

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



Bangladesh Water Development Board

PROJECT COMPLETION REPORT: IMED 04/2003 (Revised)

**Feasibility Study for Augmentation, Conservation and Wise Use of Surface
Water Resources through Dredging of the Upstream of Teesta Barrage and
Bank Protection Work of the Teesta River in Kurigram District.**

July 2023

[Handwritten signature]

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 Augmentation, Conservation and Wise Use of Surface Water Resources through Dredging of the Upstream of Teesta Barrage and Bank Protection Work of the Teesta River in Kurigram District.
(Project code- 224351500)
02. **Administrative Ministry/Division** : Ministry of Water Resources (MoWR)
03. **Executing Agency** : Bangladesh Water Development Board (BWDB)
04. **Location of the Project** : Nilphamari, Lalmonirhat, Rangpur, Kurigram and Gaibandha District.

05. Objective of the Project:

(a) Main Objective:

The main objective of this study is to investigate the feasibility of augmentation and conservation of surface water resources through the dredging of the upstream of Teesta barrage as well as improvement of water conservation of rivers (Jamuneshwari, Buriteesta, Naotara etc.) within the command area of the Teesta river through re-excavation/ dredging (as required) and construction of water retaining structure. The study shall specially address the wise use of surface water resources for irrigation expansion and livelihood improvement by using the existing river and irrigation systems.

(b) Specific Objectives:

The specific objectives of the study are as follows:

- Investigation of the suitability and sustainability of dredging at the upstream of Teesta barrage;
- Identification of the possibilities of irrigation expansion through conservation of surface water resources;
- Establishment of connectivity between upstream of Teesta Barrage and existing drainage/irrigation networks (rivers/khals etc.) for augmentation of surface water and ground water availability, improvement of agricultural production, ecosystem and environment;
- Development of a water conservation strategy and undertake measures for use of conserved water for supplementary irrigation purposes and to reduce dependency on groundwater;

Objectives as per PP/PFS	Actual achievement	Reasons for shortfall, if any
	analysing different options are incorporated in section-4 (page 4-8 to 4-44) of the final report.	
Identification of the possibilities of irrigation expansion through conservation of surface water resources.	Completed. Identification of the possibilities of irrigation expansion through conservation of surface water resources has been incorporated in section-3 (page 3-2 to 3-3) of the final report.	-
Establishment of connectivity between upstream of Teesta Barrage and existing drainage/irrigation networks (rivers/khals etc.) for augmentation of surface water and ground water availability, improvement of agricultural production, ecosystem and environment.	Completed. The study investigated the feasibility to establish the connectivity between upstream of Teesta Barrage and existing drainage/irrigation networks (rivers/khals etc.) for augmentation of surface water and ground water availability, improvement of agricultural production, ecosystem and environment has been described in section-3 (page 3-3 to 3-5) of the final report.	-
Development of a water conservation strategy and undertake measures for use of conserved water for supplementary irrigation purposes and to reduce dependency on groundwater.	Completed. Development of a water conservation strategy and undertake measures for use of conserved water for supplementary irrigation purposes and to reduce dependency on groundwater has been described in section-3 (page 3-4 to page 3-5) of the final report.	-
Determination of the long – term impacts of dredging/ re-excavation on surface water and ground water resources as well as livelihood improvements.	Completed. Determination of the long – term impacts of dredging/ re-excavation on surface water and ground water resources as well as livelihood improvements has been incorporated in section-3 (page 3-6 to page 3-8) of the final report.	-
Identification of the main course of the Teesta river in the downstream of the Teesta barrage.	Completed. Identification of the main course of the Teesta river in the downstream of the Teesta	-

Objectives as per PP/PFS	Actual achievement	Reasons for shortfall, if any
	barrage has been incorporated in section-3 (page 3-10 to page 3-14) of the final report.	
Investigation of the feasibility of construction of road cum regulator in the downstream of the existing flood bypass.	Completed. Investigation of the feasibility of construction of road cum regulator in the downstream of the existing flood bypass has been incorporated in section-3 (page 3-8 to page 3-9) of the final report.	-
Investigation of the feasibility of protection of left bank of Teesta River in Lalmonirhat district and at Gotiasam and Bogurapara of Rajarhat Upazila in Kurigram district.	Completed. Investigation of the feasibility of protection of left bank of Teesta River in Lalmonirhat district and at Gotiasam and Bogurapara of Rajarhat Upazila in Kurigram district has been incorporated in section-3 (page 3-19 to page 3-24) and section- 4 (page 4-58 to page 4-80) of the final report.	-

E. BENEFIT ANALYSIS

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

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: Nill.

