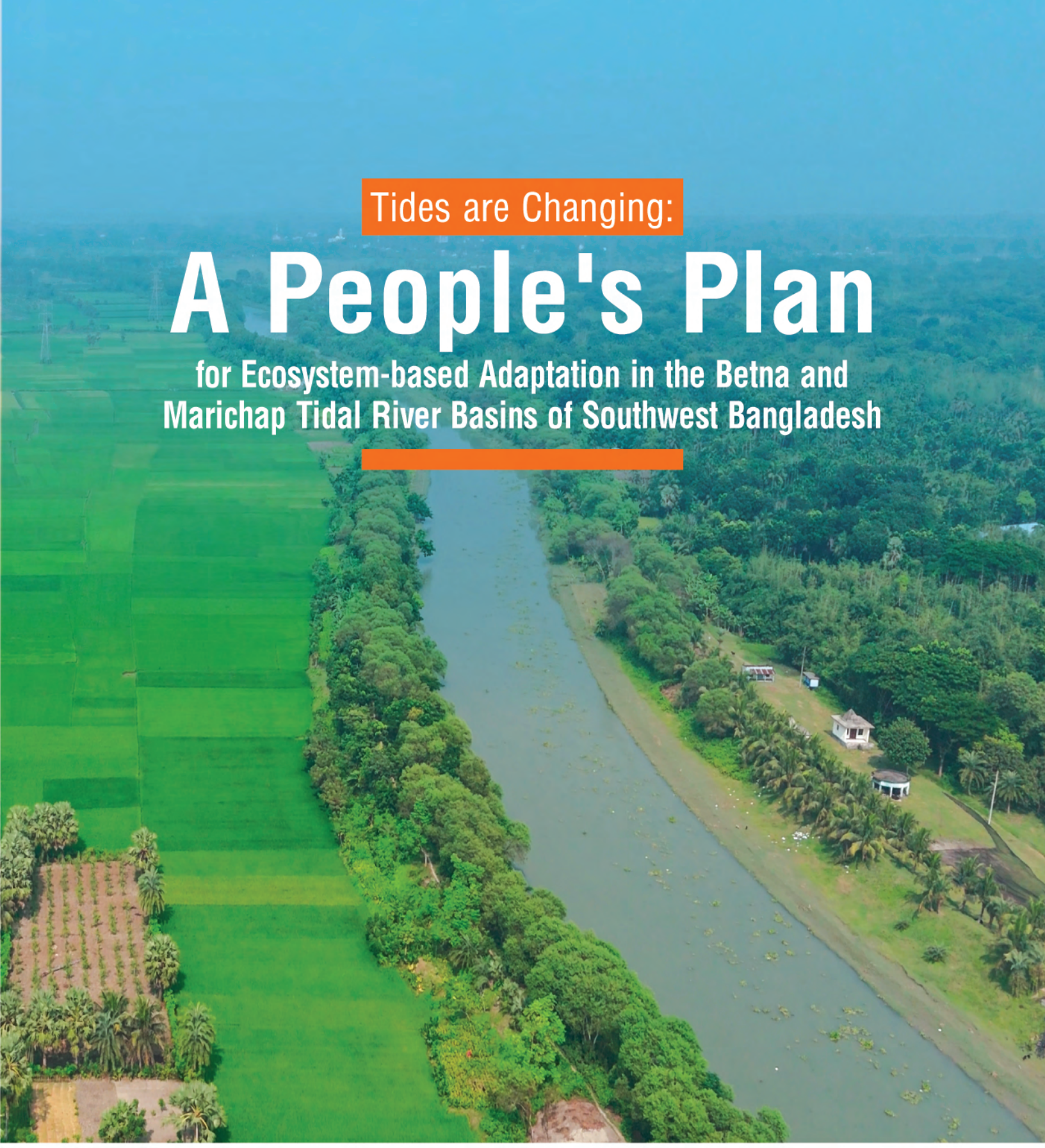

Tides are Changing:

A People's Plan

for Ecosystem-based Adaptation in the Betna and Marichap Tidal River Basins of Southwest Bangladesh

Global EbA Fund

IUCN

Supported by: Federal Ministry for Economic Cooperation and Development

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Both ENDS
Connecting people for change

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Uttaran

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Our sincere thanks go to the Global EbA Fund, whose support made this initiative possible. Their thoughtful feedback and trust in the process played a crucial role in refining the strategy and advancing this work. Without their belief in this effort, the People's Plan could not have come to fruition.

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We express our heartfelt appreciation to the Paani Committee members, for their unwavering dedication to promoting community-based Tidal River Management (CBTRM). Their efforts in mobilizing the community and providing valuable feedback on the planning and reporting processes have been vital in shaping this work. Their commitment has continually inspired us to deliver the best possible outcomes for the communities we serve.

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We remain deeply grateful to all who contributed their time, expertise, and commitment to this work.

The successful development of this People's Plan has been made possible through the strong leadership, fieldwork, community mobilization, and technical expertise provided by Both ENDS, CEGIS, and Uttaran's project team. Their science-driven evidence, coordination with various stakeholders, and unwavering commitment have been central to creating a comprehensive and feasible plan for restoring the tidal river basin, ensuring long-term sustainability and resilience.

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Message from UTTARAN

Director's Foreword

For over four decades, Uttaran has stood beside the people of southwest Bangladesh, one of the most fragile and climate-stressed corners of the country. Across Satkhira, Khulna and Jashore, millions continue to endure waterlogging, rising riverbeds, salinity intrusion, tidal surges, and repeated displacement. Year after year, families lose croplands and livelihoods to siltation, are forced to migrate for survival, or remain trapped on waterlogged homesteads without stable income, tenure security, or formal recognition of their suffering.

Throughout these long years of hardship, our work has always been guided by the knowledge, resilience and leadership of the people themselves. It was community experience, not external engineering logic, that first revealed the power of restoring tidal flows. When farmers and fishers breached embankments at Dakatia and later at Bhaina, they demonstrated a profound truth: the delta knows how to heal itself when the natural tidal pulse is allowed to return. This indigenous practice, rooted in observation, necessity and generations of wisdom, became the foundation for what is now known as Tidal River Management (TRM).

Over time, this community-driven approach has evolved into a scientifically validated, ecosystem-based water management strategy. Today, TRM is acknowledged in national policy documents, including the Bangladesh Delta Plan 2100, as one of the most effective long-term solutions to the southwest's sedimentation and waterlogging crisis. The journey from local initiative to national acceptance is a testament to the strength and credibility of people's knowledge when paired with further research, advocacy, and engaged multi-level dialogue.

As TRM matured into a recognized national approach, the Government of Bangladesh and its agencies have taken significant steps to support the region, through drainage rehabilitation projects, polder management initiatives, and research partnerships. Yet, despite this progress, deep gaps remain. Past TRM interventions have often faced conflict, mistrust and social resistance because implementation processes were fragmented, compensation systems were unclear, and communities were not meaningfully included in decision-making. Consequently, waterlogging persists, sedimentation continues, and many remain uncertain that their rights, livelihoods, and participation will be protected.

