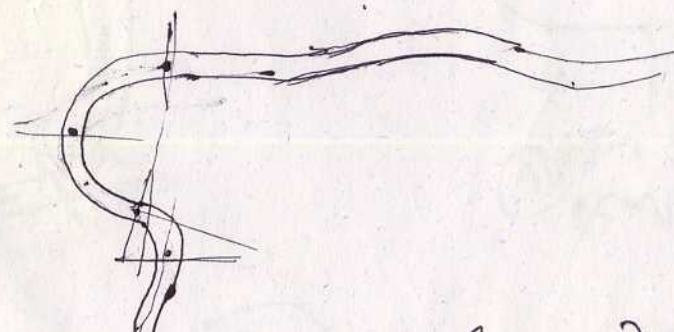
କିପରି - ସିକ୍ସ - GPS, Landmark, ସାମାନ୍ୟ କିପରି? - ଏହା କିପରି କରାଯାଏ, କିପରି କି?

⑨

Flash flood - ଏହା କିପରି (କିପରି)
- ଏହା କିପରି କିପରି
- କିପରି ଏହା କିପରି

⑩

Encroachment (କିପରି)?



| | |
|--------------|-----|
| $> 90^\circ$ | - 3 |
| $= 90^\circ$ | - 2 |
| $> 30^\circ$ | - 1 |

* ନିମ୍ନଲିଖିତ! ଏହା କିପରି କରାଯାଇଥାଏ? କିପରି କରାଯାଇଥାଏ?
X- ଏହା କିପରି କରାଯାଇଥାଏ? GPS 3 H.F.L, N.F.L, (ବ୍ୟବହାର)
କିପରି କରାଯାଇଥାଏ।

125.5, পিমন স্টেশন

LEVEL BOOK
LINE OF COLLIMATION METHOD

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

স্টেশন ১২৫.৫ এর প্রকল্প

L10 (0.017047113)

N = 22° 27' 16.8"

E = 092° 03' 44.7"

Upazila: Rangunia

District: Chittagong

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|----------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 1.423 ✓ | | - | 4.368 | 2.945 | |
| মান ১ | ০ | | 1.421 | | | 2.947 | মধ্য |
| (0+000) | 10 | | 1.423 | | | 2.945 | " |
| | 15 | | 1.744 | | | 2.624 | " L13 |
| | 16 | | 2.193 | | | 2.175 | |
| | 20 | | 3.073 | | | 1.275 | |
| | 25 | | 3.390 | | | 0.928 | |
| | 30 | | 3.650 | | | 0.718 | |
| | 35 | | 4.283 | | | 0.415 | Bed |
| | 40 | | 4.662 | | | 0.294 | |
| | 45 | | 4.246 | | | 0.122 | |
| | 50 | | 4.392 | | | 0.014 | |
| | 55 | | 4.298 | | | 0.070 | |
| | 60 | | 4.290 | | | 0.078 | |
| | 65 | | 4.243 | | | 0.125 | |
| | 70 | | 4.293 | | | 0.075 | |
| | 75 | | 4.386 | | | 0.018 | |
| | 80 | | 4.316 | | | 0.052 | |
| | 85 | | 3.627 | | | 0.691 | |
| | 90 | | 3.176 | | | 1.192 | |
| | 95 | | 3.216 | | | 1.152 | |
| | 100 | | 3.116 | | | 1.252 | |
| | 105 | | 3.216 | | | 1.152 | |
| | 110 | | 3.243 | | | 1.125 | |
| | 115 | | 1.983 | | | 2.385 | |
| | 116 | | 0.346 | | | 4.022 | R10 |
| | 121 | | 0.334 | | | 4.034 | মধ্য ২৫২ |
| | 131 | | 0.643 | | | 3.725 | " |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
Signature

Field Surveyor

Md. Abdur Razzak

Sub-Assistant Engineer

House of Consultants Ltd.

LEVEL BOOK

LINE OF COLLIMATION METHOD

32T-2

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|--|----------|--------------------------|----------|------------------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | | 6.326 | | | 1.958 | initial bed from 270 |
| | | | 4.055 | | | 0.313 | P.W.L |
| | | | 1.984 | | | 2.384 | 2nd point |
| | | | 4.162 | | | 0.206 | " " |
| | | | 0.643 | | | 5.011 | H.W.L. sum of 1st 4 points |
| | | | 1.411 | | | 2.957 | H.W.L. - sum of 1st 5 points |
| | | | 2.193 | | | 2.175 | N.W.L. of 1st 5 points |
| | | | 0 | | | 0 | |
| | | | 2nd point - 2nd 3rd pt: 3:10 00. sum of 1st 6 points | | | | |
| | | 1.298 | | - | 10.006 | 8.708 | SPS-1 |
| | | | 1.100 | | | 8.906 | SPS-2 |
| | | 1.377 | | 5.392 | 5.986 | 4.609 | |
| | | | 1.457 | | | 4.529 | 22/03/2016 |
| | | | 3.953 | | | 2.033 | 11.00 AM |
| | | | 3.274 | | | 2.712 | ST |
| | | | 3.226 | | | 2.710 | ST |
| | | | 3.243 | | | 2.743 | ST |
| | | | 1.643 | | | 4.343 | sum N.W.L |
| | | | 3.239 | | | 2.747 | 4/5 P.W.L |
| | | | 3.980 | | | 2.006 | 3/5 P.W.L. from 1st point |
| | | | 3.240 | | | 2.746 | 2nd point |
| | | | 1.489 | | | 4.497 | H.W.L. sum |
| | | 0.546 | | 1.990 | 4.542 | 3.796 | |
| | | | 2.992 | | | 1.550 | A |
| | | | 3.440 | | | 1.102 | B |
| | | | 0.713 | | | 3.829 | C |
| | | | 1.953 | | | 2.589 | D |
| | | | 2.474 | | | 2.068 | Ext |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