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>	-	-	-
c) <u>Others:</u>	-	-	-

0.2. Auditing during and after Implementation:

2.1. Internal Audit: Not 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: Not 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 Teesta is one of the most important trans-boundary rivers of Bangladesh, flowing through five northern districts (Gaibandha, Kurigram, Lalmonirhat, Nilphamari, and Rangpur) of Rangpur Division. It is called the lifeline of North Bengal. The Teesta Barrage is one of the most important structures of the country which controls the flow of the Teesta river and diverts water to irrigation canals.

X

The bed of the Teesta river is being silted up due to high sedimentation, which reduces its carrying capacity and causes shifting of river course. The sedimentation process is going on for decades. Consequently, the water level rises frequently to the danger level of Teesta barrage water level even due to very small amount of flood water from upstream hilly regions. This threatens the Teesta Barrage and undermines the real purpose of the barrage construction.

In addition to that, the flow of Teesta River is hitting strongly the right and left banks as the water storage capacity of upstream is decreased. As a result, the right and left banks of the river Teesta are being eroded. The strong currents are damaging the important structures such as spurs, groynes and dams built on the river. If the sedimentation process increases over time, the danger level of water of Teesta Barrage will easily be exceeded which will be a threat to the barrage.

The Teesta Irrigation Project is the largest irrigation project of Bangladesh dependent on the Teesta river. Due to the lack of dredging of the Teesta River, the water storage capacity is decreasing, therefore sufficient water cannot be provided for irrigation. Water of the Teesta river is the main contributor to the fertility of the land on its both sides. If the water of the Teesta can be retained, it would increase crop production.

The maximum water level shows an increasing trend which indicates increasing intensity of floods in the upstream of Teesta River. The increasing trend of maximum water level indicates more vulnerability towards intense flood. But increasing maximum water level with decreasing flow means that the river is experiencing siltation or aggradation. With the impending threat of climate change, the water balance of the Teesta Basin has become an important factor of the water stressed region.

In consideration to the above-mentioned problems, re-excavation / dredging is very important to increase the carrying capacity of the river and keep its course stable. Also, on the eve of the approval of the project "Rehabilitation and Expansion of Command Area of Teesta Irrigation Project" at the ECNEC meeting held on 4 May 2021, the Hon'ble Prime Minister directed to excavate 16 km area of Teesta River inside Bangladesh on the upstream of Teesta Barrage. It is therefore essential to check the feasibility of augmentation and conservation of surface water resources through dredging of the upstream of Teesta barrage as well as address the wise use of surface water resources for irrigation expansion and livelihood improvement by using the existing river and irrigation systems. The storage volume of water at the upstream of Teesta barrage can be used for diverting it into the adjacent rivers/khals through the establishment of a linking channel/khal.

In addition to that a project of BWDB to protect bank erosion of Gotiashama and Bogurapara area under Rajahaat Upazilla of Kurigram district is under process. Assessment of the feasibility of the bank protection works of those areas are essential for taking over the project.

In view of the above, BWDB decided to conduct a detailed feasibility study for conservation of surface water resources of the Teesta river as well as other rivers within the command area of the Teesta river and assessment of the feasibility of bank protection work along left bank of Teesta River

in Lalmonirhat district and at Gotiashama and Bogurapara area under Rajahaat Upazilla of Kurigram district.

1.2 Justification/Adequacy

The project relevance has been derived from national master plan and national goal of the country. The National Master Plan, Bangladesh Delta Plan 2100, Perspective Plan of Bangladesh and the 8th Five Year Plan have been consulted to frame the project. The relevant slice of the text of the plans are furnished below:

- **Perspective Plan of Bangladesh 2021 – 2041.**

This Plan addresses governance, human development, industry and trade, agriculture, climate change and environment. The Plan presents a path to shift Bangladesh from a rural agrarian economy to a primarily industrial and digital economy.

- **Bangladesh Delta Plan 2100.**

The Plan focuses primarily on the delta agenda through 2050 while reflecting the longer-term challenges of sustainably managing water, ecology, environment, and land resources in the context of natural disaster and climate change risk. The Delta Plan addresses flood control, sea level rise, water logging, river-bank erosion, irrigation, urban and rural water supply, water pollution, land reclamation, river dredging for inland water traffic, environmental protection, fisheries, and preservation of biodiversity.

- **8 th Five Year Plan, FY2021 to FY2025.**

The 8th FY Plan initiates the transition to the goals of the Perspective Plan and is built around six themes: (i) rapid recovery from COVID; (ii) GDP growth acceleration; employment generation, and rapid poverty reduction, (iii) a broad-based strategy of inclusiveness; (iv) a sustainable development pathway that is resilient to disaster and climate change; (v) improvement of critical institutions; and (vi) achieving the United Nations 17 sustainable development goals.