It is within this context that The People's Plan for Community-Based Tidal River Management (CBTRM) has been developed. Over two years, thousands of women, men, farmers, fishers, youth, and landless families contributed to a bottom-up planning process, supported by Uttaran, Both ENDS, CEGIS, and local government institutions. This plan offers:

- A basin-wide framework for implementing TRM in phases;
- A transparent, just compensation and livelihood protection approach;
- Inclusive governance models anchored in Multi-Stakeholder Forums;
- Practical guidelines for accountability, monitoring and conflict resolution; and
- A clear roadmap for embedding CBTRM within long-term delta management.

This People's Plan is more than a technical proposal, it is a social contract. It is a commitment to restore rivers, revive livelihoods, and rebuild trust between the state and its citizens. It is a path toward a future where the tidal plains of the southwest no longer symbolize crisis, but resilience, regeneration and shared prosperity.

Uttaran extends its deepest respect and gratitude to the people whose wisdom shaped this plan, and sincere appreciation to the Government of Bangladesh, Bangladesh Water Development Board, local administrations, Center for Environmental and Geographic Information Services (CEGIS), Both ENDS, and all partners who continue to stand with the communities of the tidal delta.

Through the wholehearted implementation of the People's Plan for CBTRM, we anticipate a more secure and climate-resilient future for southwest Bangladesh.

Shahidul Islam
Director, Uttaran

Message from Paani Committee

The tidal rivers of the southwest coast have long shaped the lives, livelihoods, and cultural identity of the communities who depend on them. Over the years, however, disruptions to natural sediment flows, embankment interventions, and prolonged waterlogging have weakened the ecological balance that once sustained the region. It is within this evolving reality that the Paani Committee emerged as a collective platform, formed by the people who experience these challenges firsthand. Our role has been to articulate community knowledge, safeguard the rivers' natural dynamics, and uphold the understanding that sustainable water management must be grounded in the lived experiences of those residing within the tidal basins.

For the Paani Committee, the Water Movement represents the collective voice of the coastal communities who have repeatedly emphasized the importance of natural sediment management. Our position is clear: the restoration of tidal rivers must follow the ecological principles that have been proven through decades of community-led practice, particularly through Tidal River Management (TRM). Community experience has consistently shown that when the tidal channels are allowed to carry, deposit, and circulate sediment naturally, the riverbeds regain depth, drainage pathways reopen, and waterlogging recedes. This understandingvalidated by both local knowledge and scientific analysisforms the foundation of our continued advocacy for community-based and nature-aligned river basin management.

A vital strength of the Paani Committee is the active participation of youth. In recent years, we have intentionally engaged young people from various river basins as part of the Youth Paani Committees, recognizing that the future of this movement depends on their leadership. Their involvement reflects our long-term vision: that the next generation will not only inherit this landscape but will also inherit the responsibility of protecting it. By encouraging youth to become advocates for river governance, we ensure that the principles of TRMrotational beel management, sediment dynamics, and community engagementare carried forward, adapted, and strengthened over time. Their energy, skills, and dedication bring renewed momentum to a movement that must remain active for decades to come.

The development of the People's Plan for the Betna–MorichapRiver Basin is a milestone in our collaborative efforts to combine community knowledge with scientific expertise. In contributing to this Plan, the Paani Committee worked closely with Uttaran, the Center for Environmental and Geographic Information Services (CEGIS), and Both ENDs. We shared practical insights gathered from years of observationseasonal sedimentation patterns, beel suitability for rotational TRM, localized waterlogging impacts, river encroachment, and community mobility constraints. This collaboration ensured that the People's Plan reflects both rigorous scientific assessment and the contextual knowledge of the people who live within the river basin. It also demonstrates the value of integrating hydrological modeling, socio-ecological understanding, and community-level decision-making into a unified planning framework.

The Paani Committee views this People's Plan not as a conclusion, but as a starting point for deeper collaboration. The challenges facing the southwestsediment imbalance, declining drainage capacity, increased tidal extremes, and climate-driven uncertaintiesrequire continuous engagement among communities, government institutions, researchers, and international partners. We remain committed to working alongside these stakeholders to expand learning, strengthen evidence-based solutions, and advance a shared agenda for sustainable river basin management. By combining scientific analysis with local experience, we believe it is possible to protect the tidal rivers, reduce chronic waterlogging, and restore a resilient future for the coastal communities of Bangladesh.

Abdul Matleb Sardar
President, Paani Committee

Message from CEGIS

This study highlights Tidal River Management as an ecosystem-based adaptation strategy, originating from community initiatives and validated by scientific research. TRM is proven to restore silted rivers, mitigate waterlogging, and enhance long-term climate resilience by leveraging natural tidal and sediment dynamics. Developed in the 1990s as an indigenous solution, TRM has since received recognition from researchers and policymakers for its efficacy in deepening river channels, improving drainage, increasing soil fertility, and reducing disaster risks through controlled tidal inundation of low-lying areas.

The study integrates multidisciplinary perspectives including hydrology, geomorphology, ecology, agriculture, and local knowledge emphasizing the Community-Based TRM model, where stakeholder participation and equitable benefit-sharing are pivotal to sustainable basin management. Advancing traditional practices, the research introduces innovative, science-driven methodologies, such as comprehensive field investigations, hydrodynamic and morphological modeling, and hydro-morphological assessments across 22 beels. A three-tier suitability framework was utilized, resulting in the identification of eight beels designated for prioritized implementation.

Sophisticated two-dimensional modeling under Least Intervention and Most Optimistic scenarios generated essential forecasts regarding sediment distribution, morphodynamics, land elevation, and drainage improvements. These findings informed the development of the Phased Operational Model, structured as a four-phase approach pairing beels from the Betna and Morirchap–Labangabati systems, thus supporting balanced basin outcomes and collaborative learning. The methodology is guided by Adaptive Delta Management principles, ensuring flexibility and responsiveness to field conditions, model updates, and community feedback.

CEGIS, a public trust under the Ministry of Water Resources, led this initiative with over 20 years of experience in Bangladesh's environmental planning. Its multidisciplinary team used advanced modeling and participatory methods to assess TRM feasibility in the Betna-Morirchap-Labangabati river basin, incorporating stakeholder input at every stage. By integrating technical analysis and local knowledge, CEGIS produced a thorough and context-specific roadmap for effective TRM implementation.

Community empowerment and strategic partnerships have been crucial to TRM's success. The participatory planning approach allowed river-basin communities to shape their future, supporting long-term ecosystem-based adaptation. We thank the Global EbA Fund for its support, and Uttaran and Both ENDS for their collaboration, which, alongside local residents' input, made this study possible.

We believe this knowledge will benefit both the Betna–Morirchap–Labangabati basin and other similar waterlogged regions in Bangladesh. The collaborative approach involving local, national, and international partners is expected to guide future ecosystem-based adaptation strategies across the delta. CEGIS is proud to lead this effort and remains dedicated to turning plans into action and improving livelihoods and natural restoration of tidal river systems.

