

Government of the People's Republic of Bangladesh
Ministry of Water Resources



Bangladesh Water Development Board

PROJECT COMPLETION REPORT : IMED 04/2003 (Revised)

for

**Feasibility Study for Restoration of Sangu and Matamuhuri
River Basin**

August, 2021

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Government of the People's Republic of Bangladesh
Ministry of Planning
Implementation Monitoring and Evaluation Division

PROJECT COMPLETION REPORT : IMED 04/2003 (Revised)

A. PROJECT DESCRIPTION :

01. Name of the Project : Feasibility Study for Restoration of Sangu and Matamuhuri River Basin (**Project code-222008600**)
02. Administrative : Ministry of Water Resources (MoWR)
Ministry/Division
03. Executing Agency : Bangladesh Water Development Board (BWDB)
04. Location of the Project : Thanchi, Rowangachari, Alikadam Upazillas of Bandarban District. Chandanaish, Satkania, Anowara and Bashkhali upazillas of Chattogram. Chokoria upazilla of Cox's Bazar District.

05. Objective of the Project:

The overall objective of the study is to carry out a holistic and integrated study for the development of Sangu and Matamuhuri river basin improvement plan considering technical, environmental, social and economic aspects.

The explicit objectives of the study are:

- To revive Sangu and Matamuhuri river basin including interconnected tributaries/distributaries.
- Assessment of basin level water requirement including e-flow.
- To establish Environmental Flow requirement of all the rivers within the Sangu and Matamuhuri river basin.
- To conduct an Environment and Social Impact Assessment (ESIA) study.
- To identify erosion prone areas in both the rivers and their tributaries/ distributaries and suggest suitable measures along with detailed design for DPP (Development Project Proforma) preparation.
- To identify suitable locations for constructing dam/reservoir/others in order to tackle the scarcity of sweet water during dry season in project area (mainly in Bandarban Sadar) along with detailed design for DPP (Development Project Proforma) preparation.
- To develop Environmental Management and Monitoring Plan (EMMP) for conservation of aquatic resources, fisheries resources and bird sanctuaries etc. considering the ecologically critical areas (ECA).
- To prepare plan for restoration and management of ecosystem.
- To prepare afforestation plan considering classification of trees.
- To develop integrated river management plan for the restoration of Sangu and Matamuhuri river basin with "no regret" concept (BDP 2100).
- To prepare afforestation plan considering classification of trees.

06. Estimated Cost

:

(In lakh Taka)

	Original	Latest Revised
(a) Total	495.00	-
(b) Taka	495.00	-
(c) Foreign Currency	-	-
(d) Project Aid	-	-
(e) RPA	-	-

07.	Date of Approval	:	PCP/PFS	PP
	(a) Original	:	04/08/2019	
	(b) Latest Revised	:		
	(c) No Cost Time Extension	:	15/09/2020	

08. Implementation Period

:

	Date of Commencement	Date of Completion
(a) Original	September 2019	November 2020
(b) Latest Revised	-	-
(c) Actual	September 2019	May 2021

09. Financing Arrangement (Source-wise):

9.1 Status of Loan/Grant

a) Foreign Financing : *Not Applicable*

Source (s)	Currency as per Agreement	Amount in US \$ (Million)	Nature (Loan/Grant/supplier's/credit)	Date of Agreement	Date of Effectiveness	Date of Closing	
						Original	Revised
1	2	3	4	5	6	7	8

b) GOB:

(In lakh Taka)

Total amount	Loan	Grant	Cash Foreign Exchange
1	2	3	4
495.00	-	495.00	-

9.2 Utilization of Project Aid: *Not Applicable*

(In million)

Source (s)	Total Amount		Actual Expenditure		Unutilized Amount	
	In US \$	In Local Currency	In US \$	In Local Currency	In US \$	In Local Currency
1	2	3	4	5	6	7

9.3 Re-imburseable Project Aid (RPA): *Not Applicable*

(In lakh Taka)

R P A Amount		Amount Spent	Amount Claimed	Amount Re-imbursed	Remarks
As per PP	As per Agreement				
1	2	3	4	5	6

B. IMPLEMENTATION POSITION

01. Implementation Period :

Implementation Period as per PP		Actual Implementation period	Time Over-run (% of original implementation period)	Remarks
Original	Latest Revised			
1	2	3	4	5
September 2019- November 2020 (15 months)	-	September 2019- May 2021 (21 Months)	6 Months (40%)	Due to Covid-19 situation the study could not be completed in due time.

02. Cost of the Project :

(In lakh Taka)

Description	Estimated Cost		Actual expenditure	Cost over-run (% of original cost)	Remarks
	Original	Latest revised			
1	2	3	4	5	6
TOTAL	495.00	-	484.11	-	The actual contract with the consultant was less than the estimated cost.
TAKA	495.00	-	484.11	-	
PA	-	-	-	-	

03. Project Personnel:

Sanctioned strength as per PP	Manpower employed during execution	Status of the existing manpower			Manpower Employed	
		Manpower requirement for O&M as per pp	Existing manpower for O & M	Others		
1	2	3	4	5	Male	Female
Officer (s)	11	-	-	-	10	1
Staff(s)	14	-	-	-	8	6
Total :	25	Existing Manpower of Directorate of Planning-1, BWDB			18	7

04. Training of Project Personnel (Foreign/Local): No provision of training in this project.

Field of Training /Study tour/workshop/ Seminar etc.	Provision as per PP		Actual		Remarks
	Number of person	Man - months	Number of person	Man - months	
1	2	3	4	5	6
a. Foreign	N/A	N/A	N/A	N/A	
b. Local	N/A	N/A	N/A	N/A	

05. Component-wise Progress (As per latest approved PFS) :

(In lakh Taka)

Items of work (as per PFS)	Unit	Target (as per PFS)		Actual Progress		Reasons for deviation (±)
		Physical	Financial	Physical (%)	Financial	
1	2	3	4	5	6	7
A. Revenue						
1. Feasibility Study (Local professionals 74.00 MM)	Man-Month	74	479.54	74	474.62	
2. Stamps and seals	LS	100%	0.10	100%	0.10	
3. Other stationery	LS	100%	1.86	100%	1.84	
4. Honorarium	LS	100%	3.00	79.02%	2.37	
5. Domestic travel expenses	LS	100%	2.00	82.9%	1.65	
6. Fuel and Gas	LS	100%	1.00	35%	0.23	
7. Petrol, Oil and Lubricants	LS	100%	1.00	55%	0.08	
8. Cleaning and Washing	LS	100%	0.50	55%	0.25	
9. General Supplies	LS	100%	2.00	100%	1.98	
10. Entertainment Expenses	LS	100%	2.00	45%	0.00	
Sub-total (Revenue):			493.00	99.31%	483.12	
B. Capital						
11. Computer and accessories	LS	100%	2.00	50%	0.99	
Sub-total (Capital):		100%	2.00	50%	0.99	
Grand-Total		100%	495.00	99.11%	484.11	

06. Information regarding Project Director (s):

Name & Designation with pay Scale.	Full time	Part time	Responsible for more than one project	Date of		Remarks
				Joining	Transfer	
1	2	3	4	5	6	7
Dr. Shamal Chandra Das Superintending Engineer Grade-4; 50,000-71,200	Full- time	-	Yes	11.11.2018 (Charge assume date) 22.09.2019 (Appoint date)	Till date	

07. Procurement of Transport (in Nos.): Not Applicable

Type of transport	Number as per P.P.	Procured with date	Transferred to Transport Pool with date	Transferred to O & M with date	Condemned/damaged with date	Remarks
1	2	3	4	5	6	7
Car	-	-	-	-	-	
Jeep	-	-	-	-	-	
Microbus	-	-	-	-	-	
Minibus	-	-	-	-	-	
Bus	-	-	-	-	-	
Pick-up	-	-	-	-	-	
Truck	-	-	-	-	-	
Motor Cycle	-	-	-	-	-	
By-cycle	-	-	-	-	-	
Speed Boat	-	-	-	-	-	
Launch	-	-	-	-	-	
Others with name	-	-	-	-	-	

08. Procurement of Goods, Works and Consultancy Services:

08.1 Goods & Works of the Project costing above Tk. 200.00 lakh. and Consultancy above Tk. 100.00 lakh :

Description of procurement (goods/works /consultancy) as per bid document	Tender/Bid/Proposal Cost (in lakh Taka)		Tender/Bid/Proposal		Date of completion of works/services and supply of goods	
	As per PFS	Contracted value	Invitation date	Contract signing/ L.C opening date	As per contract	Actual
1	2	3	4	5	6	7
Consultancy Services for "Feasibility Study for Restoration of Sangu and Matamuhuri River Basin"	479.54	475.67	08.09.2019	13.11.2019	12.11.2020 As per 1 st Revision: 31/03/2021 As per 2 nd Revision: 31/05/2021	31.05.2021

8.2 Use of Project Consultant (s) (Foreign/Local):

Name of the Field	Approved man month		Actual man month utilised	Remarks
	As per PP	As per contract		
1	2	3	4	5
a) Foreign :	-	-	-	
b) Local	74	74	74	

09. Construction/Erection/Installation Tools & Equipment: *Not Applicable*

Description of items	Quantity (as per PP)	Quantity procured with date	Transferred to O & M with date	Disposed off as per rule with date	Balance	Remarks
1	2	3	4	5	6	7

C. FINANCIAL AND PHYSICAL PROGRAMME :

01. (a) Original and revised schedule as per PFS :

(In lakh Taka)

Financial Year	Financial provision & physical target as per original PP				Financial provision & physical target as per latest revised PP			
	Total	Taka	P.A.	Physical %	Total	Taka	P.A.	Physical %
1	2	3	4	5	6	7	8	9
2019-20	-	-	-	44.20	-	-	-	-
2020-21	495.00	495.00	-	55.80%	-	-	-	-
Total	495.00	495.00	-	100%	-	-	-	-

01. (b) Revised ADP allocation and progress :

(In lakh Taka)

Financial Year	Revised Allocation & target				Taka release	Expenditure & physical progress			
	Total	Taka	P.A.	Physical %		Total	Taka	P.A.	Physical %
1	2	3	4	5	6	7	8	9	10
2019-20	100.00	100.00	-	44.20%	-	-	-	-	44.20
2020-21	495.00	495.00	-	55.80%	488.33	484.11	484.11	-	55.91%
Total	595.00	595.00	-	100%	488.33	484.11	484.11	-	99.11%

D. ACHIEVEMENT OF OBJECTIVES OF THE PROJECT:

Objectives as per PP/PFS	Actual achievement	Reasons for shortfall, if any
Technical Feasibility Study		
To revive Sangu and Matamuhuri river basin including interconnected tributaries/distributaries.	Completed. The study focused on the interventions applied for reviving the river basins, which includes dredging, excavation,	N/A

Objectives as per PP/PFS	Actual achievement	Reasons for shortfall, if any
	char removal etc.	
Assessment of basin level water requirement including e-flow.	Completed Basin level water requirement and environmental flow requirement is established and incorporated in Section 8.2.2 of the main report	N/A
To establish Environmental Flow requirement of all the rivers within the Sangu and Matamuhuri river basin.	Completed Basin level water requirement and environmental flow requirement is established and incorporated in Section 8.2.2 of the main report	N/A
To conduct an Environment and Social Impact Assessment (ESIA) study.	Completed Environment and Social Impact Assessment (ESIA) study has been conducted. (Appendix A: Environmental and Social Impact Assessment Study)	N/A
To identify erosion prone areas in both the rivers and their tributaries/ distributaries and suggest suitable measures along with detailed design for DPP (Development Project Proforma) preparation.	Completed The erosion prone area has been identified and design parameters with extent has been stipulated in the Main report, with feasibility level design. (Main report chapter 6)	N/A
To identify suitable locations for constructing dam/reservoir/others in order to tackle the scarcity of sweet water during dry season in project area (mainly in Bandarban Sadar) along with detailed design for DPP (Development Project Proforma) preparation.	Completed Dredging around the Bandarban town has been proposed to increase the storage capacity in dry season. Some water storage locations near Bandarban have also been identified. (Main report chapter 6)	N/A
To develop Environmental Management and Monitoring Plan (EMMP) for conservation of aquatic resources, fisheries resources and bird sanctuaries etc. considering the ecologically critical areas (ECA).	Completed Environmental enhancement and conservation plan is prepared and incorporated in section 8.5 of the main report. Details are provided in Appendix A (Environmental and Social Impact Assessment Study)	N/A
To prepare plan for restoration	Completed	N/A

Objectives as per PP/PFS	Actual achievement	Reasons for shortfall, if any
and management of ecosystem.	Plan for restoration and management of ecosystem is incorporated in Section 5.1 of Appendix E (Ecological survey and Biodiversity Report)	
To prepare afforestation plan considering classification of trees.	Completed Afforestation plan has been prepared considering the classification of trees (Section 7.3 of the main report)	N/A
To develop integrated river management plan for the restoration of Sangu and Matamuhuri river basin with "no regret" concept (BDP 2100).	Completed The river basin management plan has been devised in a holistic and integrated approach considering every aspect. (Chapter 6 and Section 7 of the main report)	N/A

E. BENEFIT ANALYSIS

01. Annual Out-put: *Not Applicable* for the Study Project.

The project is a Study Project.

Items of out-put	Unit	Estimated quantity expected at full capacity	Actual quantity of out-put during the 1st year of operation at full capacity (or during, real production for newly completed project).
(a)			
(b)			
(c)			
(d)			

02. Cost / Benefit: *Not Applicable* (It is not an investment project, hence *not applicable*)

Item	Estimated	Actual
(1) Benefit cost ratio of the project		
(i) Financial		
(ii) Economic		
(2) Internal Rate of Return		
(i) Financial		
(ii) Economic		

03. Please give reasons for shortfall, if any, between the estimated and actual benefit: *Not Applicable*

F. MONITORING AND AUDITING

Monitoring:

Name & designation of the inspecting official	Date of Inspection	Identified Problems	Recommendations
1	2	3	4
a) <u>Ministry / Agency:</u>			
b) <u>IMED:</u> Upama Akter, Deputy Director, IMED-4, Ministry of Planning	13/01/2021	Identified problems, recommendations and compliances are given as Annexure-1.	
c) <u>Others:</u>			

0.2. Auditing during and after Implementation:

2.1. Internal Audit: *No audit conducted yet.*

Period of Audit	Date of submission of Audit Report	Major findings/ objections	Whether objections resolved or not.
1	2	3	4

2.2. External Audit: *No audit conducted yet.*

Audit period	Date of submission of Audit Report	Major findings/ objections	Whether objections resolved or not.
1	2	3	4

G. DESCRIPTIVE REPORT

1. General Observations/Remarks of the Project on:

1.1 Background

The Sangu and Matamuhuri rivers are perennial rivers and influenced by strong tidal action. The rivers are situated in the South-eastern region of Bangladesh. Sangu river originates from Remakri of Thanchi Upazilla in Bandarban district. It flows towards north after originating from Thanchi and flows through Rowangachari and Bandarban. Further flowing west, it falls in the Bay of Bengal after passing by the Chandanaish, Satkania, Anowara and Bashkhali upazillas of Chattogram. Whereas, Matamuhuri originates from the Chokhyong union of Alikadam upazilla of Bandarban district. It flows North-West and eventually falls in the Bay of Bengal through Cox's Bazar (Chokoria upazilla). Agriculture, fisheries, bio-diversity and trades of this region are largely depending on these rivers. However, Sangu and Matamuhuri rivers and most of the interconnecting tributaries/distributaries/khals experience siltation, flooding, erosion problems over the years due to huge onrush of sediment laden water during monsoon. Huge siltation leads to decreased conveyance of river and decreased water availability during dry season- leading to navigation problems and scarcity of water for industrial use. High flow occurs during wet season caused by decreased river conveyance (a result of siltation) and heavy rainfall. The heavy rainfall causes higher erosion of hills and river banks causing faster sedimentation deposition on river bed resulting in lower conveyance. Thus the river loses its natural conveyance capacity, and flash flood occurs in the floodplain in wet season. Other issues related to Sangu and Matamuhuri river basin is establishment of different industries which causes water pollution in the river reducing the surface water quality. The unprecedented rate of deforestation in the Sangu-Matamuhuri region has reduced soil stability and destroyed the natural barrier to soil erosion that comes with forestation.