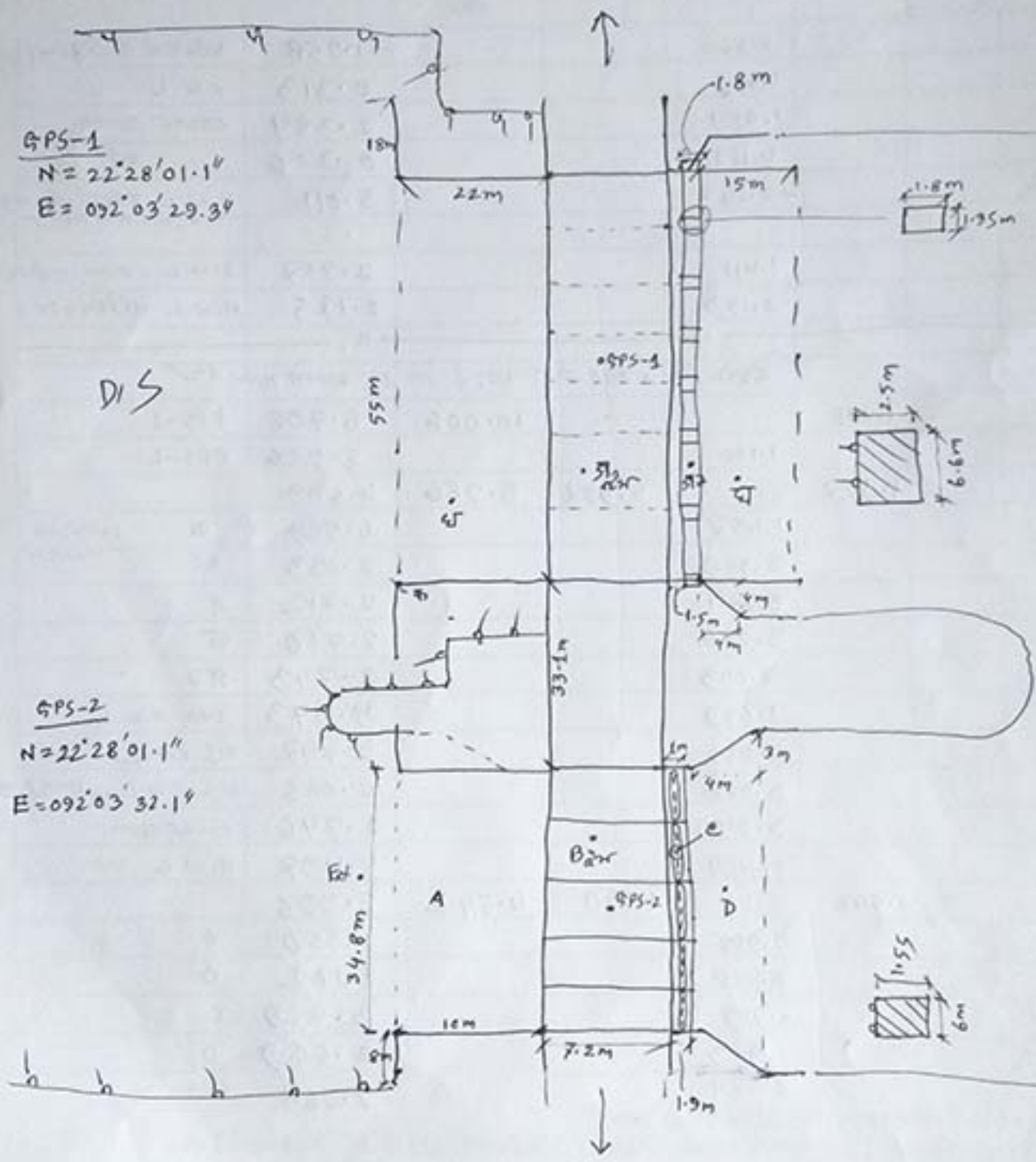
Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
Signature

Field Surveyor

Md. Abdur Razzak
Sub-Assistant Engineer
House of Consultants Ltd.

GPS-1
 $N = 22^{\circ}28'01.1''$
 $E = 092^{\circ}03'29.3''$



GPS-2
 $N = 22^{\circ}28'01.1''$
 $E = 092^{\circ}03'32.1''$

200m

At. 1450km

LEVEL BOOK

LINE OF COLLIMATION METHOD

24-3

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

45 G.P.S

Upazila: Rangunia

মার্স জরুরি

N = 22° 28' 12.7"

District: Chittagong

E = 092° 03' 32.9"

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|---------------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 4.331 ✓ | | - | 7.078 | 2.747 | P.V.L |
| ০০ | ০০ | | 1.263 | | | 5.815 | H.S |
| ০৫ | ০৫ | | 0.923 | | | 6.155 | L/B TOP |
| ১০ | ১০ | | 3.103 | | | 3.975 | |
| ১৫ | ১৫ | | P.3.300 | | | 2.0.553 | |
| ২০ | ২০ | | P.5.563 | | | 2.816 | |
| ২৫ | ২৫ | | P.5.623 | | | 2.876 | |
| ৩০ | ৩০ | | P.4.123 | | | 1.376 | |
| ৩৫ | ৩৫ | | P.2.756 | | | 0.009 | |
| ৪০ | ৪০ | | P.1.268 | | | 1.479 | |
| ৪৫ | ৪৫ | | 4.063 | | | 3.015 | |
| ৪৮ | ৪৮ | | 2.201 | | | 4.877 | R/B |
| ৫৩ | ৫৩ | | 2.218 | | | 4.860 | P/L |
| ৬৩ | ৬৩ | | 2.226 | | | 4.852 | " |
| | | | 3.384 | | | 3.694 | ৩৩ নং পয়েন্ট (৬৩০) |
| | | | 2.783 | | | 4.295 | N.W.L স্বাক্ষর |
| | | | 1.430 | | | 5.648 | H.W.L স্বাক্ষর. মাসজুমদার |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak

Signature

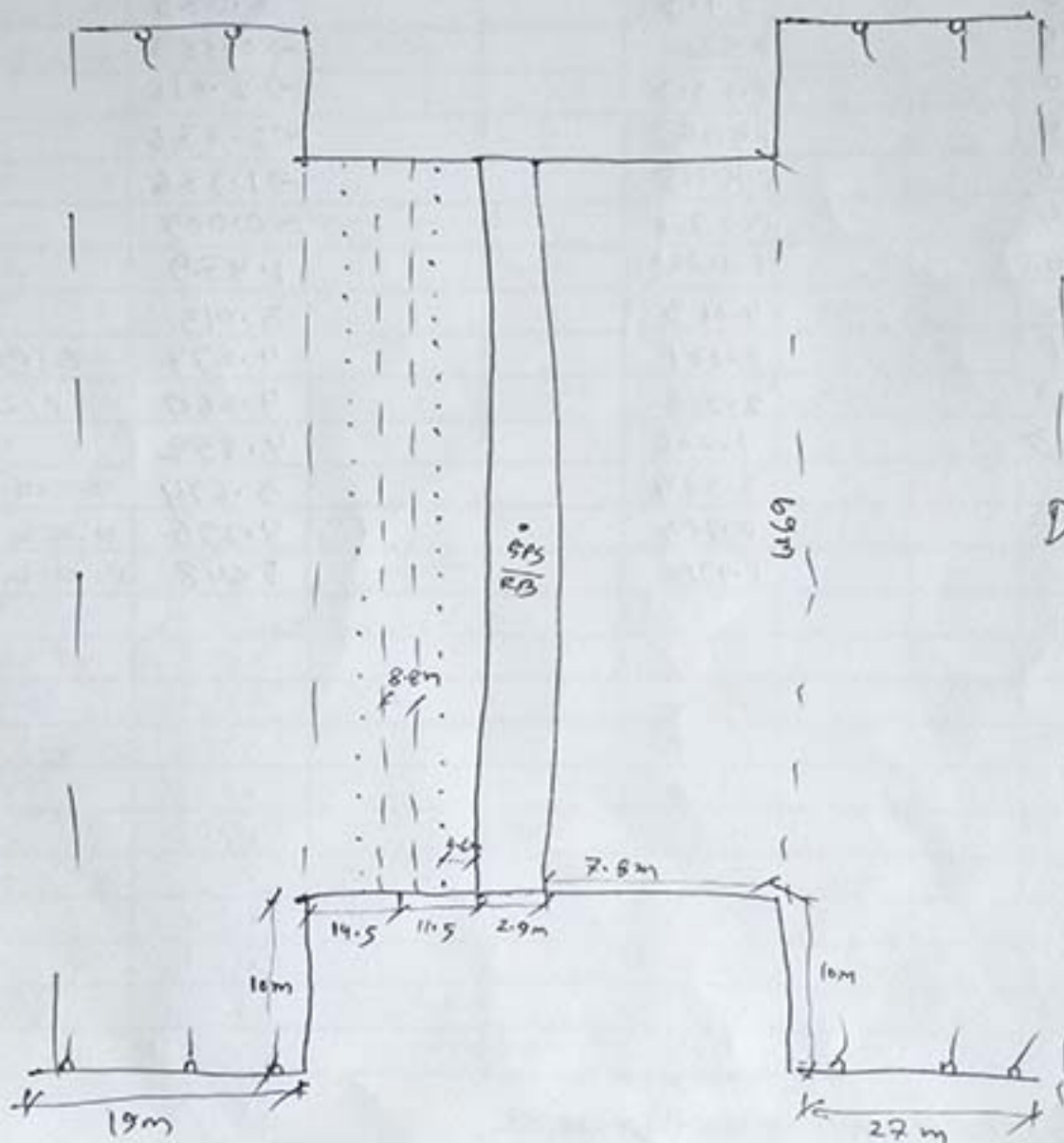
Field Surveyor

Md. Abdur Razzak

Sub-Assistant Engineer

House of Consultants Ltd.

415



At, 8+885 km

DIS

GPS-RD

N=22° 30' 13.8"

E=692° 8351.2"

N = 22° 30' 13.8"
E = 092° 03' 51.2"

2625-4

ഭവനം ൧൦൦, ൧൦൦

District: Chittagong

$$N = 223012.8$$

$$E = 092.349.3''$$

9.484 P/L

98 0.754

9.473

Field Surveyor
Md. Abdul Razzak
Sub-Assistant Engineer
House of Consultants Ltd

LEVEL BOOK

LINE OF COLLIMATION METHOD

25-5

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

area 200 Bz 20000

N = 22° 31' 43.1"
E = 092° 63' 14.1"