Malik Fida A. Khan
Executive Director, CEGIS

Message from Both ENDS

This People's Plan represents the collective effort of an international partnership committed to strengthening community-led climate adaptation in one of the world's most vulnerable coastal regions. As the lead organisation of the consortium—together with Uttaran and CEGIS Both ENDS has been honoured to work alongside the people of the Betna and Moricchap–Labangabati River basins, whose knowledge, experience, and determination form the foundation of this plan.
The People's Plan builds on decades of community-based innovation in Tidal River Management (TRM), a practice rooted in working with nature rather than against it. These experiences offer essential lessons for delta regions worldwide. With rising sea levels, salinity intrusion, land subsidence, and increasingly severe cyclones, the challenges faced by southwestern Bangladesh mirror those now emerging in deltas across the globe, including the Netherlands.

The historical ties between Bangladesh and the Netherlands in water management are deeply embedded in the coastal landscape. The polders constructed in the 1960s, based on Dutch design principles, brought safety and opened new opportunities for settlement and agriculture. At the same time, the rapid sedimentation of surrounding riverbeds reduced natural drainage capacity, resulting in the severe waterlogging that continues to affect large areas today. The consequences are far-reaching: reduced agricultural productivity, loss of biodiversity, and growing socio-economic vulnerability—especially for women and children.

Recognising these challenges, the Government of Bangladesh has shown strong commitment through initiatives such as the Bangladesh Delta Plan 2100 and major investments in river excavation, including the Betna and Morirchap–Labangabati rivers. These interventions are essential, yet their long-term effectiveness depends on complementary approaches that restore natural sediment dynamics and strengthen local ownership.

Community-Based Tidal River Management (CBTRM) offers such an approach. By allowing sediment-laden tidal flows to enter designated areas for controlled sedimentation and drainage, CBTRM improves the functioning of polder infrastructure rather than replacing it. As a nature-based solution grounded in community participation, it supports the sustainability of past and present investments while enhancing resilience across the wider basin.

This experience holds valuable insights for the Netherlands as well. Dutch experiments with wisselpolders, designed to stimulate natural delta formation, reflect an increasing recognition of nature-based and socially supported adaptation strategies. CBTRM presents a community-driven model from which the Netherlands can learn as it prepares its own delta for the impacts of sea level rise—while also demonstrating how technical innovation, ecological processes, and local support can be aligned in practice.
This People's Plan presents a coherent roadmap for CBTRM that integrates ecosystem restoration, inclusive governance, community ownership, and sustainable financing. It contributes to ongoing national and international dialogues on climate resilience and offers a model with relevance far beyond the southwest coastal region of Bangladesh.

We hope this People's Plan helps inspire collaborative, community-driven action grounded in ecological integrity, social justice, and long-term sustainability.

Melvin van der Veen
Project Lead and Senior Policy Officer Inclusive Water Governance & Climate Adaptation

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Abbreviations and Acronyms

ADM	Adaptive Delta Management
BBS	Bangladesh Bureau of Statistics
BCSAP	Biodiversity Conservation Strategy and Action Plan
BMD	Bangladesh Meteorological Department
BWDB	Bangladesh Water Development Board
CBTRM	Community-Based Tidal River Management
CDS	Compensation Distribution System
CEGIS	Center for Environmental and Geographic Information Services
CSO	Civil Society Organization
DEM	Digital Elevation Model
DGPS	Differential Global Positioning System
DoE	Department of Environment
DoF	Department of Fisheries
EbA	Ecosystem-Based Adaptation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
FAP	Flood Action Plan
FGD	Focus Group Discussion
GCA	Gross Cropped Area
GPA	Guidelines for the Project Assessment
GPWM	Guidelines for Participatory Water Management
ICZM	Integrated Coastal Zone Management
IWM	Institute of Water Modelling
IWRM	Integrated Water Resources Management
KII	Key Informant Interviews
LGED	Local Government Engineering Department

Glossary

Beel	Low-lying area or waterfilled depressions; Beels are former tidal floodplains or low-lying lands that, after the establishment of polders, were converted into freshwater zones for agriculture.
Gher	Fish farms; mostly shrimp farms
Hari	The local land leasing mechanism which is prominently used in the shrimp farming sector (*Gher*).
Crore	Unit of Money; One crore means 10 million

Executive Summary

The Project "Tides are Changing: A People's Plan for Upscaling Ecosystem-based Adaptation (EbA) in the Tidal Rivers of Southwest Bangladesh," supported by the Global EbA Fund, is developed mostly based on water management perceptions of the local people. "The People's Plan" is a holistic approach using a participatory, bottom-up planning process in which the affected local people are the major decision-makers contributing to the plan. The People's Plan project consists of two pillars that will mostly support the implementation of Community-Based Tidal River Management (CBTRM) in the Betna and Morirchap-Labangabati River Basin. The pillars are as follows:

- A People's Plan for CBTRM: A participatory planning process has been undertaken with communities and local institutional stakeholders of the Betna-Morirchap-Labangabati River Basin.
- An inclusive governance model for CBTRM: A governance model has been developed in order to institutionally embed CBTRM, based on a thorough analysis of current institu-tional mandates pertaining to resource governance in the Betna-Morirchap-Labangabati River Basin.

The project consortium, consisting of Both ENDS, Uttaran and research institute Center for En-vironmental and Geographic Information Services (CEGIS) worked with local communities and local governments in the Betna-Morirchap-Labangabati River Basin in the Satkhira District to elaborate an innovative, inclusive and ecosystem-based approach that will enhance coastal resi-lience: Community-Based Tidal River Management.

The project focuses on a total of 955 km², including three administrative Upazilas: Satkhira Sadar (401 km²), Debhata (174 km²) and Assasuni (380 km²). Waterlogging is a significant issue in the region, especially during the late monsoon period, when approximately 30% of the total area remains submerged. Analysis for the first 15 days of September 2023 revealed that 29,995 hectares (or nearly 300 km2) were submerged, reflecting the severity of waterlogging in the region. To address these challenges, Bangladesh Delta Plan 2100 (BDP 2100) proposed five options. Of these, TRM offers the sustainable, nature-based community-supported approach. TRM is also expected to be the least expensive option, ensuring long-term benefits and providing a comprehensive solution to the region's complex environmental challenges.

Based on extensive field visits and a comprehensive evaluation of the low-lying areas in the Betna–Morirchap–Labangabati River Basin, this study identifies Tidal River Management (TRM) as the most suitable and sustainable approach to address persistent waterlogging, drainage congestion, and related socio-environmental challenges in the region. A total of 22 low-lying areas, known as beels, were assessed using hydrodynamic modeling, topographic surveys, hydro-morphological suitability checks and extensive community consultations. From this assessment, three categories of beels have been identified using a three-tier suitability framework:

ii. Tier A - Highly Suitable Sites (8 beels);
ii) Tier B - Moderately Suitable/Promising Sites (4 beels);
iii) Tier C- Not Suitable Sites (10 beels)

The first eight finalized beels in Tier A are strategically located in both the Betna and Morirchap-Labangabati catchments, with each phase of the project targeting specific areas based on their readiness and suitability. The implementation will take place in multiple phases, ensuring a focused and efficient long-term approach for maximum benefit. Below is the detailed breakdown of the selected beels and their respective implementation phases (1-4) under the CBTRM project.