Bangladesh Delta Plan, BDP- 2100 is a water centric, multi sectoral techno-economic long term adaptive plan. The Mission for BDP 2100 formulated as "Ensure long term water and food security, economic growth and environmental sustainability while effectively reducing vulnerability to natural disasters and building resilience to climate change and other delta challenges through robust, adaptive and integrated strategies, and equitable water governance."

There are 6 Goals to achieve the Delta Vision. Goal 1: **Ensure safety from floods** and climate change related disasters; Goal 2: **Enhance water security and efficiency of water usages**; Goal 3: Ensure sustainable and integrated **river systems** and estuaries management; Goal 4: Conserve and preserve wet-lands and ecosystems and promote their wise use; Goal 5: Develop effective institutions and equitable governance for in-country and trans-boundary water resources management; Goal 6: Achieve optimal and integrated use of land and water resources. Goals of enhancing water security, ensuring flood safety is related to river basin management. So in this context the current study project of Sangu- Mtamuhuri River Basin Restoration is significant. Moreover Chattagram Hill Tracts and Coast is one of the Hotspots of Bangladesh Delta Plan(BDP), 2100. As the river Sangu and Matamuhuri flow through this Hotspot, the contribution of this study project may be considered significantly to achieve the goal of Delta Plan.

1.2 Justification/Adequacy

NWMP states that most of the part of Bangladesh are dependent upon surface water. So, development of surface water for multi-purpose use is an important issue. From economic perspective Sangu and Matamuhuri rivers are two important rivers of Bangladesh. In spite of being economic importance, at present Sangu and Matamuhuri rivers and most of the interconnecting tributaries/distributaries/khals experience siltation, flooding, erosion problems over the years due to huge onrush of sediment laden water during monsoon. Huge siltation leads to decreased conveyance of river and decreased water availability during dry season- leading to navigation problems and scarcity of water for industrial use. High flow occurs during wet season caused by decreased river conveyance (a result of siltation) and heavy rainfall. The heavy rainfall causes higher erosion of hills and river banks causing faster sedimentation deposition on river bed resulting in lower conveyance. Thus the river loses its natural conveyance capacity, and flash flood occurs in the floodplain in wet season. Other issues related to Sangu and Matamuhuri river basin is establishment of different industries which causes water pollution in the river reducing the surface water quality. The unprecedented rate of deforestation in the Sangu-Matamuhuri region has reduced soil stability and destroyed the natural barrier to soil erosion that comes with forestation.

To meet Sustainable Development Goals, restoration of Sangu and Matamuhuri river basin is the demand of time for the conservation of aquatic resources, fisheries resources and bird sanctuaries etc. and socio-economic development. Under this circumstances, a comprehensive study is required on Sangu and Matamuhuri river basin to make this basin more active.

Linkage With Bangladesh Delta Plan (BDP), 2100

Bangladesh Delta Plan (BDP) 2100 is a water centric, multi sectoral techno-economic long term adaptive plan. Delta Vision and Goals show a broader scope (water, food, economy) leading to a holistic approach with 19 themes. Among those themes first three themes are directly related to Water resources. Those themes are-

- i) Morphological Dynamics & River Management
- ii) Water Resources
- iii) Coastal Zone Issues

Moreover Chattagram Hill Tracts and Coast is one of the Hotspots of Bangladesh Delta Plan(BDP), 2100. Under the investment plan there are two projects named “Development Catchment and Sub- catchment Management Plans” and “Flow control and water storage structures for water availability in the dry season” .

At this circumstances, a holistic approach is required to complete the study on Sangu and Matamuhuri river basin so that the goal of Bangladesh Delta Plan can be achieved.

1.3 Objectives

The overall objective of the study is to carry out a holistic and integrated study for the development of Sangu and Matamuhuri river basin improvement plan considering technical, environmental, social and economic aspects.

The explicit objectives of the study are:

- To revive Sangu and Matamuhuri river basin including interconnected tributaries/distributaries.
- Assessment of basin level water requirement including e-flow.

- To establish Environmental Flow requirement of all the rivers within the Sangu and Matamuhuri river basin.
- To conduct an Environment and Social Impact Assessment (ESIA) study.
- To identify erosion prone areas in both the rivers and their tributaries/ distributaries and suggest suitable measures along with detailed design for DPP (Development Project Proforma) preparation.
- To identify suitable locations for constructing dam/reservoir/others in order to tackle the scarcity of sweet water during dry season in project area (mainly in Bandarban Sadar) along with detailed design for DPP (Development Project Proforma) preparation.
- To develop Environmental Management and Monitoring Plan (EMMP) for conservation of aquatic resources, fisheries resources and bird sanctuaries etc. considering the ecologically critical areas (ECA).
- To prepare plan for restoration and management of ecosystem.
- To prepare afforestation plan considering classification of trees.
- To develop integrated river management plan for the restoration of Sangu and Matamuhuri river basin with “no regret” concept (BDP 2100).
- To prepare afforestation plan considering classification of trees.

1.4 Project revision with reasons: Not Applicable

2. Rationale of the project in respect of Concept, Design, Location and Timing.

The present study for Restoration of Sangu and Matamuhuri River Basin aims to make development plan of the river basin in a holistic and integrated approach considering technical, environmental, social and economic aspects. The Sangu basin is located within the districts of Bandarban and Chittagong. The total area of the basin is 3,601 km², out of which, about 2,800 km² is within hilly terrain. The remaining 800 km² is in coastal plain land along the Bay of Bengal. The Matamuhuri Basin is in the district of Cox's Bazar and Bandarban. The total area of the basin is about 1600 km², out of which about 1400 km² is within hilly terrain. The remaining 200 km² lies in the downstream Matamuhuri delta, locally called Chakaria forest. The study area faces problems regarding erosion, flash flood, navigability problem, scarcity of water during dry season, deforestation, fisheries problem, agricultural problem, river sedimentation, tourism problem etc. Severe bank erosion as well as siltation problems are observed in places in the downstream portion of Sangu and Matamuhuri rivers. Moreover, water scarcity becomes severe especially in the upstream parts during dry season but flash floods is a big challenge during the monsoon. The scarcity of water is a severe problem in the Bandarban city, but there are number of projects are going on to resolve the issue. Deforestation and stone mining are the major anthropogenic activity which severely hampers the ecology and causes numerous problems. Earlier, the local tribal people used water from chara, jhiri, etc. near them but at present these hilly streams and waterfalls do not have enough water for their domestic uses during dry period. The downstream part of the rivers has tidal effects and faces flooding and siltation problems. In short, it can be stated that the problems are different in upstream and downstream reaches of the rivers. The problems in Sangu River Basin can be identified as bank erosion, siltation, flash flood, polder maintenance issues in the downstream part; flash flood during monsoon as well as shortage of drinking water and navigation problem during dry season in the middle

part near Bandarban area and also in the upstream region. There are many kums (deep channel) in the river where fishes take refuge from the flowing water and spawn their eggs as well as stones on the riverbeds where fishes and other aquatic fauna take shelter. However, mining of stones and siltation of riverbeds are destroying the natural shelters and hampering balance of ecosystem.

3. Brief description on planning and financing of the project and its applicability.

◆ Project Identification

Sangu and Matamuhuri rivers originate in the Arakan hills and flows through Bandarban District of Chittagong Hill Tracts (CHT) and then falls into the Bay of Bengal. The physiography of the CHT is much different than the rest of the country, which in turn makes the rivers flowing through this region special in their own nature. Sangu and Matamuhuri rivers are very important for agriculture, fisheries, bio-diversity and trades of CHT region. The Sangu and Matamuhuri rivers are perennial rivers and influenced by strong tidal action. The rivers are situated in the South-eastern region of Bangladesh. Sangu river originates from Remakri of Thanchi Upazilla in Bandarban district. It flows towards north after originating from Thanchi and flows through Rowangachari and Bandarban. Further flowing west, it falls in the Bay of Bengal after passing by the Chandanaish, Satkania, Anowara and Bashkhali upazillas of Chattogram. Whereas, Matamuhuri originates from the Chokhyong union of Alikadam upazilla of Bandarban district. It flows North-West and eventually falls in the Bay of Bengal through Cox's Bazar (Chokoria upazilla). Agriculture, fisheries, bio-diversity and trades of this region are largely depending on these rivers. However, Sangu and Matamuhuri rivers and most of the interconnecting tributaries/distributaries/khals experience siltation, flooding, erosion problems over the years due to huge onrush of sediment laden water during monsoon.

◆ Project Preparation

As National Water Policy (NWPo-1999) emphasize on basin wise water management and aslo to meet Sustainable Development Goals, restoration of Sangu and Matamuhuri river basin is the demand of time for the conservation of aquatic resources, fisheries resources and bird sanctuaries etc. and socio-economic development. Under this circumstances, a comprehensive study is required on Sangu and Matamuhuri river basin to make this basin more active.

Appraisal: The DPEC meeting was held on 03/02/2019.

- ◆ Credit Negotiation
- ◆ Credit Agreement
- ◆ Credit Effectiveness
- ◆ Loan Disbursement
- ◆ Loan Conditionalities
- ◆ Project Approval: The project was approved by honorable state minister, MoWR on 04/08/2019
- ◆ Others (if any).

Applicable for
Investment Project

4. Analysis of the Post-Implementation situation and result of the project: *Not Applicable for this study project.*

- 4.1 Whether the beneficiaries of the project have clear knowledge about the Target/ Objectives of the project.
- 4.2 Programme for use of created-facilities of the project
- 4.3 O & M programme of the project.
- 4.4 Impact of the project -
 - 4.4.1 Direct
 - 4.4.2 Indirect
- 4.5 Transfer of Technology and Institutional Building through the project
- 4.6 Employment generation through the project.
- 4.7 Possibility of Self employment
- 4.8 Possibility of women-employment opportunity
- 4.9 Women's participation in development
- 4.10 Probable Impact on Socio-Economic activity.
- 4.11 Impact on environment
- 4.12 Sustainability of the project
- 4.13 Contribution to poverty alleviation/reduction
- 4.14 Opinion of the public representatives, local elite, local administration, teachers, religious leaders, women's representatives etc.
- 4.15 Contribution of Micro-credit programmes and Comments on overlapping with any NGO activities.

5. Problems encountered during Implementation (with duration & steps taken to remove those)

- | | |
|---|---|
| 5.1 Project Management | 5.12 Project aid disbursement and re-imbursment |
| 5.2 Project Director | 5.13 Mission of the development partners. |
| 5.3 Land Acquisition | 5.14 Time & Cost Over-run |
| 5.4 Procurement | 5.15 Project Supervision/Inspection |
| 5.5 Consultancy | 5.16 Delay in Decision |
| 5.6 Contractor | 5.17 Transport |
| 5.7 Manpower | 5.18 Training |
| 5.8 law & Order | 5.19 Approval |
| 5.9 Natural calamity | 5.20 Others. |
| 5.10 Project financing, allocation and release. | |
| 5.11 Design formulation/approval | |

It is a contract base consultancy project. The above problems don't occur

6. Remarks & Recommendations of the Project Director:

The prime objective of this study is to carry out a Feasibility Study including EIA on Sangu and Matamuhuri river basin to make this basin more active.

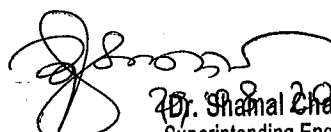
The present study for Restoration of Sangu and Matamuhuri River Basin aims to make development plan of the river basin in a holistic and integrated approach considering technical, environmental, social and economic aspects. The Sangu basin is located within the districts of Bandarban and Chattogram. The total area of the basin is 3,601 sq. km, out of which, about 2,800 sq. km. is within hilly terrain. The remaining 800 km² is in coastal plain land along the Bay of Bengal. The Matamuhuri Basin is in the district of Cox's Bazar and Bandarban. The total area of the basin is about 1600 sq. km, out of which about 1400 sq. km is within hilly terrain. The remaining 200 sq. km lies in the downstream Matamuhuri delta, locally called Chakaria forest. The study area faces problems regarding erosion, flash flood, navigability problem, scarcity of water during dry season, deforestation, fisheries problem, agricultural problem, river sedimentation, tourism problem etc. Severe bank erosion as well as siltation problems are observed in places in the downstream portion of Sangu and Matamuhuri rivers. Moreover, water scarcity becomes severe especially in the upstream parts during dry season but flash floods is a big challenge during the monsoon. The scarcity of water is a severe problem in the Bandarban city, but there are number of projects are going on to resolve the issue. Deforestation and stone mining are the major anthropogenic activity which severely hampers the ecology and causes numerous problems. Earlier, the local tribal people used water from chara, jhiri, etc. near them but at present these hilly streams and waterfalls do not have enough water for their domestic uses during dry period. The downstream part of the rivers has tidal effects and faces flooding and siltation problems. In short, it can be stated that the problems are different in upstream and downstream reaches of the rivers. The problems in Sangu River Basin can be identified as bank erosion, siltation, flash flood, polder maintenance issues in the downstream part; flash flood during monsoon as well as shortage of drinking water and navigation problem during dry season in the middle part near Bandarban area and also in the upstream region. There are many kums (deep channel) in the river where fishes take refuge from the flowing water and spawn their eggs as well as stones on the riverbeds where fishes and other aquatic fauna take shelter. However, mining of stones and siltation of riverbeds are destroying the natural shelters and hampering balance of ecosystem. There are numerous tourist spots in the study area but some of them are very difficult to access.

Dredging of riverbed is one of the options for improving the conveyance of the rivers and mitigate flood, siltation and also erosion problems. Moreover, local people should be involved in conservation of the waterbodies and streams for ensuring integrated natural resource management as well as sustainability of the project intervention.

A loop cut near the Premashia bazar is included and some interventions are excluded i.e., stone removal, rubber dam, water reservoir etc. Loop cut in the downstream part of Sangu river near the Premashia bazar is proposed for diverting the enrgy and flow which is presently eroding the outer bank affecting the polder. Dredging of Sangu river in downstream parts and protective work in the eroding banks are also included in this option. The vulnerable locations for riverbank erosion are identified by Feasibility Study for Restoration of Sangu

and Matamuhuri River Basin 258 Draft Final Report planform analysis, field visit, stakeholder consultation, local demands and protective measures are proposed. Siltation in Sangu river around Bandarban town is a big challenge since it is reducing conveyance capacity of the river and increasing flooding and riverbank erosion. Dredging is proposed in the reach of km15+500 (near Juidondi) to km47+500 (Toilerdwp) and km87+500 to km92+000 (Bandarban) of Sangu River.

The study area falls in the hotspot (Chattogram Hill Tracts) zone identified by Bangladesh Delta Plan 2100. Also, the project area is located in an ecologically resourceful and sensitive area (eg. Biodiversity Special Area). This study has identified the problems/challenges to restore this resourceful river basin and also suggested how to mitigate those challenges. If the recommendations of the study can be implemented, it will bring a great benefit to the river basin and its ecology.


Dr. Shamal Chandra Das
Superintending Engineer (Civil)
Directorate of Planning-1
BWDB, Dhaka.

Date :

Signature and seal of the Project Director

7. Remarks/Comments of Agency Head

As National Water Policy emphasize on basin wise water management and also to meet Sustainable Development Goals, restoration of Sangu and Matamuhuri river basin is the demand of time for the conservation of aquatic resources, fisheries resources and bird sanctuaries etc. and socio-economic development. Under this circumstance, a comprehensive study was required on Sangu and Matamuhuri river basin to make this basin more active. Considering the importance of Sangu and Matamuhuri river basin (eg. biodiversity special area) and due to their vast aquatic resources environment friendly, economically viable, socially acceptable and nature based solutions were selected. The planned interventions put more emphasis on non-structural options rather than structural options for overall improvement of the basin. If the recommendations of the study can be implemented, the ecology of the river basin along with the stakeholders will be benefitted. Considering the recommendations of the Technical and ESIA report, with the consent from MoWR, BWDB will take necessary steps to prepare the DPP of the implementation project as soon as possible.