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|-----------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 0.232 | | - | 14.974 | 14.742 | AT. 12+750m. 90m |
| | | 1.393 | | 3.028 | 13.289 | 11.896 | |
| | | | 2.523 | | | 10.766 | H.W.L. out of - 100m |
| | | | 1.522 | | | 11.767 | H.W.L. on 40m on 200m |
| | | | | | | | N.W.L. out of 100m |
| | | | 4.412 | | | 8.877 | P.W.L. |
| | 0 | | 1.416 | | | 11.873 | P.L. |
| 135415 | 10 | | 1.402 | | | 11.887 | " |
| | 15 | | 1.403 | | | 11.886 | L.B. |
| | 20 | | 2.823 | | | 10.416 | |
| | 25 | | P. 0.503 | | | 8.324 | |
| | 30 | | P. 2.611 | | | 6.266 | |
| | 35 | | P. 2.716 | | | 6.161 | |
| | 40 | | P. 2.953 | | | 5.924 | Bed |
| | 45 | | P. 2.886 | | | 5.791 | |
| | 50 | | P. 2.843 | | | 6.034 | |
| | 55 | | P. 2.562 | | | 6.315 | |
| | 60 | | P. 1.562 | | | 7.315 | |
| | 65 | | 4.356 | | | 8.933 | |
| | 70 | | 2.726 | | | 10.563 | |
| | 75 | | 1.386 | | | 11.903 | R.B. |
| | 80 | | 1.370 | | | 11.919 | " |
| | 85 | | 1.413 | | | 11.876 | P.L. |
| | 90 | | 1.396 | | | 11.893 | " |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
Signature
Field Surveyor

Md. Abdur Razzak
Sub-Assistant Engineer
House of Consultants Ltd.

124 নং খোলা, চাঁদাখতি

LEVEL BOOK
LINE OF COLLIMATION METHOD ২২৫-৬
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

২২৫ ২৬ ১৩৫

৫৫৫
৫৫৫৫৫৫
 $N = 223^{\circ} 12' 6''$ $E = 092^{\circ} 02' 26.7''$

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 0.427 | | - | 22.495 | 22.068 | ১০.৫ |
| | | 0.320 | | 5.894 | 16.971 | 16.601 | ১৩০.৫ম |
| | | | 2.483 | | | 14.488 | H.W.L. ২০০ |
| | | | 5.301 | | | 11.670 | N.W.L. ৫ |
| ০১৫ | ০০ | | 0.883 | | | 16.088 | ১৩০০০ |
| ০১৫ | ১০ | | 0.983 | | | 15.988 | ৫৩ " " |
| | ১৫ | | 1.601 | | | 15.370 | |
| | ২০ | | 2.413 | | | 14.558 | |
| | ২৫ | | 3.392 | | | 13.579 | |
| | ৩০ | | 4.526 | | | 12.445 | |
| | ৩৫ | | 5.101 | | | 11.870 | |
| | ৪০ | | 5.601 | | | 11.370 | |
| | ৫০ | | 5.801 | | | 11.170 | |
| | ৫৫ | | 6.213 | | | 10.758 | |
| | ৬০ | | 6.563 | | | 10.408 | |
| | ৬৫ | | 6.311 | | | 10.660 | |
| | ৭৫ | | 6.713 | | | 10.258 | |
| | ৮৫ | | 6.866 | | | 10.105 | |
| | ৯৫ | | 6.946 | | | 10.025 | |
| | ১০০ | | 6.993 | | | 9.978 | Bed |
| | ১০৫ | | 5.362 | | | 11.609 | |
| | ১১০ | | 3.582 | | | 13.389 | |
| | ১১৬ | | 0.324 | | | 16.647 | R/B |
| | ১২১ | | 0.301 | | | 16.670 | ১৩০০০ |
| | ১৩১ | | 0.443 | | | 16.528 | ৫ |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
 Signature
 Field Surveyor
 Md. Abdur Razzak
 Sub-Assistant Engineer
 House of Consultants Ltd.

LEVEL BOOK LINE OF COLLIMATION METHOD

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

সার্বভৌম প্রকল্প

৩০-৭

N = 22.35.35.74

E = 092° 02' 27.24"

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--|-------------------------------------|---------------|----------|----------|--------------------------|----------|---------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 0.362 ✓ | | — | 23.996 | 23.634 | 126.125m |
| | | 0.321 | | 5.580 | 19.337 | 18.416 | |
| মানুষ | 00 | | 0.011 | | | 19.326 | PIC |
| | 10 | | 0.010 | | | 19.327 | " |
| | 15 | | 0.009 | | | 19.328 | LIB |
| | 25 | | 1.522 | | | 17.765 | |
| N = 22.35.35.74 E = 092° 02' 29.11" | 35 | | 3.323 | | | 16.014 | |
| | 45 | | 4.701 | | | 14.636 | |
| | 50 | | 5.443 | | | 13.894 | |
| | 60 | | 6.711 | | | 12.626 | |
| | 70 | | 6.843 | | | 12.494 | |
| | 80 | | 7.113 | | | 12.224 | |
| | 85 | | 5.663 | | | 13.674 | |
| | 95 | | 4.453 | | | 14.884 | |
| | 105 | | 4.044 | | | 15.293 | |
| | 115 | | 3.701 | | | 15.636 | |
| | 125 | | 2.983 | | | 16.354 | |
| | 135 | | 2.301 | | | 17.036 | |
| | 140 | | 1.711 | | | 17.626 | RIB |
| | 144 | | 1.703 | | | 17.634 | " |
| | 148 | | 1.746 | | | 17.591 | PIC |
| | 158 | | 1.766 | | | 17.571 | " 17.571 |
| | | | 7.263 | | | 12.074 | প্রা. প্রকল্প |
| | | | 4.923 | | | 14.414 | N.W.L - প্রা. |
| | | | 3.736 | | | 15.901 | H.W.L " |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
Signature
Field Surveyor
Md. Abdur Razzak
Sub-Assistant Engineer
House of Consultants Ltd.