Serial Number	Beel Name	River Name	Area (Ha)	Chainage (km)	Phase
1	Beurir	Morirchap	906.70	17.5	Phase 1
2	Daulatpur	Betna	691.41	12.8	Phase 1
3	Ticket-Govendapur	Morirchap	584.00	22.7	Phase 2
4	Amtali	Betna	343.15	21.06	Phase 2
5	Jheelmari	Morirchap	561.59	26.22	Phase 3
6	Kundur Danga	Betna	573.29	27.51	Phase 3
7	Bughmara	Morirchap	551.43	32.73	Phase 4
8	Athabishi	Betna	416.56	33.22	Phase 4

Importantly, the completion of these four phases will not mark the end of TRM in the Betna and Morirchap-Labangabati catchments. Rather, as a long-term vision, CBTRM will continue as a rotational process, with future attention directed toward low-lying areas categorized as Tier B-Moderately Suitable, while also identifying new sites that may emerge as viable through ongoing field assessments. Any subsequent phases will follow the same systematic approach of progressing upstream from downstream, ensuring continuity, adaptability and long-term sustainability of the intervention.

The first pair of TRM sites are the Beurir Beel in the Morirchap-Labangabati system and Daulatpur Beel in the Betna system, both of which have been studied in technical detail and are projected to require approximately four years to complete successfully. Beyond this initial stage, subsequent phases will be determined based on updated field data, hydrodynamic and morphological assessments, and evolving community perspectives. By avoiding a fixed timeline, the plan remains flexible, allowing future TRM initiatives to adapt to sediment dynamics, local socio-economic conditions and broader water governance needs as they emerge.

The People's Plan proposed an implementation action plan for the Phase 1 of the CBTRM with three stages of activities. The **Preparation Stage (approximately two years)** of the first phase of implementation focuses on institutional, social, and physical readiness. Key activities include establishing Water Management Organizations (WMOs), Livelihood Groups and Water Control Structure Committees to ensure community-based governance, implementation of transparent compensation processes to address socio-economic concerns, and preparation of infrastructure such as embankments, canals and outlet structures. **The Operation and Monitoring Stage (approximately four years)** centers on active TRM implementation, with emphasis on regulating tidal flows through inlets and outlets, managing sediment deposition and redistribution, applying nature-based erosion control measures, and ensuring routine maintenance of infrastructure. Continuous monitoring will guide mid-course adjustments, while community engagement will help sustain local ownership of the process. **The Post-TRM Completion Phase (approximately two years)** involves rehabilitating reclaimed land, clearing drainage channels and leveling plots for agricultural reuse.

The Community-Based Tidal River Management (CBTRM) intervention in the Betna-Morirchap-Labangabati River Basin is expected to have significant impacts on water resources, agriculture, fisheries and the overall socio-economic landscape of the region. In the Betna river catchment approximately 79.28% of the primary response zone (area close to TRM sites) will be free from waterlogging after implementation of CBTRM Phase 1. In the Morirchap-Labangaboti river catchment, this figure will be about 74.27%. In this study, the specific impact of CBTRM was assessed for only the Phase 1 of TRM, which will be implemented in Beurir and Daulatpur Beels simultaneously. Model simulations predicted that Daulatpur Beel is expected to rise by 1.11 to 2.83 meters, and Beurir Beel by 0.61 to 1.55 meters by approximately 2031 after completion. The average rise in land elevation is 2 meters in Daulatpur Beel and 1.11 meters in Beurir Beel, which shows the fact that uneven sediment distribution has been to a great extent addressed in this approach.

While the implementation of CBTRM in Daulatpur Beel and Beurir Beel will significantly improve the livelihoods of 2,207 directly dependent households, indirect benefits will also extend to the broader Betna-Morirchap-Labangabati river system area, which is home to approximately 211,402 households. This will significantly enhance agricultural productivity in the Betna-Morirchap-Labangabati River Basin. After the implementation of TRM, the agricultural land in Daulatpur is expected to rise by an average of 2 meters, while the adjacent river depth will increase by about 8 meters. It will restore navigability and drainage capacity of the river systems as well as remove silt load from the Kolpetua river, the downstream of Betna and Morichap-Labangabati rivers. After the implementation of CBTRM in two beels, year-round cultivation will be ensured and cropping intensity will increase from 174% to 292% in the study area. The improved river depth and habitat conditions are expected to support diverse fish species in the long term. The combined benefits demonstrate TRM's potential to transform agricultural productivity, fishery management and socio-economic conditions in the region. The total benefit increases from BDT 54.35 crore to BDT 129.71 crore, showing a net benefit of BDT 75.36 crore annually. Despite a decline in fish production, the significant increase in agricultural productivity, employment generation, and avoided costs from improved drainage and navigability highlights the positive impact of TRM on the region's socio-economic development.

In line with the principles of Adaptive Delta Management (ADM), this study emphasizes that CBTRM implementation should remain a learning, iterative and evidence-driven process rather than a static one-time intervention. To ensure that each phase of implementation is grounded in the most recent physical, social and institutional realities, four detailed feasibility studies (including Environmental and Social Impact Assessment and Environmental Management Plan) are proposed (one for each TRM phase). These studies will be strategically scheduled to precede their respective implementation phases, allowing for adaptive planning and continuous learning.

One of the major findings from community consultation and focus group discussions that took place to develop the People's Plan is that the main challenges in adapting CBTRM have to do with compensation and governance processes.

Compensation: During the CBTRM process, it is not possible to do any agriculture or aquaculture within the CBTRM basin area, since the beel gets inundated. It is therefore essential that the state compensate the local people, including not only those who own land inside the basin area, but also those who are dependent on the selected CBTRM beel for their livelihoods. Generally, the CBTRM process has been proposed for at least four years in a beel, which means that landowners will lose their main crops for a minimum of four years. These landowners may be marginal farmers whose livelihood depends on their land. Since their only source of income becomes obsolete during CBTRM implementation, the compensation amount needs to competitive and timely, so that the affected landowners will have no objection to the CBTRM process. Similarly, other people who are expected to be affected by CBTRM implementation need to be identified and appropriately compensated.