02/02/2020
(FAZLUR RASHID)
Director General
BWDB, Dhaka.

Date :

Signature and Seal

8. Remarks/Comments of the officer in- charge of the Ministry/Division

Date :

Signature and Seal

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
পরিকল্পনা মন্ত্রণালয়
বাস্তবায়ন পরিবীক্ষণ ও মূল্যায়ন বিভাগ
পরিবীক্ষণ ও মূল্যায়ন সেক্টর-৪
শেরে বাংলা নগর, ঢাকা-১২০৭
www.moe.gov.bd

নং- ২১.০০.০০০০.১২১.১৪.১৯৪.১৯-৪১

তারিখঃ ১৬/০২/২০২১

বিষয়ঃ “সাজু ও মাতামুহুরী নদীর বেসিন রেস্টোরেশনের নিমিত্ত সম্ভাব্যতা সমীক্ষা” শীর্ষক প্রকল্পের পরিদর্শন প্রতিবেদন প্রেরণ।

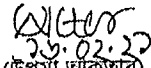
উপর্যুক্ত বিষয়ের আলোকে অত্র বিভাগ কর্তৃক প্রণীত মতামত/সুপারিশ সম্বলিত পরিবীক্ষণ প্রতিবেদন (Monitoring Report) পরিবর্তী প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য নির্দেশক্রমে প্রেরণ করা হলো। আইএমইডি'র মতামত/সুপারিশসমূহ নিম্নরূপঃ

- পারামর্শক প্রতিষ্ঠান কর্তৃক দাখিলকৃত Inception Report ও Interim Report এ KII (Key Informant Interviews) কতটি করা হবে বিষয়টি সুস্পষ্ট নয়। এছাড়া কী ধরনের Questionnaire এর ভিত্তিতে KII ও Focus Group Discussion (FGD) Data collection করা হচ্ছে বোঝার জন্য পরবর্তীতে দাখিলকৃত সকল প্রতিবেদনে সংযুক্তি হিসেবে Questionnaire সংযোজন করতে হবে;
- প্রকল্পের আওতায় নিয়োগকৃত ২৫ জন ভিন্ন ভিন্ন পারামর্শকের সম্ভাব্যতা সমীক্ষা প্রতিবেদনে প্রণয়নে অংশগ্রহণ নিশ্চিত হচ্ছে কিনা বিষয়টিও সুস্পষ্ট নয়। এ ক্ষেত্রে প্রত্যাশী সংস্থা কর্তৃক ভিন্ন ভিন্ন ব্যক্তি পারামর্শকের প্রতিবেদনে প্রদত্ত Input যথার্থ কিনা তা যাচাই এর জন্য একটি Supervision বোর্ড গঠন করা যেতে পারে;
- পারামর্শক প্রতিষ্ঠান কর্তৃক দাখিলকৃত বিভিন্ন প্রতিবেদন প্রত্যাশী সংস্থার কার্য পরিধি অনুযায়ী হচ্ছে কিনা সে বিষয়টি ১টি কমিটির মাধ্যমে খতিয়ে দেখা যেতে পারে;
- সম্ভাব্যতা সমীক্ষা প্রকল্পের মোট ব্যাপ্তি ও ব্যয় বিবেচনায় IWM প্রতিষ্ঠানের বিভিন্ন ব্যক্তি পারামর্শকের সংখ্যা বেশি ও সম্মানী প্রচলিত সম্মানীর চেয়ে কিছুটা বেশি মনে হয়েছে। ভবিষ্যতে এ ধরনের সম্ভাব্যতা সমীক্ষায় ব্যক্তি পারামর্শকের সংখ্যা হ্রাস করাসহ সম্মানীর পরিমাণ প্রকৃত প্রয়োজন বিবেচনায় রেখে প্রচলিত ধারা অনুযায়ী নির্ধারণের বিষয়টি বিবেচনা করতে হবে;
- চট্টগ্রাম অঞ্চলে চলমান বিভিন্ন প্রকল্পের সাথে সম্পাদিত সম্ভাব্যতা সমীক্ষার কোন Over laping/দ্বৈততা হচ্ছে/হবে কিনা এ বিষয়টি রিপোর্টে প্রতিফলন করা প্রয়োজন। একই সাথে সংশ্লিষ্ট এলাকায় ইতোমধ্যে সম্পাদিত ও বর্তমানে চলমান বিভিন্ন প্রকল্পের আওতায় যে সকল ভৌত কাজ বাস্তবায়িত হয়েছে এবং বাস্তবায়নধীন রয়েছে তা ক্ষেত্র বিশেষে টেকসই না হওয়ার কারণ ও তার সম্ভাব্য সমাধান কী হতে পারে এ বিষয়গুলো চূড়ান্ত প্রতিবেদনে সংযোজন করতে হবে;
- পানি সম্পদ মন্ত্রণালয় কর্তৃক ইতিপূর্বে সম্পাদিত, বর্তমানে চলমান ও ভবিষ্যতে গৃহীতব্য বিভিন্ন সম্ভাব্যতা সমীক্ষা বিক্ষিপ্তভাবে নির্বাচনের পরিবর্তে অঞ্চল ভিত্তিক গ্রহণ করা প্রয়োজন বলে প্রতীয়মান হয়;
- বাগাউনো কর্তৃক পরবর্তীতে সম্ভাব্যতা সমীক্ষা পরিচালনার ক্ষেত্রে ক্রয় প্রক্রিয়া অধিক প্রতিযোগিতাপূর্ণ ও স্বচ্ছ করার স্বার্থে উন্নত দরপত্র পদ্ধতি (QCBS) অনুসরণ করা যুক্তিসংগত হবে;
- সম্ভাব্যতা সমীক্ষা প্রকল্পের আওতায় ২০২০-২১ অর্থ বছরের অডিট সম্পাদন এবং তা আইএমইডি-কে অবহিত করতে হবে;
- প্রকল্প সমাপ্তির ৩ মাসের মধ্যে প্রকল্প সমাপ্তি প্রতিবেদন (পিসিআর) আইএমইডিতে প্রেরণ করতে হবে।

২। প্রণীত পরিবীক্ষণ প্রতিবেদনের উপর গৃহীত ব্যবস্থা সম্পর্কে এ বিভাগকে আগামী ১ (এক) মাসের মধ্যে অবহিত করার জন্য নির্দেশক্রমে অনুরোধ জানানো হলো।

সংযুক্তিঃ পরিদর্শন প্রতিবেদন।

সিনিয়র সচিব
পানি সম্পদ মন্ত্রণালয়
বাংলাদেশ সচিবালয়, ঢাকা।


(উপমা আকতার)
উপপরিচালক
ফোনঃ ৯১৮০৬৮১

সদয় অবগতি ও প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য অনুলিপি (স্ব্যেচ্ছতার ক্রমানুসারে নয়):

- ১। সদস্য, কৃষি, পানি সম্পদ ও পল্লী প্রতিষ্ঠান বিভাগ, পরিকল্পনা কমিশন, শেরে বাংলা নগর, ঢাকা।
- ২। মহাপরিচালক, বাংলাদেশ পানি উন্নয়ন বোর্ড, পানি ভবন, লেভেল-৬, ৭২ গ্রীন রোড, ঢাকা।
- ৩। প্রকল্প পরিচালক (ভ্রমাবধায়ক প্রকৌশলী), “সাজু ও মাতামুহুরী নদীর বেসিন রেস্টোরেশনের নিমিত্ত সম্ভাব্যতা সমীক্ষা” শীর্ষক প্রকল্প, বাংলাদেশ পানি উন্নয়ন বোর্ড, পানি ভবন, লেভেল-৬, ৭২ গ্রীন রোড, ঢাকা।
- ৪। পরিচালক, প্রকল্প মূল্যায়ন পরিদপ্তর, পানি ভবন (লেভেল-৪, ব্লক-ডি) ৭২ গ্রীন রোড, ঢাকা।

অনুলিপি:

- ১। সচিব মহোদয়ের একান্ত সচিব, আইএমইডি, পরিকল্পনা মন্ত্রণালয়, শেরে বাংলা নগর, ঢাকা।
- ২। মহাপরিচালক (পরিবীক্ষণ ও মূল্যায়ন সেক্টর-৪) মহোদয়ের ব্যক্তিগত কর্মকর্তা, আইএমইডি, পরিকল্পনা মন্ত্রণালয়, শেরে বাংলা নগর, ঢাকা।
- ৩। অফিস কপি।



বাংলাদেশ পানি উন্নয়ন বোর্ড
প্রধান প্রকৌশলী (পুর) পরিকল্পনা এর দপ্তর
পানি ভবন, ৭২ গ্রীন রোড, ঢাকা-১২০৫।
www.bwdb.gov.bd

স্মারক নম্বর: ৪২.০১.০০০০.০৩৪.১৬.০১৪.২১.২১

তারিখ: ১৩ জ্যৈষ্ঠ ১৪২৮

২৭ মে ২০২১

বিষয়: “সাঙ্গু ও মাতামুহুরী নদীর বেসিন রেস্টোরেশনের নিমিত্ত সম্ভাব্যতা সমীক্ষা” শীর্ষক প্রকল্পের উপর আইএমইডি কর্তৃক প্রণীত পরিদর্শন প্রতিবেদনে বর্ণিত সুপারিশের আলোকে বাপাউবোর প্রতিপালন প্রতিবেদন প্রেরণ প্রসঙ্গে।

সূত্র: আইএমইডি’র স্মারক নং-২১.০০.০০০০.১২১.১৪.১৯৪.১৯-৪১, তারিখঃ ১৬-০২-২০২১ খ্রি.

মহোদয়,

যথাযথ সম্মান প্রদর্শনপূর্বক সূত্রস্থ স্মারকের চাহিদামতে পানি সম্পদ মন্ত্রণালয়ের আওতায় বাংলাদেশ পানি উন্নয়ন বোর্ড কর্তৃক বাস্তবায়নাধীন বর্ণিত প্রকল্পটির উপর আইএমইডি কর্তৃক প্রণীত পরিদর্শন প্রতিবেদনের সুপারিশ/মতামত এর বিষয়ে বাপাউবো কর্তৃক গৃহীত পদক্ষেপ ও ব্যবস্থা সম্বলিত ব্যাখ্যা/প্রতিবেদন সদয় প্রয়োজনীয় ব্যবস্থা গ্রহণের জন্য অত্রসাথে প্রেরণ করা হল।

এ পত্র প্রেরণে মহাপরিচালক, বাপাউবো মহোদয়ের সম্মতি রয়েছে।

সংযুক্তিঃ বর্ণনামতে।

আপনার অনুগত,

২৭-৫-২০২১

মোঃ মাহবুর রহমান

প্রধান প্রকৌশলী (পুর) পরিকল্পনা

ফোন: ০২-২২২২৩০২০০

ইমেইল: ce.planning@bwdb.gov.bd

সিনিয়র সচিব

পানি সম্পদ মন্ত্রণালয়

দৃষ্টি আকর্ষণঃ যুগ্মসচিব, পরিকল্পনা উইং, পানি সম্পদ মন্ত্রণালয়

IMED কর্তৃক “পাঙ্গু ও মাতামুহুরী নদীর বেসিন রেস্টোরেশনের নিমিত্ত সম্ভাব্যতা সমীক্ষা” শীর্ষক সমীক্ষা প্রকল্পের পরিদর্শন প্রতিবেদনের প্রতিপালন প্রতিবেদনঃ

নং	IMED-এর মতামত/সুপারিশসমূহ	গৃহীত ব্যবস্থা
১	পরামর্শক প্রতিষ্ঠান কর্তৃক দাখিলকৃত Inception Report ও Interim Report এ KII (Key Informant Interviews) কতটি করা হবে বিষয়টিও সুস্পষ্ট নয়। এছাড়া কী ধরনের Questionnaire এর ভিত্তিতে KII ও Focus Group Discussion (FGD) Data collection করা হচ্ছে বুঝার জন্য পরবর্তীতে দাখিলকৃত সকল প্রতিবেদনে সংযুক্তি হিসেবে Questionnaire সংযোজন করতে হবে।	চলমান প্রকল্পের আওতায় ২০ টি Public Consultation Meetings (PCMs) এবং ১৫ টি KII করা হয়েছে (সংযুক্তি-১)। এ সকল কাজের বিস্তারিত প্রতিবেদন Draft Final Report অন্তর্ভুক্ত করা হয়েছে। সমীক্ষায় ব্যবহৃত Questionnaire এর নমুনা সংযুক্ত করা হল (সংযুক্তি-২)।
২	প্রকল্পের আওতায় নিয়োগকৃত ২৫ জন ডিম ডিম পরামর্শকের সম্ভাব্যতা সমীক্ষা প্রতিবেদন প্রণয়নের অংশগ্রহণ নিশ্চিত হচ্ছে কিনা বিষয়টিও সুস্পষ্ট নয়। এক্ষেত্রে প্রত্যাশী সংস্থা কর্তৃক ডিম ডিম ব্যক্তি পরামর্শকের প্রতিবেদনে প্রদত্ত যথার্থ কিনা তা যাচাই এর জন্য একটি Supervision কমিটি গঠন করা যেতে পারে।	প্রকল্পের আওতায় নিয়োগকৃত ২৫ জন ডিম ডিম পরামর্শকের সম্ভাব্যতা সমীক্ষা প্রতিবেদন প্রণয়নে অংশগ্রহণ নিশ্চিত করা হয়েছে। পরামর্শকগণ মাঠ পর্যায় থেকে সংগৃহীত তথ্য ও উপাত্ত বিশ্লেষণপূর্বক সমীক্ষা প্রতিবেদন প্রণয়ন করেন। এছাড়াও বিভিন্ন পর্যায়ে দাখিলকৃত Inception, Interim ও Draft Final Report এর ওপর অনুষ্ঠিত পর্যালোচনা সভায় অংশগ্রহণ করেন ও সভায় প্রণীত পর্বে অংশগ্রহণ করেন।
৩	পরামর্শক প্রতিষ্ঠান কর্তৃক দাখিলকৃত বিভিন্ন প্রতিবেদন প্রত্যাশী সংস্থার কার্যপরিধি অনুযায়ী হচ্ছে কিনা সে বিষয়টি ১টি কমিটির মাধ্যমে খতিয়ে দেখা যেতে পারে।	প্রকল্পের বিভিন্ন পর্যায়ে পরামর্শক প্রতিষ্ঠান কর্তৃক দাখিলকৃত প্রতিবেদনসমূহ কার্যপরিধি অনুযায়ী হচ্ছে কিনা তা খতিয়ে দেখার জন্য প্রতিবেদনসমূহ বাপাউবোর নকশা, পরিকল্পনা ও মাঠ পর্যায়ের সংশ্লিষ্ট দপ্তরে প্রেরণ করা হয় এবং সুনির্দিষ্ট ও সুপরিকল্পিত মতামত চাওয়া হয়। এছাড়াও পরামর্শক প্রতিষ্ঠান দ্বারা দাখিলকৃত Inception, Interim ও Draft Final Report মূল্যায়ন ও অনুমোদনের জন্য প্রতিটি প্রতিবেদন দাখিলের পর BWDB ও সংশ্লিষ্ট অন্যান্য সরকারি সংস্থার কর্মকর্তাদের সম্মুখে সভা-আয়োজন করে প্রতিটি প্রতিবেদন মূল্যায়ন পূর্বক অনুমোদন প্রদান করা হয়। (সংযুক্তি-৩)। এছাড়াও সমীক্ষা কাজের চূড়ান্ত প্রতিবেদন অনুমোদনকল্পে চূড়ান্ত প্রতিবেদনে প্রদত্ত সুপারিশসমূহ বাস্তব সম্মত ও প্রকল্পের মূল উদ্দেশ্যের সাথে সামঞ্জস্যপূর্ণ কিনা সেবিষয়ে সুস্পষ্ট মতামত প্রদান ও প্রতিবেদন পর্যালোচনার নিমিত্ত গঠিত কমিটির সুপারিশের পর চূড়ান্ত প্রতিবেদন অনুমোদন করা হয় (সংযুক্তি-৪)।
৪	সম্ভাব্যতা সমীক্ষা প্রকল্পের মোট ব্যাপ্তি ও ব্যয় বিবেচনায় IWM প্রতিষ্ঠানের বিভিন্ন ব্যক্তি পরামর্শকের সংখ্যা বেশি ও সম্মানী প্রচলিত সম্মানীর চেয়ে কিছুটা বেশি মনে হয়েছে। ভবিষ্যতে এ ধরনের সম্ভাব্যতা সমীক্ষায় ব্যক্তি পরামর্শকের সংখ্যা হ্রাস করাসহ সম্মানীর পরিমাণ প্রকৃত প্রয়োজন বিবেচনায় রেখে প্রচলিত ধারা অনুযায়ী নির্ধারণের বিষয়টি বিবেচনা করতে হবে।	সমীক্ষা প্রকল্পের Technical ও Financial proposal এ প্রস্তাবিত পরামর্শকের সংখ্যা ও তাদের input month proposal evaluation committee এর মাধ্যমে মূল্যায়ন পূর্বক পরামর্শক প্রতিষ্ঠানের সঙ্গে negotiation এর মাধ্যমে নির্ধারিত হয়েছে। IWM এর পরামর্শকদের সম্মানী মন্ত্রণালয় দ্বারা অনুমোদিত (সংযুক্তি-৫)। যেমন IWM এর পরামর্শকদের সম্মানী নির্ধারণের ক্ষেত্রে সোশ্যাল চার্জ, ওভারহেড, গবেষণা ও উন্নয়ন ফি যথাক্রমে ৩০%, ৯০% ও ১০% বিবেচনা করা