- ❖ The impact (goal) of the project is aligned with these documents, and particularly the 8th Five Year Plan for “sustainable, inclusive development resilient to disaster and climate change generating employment and leading to rapid poverty reduction”.
- ❖ This project implementation would be protecting many governments non government establishments & properties situated along the right & left bank of Teesta River.

Therefore, the goals of the project is in the same line of the Vision Bangladesh 2100- 50.

1.3 Objectives

The main objective of this study is to investigate the feasibility of augmentation and conservation of surface water resources through the dredging of the upstream of Teesta barrage as well as improvement of water conservation of rivers (Jamuneshwari, Buriteesta, Naotara etc.) within the command area of the Teesta river through re-excavation/ dredging (as

required) and construction of water retaining structure. The study shall specially address the wise use of surface water resources for irrigation expansion and livelihood improvement by using the existing river and irrigation systems. The specific objectives of the study are as follows:

- Investigation of the suitability and sustainability of dredging at the upstream of Teesta barrage;
- Identification of the possibilities of irrigation expansion through conservation of surface water resources;
- Establishment of connectivity between upstream of Teesta Barrage and existing drainage/irrigation networks (rivers/khals etc.) for augmentation of surface water and ground water availability, improvement of agricultural production, ecosystem and environment;
- Development of a water conservation strategy and undertake measures for use of conserved water for supplementary irrigation purposes and to reduce dependency on groundwater;
- Determination of the long – term impacts of dredging/ re-excavation on surface water and ground water resources as well as livelihood improvements;
- Identification of the main course of the Teesta river in the downstream of the Teesta barrage;
- Investigation of the feasibility of construction of road cum regulator in the downstream of the existing flood bypass;
- Investigation of the feasibility of protection of left bank of Teesta River in Lalmonirhat district and at Gotiasam and Bogurapara of Rajarhat Upazila in Kurigram district;
- Detailed design of proposed interventions;
- Environmental and Social Impact Assessment (ESIA);
- Preparation of DPP of the subsequent investment project.

1.4 Project revision with reasons: Not Applicable

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

The project is located under “Barind and Drought Prone Areas” which is one of the hotspots of Bangladesh Delta Plan 2100 (BDP 2100). The main strategy for development of the area as specified in the Delta Plan is balancing supply and demand for sustainable and inclusive growth, minimizing losses due to floods and drainage congestion and ensuring water supply and sanitation. Some measures to attain the strategy are extension of irrigation using the surface water, regulating ground water extraction, water retention for the dry season usage, reclaiming encroached river banks etc. The proposed project is aimed for augmentation and conservation of surface water resources of the Teesta and other rivers within the project area. Implementation of the project would result food attenuation, ground water recharge and river bank protection of the study area.



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

◆ Project Identification

The 414 km long Teesta River originates in the Mountain of eastern Himalayas, flows through the Indian states of Sikkim and West Bengal, and enters Bangladesh at Dimla Upazila in Nilphamari District. The Teesta is one of the most important trans-boundary rivers of Bangladesh, flowing through five northern districts (Gaibandha, Kurigram, Lalmonirhat, Nilphamari, and Rangpur) of Rangpur Division. It is called the lifeline of North Bengal. The Teesta Barrage is one of the most important structures of the country which controls the flow of the Teesta river and diverts water to irrigation canals.

The carrying capacity of the Teesta River has decreased due to the raised river bed level through prolonged sedimentation. Consequently, the water level rises frequently to the danger level of the Teesta barrage, even with minimal flood water from upstream hilly regions. This phenomenon has put the barrage and ancillary structures at risk and impedes the objective of the barrage construction. In addition, Teesta River's flow strongly hits the right and left banks as the water storage capacity upstream of the barrage has decreased. As a result, Teesta's right and left banks are being eroded. The strong currents are damaging the important structures, such as spurs, groynes and embankment built on the river. If the sedimentation process increases over time, the danger level of water of Teesta Barrage will easily be exceeded, which will threaten the barrage.

In consideration to the above-mentioned problems, re-excavation / dredging seemed important to increase the carrying capacity of the river and keep its course stable. It is therefore essential to assess the feasibility of augmentation and conservation of surface water resources through dredging of the upstream of Teesta barrage as well as address the wise use of surface water resources for irrigation expansion and livelihood improvement by using the existing river and irrigation systems.

In addition to that a project of BWDB to protect bank erosion of Gotiashama and Bogurapara area under Rajahaat Upazilla of Kurigram district is under process. Assessment of the feasibility of the bank protection works of those areas are essential for taking over the project.

In view of the above, BWDB decided to conduct a detailed feasibility study for conservation of surface water resources of the Teesta river as well as other rivers within the command area of the Teesta river and assessment of the feasibility of bank protection work along left bank of Teesta River in Lalmonirhat district and at Gotiashama and Bogurapara area under Rajahaat Upazilla of Kurigram district.