The implementation authority should strictly follow the land acquisition and reacquisition policy to provide the compensation for **Project-Affected Persons (PAPs).** Compensation should be given in different options, based on the type of PAP. For landowners, it could be **monetary crop compensation** in which cash is provided for lost crops. For PAPs who are not landowners, but are dependent on the TRM beel – such as leaseholders, sharecroppers, day laborers, *Gher (*Shrimp/fish farm) workers and other vulnerable groups – **alternative livelihood support** can serve as compensation. This may include providing job training, credit facilities, or access to alternative income-generating opportunities. **Alternative compensation programs**, such as providing substitute land, housing, livelihood opportunities, free treatment facilities and education of children can also be introduced for project-affected people. A **resettlement plan** is required because permanent land acquisition may be needed for construction of a link canal or other supportive interventions. The compensation distribution system should be easy and accessible. The distribution should be conducted in the project management office near the TRM beel and done by the assigned committee under the multi-stakeholder participation approach, which includes community WMOs, NGOs and CBOs, etc. To mitigate the complexity and ensure easy access to the compensation process, an inclusive governance

support is proposed in the CBTRM project.

Inclusive Governance: Inclusive governance has emerged as a fundamental approach to addressing the needs of diverse groups and communities. The present study aims to develop and propose an Inclusive Governance Model (IGM) to support the People's Plan for implementation of CBTRM in the Betna-Morirchap-Labangabati River Basin, which could also be applicable for other tidal river basins in the southwest coastal area in Bangladesh. This model encourages the adoption of specific strategies that seek to optimize the government's response to those groups. IGM is conceptualized as a structured approach to decision-making that ensures equitable representation, participation and collaboration of diverse stakeholders within the system. It defines the gaps in existing policy and practices in the Bangladesh delta water management system. The proposed IGM also recommends a logical modification and update of the existing policy or rules in participatory water management to ensure the following:

- PAPs analysis
- Multi-stakeholder participation
- Compensation
- Feasible resettlement action plan
- Guidelines for alternative livelihoods support

To bridge policy and strategic gaps in the current water management system, the implementation mechanism should be transformed towards a local or basin-wise management approach and participation of different level of water management actors and their actions should be rearranged. The following recommendations would ensure community participation:

a. Practice an integrated approach in a defined / registered Multi-Stakeholder Forum (MSF)
b. Develop a Participatory Decision Support System (PDSS) to support the MSF
c. Efficient and Responsive Operation and Maintenance Services (O&MS)
d. Transparent Compensation Distribution System (CDS)
e. Effective Advocacy and Communication System (A&CS)
f. Conflict Resolution System (CRS) for dealing the Conflicts

It is expected that the IGM will help transform TRM into a dynamic, phased and resilient delta management process – one that simultaneously advances scientific understanding, community empowerment and sustainable water governance in the southwest coastal region of Bangladesh. To ensure the effective participation of community people, a systematic framework of Water Management Organizations (WMOs) is suggested in the water governance system. It will include WMOs in villages (Village committees) and intervention-based committees (Beel committees and Sluice Gate committees). Representatives of Union Parishad, Land, Agriculture and Fisheries Office, Bangladesh Water Development Board etc. and representatives of various professions and categories will be included the CBTRM Beel Committee. These committees should have at least 30% women members.

A structured **Monitoring and Evaluation System** is required throughout the project, and especially during the post implementation phase. Effective and inclusive participation of different levels of stakeholders should be monitored to enhance the functionality and benefit of the project. Monitoring and evaluation of responsiveness, accountability, transparency and equity is required as the government agency and their actions come to a close. (It should be noted that the coordination and advocacy program should continue at the regional level under the Multi-Stakeholder Forum.)

CBTRM must not be proposed as a project limited to four phases, but rather as a continuing, rotational process that adapts to changing hydrological, environmental and social conditions. This forward-looking plan positions TRM as a platform for ongoing delta resilience, livelihood diversification, and climate-smart water governance, ensuring that even after the first implementation cycle is completed, the process remains viable, scalable and adaptable for decades to come.

CHAPTER 01

Introduction

0.1. Background

Bangladesh's southwest coast, home to six million people, is a major climate hotspot. It is also an area that is among the world's most vulnerable to disasters caused by sea level rise, tidal surges, increased salinity and cyclones (Shaw et al, 2022). This vulnerability is exacerbated by the deterioration of the ecosystems caused by the coastal embankments that created the polders built in the 1960s (Dewan et al., 2015). The polders initially brought significant economic benefits; however they also caused enormous negative impacts to the environment and the society of this active tidal area. The large infrastructure cut off the tidal rivers from floodplains, leading to an accumulation of sediment on the riverbeds (Sarker, 2004; Mutahara et al, 2017). As a consequence, most of the region's tidal rivers have lost their tidal nature and drainage capacity. Meanwhile, many tidal rivers in southwest Bangladesh have lost their transboundary upstream connectivity (Sarker, 2004; Mutahara et al, 2017). Taken together, these factors have resulted in waterlogging (i.e. the complete saturation of land areas for prolonged periods, up to several months per year) in a larger area of the river basin during most of the year. In response to waterlogging, shrimp farming was adopted in the area, and the sector amassed significant political influence. Shrimp farming has caused higher soil salinity and scarcity of fresh water sources (Mutahara et al., 2017). Finally, drainage capacity within polders has further deteriorated due to encroachments on the riverbed (Sakkhar, 2017).

In sum, ecosystem degradation and chronic waterlogging have affected people's livelihoods and adaptive capacities, and these problems are worsening with sea level rise (Jisan et al., 2018). Temporary migration is an adaptive strategy for some households. But the southwest is among the country's economically poorest regions, and most marginalized groups do not have the ability to migrate, thus remaining trapped in a state of poverty and climate vulnerability. The vulnerability of a household is largely determined by the location of a settlement. Household located on tidal surge-prone embankments or in low-lying areas prone to waterlogging are especially vulnerable, particularly children, women and the elderly, as they often stay behind in unhealthy waterlogged conditions when men migrate to cities in search of jobs during monsoon (Sakkhar, 2014; Mutahara et al., 2020).

Within the southwest region of Bangladesh, the three coastal districts of Jashore, Khulna and Satkhira in particular have experienced severe waterlogging problems for the last 35 to 40 years, and the situation is worsening (Uttaran, Paani Committee, CEGIS, IWM, 2013). The government has implemented several scattered initiatives to resolve the problem, a few of which are ongoing. Most of the past initiatives, however, were neither fully successful nor completely accepted to the local community. None of the initiatives took into account the perspectives of local communities. Previously, the Government of Bangladesh tried to address waterlogging through improved polder management, including Tidal River Management (TRM), but community people from the area were often not consulted or invited to participate, even when such projects would affect their households and livelihoods. Small landowner and landless people are especially vulnerable to top-down interventions under the existing governance system, which fail to include local perspectives, participation and partnerships, or provide legal means to claim compensation (Mutahara et al., 2017; Uttaran, Paani Committee, CEGIS, IWM, 2013).

Together with community people and other stakeholders, this project therefore has conceptualized a community-based approach to implement TRM – Community-Based Tidal River Management (CBTRM) – and tackle waterlogging through the restoration of the tidal river basins. The major concern of this project

is the Betna-Morirchap-Labangabati River Basin of Satkhira District. This basin has been facing serious riverbed sedimentation, which eventually results in never-ending waterlogging inside the basin area.