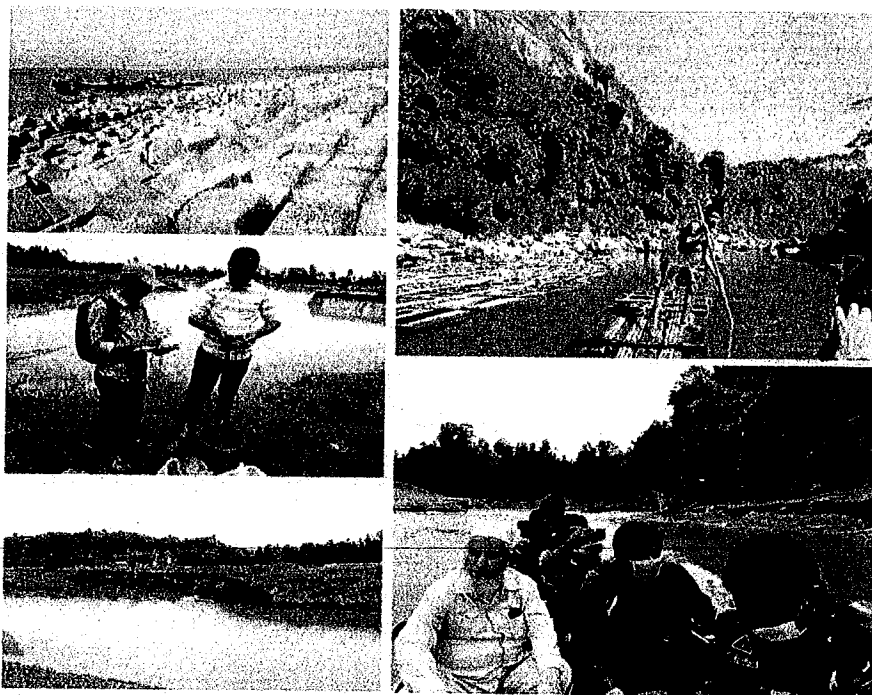
Government of the People's Republic of Bangladesh
Ministry of Water Resources



APPROVED

(Signature)
(A K M Wahed Uddin Chowdhury)
Director General
BWDB, Dhaka

Bangladesh Water Development Board
Feasibility Study for Restoration of Sangu and Matamuhuri
River Basin



FINAL REPORT

Main Report

May 2021



INSTITUTE OF WATER MODELLING

Government of the People's Republic of Bangladesh
Ministry of Water Resources

Executive Summary

E1 Introduction

Sangu and Matamuhuri rivers originate in the Arakan hills and flows through Bandarban District of Chittagong Hill Tracts (CHT) and then falls into the Bay of Bengal. The physiography of the CHT is much different than the rest of the country, which in turn makes the rivers flowing through this region special in their own nature. Sangu and Matamuhuri rivers are very important for agriculture, fisheries, bio-diversity and trades of CHT region.

Bangladesh Water Development Board (BWDB) has identified Sangu and Matamuhuri rivers for improvement and restoration of dry season flow and entrusted the Institute of Water Modelling (IWM) through a formal contract agreement signed on 13th November, 2019. The present study aims at devising a holistic and integrated plan for improvement and management of these river basins considering technical, environmental, social and economic aspects.

Objective of the Study

The overall objective of the study is to carry out a holistic and integrated study for development of Sangu and Matamuhuri river basin improvement plan considering technical, environmental, social and economic aspects.

Study Area

Sangu river is 294 km long draining a basin of 3,601 km², out of which, about 2,800 km² is within hilly terrain and about 800 km² is coastal plain land along the Bay of Bengal. Whereas, Matamuhuri river is 174 km long draining a basin of 1,600 km², out of which, about 1,400 km² is within hilly terrain and remaining 200 km² lies in the downstream Matamuhuri delta, locally called Chakaria forest. At present, almost the entire forest area has been converted into farming land for agriculture, shrimp culture and salt production. Numerous 'chara', 'jhiri' and 'shoilo propats' (sub-surface water out letting through rocks as water falls or seeping through rocks) contribute into the flow of these two rivers. These tributaries remain active and keep feeding the rivers even in the driest months without any rain due to groundwater contributions. The study area map is shown in **Figure E.1**.

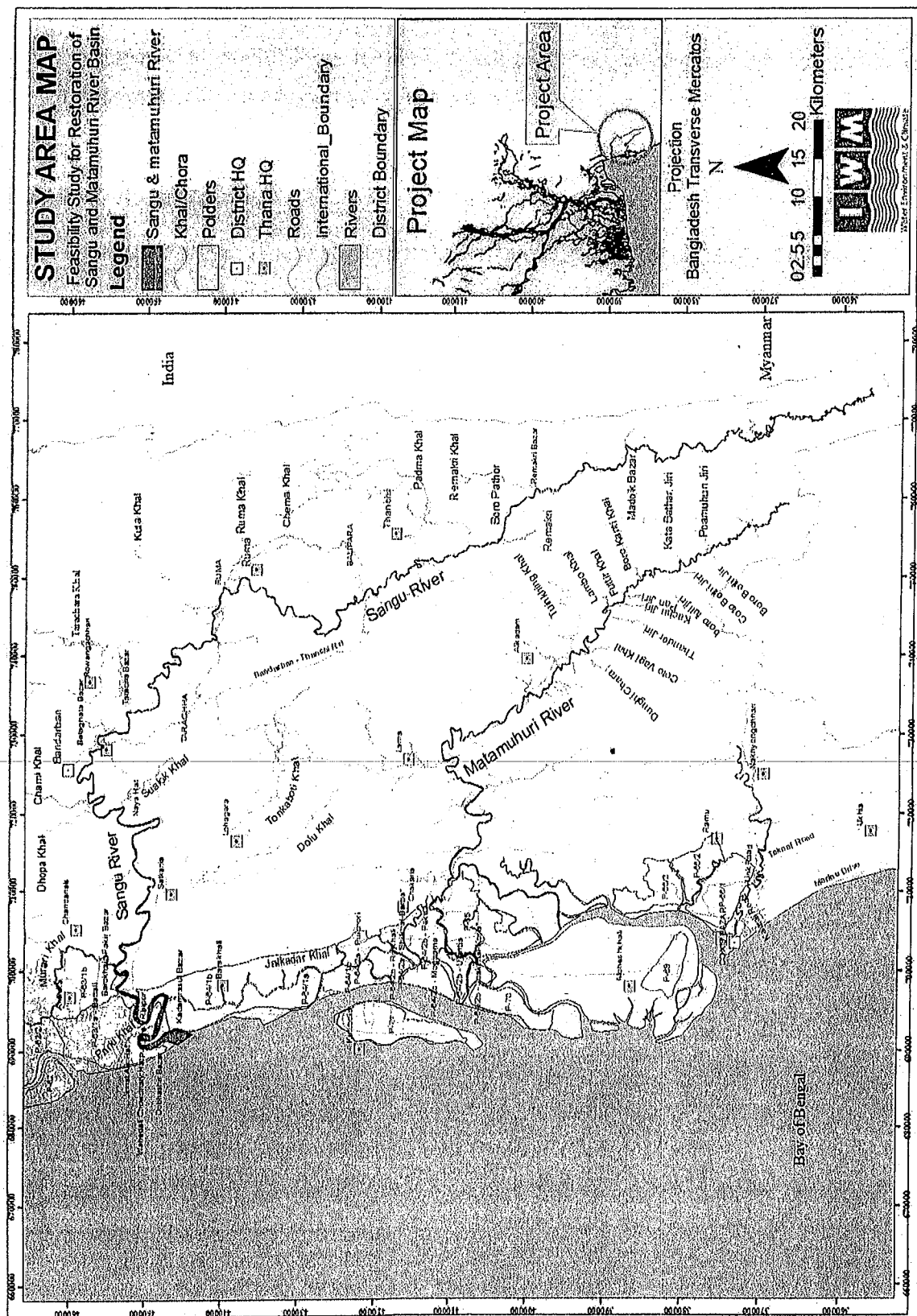


Figure E.1: Study Area Map

E2. Problems of the Study Area

Field visits, literature review and data analysis are instrumental to identify the problems in these river basins. Moreover, water flow models of Sangu and Matamuhuri rivers have been developed for establishing baseline conditions and assessment of the potential plan for improvement and management of these river basins.

River Bank Erosion

Riverbank erosion is taking place at the meandering bends of Sangu and Matamuhuri rivers. Riverbanks are facing erosion at several locations due to helical flow at meandering bends and high velocity of river water during flash flood. Moreover, cutting of trees induces landslides, land degradation and also aggregate riverbank erosion. The meandering Sangu river has tidal influence in the downstream area from outfall to Dohazari bridge and both of the banks have eroded areas and there are some bank protection works in this reach. Moreover, there is some mangrove afforestation near Premashia bazar which acts as natural protection against bank erosion. The adjacent polders also have bank/slope protection works in the bend to prevent erosion.

On the basis of field visits, consultations with local community, literature review, data analysis and model results problems in these river basins are identified. There are some erosion vulnerable locations in Sangu river namely Jele para (2230m), Pukuria (1070m), Banglabazar (510m), Charati (1120m), Katagarh (835m), Bishawshat (310m), Chiringghata (245m), Baitrani (270m), Goalikhola (1030m), Vorakhali (330m), kobirajpara (260m & 330m), Bandarban cantonment (220m), Pilot para (300m), Ruma bazar (400m), Thanchi sadar (250m), Headmanpara (400m), Remakri (300m) and Boromodok bazar (200m) where bank protection is required.

There are some erosion vulnerable locations in Matamuhuri river namely Lama bazar (1030m), Anglapara (600m), Merakhola (880m), Shilertoamarma Para (730m), Sabermia para (400m), Rampur (680m), Kurukpata bazar (200m) and Puamuhuri bazar (90m). where bank protection is required. There are more vulnerable locations in the Matamuhuri river, which already been included in the DPP of other projects.

Figure E.2 presents erosion problems in the study area. Table E.1 and Table E.2 present riverbank shifting and erosion-accretion assessed from satellite images of 2014 and 2019 for Sangu and Matamuhuri rivers, respectively.