◆ Project Preparation

In view of the above, BWDB prepared a PFS to execute the feasibility study project.

Appraisal: The DPEC meeting was held on 03/01/2022.

◆ Credit Negotiation-N/A

◆ Credit Agreement-N/A

♦ Credit Effectiveness-N/A

♦ Loan Disbursement-N/A

♦ Loan Conditionalities-N/A

♦ Project Approval: The project was approved by the Ministry of Water Resources on 10/02/2022.

♦ Others (if any).

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 | |

This is a consultancy service procurement project. No such problems were occurred.

6. Remarks & Recommendations of the Project Director:

The study was approved by the Ministry of Water Resources (MoWR) vide memo number :42.00.0000.041.14.054.21-216, dated 10 February 2022. The project was accomplished on 30 April 2023.

The main objective of this study is to investigate the feasibility of augmentation and conservation of surface water resources through the dredging of the upstream of Teesta barrage as well as improvement of water conservation of rivers (Jamuneshwari, Buriteesta, Naotara etc.) within the command area of the Teesta river through re-excavation/ dredging (as required) and construction of water retaining structure.

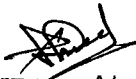
The study has been framed to attain its objectives through three components: Mathematical Modelling Component, Physical Modelling Component and Environmental and Social Study Component. Under Mathematical Modelling Component, detailed hydromorphological analysis of the concerned area was done through mathematical modelling. Based on the outputs of the mathematical modelling, project interventions have been proposed. The dredging intervention proposed under Mathematical Modelling Component was cross checked under Physical Modelling Component of the project. Under Environmental and Social Study Component of the project, detailed environmental and social impact assessment (ESIA) has been completed to analysis the impact of the proposed interventions on the environment and the society of the project area.

Recommendation of the study domain is divided into two major parts : (a) Dredging at the upstream of Teesta barrage for which a individual project has been proposed and (b) Erosion and flood protection at both banks of Teesta River. Overall, the study proposed five different investment projects for implementation.

The study analysed five (5) different options to improve water storage capacity of Teesta river through dredging. Among the 5 options, best suited option has been selected based on the multicriteria analysis considering technical, environmental, social and financial criteria. After analysing the best option, dredging of 7.0 km channel at the u/s of Teesta barrage together with construction of 04 nos. submersible geotextile covered earthen spurs, 32 km haul-road construction, 3.0 km edge-line protection & 140.0 ha land acquisition for dredge material management & disposal, 1.50 km bank-revetment work near left bank at the u/s of Teesta barrage, near Indo-Bangladesh border have been recommended for implementation under the aforementioned project in this study which will be implemented in four consecutive years.

In addition to that, the developed 2D- morphological model has been applied to estimate probable bank erosion. After analysing the model results, field data and satellite image analysis, total 111.021 km bank revetment work, of which 36.341km at the right bank and 74.680 km at the left bank has been recommended for implementation. Also, construction of 66.66 km embankment, of which 62.20 km at the left bank and 4.46 km at the right bank and 165.30 km embankment re-sectioning work at both banks have been suggested for implementation.

It is anticipated that the study project output would help in DPP preparation and implementation of the subsequent investment projects.

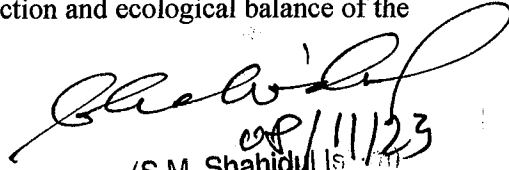

Farzana Ahmed
Project Director & Executive Engineer
Directorate of Planning-2
BWDB, Dhaka.

Date : 26/07/2023

Signature and seal of the Project Director

7. Remarks/Comments of Agency Head

The decades-long sedimentation process in Teesta river has increased the river bed level and decreased the carrying capacity of the river. The Teesta Barrage Project is the largest irrigation project of the country which is suffering due to shortage of water of Teesta river. This study was conceived based on the instruction of the Hon'ble Prime Minister to excavate Teesta River within Bangladesh on the eve of the approval of the project "Rehabilitation and Expansion of Command Area of Teesta Irrigation Project" at the ECNEC meeting held on 4 May 2021. After field investigation, satellite image analysis and analysis of model outputs, the consultants of this study project recommended some solutions to mitigate existing problems of the river. It is anticipated that the proposed interventions would contribute in food attenuation, river bank protection and ecological balance of the project area.


08/11/23
(S.M. Shahidul Islam)
ID NO: 65038700
Director General
BWDB, Dhaka

Date :

Signature and Seal

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

The project has been done successfully and subsequent investment project will be taken as per recommendations of the study.

Date :

Signature and Seal