The project "Tides are Changing: A People's Plan for Upscaling Ecosystem-based Adaptation (EbA) in the Tidal Rivers of Southwest Bangladesh," supported by the Global EbA Fund, is developed mostly based on water management perceptions of the local people. "The People's Plan" is a holistic approach using a participatory, bottom-up planning process in which the affected local people are the major decision-makers contributing to the plan. The People's Plan project consists of two pillars that will mostly support the implementation of Community-Based Tidal River Management (CBTRM) in the Betna and Morirchap-Labangabati River Basin. The pillars are as follows:

A People's Plan for CBTRM: A participatory planning process has been undertaken with communities and local institutional stakeholders of the Betna-Morirchap-Labangabati River Basin that addresses hydrology, (community) resource management and livelihood planning under CBTRM. This process has been done through workshops and focus group discussions (FGD) whereby particular attention has been paid to the meaningful participation of women, youth, and other marginalized groups.

An inclusive governance model for CBTRM: A governance model has been developed in order to institutionally embed CBTRM, based on a thorough analysis of current institutional mandates pertaining to resource governance in the Betna-Morirchap-Labangabati River Basin. Particular emphasis has been given to the necessary institutional reforms for safeguarding community ownership within CBTRM.

The project consortium, consisting of Both ENDS, Uttaran and research institute CEGIS worked with local communities and local governments in the Betna-Morirchap-Labangabati River Basin in the Satkhira District to elaborate Community-Based Tidal River Management, an innovative, inclusive and ecosystem-based approach that will enhance coastal resilience.

1.2. The Problem Statement

The coastal area of southwestern Bangladesh is flat with an estimated 21% of the area having an elevation of less than 1 meter above mean sea level (Islam, 2021). At the same time, the land in the southwest area is subsiding 3-4 mm per year (Steckler, 2021). Before construction of the embankments that enclosed the polders, subsidence was compensated by sedimentation during seasonal flooding of the delta flood plain. However, the embankments have largely prevented any natural sedimentation from the tidal rivers to flow into the floodplains. In addition, due to tidal asymmetry caused by the disconnecting of upstream flow, the tidal rivers became silted and lost their navigability.

1 Tidal asymmetry in a tidal river is the difference in magnitude and duration between ebb (longer duration with lower velocity) and flood tidal (shorter duration with faster velocity) currents, which causes sedimentation when the velocity is low and hence a net sediment transport from the ocean land inward.

The main problem of the target area is the increasing severity of waterlogging in recent years, which affects people's lives and livelihoods, as well as their health and well-being, and the destruction of floodplain ecology and loss of biodiversity.

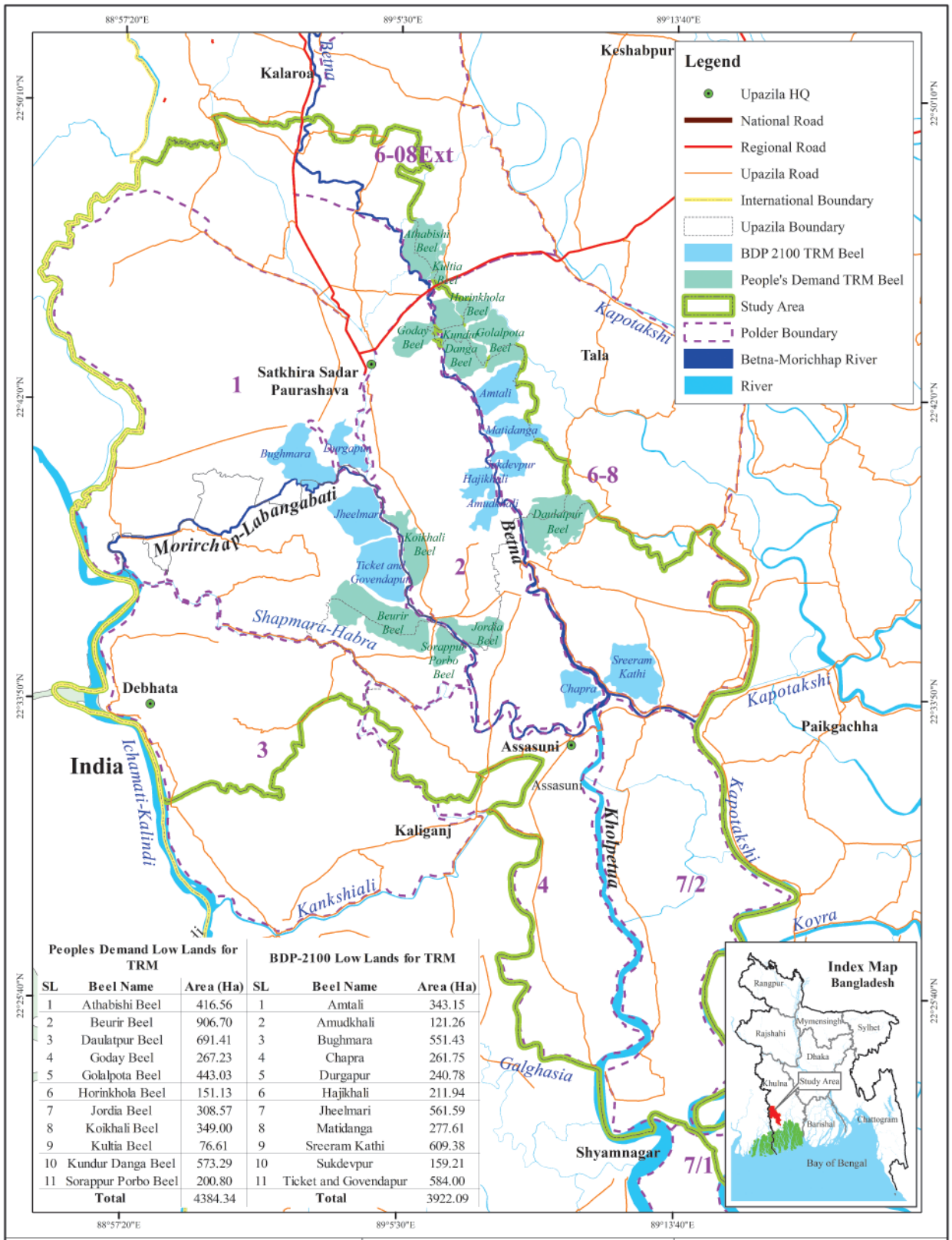
Betna, Morirchap-Labangabati, and Kholpetua are the three major rivers in the southwest area of Bangladesh delta. However, at present, the Betna and Morirchap-Labangabati rivers are sedimented to an extent that they are hard to recognize as rivers (see Figure 1.1). According to field observation and people's vperceptions, the Betna-Morirchap-Labangabati is one of the major vulnerable tidal river systems in Satkhira District. 937,696 people live within the river basin area (administrative area of Satkhira Sadar, Debhata and Assasuni Upazila (sub-district) under the Satkhira District). Both the Betna and Morirchap-Labangabati rivers meet at Assasuni and form the Kholpetua River.