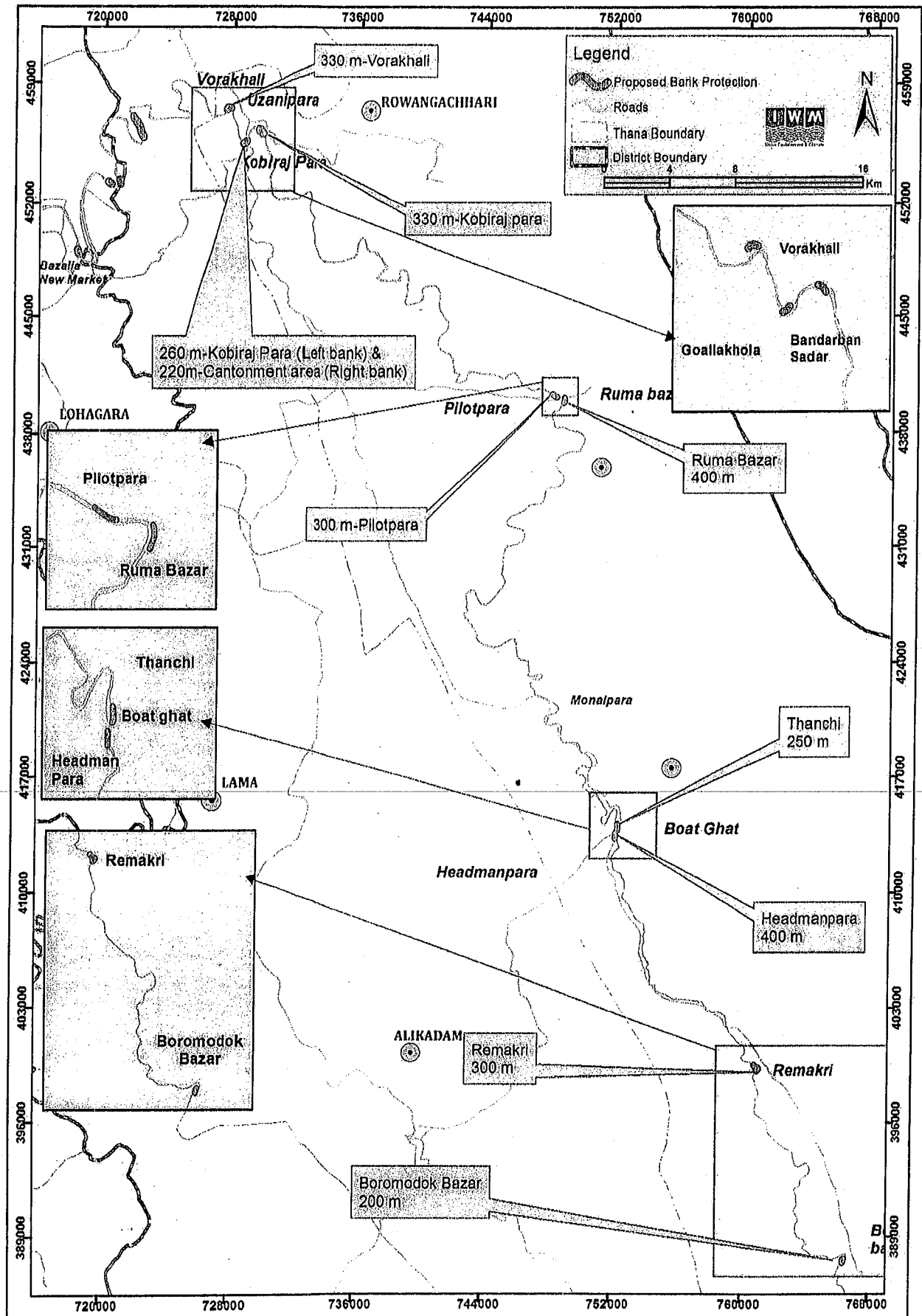
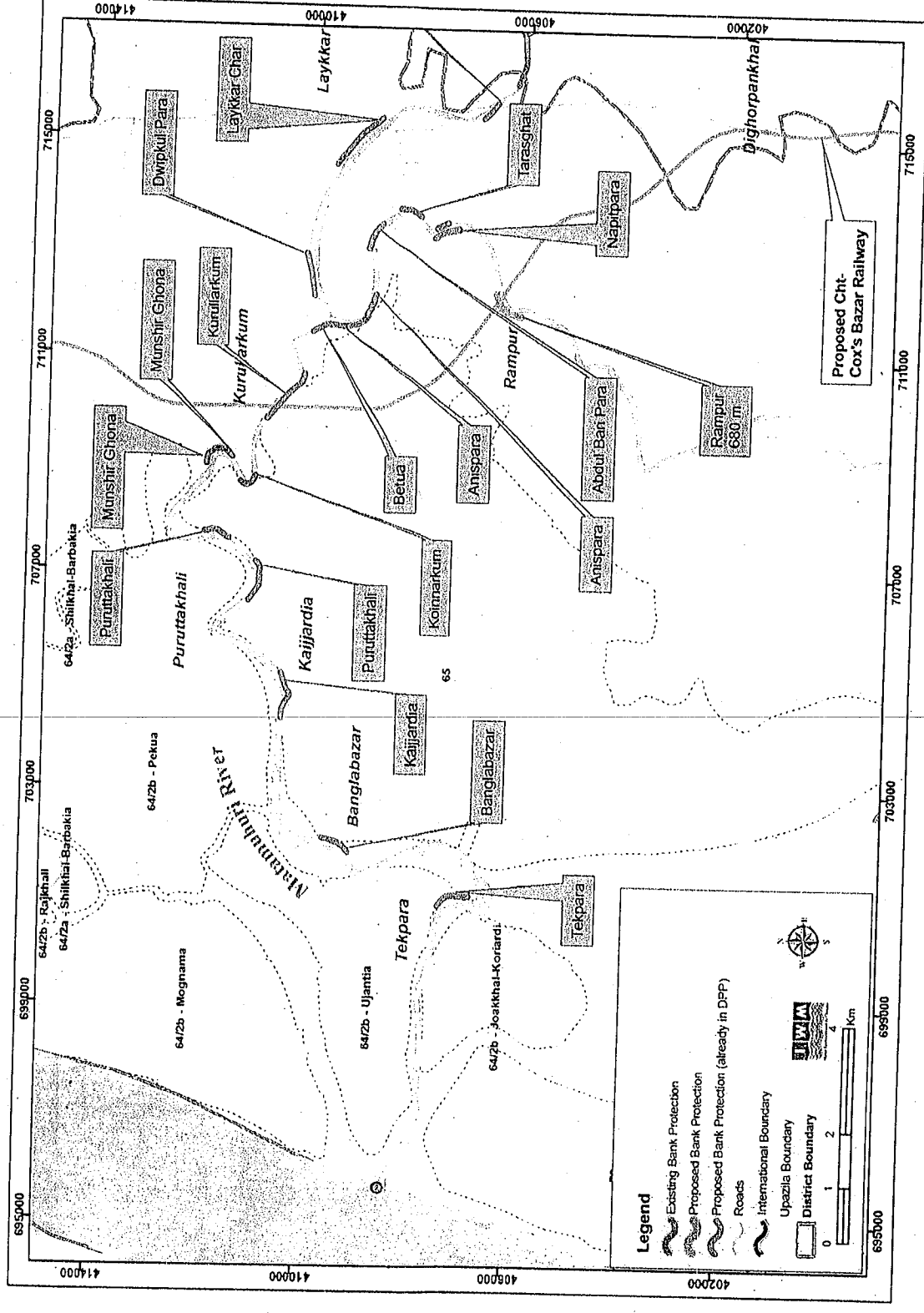


Figure E.2: Map showing proposed bank protection works in Sangu river



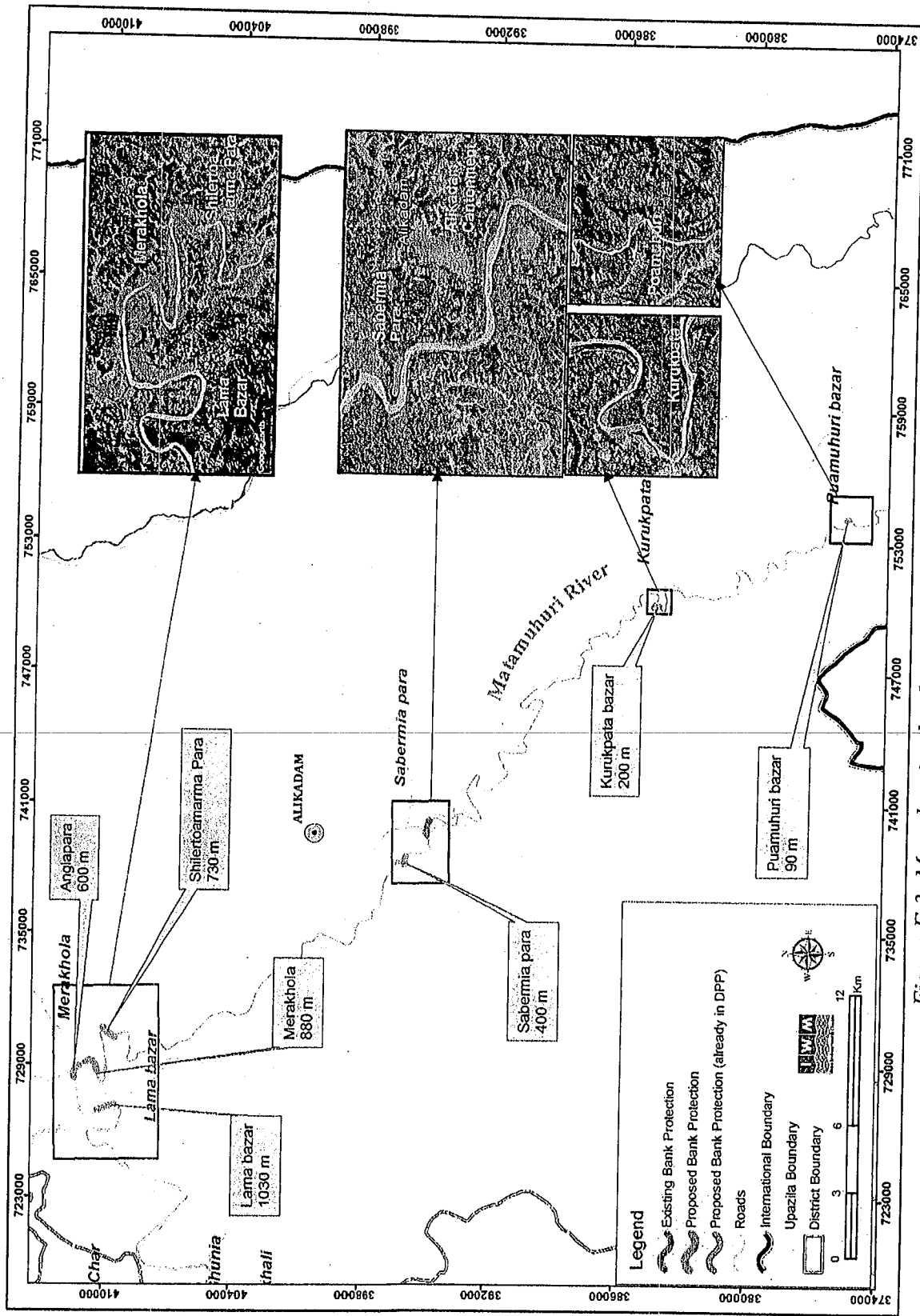


Figure E.3: Map showing bank protection work in Matamuhuri river

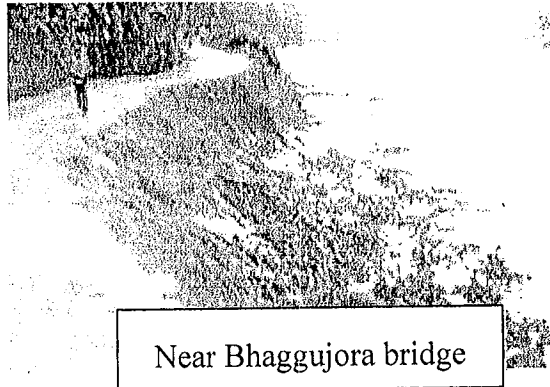
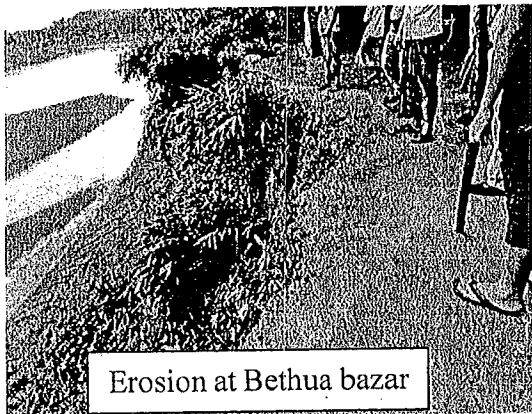
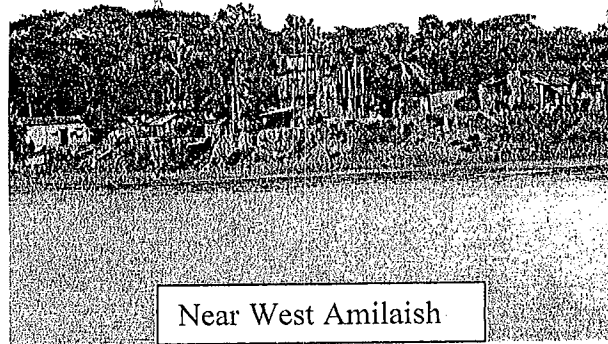
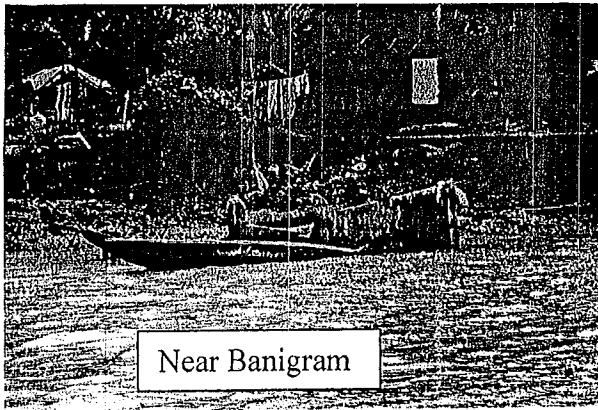


Figure E.4: Prevailing riverbank erosion problems in the study area

Table E.1: Riverbank Shifting and erosion-accretion from 2014 to 2019 in Sangu River

Segment	Average Shifting (Erosion) (m)	Average Shifting (Accretion) (m)	Length of erosion along Bankline (km)	Average Erosion (hectares)	Average Accretion (hectares)	Net Erosion-Accretion	Avg. erosion rate per km bank of length (ha/km/yr)	Remarks
0 km to 15 km	95.4	70.2	14.19	127.61	43.95	83.66 (Erosion)	1.701	Erosion
15 km to 30 km	56.97	49.5	13.56	91.87	57.76	34.11 (Erosion)	1.225	Erosion
30 km to 45 km	77.7	68.32	9.35	79.96	47.98	31.98 (Erosion)	1.066	Erosion
45 km to 60 km	33.88	35.31	5.88	16.44	30.18	13.74 (Accretion)	0.219	Accretion
60 km to 75 km	19.56	30.43	7.12	9.92	12.58	2.66 (Accretion)	0.132	Accretion
75 km to 90 km	20.66	30.03	6.4	9.48	41.75	32.27 (Accretion)	0.126	Accretion

Table E.2: Riverbank Shifting and erosion-accretion from 2014 to 2019 in Matamuhuri River

Segments	Average Shifting (Erosion) (m)	Average Shifting (Accretion) (m)	Length of erosion along Bankline (km)	Average Erosion (hectares)	Average Accretion (hectares)	Net Erosion-Accretion	Avg. erosion rate per km bank of length (ha/km/yr)	Remarks
0 km to 15 km	38.07	36.51	9.41	27.28	43.72	16.44 (Accretion)	0.364	Accretion
15 km to 30 km	24.18	28.37	10.28	22.41	17.32	5.09 (Erosion)	0.132	Erosion
30 km to 45 km	54.27	46.7	6.87	34.85	15.98	18.87 (Erosion)	0.465	Erosion
45 km to 60 km	28.9	23.8	4.34	9.29	12.8	3.51 (Accretion)	0.124	Accretion
60 km to 75 km	20.17	27.95	1.72	2.2	23.49	21.29 (Accretion)	0.029	Accretion
75 km to 90 km	22.09	30.9	6.2	13.51	13.56	0.05 (Accretion)	0.18	Accretion
90 km to 105 km	20.16	15.21	9.8	17.14	2.331	14.8 (Erosion)	0.229	Erosion
105 km to 120 km	22.18	14.8	4.23	8.02	1.22	6.8 (Erosion)	0.107	Erosion
120 km to 135 km	24.83	18.65	2.25	3.92	1.34	2.58 (Erosion)	0.052	Erosion
Matamuhuri Branch (0-23 km)	25.39	-	3.71	11.16	0	11.16 (Erosion)	0.149	Erosion

Deforestation

Deforestation in the study area is significant and satellite image analysis shows that compared to 1989 the total denuded land in 2020 is 12162 hectares. Tree-based Forest area was highest in 1989 and lowest in 2000. Forest area decreased by 19.8 % between the years 1989 and 2000 but slight increase, about 4.19 % is observed during 2010-2020. A comparative picture of forest area for the year 2000 and 2020 is shown in Figure E3.