3. Δ ની ઓછી- સમાપ્ત પૂર્ણ
કિંમત માટે TOP ON માટે
D.B.M., RL = 19.660 m PWD

B.M, $RL = 19.660 \text{ m PWD}$

ইচ্ছামতি (লাডল কাগজের)

24th Oct 2023

2015

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A-R633K

Signature _____

Field Surveyor

Md. Abdur Razrak

Sub-Assistant Engineer

House of Consultants Ltd.

LEVEL BOOK
LINE OF COLLIMATION METHOD
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

২৫২০০৮ (২৫২০০৮/০৮/২০০৮)

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|----------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 0.585 | | - | 19.491 | 18.906 | For গাতি ঘাট |
| | | 1.433 | | 1.748 | 19.176 | 17.743 | |
| | | 1.270 | | 1.250 | 19.196 | 17.926 | |
| | | 1.126 | | 1.902 | 18.420 | 17.294 | |
| | | 1.739 | | 1.362 | 18.797 | 17.058 | |
| | | 1.165 | | 1.378 | 18.584 | 17.419 | |
| | | 1.010 | | 1.890 | 17.704 | 16.694 | |
| | | 1.169 | | 2.260 | 16.613 | 15.444 | |
| | | 1.067 | | 1.631 | 16.049 | 14.982 | |
| | | 1.632 | | 1.428 | 16.253 | 14.621 | |
| | | 1.502 | | 1.285 | 16.470 | 14.968 | |
| | | 1.543 | | 2.007 | 16.006 | 14.463 | |
| | | 0.905 | | 1.412 | 15.499 | 14.594 | |
| | | 0.514 | | 0.285 | 15.728 | 15.214 | 0.285 |
| | | 0.537 | | 1.237 | 15.028 | 14.491 | |
| | | 1.088 | | 0.448 | 15.668 | 14.580 | |
| | | 1.090 | | 1.352 | 15.406 | 14.316 | |
| | | 1.293 | | 1.150 | 15.549 | 14.256 | |
| | | 0.688 | | 1.888 | 14.349 | 13.661 | |
| | | 1.199 | | 1.562 | 13.986 | 12.787 | |
| | | 1.297 | | 2.037 | 13.246 | 11.949 | |
| | | 1.192 | | 1.328 | 13.110 | 11.918 | |
| | | 3.617 | | 1.170 | 15.557 | 11.940 | |
| | | | 0.815 | | | 14.742 | গাতি ২৫৬৮৮৮ |
| | | | 1.218 | | | 14.339 | ১৫৬৮৮৮-২৫৬৮৮৮ ১৫৬৮৮৮ |
| | | | | | | | |
| | | | | | | | |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razak

Signature

Field Surveyor

Md. Abdur Razak

Sub-Assistant Engineer

House of Consultants Ltd.

LEVEL BOOK **LINE OF COLLIMATION METHOD**

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

স্বাক্ষরিত (মাস্টার লাইন)

গণনা? বিল্ডিং
Event (স্বাক্ষরিত)

P/S - জমিদার
জমিদার TO P = R.L. 6.59
m.p.d.

N = 22° 27' 34.1"
E = 092° 03' 52.9"

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|---------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 0.787 | | - | 7.377 | 6.590 | 125 m (স্বাক্ষরিত) |
| | | 1.693 | | 4.001 | 5.069 | 3.376 | |
| | | 1.858 | | 1.208 | 5.719 | 3.861 | |
| | | 1.074 | | 1.907 | 4.886 | 3.812 | * |
| | | 1.123 | | 1.674 | 4.335 | 3.212 | |
| | | | 1.388 | | | 2.947 | P.L. মাস্টার লাইন |
| | | | 1.415 | | | 2.920 | P.L. " মাস্টার লাইন |
| | | 1.568 | | - | 5.380 | 3.812 | * |
| | | 1.202 | | 1.527 | 5.055 | 3.853 | |
| | | 2.100 | | 2.078 | 5.077 | 2.977 | |
| | | 1.532 | | 1.711 | 4.898 | 3.366 | |
| | | 3.400 | | 3.296 | 5.002 | 1.602 | P.W.L. |
| | | | 0.423 | | | 4.529 | |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A.R. 3361K
Signature
Field Surveyor
Md. Abdur Razzak
Sub-Assistant Engineer
House of Consultants Ltd.

જાળ (જાળાઈ રહ્યા)

C/S

125 કી (ચોક)

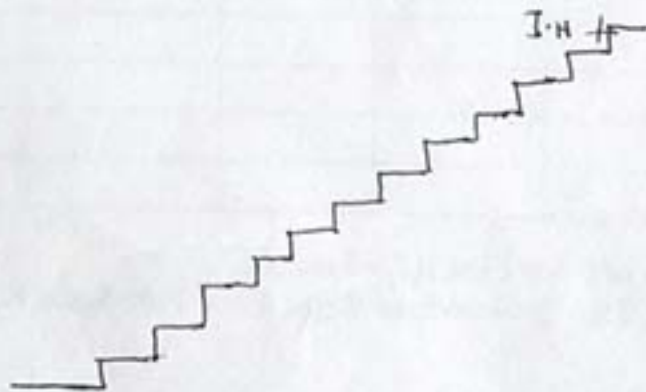
16.9m

H = 5.9m

R/S

અસાધ્ય
અવસ્થા

I.H.