Tidal asymmetry in a tidal river is the difference in magnitude and duration between ebb (longer duration with lower velocity) and flood tidal (shorter duration with faster velocity) currents, which causes sedimentation when the velocity is low and hence a net sediment transport from the ocean land inward.

Figure 1.1 a) Existing Problems in the Betna River

Figure 1.1 b) Existing Problems in the Morirchap-Labangabati River

The study area spans a total of 955 km², including three administrative upazilas: Satkhira Sadar (401 km²), Debhata (174 km²) and Assasuni (380 km²). The major rivers in the region are the Betna (48 km), Morirchap-Labangabati (46 km), and Kholpetua (25 km) (see Map 1.1).



Peoples Demand Low Lands for TRM

SL	Beel Name	Area (Ha)
1	Athabishi Beel	416.56
2	Beurir Beel	906.70
3	Daulatpur Beel	691.41
4	Goday Beel	267.23
5	Golalpota Beel	443.03
6	Horinkhola Beel	151.13
7	Jordia Beel	308.57
8	Koikhali Beel	349.00
9	Kultia Beel	76.61
10	Kundur Danga Beel	573.29
11	Sorappur Porbo Beel	200.80
	Total	4384.34

BDP-2100 Low Lands for TRM

SL	Beel Name	Area (Ha)
1	Amtali	343.15
2	Amudkhali	121.26
3	Bughmara	551.43
4	Chapra	261.75
5	Durgapur	240.78
6	Hajikhali	211.94
7	Jheelmari	561.59
8	Matidanga	277.61
9	Sreeram Kathi	609.38
10	Sukdevpur	159.21
11	Ticket and Govendapur	584.00
	Total	3922.09

Data Sources:
National Water Resources Database (NWRD), 2011,
WARPO and CEGIS Archive
Bangladesh Water Development Board, 2022

0 4 8 km

Projection:
Bangladesh Transverse Mercator (BTM)
Datum - Gulshan 303

CEGIS
Center for Environmental and Geographic Information Services

Map 1.1: Study Area Map (CEGIS, 2025)

A total of seven polders lie within the study area. Polder-1, Polder-2, and Polder-7/1 fall completely inside the study area, whereas Polder-3, Polder-4, Polder-6-8, and Polder 6-8 ext. lie partially inside the study area. For the last three years, all the rivers within Polder No. 1, 2, 6-8 have been undergoing re-excavation. The project area has no alternative drainage system during monsoon season, which has resulted in increased suffering due to inundation. People say that the river Betna-Morirchap-Labangabati lost its width and has been turned into a canal due to the excavation (see Figure 1.1). The excavated soil was kept in a disorderly manner on both banks of the rivers. During the monsoon, the soil was washed back into the river. The sediments brought in by the tides filled the river again due to the lack of open floodplains on both sides. Moreover, the monsoon water from upstream of the river systems was obstructed due to the cross dam, which was constructed during river excavation work and not removed in time. Consequently, the lower Kholpetua river (downstream of the Betna-Morirchap-Labangabati river system) is also rapidly filling up. As a result, waterlogging has become a severe problem in this region, especially during the late monsoon period.

Although the extent of waterlogging in the project area has fluctuated in recent years, there is a trend of increased waterlogging every other year (Figure 2.2).

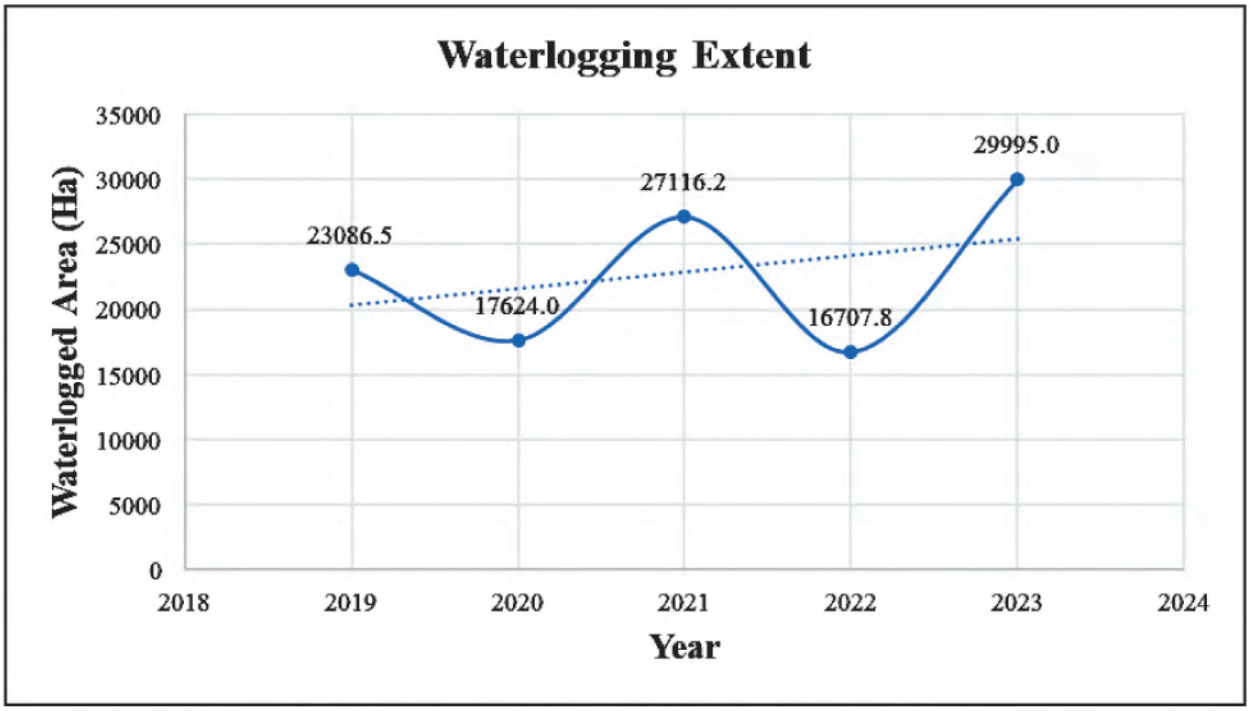
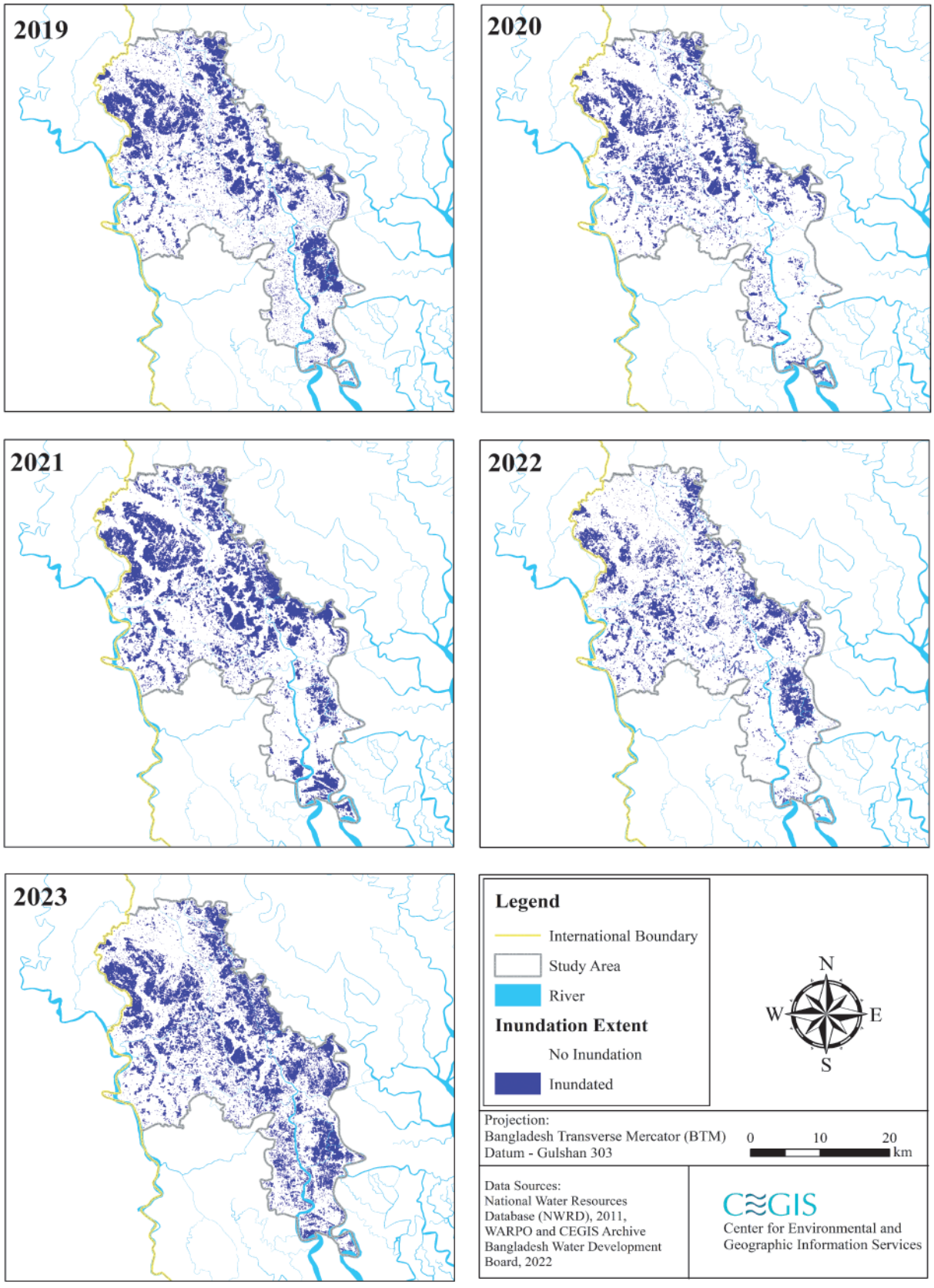