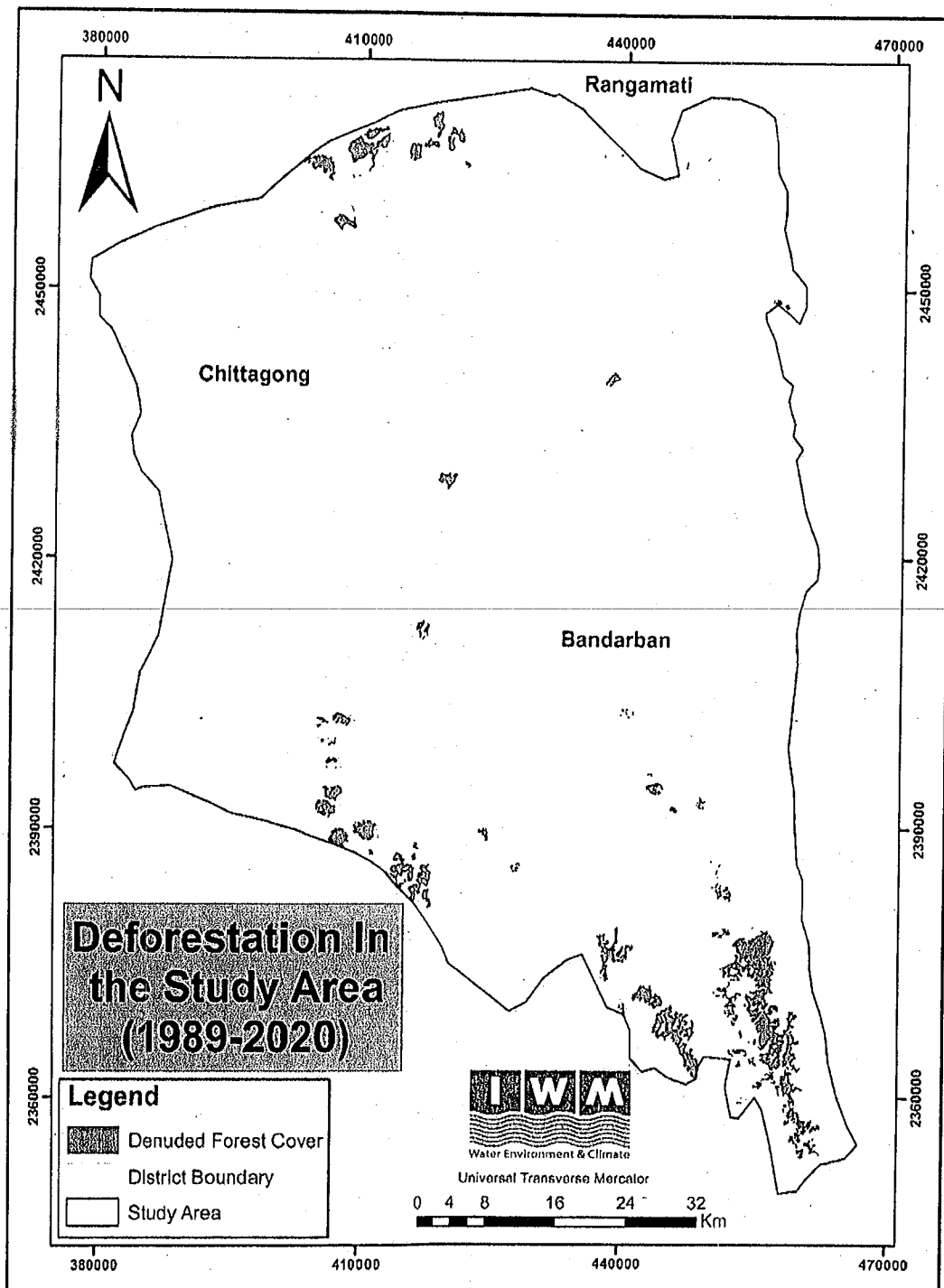


Figure E.5: Deforestation in the study area

Scarcity of drinking water during dry season

River flow decreases during dry season which causes severe problems for drinking water. There is still small flow in the rivers due to groundwater contribution during dry season but scarcity of drinking water prevails. Drinking water crisis prevail from February to June in Bandarban town. Young, adolescents as well as women are vulnerable to water born epidemic disease by using contaminated water. The scarcity of water during the dry season also causes problems of irrigation water requirement in agriculture, fisheries spawning ground and inland navigation.

From stakeholder consultations, it is found that Department of Public Health Engineering (DPHE) can supply water to Bandarban town two days per week due to water crisis during dry season. However, DPHE has taken up another study to meet the water crisis.

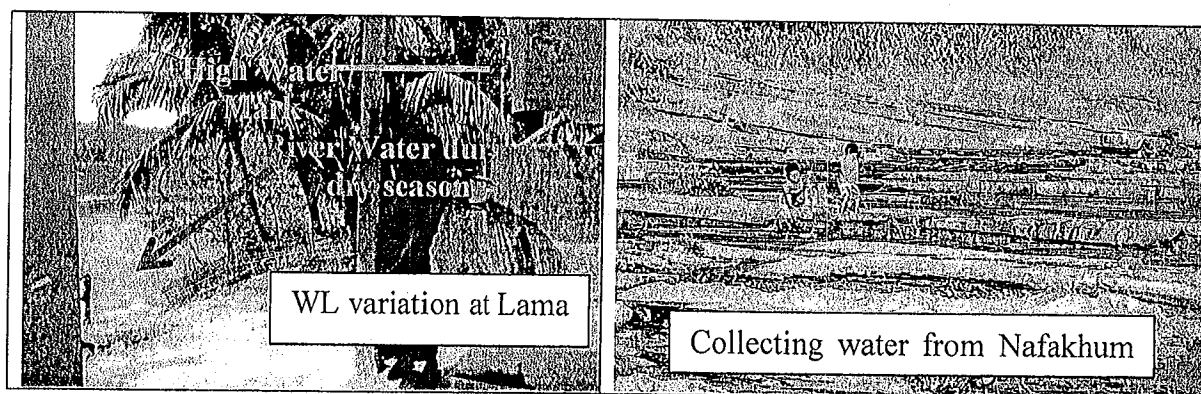
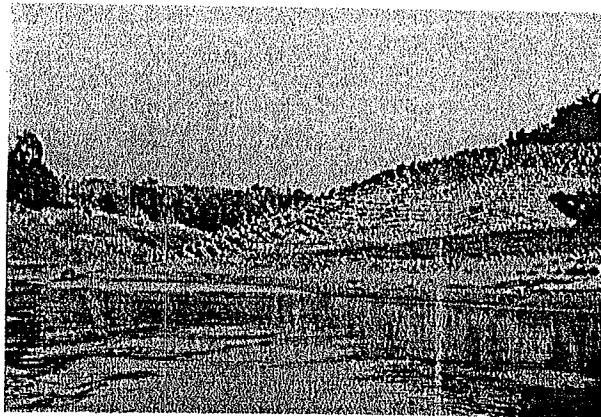


Figure E.6: Water scarcity problems in the study area

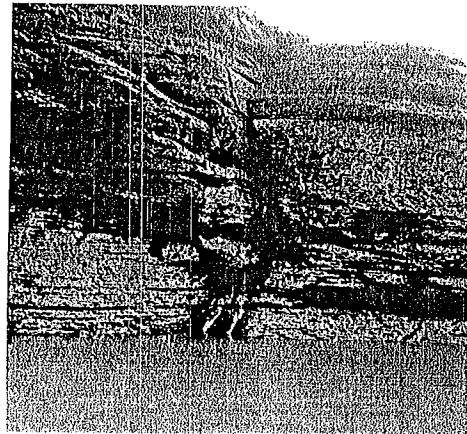
Existing land use and land degradation

Rocky and sandy hills are found on both banks of Sangu river from Ruma bazar to Thanchi. In this area, manmade settlements, urbanization, hill-cutting for peanuts, betel nut, cauliflower, cabbage, water melon, tobacco etc. cultivation is degrading land and causing landslides. It also causes sedimentation on riverbeds causing problems for navigation during dry season and flooding during monsoon. There are a significant number of chara, jhiri, shoilopropat, internal water of rocks which are the main sources of water in the upstream.

Top soil cutting for agriculture is another cause of land degradation and landslides. Clearing of natural vegetation for agricultural operations along the slope has adverse effect. Rubber plantations cause land slide. Slash and burn and uses of agro-chemicals for 'jum' agriculture are also polluting water and ecosystems. The soil ecosystems are badly affected by drought, unpredicted rainfall, high temperature etc.



Agriculture on hill slope near Ruma Bazar



Water seeping from rocks at u/s of
Thanchi

Figure E.7: Existing land use pattern and Land slides

Tourism

Bandarban is regarded as one of the most attractive travel destinations in Bangladesh located in the Sangu River Basin. Bandarban is a district in South-Eastern Bangladesh, and a part of the Chittagong Division and Chittagong Hill Tracts. There is a lot of opportunities to promote tourism by increasing tourist facilities. Various tourist activities such as trekking and adventure tours are operated here that give tourists the opportunity to take in the beautiful green mountains, sparkling rivers and clear vistas. There are some well-known tourist spots available in the Bandarban area such as Nafakhum, Rijuk, Boga lake etc. There is a number of jhorna, shoilopropat, chara, jhiri etc. available at upstream reach of Sangu river, famous for their natural beauty and the scenery varies in different seasons. However, these tourist spots are not easily accessible due to navigation problem. There are some places such as Boropathor, Jhinuk para along Sangu river where draft is not adequate during dry season and underwater rocks poses risks to boats.

The problems in the tourism sectors are as follows:

- Limited accommodation/hospitality variety
- Limited activities - culture, sport, adventure, etc.
- Security and permit constraints
- Limited packaging routes /activities
- Limited service and facility quality
- No site planning and controls

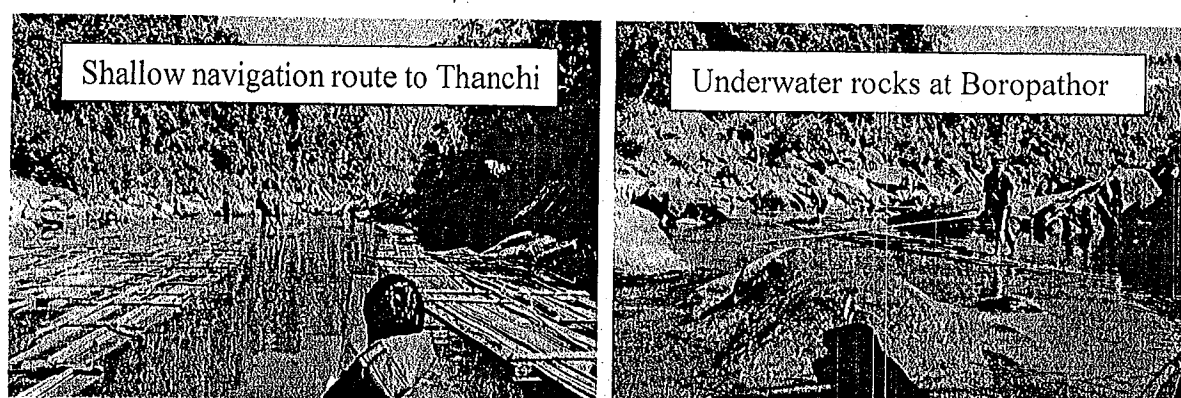


Figure E.9: Navigation problem at upstream reaches of Sangu River

The Sangu and Matamuhuri rivers are losing navigability and it is very difficult to navigate especially during dry season. The upstream parts of the rivers often have very low draft during dry season. Moreover, flash flood from hills, landslides and sedimentation, big stones under water etc. causes navigation problem. Hence it becomes very difficult for the local people to carry their household needs during the dry period.

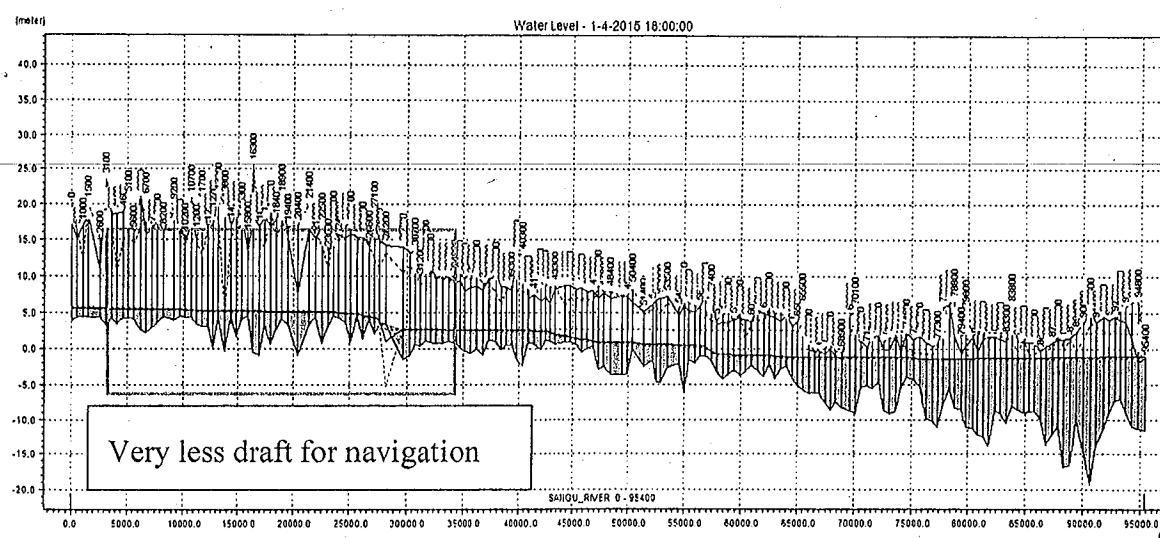


Figure E.10: Long profile of Sangu river during dry season

E3. Focus Group Discussion and Community Consultation

Total 20 community consultation/FGD sessions (with 330 participants) were conducted within the project area in order to devise a plan for development and management of Sangu and Matamuhuri river basin through participatory approach involving the community of the project area and other stakeholders. Moreover, at least 12 key informants' interviews were carried out. Major suggestions of the focus group discussion and community consultation is presented in Table E.3.

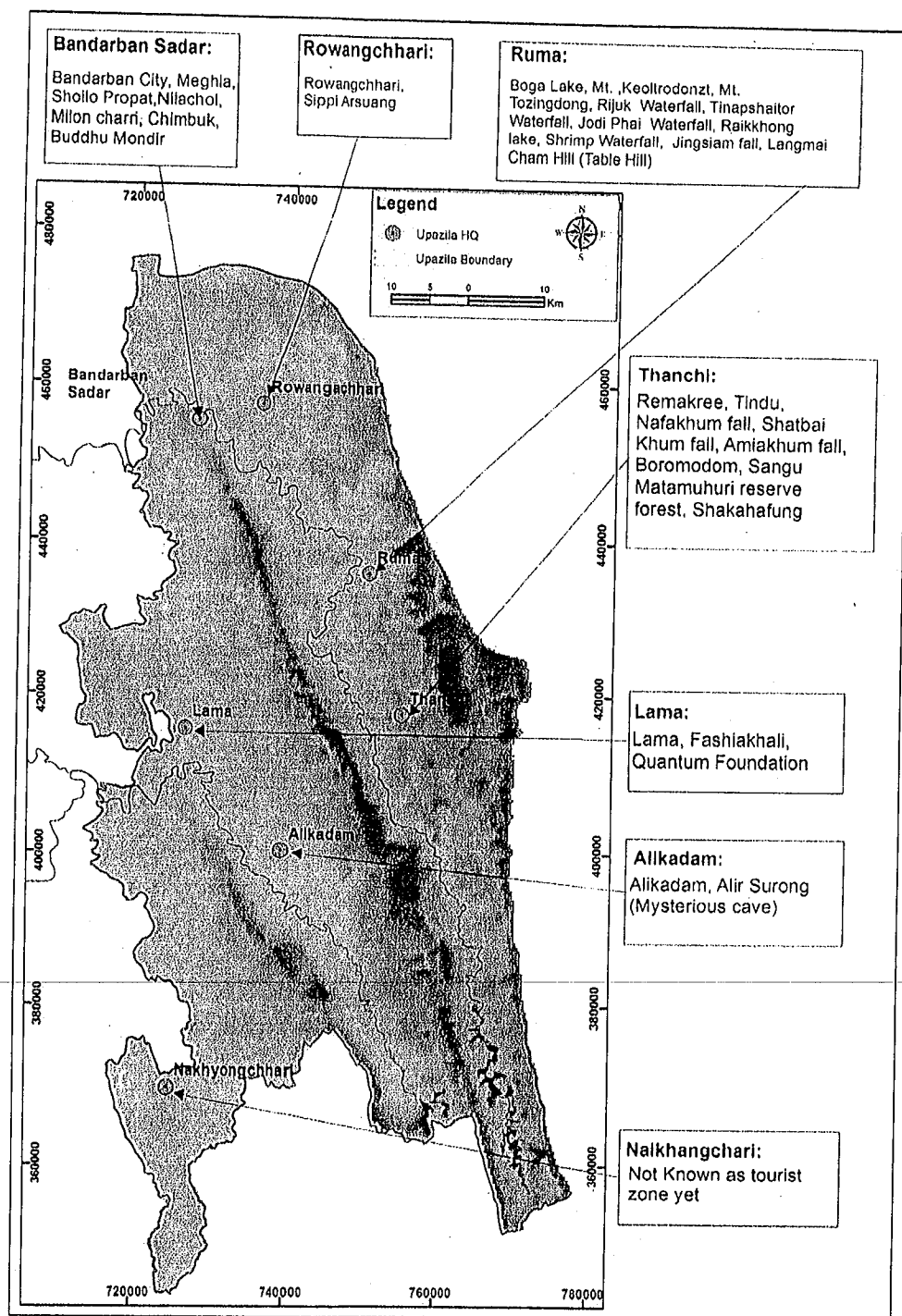
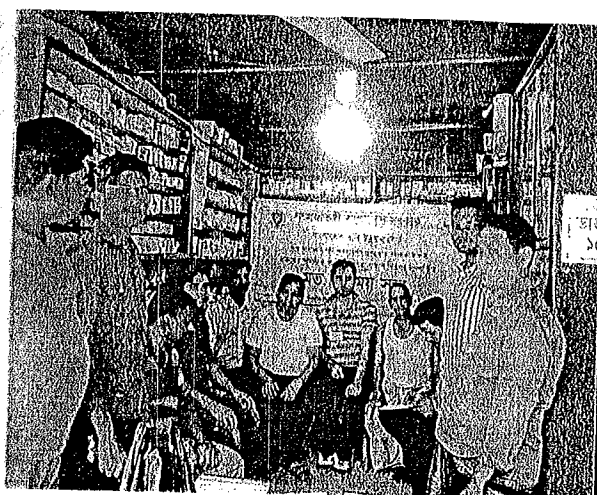