LEVEL BOOK

LINE OF COLLIMATION METHOD

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

১৫ লি. ৩৬৪.৬৮ ফু
T.O.P, N = 22° 26' 56.8"
E = 092° 03' 15.6"

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|-------------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 0.298 ✓ | | - | 6.959 | 6.661 | 10.47 (0.298) 11.76 |
| ০০ | | | 0.152 | | | 6.807 | ১১.৭৬ |
| ০৫ | | | 0.355 | | | 6.604 | ১১.৭৬ |
| ১০ | | | 2.193 | | | 4.766 | |
| ১৫ | | | 3.448 | | | 3.511 | |
| ২০ | | | 4.392 | | | 2.577 | |
| ২৫ | | | P=0.250 | | | 1.279 | P.W.L = 4.930 |
| ৩০ | | | P=2.136 | | | 0.107 | (R.L=2.029) |
| ৩৫ | | | P=1.0223 | | | 0.306 | |
| ৪০ | | | P=1.656 | | | 0.374 | |
| ৪৫ | | | P=1.801 | | | 0.228 | |
| ৫০ | | | P=2.161 | | | 0.132 | |
| ৫৫ | | | P=2.301 | | | 0.272 | |
| ৬০ | | | P=2.416 | | | 0.387 | |
| ৬৫ | | | P=2.742 | | | 0.713 | |
| ৭০ | | | P=1.426 | | | 0.803 | |
| ৭৫ | | | 3.362 | | | 3.597 | |
| ৮০ | | | 0.262 | | | 6.697 | P.I.B |
| ৮৫ | | | 0.463 | | | 6.495 | ১১.৭৬ |
| ৯০ | | | 0.348 | | | 6.611 | |
| | | | P=3.462 | | | 1.433 | ১১.৭৬ |
| | | | 4.000 | | | 2.959 | ১১.৭৬ |
| | | | 5.830 | | | 1.129 | ১১.৭৬ |
| | | | 3.642 | | | 3.317 | (H.F.L. 20.52 (10.250)) |
| | | | 2.023 | | | 4.886 | H.F.L. ১১.৭৬ |
| | | | 3.535 | | | 3.424 | N.F.L |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A-Res336k

Signature

Field Surveyor

Md. Abdur Razzak

Sub-Assistant Engineer

House of Consultants Ltd.

LEVEL BOOK

LINE OF COLLIMATION METHOD

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

১৪ নং ওয়ার্ড ১৪ (১৪ নং ওয়ার্ড ১৪ ১৪ নং ওয়ার্ড ১৪) N = 22°26'48.3" E = 092°03'20.6"

24/03/2016

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|-----------|----------|--------------------------|----------|---------------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 0.752 ✓ | | — | 12.140 | 11.383 | ১৪. A + 0 + 385 km |
| | | 1.286 | | 5.451 | 7.925 | 6.689 | |
| | | 1.302 | | 2.522 | 6.680 | 5.378 | |
| | | | 3.188 | | | 3.492 | ১৪.৩০০০০০ |
| | | | 5.362 | | | 1.318 | ১৪.৩০০০০০ |
| | | | 4.262 | | | 2.418 | ১৪.৩০০০০০ |
| | | | 5.248 | | | 1.432 | ১৪.৩০০০০০ |
| | | | 1.892 | | | 4.787 | H.W.L. - ১৪.৩০০০০০ |
| | | | 3.340 | | | 3.340 | H.W.L. - ১৪.৩০০০০০ |
| ১৪.৩০০০০০ | ০০ | | 1.032 | | | 5.648 | P/L ১৪.৩০০০০০ |
| ১৪.৩০০০০০ | 10 | | 1.066 | | | 5.614 | " " |
| | 15 | | 1.083 | | | 5.597 | ১৪.৩০০০০০ |
| | 20 | | 3.124 | | | 3.506 | |
| | 25 | | P = 3.800 | | | 2.1350 | P.U.L = 4.230 (R.L = 2.4) |
| | 30 | | P = 5.30 | | | 2.850 | |
| | 35 | | P = 5.40 | | | 2.750 | |
| | 40 | | P = 3.456 | | | 1.006 | |
| | 45 | | P = 2.466 | | | 0.016 | |
| | 50 | | P = 2.301 | | | 0.149 | |
| | 55 | | P = 1.883 | | | 0.567 | |
| | 60 | | P = 0.943 | | | 1.507 | |
| | 62 | | 3.632 | | | 3.048 | ১৪.৩০০০০০ |
| | 82 | | 2.923 | | | 3.707 | |
| | 92 | | 2.243 | | | 3.937 | |
| | 102 | | 1.983 | | | 4.697 | |
| | 112 | | 1.962 | | | 4.718 | |
| | 122 | | 2.822 | | | 3.858 | |
| | 122 | | 1.462 | | | 5.218 | P/L ১৪.৩০০০০০ |
| | 137 | | 1.443 | | | 5.237 | |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
Signature

Field Surveyor

Md. Abdur Razzak
Sub-Assistant Engineer
House of Consultants Ltd.

LEVEL BOOK

LINE OF COLLIMATION METHOD

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

21/03/2016

TOP

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

কিরুর ডাটা প্লট - কলিমার ড্রাইভিং
 $N = 22^{\circ}25'58.7''$
 $E = 092^{\circ}03'56.4''$