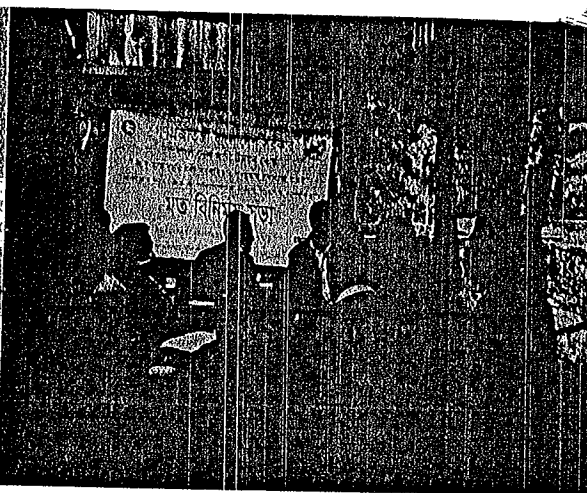
Figure E.8: Main tourism spots in the study area, especially in Bandarban

Navigation

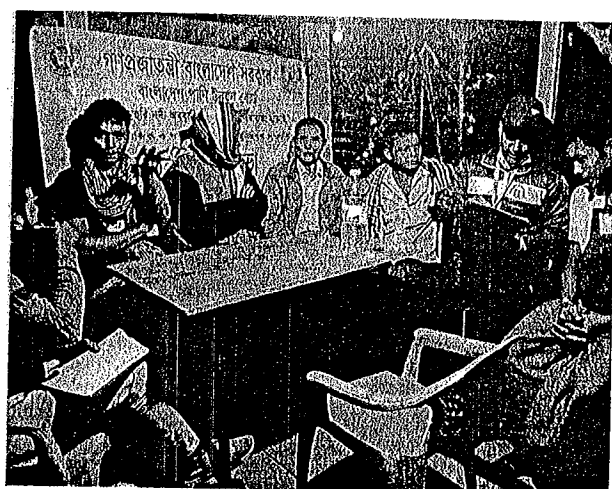
Navigation and communication are hampered especially during the dry period due to shallow water depth and underwater rocks in upstream reaches of the rivers. There is some sedimentation problem at the inner banks of the river. The downstream reaches from Bandarban to Banigram has some sedimentation on riverbed. Moreover, there is a rubber dam on Matamuhuri river which acts as dead end during dry season and leads to river sedimentation at its downstream.



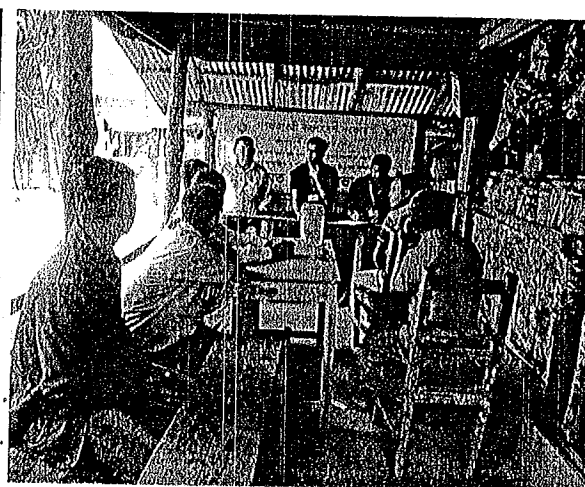
Lama Bazar



Poa Muhuri Bazar



Remakri Bazar



Mong Soi Pru Para

Figure E11: Focus group discussion at different locations

Table E3: Major suggestions of the focus group discussion and community consultation

River Name	Suggestions
Sangu and Matamuhuri River (downstream part)	- High river bank erosion, Bank protection needed. - Highly flood prone area - Dredging where the navigability is not well enough and rise of char within the river bed - Excavation of channel opposite side of the river bank - Construction and repair of road cum embankment along the river bank June–August is the rainy season when it often overflows & causes flood. - June–August is the rainy season when it often overflows & causes flood.

River Name	Suggestions
Uzanipara (Sangu River Basin)	▪ Dredging materials should be dumped little bit far into the ravine or can be used for local construction ▪ Stop hill cutting and more afforestation as river management ▪ Riverine community, especially of Modhopara and Uzanipara are affected from flash flood.
Headman para (Sangu River Basin)	▪ Jum farming and Livestock Business is the main income source. ▪ River erosion and flood is severe here in the rainy season. ▪ People advised the that current stream needed to be rerouted to connect the previous stream. ▪ A temple is in high risk of erosion at Headman para. ▪ They also demanded for stair where it is necessary
Remakri Bazaar (Sangu River Basin)	▪ Jum farming and Business is the main income source . ▪ Many tourists visit here every year because there is a several attractive places like-Nafakum, Omia Kum, Bela Kum, Boro Pathor, Lakhlukh Fountain, Lokkhen Fountain, Rijuk Fountain, Batlay Fountain. ▪ Embankment cum road from Penodon para to Remakri bazar is needed ▪ There is a severe shortage of water during the dry season. ▪ They also demanded for stair where it is necessary.
Matamuhuri River (Lama bazar and Alikadam)	▪ Loop cut is needed by cutting hill 800 meters upstream from the bazaar. ▪ River erosion and flood is severe here in the rainy season (June-August).
Poa Mohuri Bazar and Kuruk pata Bazar (Matamuhuri River Basin)	▪ The river bank is very steep and jum cultivation is popular here. ▪ They also demanded for stair on the embankment where it is necessary ▪ Peanut, tobacco, banana and vegetables are the main crops

E4 Potential Options for Improvement and Management

Potential options are formulated considering different improvement measures to alleviate the problems prevailing in Sangu and Matamuhuri River basins. The potential options are presented in Table E.4

Table E.4: List of Interventions considered in Option-1 and 2

Sl.	River Name	Measures	Option-1	Option-2
1	Sangu River (outfall to Dohazari Bridge)	Loop-cut at upstream of Premasia Bazar	X	√
2		Bank protection works along eroding banks	√	√
3		Provision of water reservoir/Fish sanctuary near Jotormukh loop, Dholu-Tonkabati khal, Dhopachara	√	√
4		Construction of a rubber dam at upstream of Bandarban	√	X
5		Dredging/Excavation of Sangu river and Jalkadar khal	X	√
6		Fish Sanctuaries in khal/Chara	√	√
7	Sangu River (Dohazari Bridge to Kalaghata road bridge)	Bank protection works at eroding bank near Bandarban	√	√
8		Provision of water reservoir near Kalaghata Road Bridge	√	X
9		Dredging of silted riverbed around Bandarban town	X	√
10		Development of ecotourism Facility	√	√
11	Sangu River (Upstream of Kalaghata road bridge)	Removal of rocks at Barapathor area	√	X
12		Afforestation	√	√
13		Development of ecotourism Facility	√	√
14	Matamuhuri River	Bank protection works along eroding banks	√	√
15		Dredging at upstream and downstream of existing rubber dams, Lama Bazar	√	X
16		Char removal near Lama bazar and adjacent area	X	√
17		Fish Sanctuary in khal/Chara	√	√
18		Development of ecotourism Facility	√	√
19	In the river bank and hilly area	Provide some facilities for tribal people i.e., retaining wall, landing stair, boat ghat etc.	√	√
20		Tree plantation in the deforested area	√	√

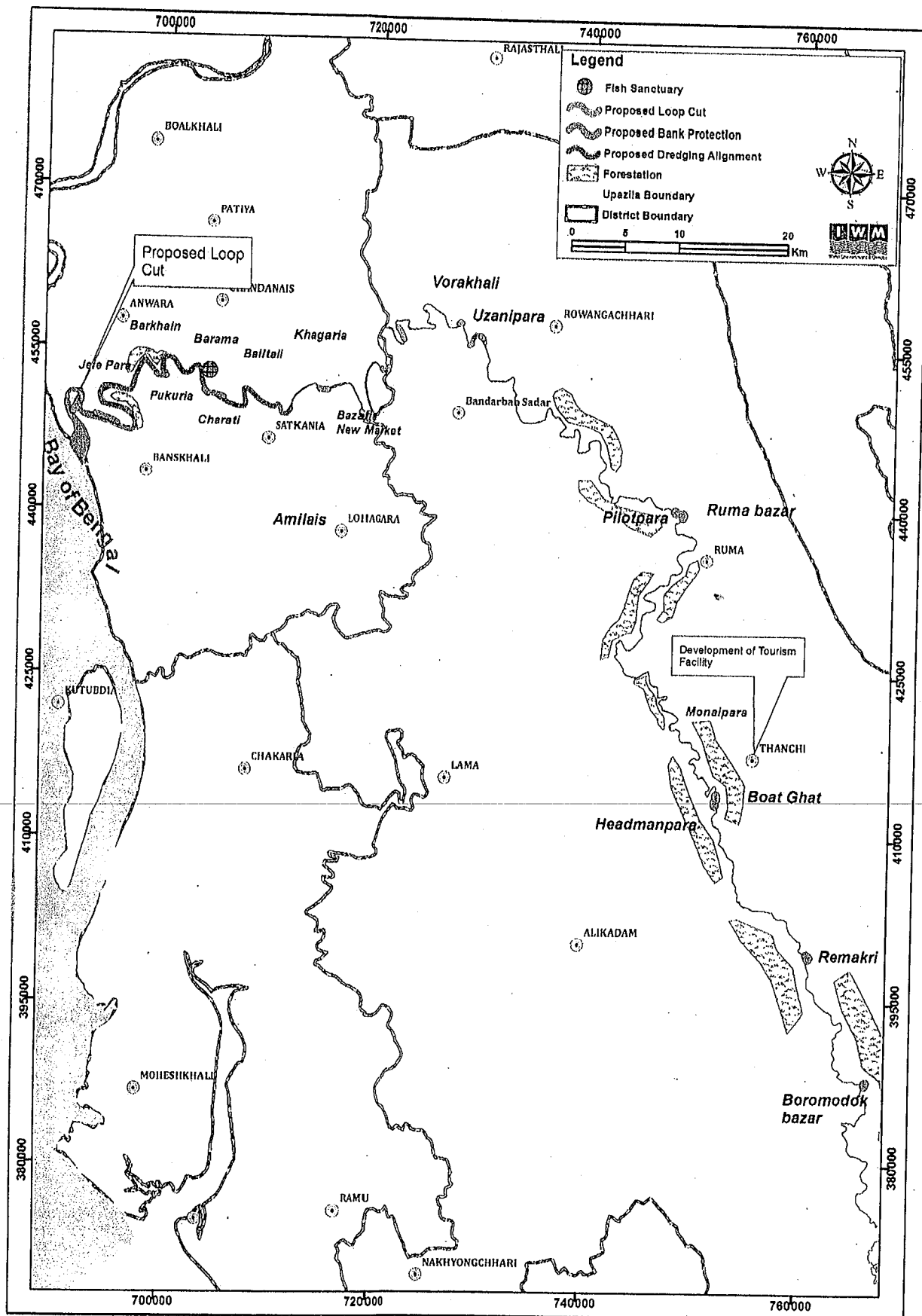


Figure E.12: Map showing proposed option -2 in Sangu river

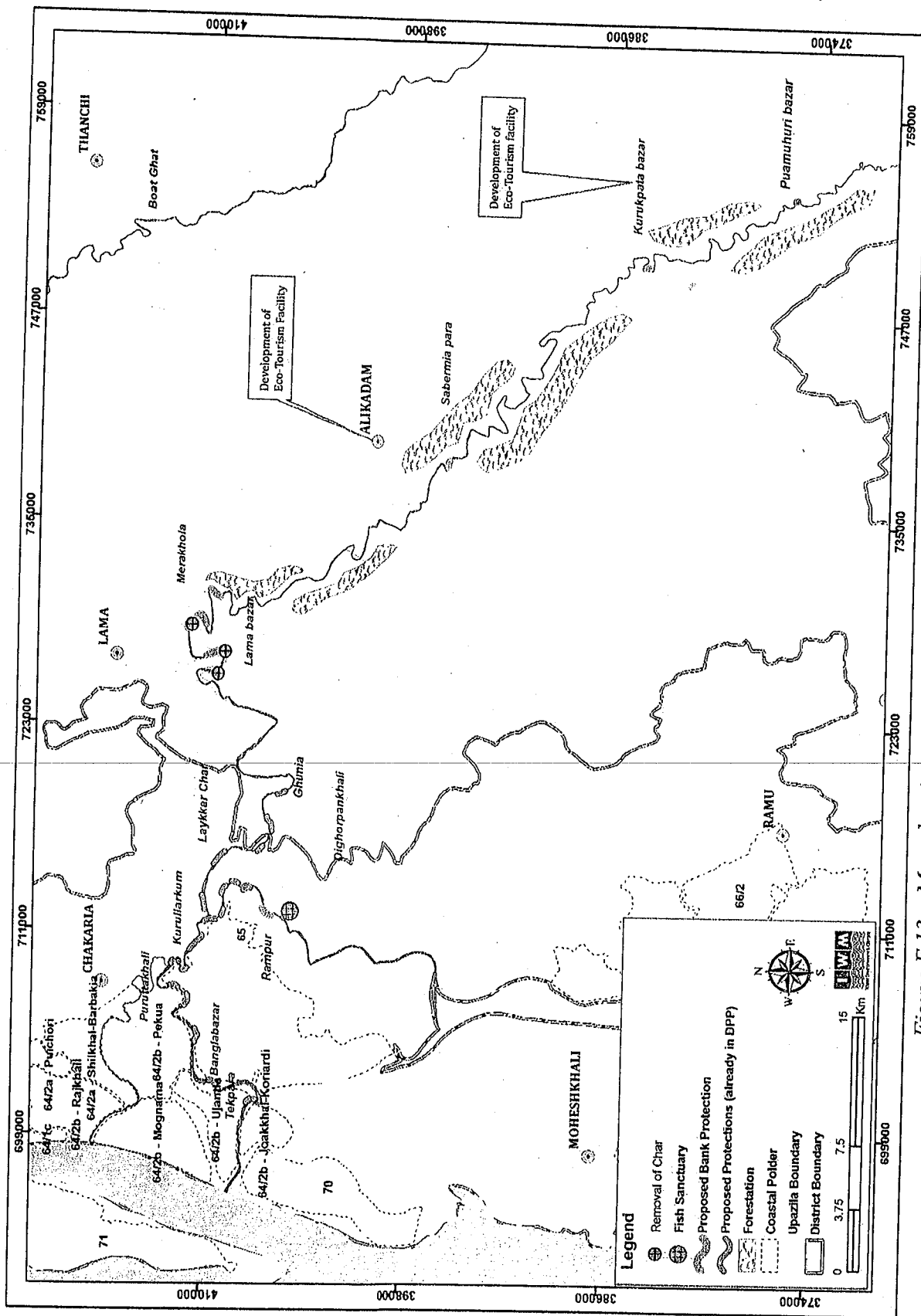


Figure E.13: Map showing proposed option -2 in Matamuhuri river

The selected basins are pristine in nature and have rich ecological resources that cannot be hampered. Hence, extensive analysis of data, use of mathematical modelling and social consultation and disclosure will be carried out to find a holistic and integrated plan for improvement and management of these river basins.