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|-----------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 0.446 | | - | 9.218 | 8.772 | 34 |
| | | 1.160 | | 3.620 | 6.758 | 5.598 | |
| | | | 0.346 | | | 6.442 | H.W.L. - 80m |
| | | | 2.680 | | | 4.078 | N.W.L. - 1 |
| | | | 3.350 | | | 3.408 | 80m |
| | | | 4.870 | | | 1.888 | ৪২ |
| ১০০ | ০০ | | 1.640 | | | 5.118 | H.C.S. - L |
| ১১০ | ১০ | | 1.585 | | | 5.173 | |
| ১২০ | ০৬ | | 1.552 | | | 5.206 | |
| ১৩০ | ০৪ | | 1.422 | | | 5.286 | ৮১৩ |
| ১৪০ | ১৩ | | 3.052 | | | 3.706 | |
| ১৫০ | ১৫ | | 4.683 | | | 2.075 | |
| ১৬০ | ২০ | | P. 1.923 | | | 1.955 | P.W.L. 3.880 (৮২.৮৭০) |
| ১৭০ | ২৫ | | P. 1.923 | | | 0.905 | |
| ১৮০ | ৩০ | | P. 2.250 | | | 0.628 | Bed |
| ১৯০ | ৩৫ | | P. 2.156 | | | 0.722 | |
| ২০০ | ৪০ | | P. 0.543 | | | 2.335 | |
| ২১০ | ৪৫ | | 2.243 | | | 4.015 | |
| ২২০ | ৫০ | | 1.230 | | | 5.528 | |
| ২৩০ | ৫৩ | | 0.444 | | | 6.314 | R. 13 |
| ২৪০ | ৫৪ | | 0.683 | | | 6.075 | ৮২.২৮২ |
| ২৫০ | ৬২ | | 0.632 | | | 6.126 | ৮২ |
| | | | P. 2.155 | | | 0.723 | ৮২.০৮২ |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
 Signature
 Field Surveyor

Md. Abdur Razzak
 Sub-Assistant Engineer
 House of Consultants Ltd.

Figure-8

19

दिनांक ८^व मार्च मंगलवार तिथि - T.O.P N = 22° 23' 50.6"
 E = 092° 04' 32.5"
 → समानांतर रेखा

$$E = 092^{\circ} 04' 32.5''$$

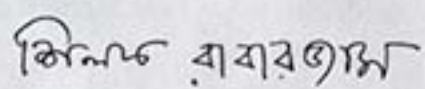
→ બાબત કાયદો હેઠળ

[illegible]

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
Signature
Field Surveyor
Md. Abdur Razzak
Sub-Assistant Engineer
House of Consultants Ltd

$\angle S = 22^\circ 24' 59.4''$
 $E = 092^\circ 04' 19.1''$



মিলে যায৷

LEVEL BOOK

LINE OF COLLIMATION METHOD

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

পরিমাপ - ১ - মানচিত্র প্রস্তুতকরণ

১/১৫ ৯৫.৫
N = 22° 25' 03.6"
E = 092° 04' 18.5"

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|---------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| ০০ | | | 1.201 | | | 7.467 | ১/১৫ ৯৫.৫ |
| 10 | | | 1.222 | | | 7.446 | ৭ |
| 15 | | | 1.444 | | | 7.224 | ১/১৫ |
| 18 | | | 2.963 | | | 5.705 | |
| 20 | | | 3.106 | | | 5.562 | |
| 25 | | | 3.136 | | | 5.532 | |
| 30 | | | 3.274 | | | 5.394 | |
| 35 | | | 3.470 | | | 5.198 | |
| 40 | | | 3.763 | | | 4.905 | |
| 45 | | | 3.701 | | | 4.967 | |
| 50 | | | 3.613 | | | 5.055 | |
| 51 | | | 3.473 | | | 5.175 | |
| 53 | | | 5.923 | | | 2.745 | |
| 56 | | | 6.043 | | | 2.625 | Bed |
| 59 | | | 5.964 | | | 2.704 | |
| 61 | | | 3.736 | | | 4.732 | |
| 66 | | | 3.856 | | | 4.812 | |
| 71 | | | 3.556 | | | 5.112 | |
| 76 | | | 1.683 | | | 6.985 | |
| 78 | | | 0.925 | | | 7.843 | ১/১৫ |
| 83 | | | 0.816 | | | 7.852 | ১/১৫ ৯৫.৫ |
| 93 | | | 0.829 | | | 7.839 | ৭ |
| | | | 0.444 | | | 8.224 | H.W.L. - ১০০০ |
| | | | 1.983 | | | 6.685 | N.U.L. ৭ |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
Signature

Field Surveyor
Md. Abdur Razzak

Sub-Assistant Engineer
House of Consultants Ltd.

LEVEL BOOK

LINE OF COLLIMATION METHOD

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

সিমানা - ১৬

১৬ নং সিমানা

N = 22°22'25.8"

E = 092°05'52.4"

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|---------------|----------|----------|--------------------------|----------|------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | ✓ 2.162 | | - | 14.577 | 12.415 | |
| ০০ | | | 0.843 | | | 13.734 | |
| ০৫ | | | 0.858 | | | 13.719 | L/B |
| ০২ | | | 2.362 | | | 12.215 | |
| 10 | | | 4.036 | | | 10.541 | |
| 15 | | | 4.322 | | | 10.255 | Bed |
| 20 | | | 4.153 | | | 10.424 | |
| 25 | | | 4.104 | | | 10.473 | |
| 30 | | | 4.076 | | | 10.501 | |
| ৩৫ | | | 3.653 | | | 10.924 | |
| 40 | | | 3.669 | | | 10.908 | |
| ৫৫ | | | 3.643 | | | 10.934 | |
| ৬০ | | | 3.596 | | | 10.981 | |
| 65 | | | 3.584 | | | 10.993 | |
| ৭০ | | | 3.501 | | | 11.076 | |
| ৭১ | | | 2.162 | | | 12.415 | R/B |
| ৭৪ | | | 1.583 | | | 12.994 | |
| ৭৯ | | | 1.322 | | | 13.255 | |
| | | | | | | | |
| | | | 3.658 | | | 10.919 | ১৬ নং সিমানা |
| | | | 1.555 | | | 13.022 | H.F.L. সম |
| | | | 0.653 | | | 13.924 | H.F.L. সম |
| | | 3.403 | | 0.167 | 17.813 | 14.410 | 112.2m |
| | | | 0.378 | | | 17.435 | ১৩৫ T.P |
| | | | | | | | N = 22°22'27.0" |
| | | | | | | | E = 092°05'52.1" |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Rezzak
Signature
Field Surveyor
Md. Abdur Rezzak
Sub-Assistant Engineer
House of Consultants Ltd.

LEVEL BOOK

LINE OF COLLIMATION METHOD

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

১৪ টি উপজিলায় প্রকল্প

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|--------------|-------------------------------------|------------------|----------|------------------|--------------------------|----------|-------------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 3.715 ✓ | | - | 8.050 | 4.335 | H.I. (২৬০০.০৫০) |
| | | | 1.446 | | | 6.604 | C.C. 35 TOP ২৩৫৫ |
| | | | 1.428 | | | 6.622 | " " ২৩ - |
| | | 1.555 | | 1.275 | 8.330 | 6.775 | |
| | | 1.550 | | 1.423 | 8.457 | 6.907 | |
| | | 2.321 | | 1.302 | 9.476 | 7.155 | |
| | | | 0.079 | | | 9.397 | For comparison |
| | | 2.236 | | 0.435 | 11.277 | 9.041 | |
| | | 2.562 | | 1.388 | 12.451 | 9.889 | |
| | | | 1.068 | | | 11.383 | 35 TOP ২৩৫৫/১৬০০ |
| | | | | 0 | | | |
| | | 1.260 ✓ | | - | 10.657 | 9.397 | For comparison |
| | | 1.842 | | 2.328 | 10.171 | 8.329 | |
| | | 4.092 | | 0.114 | 14.149 | 10.057 | |
| | | 0.170 | | 1.826 | 12.493 | 12.323 | |
| | | 0.848 | | 4.808 | 8.533 | 7.685 | |
| | | 2.278 | | 1.896 | 8.915 | 6.637 | 2.278 |
| | | 2.252 | | 2.398 | 7.299 | 6.013 | 2.902 |
| | | 1.286 | | 1.230 | 7.037 | 6.069 | |
| | | 0.968 | | 1.048 | 7.427 | 5.989 | |
| | | 1.438 | | 0.846 | 8.206 | 6.581 | |
| | | 1.625 | | 1.610 | 7.886 | 6.596 | |
| | | 1.290 | | 1.002 | 8.302 | 6.884 | |
| | | 1.418 | | | | 7.040 | For comparison note 950 |
| | | | 1.262 | | | 6.858 | |
| | | 2.013 | | 1.444 | 8.871 | | |
| | | | 0.098 | | 8.772 | | comparison 35 TOP 0.098 |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzaq

Signature
Field Surveyor

Md. Abdur Razzaq
Sub-Assistant Engineer
House of Consultants Ltd.

LEVEL BOOK **LINE OF COLLIMATION METHOD**

PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

Name of Scheme: Do

Upazila: Rangunia

District: Chittagong

ফিরে / ২ (১৫০০ ফুট)

| Chainage (m) | Staff Distance from Centre Line (m) | Staff Reading | | | Height of Instrument (m) | R.L. (m) | Remarks |
|-----------------|--|---------------|-------------|-------------|-----------------------------------|-------------|------------------|
| | | B.S. (m) | I.S. (m) | F.S. (m) | | | |
| | | 1.032 ✓ | | - | 8.072 | 7.040 | For line 1000 ft |
| | | 1.379 | | 0.888 | 8.568 | 7.189 | |
| | | 1.496 | | 0.832 | 9.232 | 7.736 | |
| | | 1.478 | | 1.260 | 9.450 | 7.972 | |
| | | 1.312 | | 1.703 | 9.059 | 7.747 | |
| | | 1.347 | | 1.098 | 9.308 | 7.961 | |
| | | 1.472 | | 0.982 | 9.798 | 8.326 | |
| | | 1.194 | | 1.268 | 9.724 | 8.530 | |
| | | 1.607 | | 1.546 | 9.785 | 8.178 | |
| | | 1.532 | | 1.699 | 9.618 | 8.086 | |
| | | 2.220 | | 1.289 | 10.549 | 8.329 | |
| | | | 0.712 | | | 9.837 | 7.189 |
| | | 1.267 | | 1.166 | 10.650 | 9.383 | |
| | | 1.967 | | 2.108 | 10.509 | 8.542 | |
| | | 0.922 | | 0.951 | 10.480 | 9.558 | |
| | | 1.625 | | 0.632 | 11.473 | 9.848 | |
| | | 1.511 | | 1.127 | 11.857 | 10.346 | |
| | | 1.406 | | 1.548 | 11.715 | 10.309 | |
| | | 1.790 | | 1.270 | 12.235 | 10.445 | |
| | | 1.146 | | 1.312 | 12.069 | 10.923 | |
| | | 1.743 | | 1.489 | 12.323 | 10.580 | |
| | | 1.844 | | 1.695 | 12.472 | 10.628 | |
| | | 1.328 | | 1.398 | 12.402 | 11.074 | |
| | | 1.530 | | 2.040 | 11.892 | 10.362 | |
| | | 1.018 | | 1.070 | 11.840 | 10.822 | |
| | | 3.045 | | 0.626 | 14.259 | 11.214 | |
| | | | 1.051 | | | 13.208 | 11.214 |
| | | 1.514 | | 3.030 | 12.743 | 11.229 | |

Check: Sum of B.S. - Sum of F.S. = First R.L. - Last R.L.

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. Razzak
Signature
Field Surveyor
Md. Abdur Razzak
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PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILA'S PROJECT

District: Chittagong

કિલો/2 (નિહત્તર કાલકાલને)

[illegible]

Note: B.S. = Back Sight, I.S. = Intermediate Sight, F.S. = Fore Sight, R.L. = Reduced Level

A. RAZBOK

House of Consultants Ltd