Effectiveness of Different Options

Effectiveness of different options has been assessed considering the issues of drainage improvement, enhance the dry season water availability, navigability improvement, improvement of fisheries resources, enhance the irrigation facility and ecotourism facility.

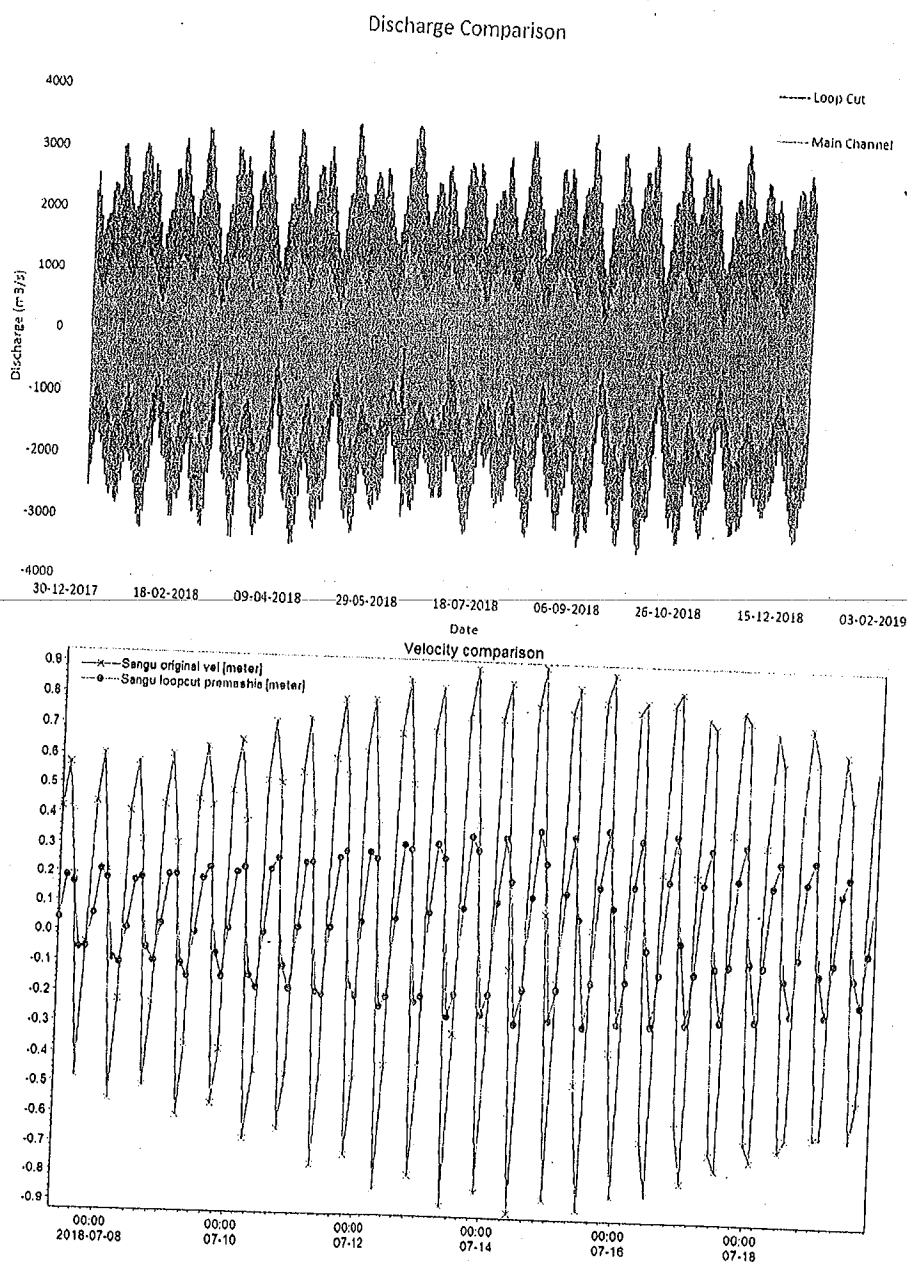


Figure E.14: Discharge in the proposed loop cut and main channel and Velocity in the main channel with and without loop-cut condition

Two different options have been devised for restoration of Sangu and Matamuhuri River basins. Among them dredging in downstream reaches of Sangu and Matamuhuri rivers, bank protection works along eroding banks, provision of water reservoir at Jotormukh, afforestation, fish sanctuaries in khal/chara/water reservoir, development of ecotourism facilities, provision of some landing facilities for tribal people are included in both the options.

The selected potential option - 2 includes loop cut in the downstream of Sangu river, Bank protection works, dredging/ excavation in the Sangu downstream part, Bandarban area, and Jalkadar khal, char removal at Lama bazar, afforestation, fish sanctuary, ecotourism facility development.

Simulation of the loop-cut condition show that 75% of flow passes through the loop cut and the velocity is also 60~70% higher in the main channel without loop cut. If the loop cut is established then it is very likely that the cut channel will get more flow in future and the present channel will be silted up. The discharge comparison is shown in the figure E.14.

Dredging/ excavation is proposed at downstream of Sangu and around Bandarban town. The model result shows that discharge increases due to dredging in Sangu river from km15+500 to km47+500 (Toiler dip to Dohazari bridge). Water flow comparisons in base condition and dredged condition at selected locations are presented in Figure E.15. The comparisons show that more tidal flow is found in the river since dredging increases conveyance capacity of the river.

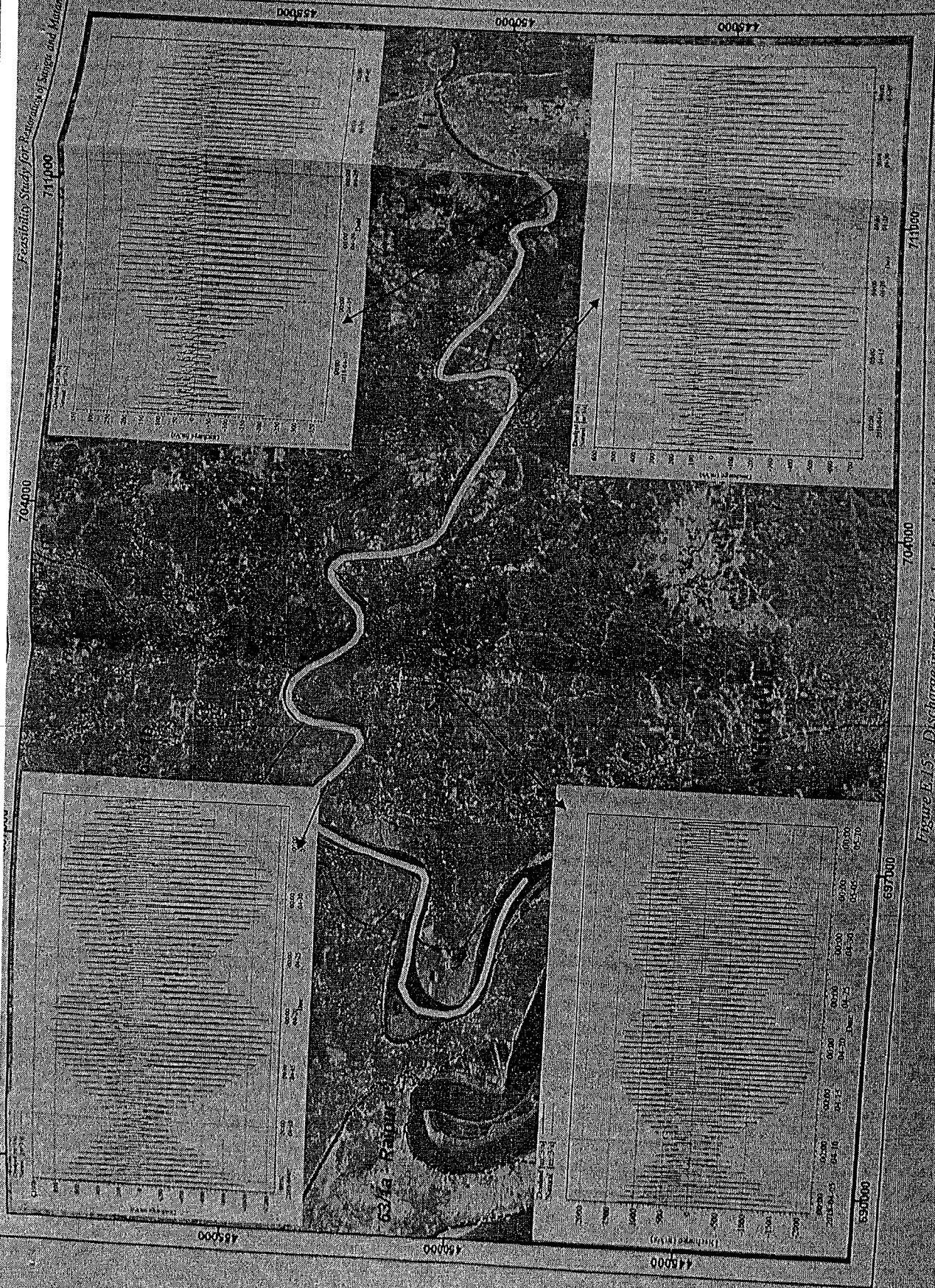


Figure E.15: Discharge increased in dredged conditions

Multicriteria Analysis

The suitability and effectiveness of the two options are ascertained applying multi-criteria analysis, field visits, model results, suggestions of BWDB officials and opinion of local people. Multicriteria analysis of the is presented in **Table E.5**. The impact assessment scoring is done within the following points score scale ranging from -1 to -5 for negative impact and from +1 to +5 for positive impact.

Table E.5: multi-criteria analysis of two options

SL No.	Evaluation Criteria	Option-1	Option-2
1	Riverbank erosion and sedimentation	3	4
2	Flooding	3	4
3	Water availability during dry season	3	2
4	Ecology and environment	3	4
5	Economic Aspects	2	4
6	Agricultural benefit	3	3
7	Fisheries	3	3
8	Navigability	3	3
9	Social acceptance	4	4
Total		27	31

By comparing the score of two potential options under different criteria given in the table, it appears that Option-2 is the best suited option and suggested for implementation.

The schematic diagram of Option-2 is shown in Figure E.12 and E.13.

E5. Environmental and Social Impact Assessment

Valued Environmental and Social Components (VESC)s are defined as fundamental elements of the physical, biological or socio-economic environment, including the ecosystem, ecosystem services, air, water, soil, terrain, vegetation, forest, wildlife, fisheries, agriculture, navigation and land use that are likely to be impacted by a proposed project. Based on field investigation data and past experience the VESC)s have been identified and shown in **Table E.6**. The VESC)s have been rated with positive and negative trends under future without project and with project scenarios. They have been evaluated prior to drawing up suitable mitigation and compensation programs.

Table E.6: Potential impacts of project activities on the environmental /Social Components

VESC)s	Future without Project	Future with Project	Comments
River bank erosion	0	+	Riverbank erosion is a major problem in the downstream meandering bends which is likely to be decreased by bank protection measures.
Siltation on riverbed	0	+	The sediment dispersion is not expected since there is no flow/small flow in the rivers.
Dry season flow	-	+	Unavailability of water during dry season, due to decreased conveyance of rivers, is a serious issue in the study area especially in the upstream regions. Restoration of the rivers/khals by dredging, erosion protection will decrease the sedimentation on riverbeds. Moreover, water reservoirs are also proposed under the project to store monsoon water for use in dry period.
Fish habitat and fish spawning ground	-	+	The project interventions are likely to improve the fish habitats in Sangu and Matamuhuri rivers. A significant part of the study area is the tidal zone enrich in different fish and shrimp species. dredging, and construction of the embankment alongside the rivers may affect the fisheries resources. However, the project activities are very likely to enhance fisheries resources and fish migration in the long run.
Water quality	0	-/+	Water quality is comparatively better in these rivers. Turbidity is likely to be increased temporarily during the project period due to dredging and construction works but will improved when the rivers are restored.

VESCs	Future without Project	Future with Project	Comments
Forest	-	+	The forest resources are being depleted due to anthropogenic reasons. An afforestation plan has been proposed under the project which will be beneficial for the forest resources.
Wildlife	-	-	Wildlife resources is decreasing significantly in the study area. The project is not likely to incur any change of the present trend. The noise due to project activities may incur some temporary effects on wildlife if proper mitigation measures are not implemented. The afforestation may have slight positive impact on wildlife resources but it will not be very significant.
Benthic environment	0	-	Benthic environment will be lost temporarily due to dredging activities but it is very likely to be replenished within 6 months to 1 year.
Agricultural products	0	+	Agricultural production is likely to be increased significantly due to project interventions since availability of irrigation water will be much higher due to the project interventions.
Air quality and noise	0	-	Air and noise pollution is expected to be elevated due to construction and dredging works during the project period. The ambient air quality is within range in the project area which may be affected by the dredging operations if proper maintenance of the dredger and other mitigation measures are not maintained.
Ethnic community	0	+	Project activities are not likely to hamper the ethnic community living in the project area. However, their living is expected to be improved with less drainage and flooding problems, bank erosion and siltation of riverbeds. Moreover, improvement of agriculture water, navigability etc. will improve their livelihood opportunities for the local people.
Navigation	0	+	Navigation problem due to siltation of riverbeds will be decreased by dredging and bank protection works.

Rating of Impacts:

(+) Positive trend

(0) Present baseline status

(-) Negative trend

E7. Economic Viability

The total Investment cost includes the cost of Civil works, Dredging, Bank protective works, etc. is about Financial BDT 151,943.33. lakh and Economic BDT 113,648.63lakh. Economic analysis illustrates that the EIRR for option-2 is 19.91%, which is the above 12%, i.e., the opportunity cost of capital. In view of above, the project is economically viable option to implement. The analytical results are shown in Table E7.

Table E7: Summary of economic and financial indicators

Viability Indicator	Option-2
1. Capital Cost Financial (Lakh BDT)	151,943.33
2. O&M Cost Financial (Lakh BDT)	3057.86
3. Capital Cost Economic (Lakh BDT)	113648.63
4. O&M Cost Economic (Lakh BDT)	2347.06
5. Economic Benefit Cost Ratio (BCR @ 12%)	1.75
6. Economic Net Present Value (NPV @ 12%) Lakh BDT	73510.44
7. Economic Internal Rate Return (IRR %)	19.91%

E8: Recommendations

- I: It is recommended to implement all the interventions suggested in the Option-2 for development and management of Sangu and Matamuhuri river basin as it is technically feasible, economically viable, environment friendly and socially acceptable.

The suggested interventions area as follows;

Sangu River

- River bank erosion protection works about 10610m in different reaches of the river;
- Dredging / Excavation of Sangu river in two reaches, one from km15+500 to km47+500 (From Juidondi to near Dohazari bridge) and other km87+500 to km92+000 near Bandarban town and Jalkadar khal excavation;
- Development of fish sanctuary in jotormukh loop, Dholu Tonkabati khal, Dhapachara khal etc.;

- Development of tourism facilities i.e., walking trails, resting shelters and washroom facilities, landing stairs, boat ghats etc.

Matamuhuri River

- River bank erosion protection works about 4610m in different reaches of the river;
- Development of fish sanctuary in Kahariaghona loop, Toin khal, Chokkhom khal etc;
- Development of tourism facilities i.e., landing stair, boat ghat, toilet facilities etc.

Afforestation

- Planation in the river bank.
- I. It is also recommended to implement the environmental management and enhancement plan
 - II. Physical, environmental, social and economic benefit monitoring is recommended to carry out before, during and after completion of the project.