Figure 1.2: Waterlogging Extent Trend of the Project Area

The Remote Sensing analysis (Sentinel-1 imagery was used to assess the extent of waterlogging) for the first 15 days of September 2023 revealed that about 30% of the study area, 29,995 hectares (or nearly 300 km2), were submerged, which reflects the severity of waterlogging in the region (see Map 1.2).



Map 1.2: Waterlogging Extent of the Project Area 2019-2023 (CEGIS, 2025)

1.3. The History of Tidal Water Management

Before the 1980s, waterlogging and drainage congestion in the Bangladesh delta were rare (Tutu, 2005; de Die, 2013). Since then, however, due to both natural and human interventions, they have become a severe problem in the southwest coastal area. Historically, people in the southwestern part of the Bangladesh delta used indigenous approaches to protect their agricultural lands from flooding and salinity intrusion, such as construction of freshwater reservoirs ('Jwaradhars') or earthen embankments ('Bandhs') for the eight dry months of the year (November to mid-June) (Tutu, 2005). During the monsoon months, natural river floods would sweep away the temporary embankments, and floodplains gained silt as part of the natural delta formation, which would also make their lands more fertile.

Shifting from the traditional approach, infrastructural water management was introduced in the Bangladesh delta with the large-scale Coastal Embankment Project (CEP) proposed by the East Pakistan - Water and Power Development Authority (EP-WAPDA) after severe flooding in 1954 (Dewan et al., 2015). This hydraulic engineering project was completed in 1975, covering over 400,000 hectares of area along the entire coast. Under the CEP, the largest structural interventions of 39 polders, 1566 Kilometers of embankment and 282 sluice gates were constructed in the Khulna Circle, the most southwestern part of the delta, to protect the area from tidal flooding and rising salinity and to support agricultural development (Dewan et al., 2015; Kibria, 2011). Good project performance was seen and crop production was outstanding until the 1980s. Gradually, sedimentation of the rivers, drainage congestion and waterlogging increased (Nowreen et al., 2014, Mutahara. et al, 2017). Delta dwellers started to face another major impact of the full flood-control project, as sediment built up on river beds and polders became detached from the rivers. With far less fresh water pressure from upstream, most rivers in the southwest area began silting up by trapping the huge sediment load coming from downstream (from the Bay) in the months of March, April, and May. In most cases, the elevation of the river bed became higher than the embanked floodplains, and caused severe waterlogging within the polders.

Inhabitants began raising their voices against infrastructural coastal engineering only in the 1990s (Khadim et al., 2013). As the government agency (Bangladesh Water Development Board, BWDB) was not attentive to their complaints, people themselves took the initiative to organize and mobilize the community, and devise plans for solving the problem. From their own experience and observation, people recognized that if tidal flows can be made free and reconnected to their original floodplains, the navigability of the rivers would be restored and the enclosed lands would be free from waterlogging. In September 1990, the polder of Dakatia Beel (a low-lying area located in the Hamkura and Solmari-Salta River catchment at Khulna District) was breached in four places by the community people. This embankment cut led to an immediate removal of waterlogging in those areas. About 1000 hectares of highland were gained in the Dakatia Beel area, which became suitable for rice production within two years (Mutahara et al. 2017). The concept of embankment cutting later became known as Tidal River Management (TRM) (Figure 1.2).

The term "Tidal River Management" does not refer to managing the water in the rivers (or estuary), but rather managing the silt that comes with tidal flood water from the sea, and which, because of the embanked polders, has no place to go except partially back to the sea (during low tide) or onto the riverbed. Management is needed to keep the estuary and rivers 'alive' with tidal flood plains that remain low enough to allow polder water to drain into the estuary, and fish (and other flora and fauna) to live in these tidal rivers (Uttaran, 2023).

Conceptually, TRM not only mitigates waterlogging, but is also a tool for adaptation measures against sea level rise, soil subsidence, tidal surge, flood and drought. By restoring the natural function of the tidal ecosystem, TRM also enriches the biodiversity of the local area. TRM is based on knowledge that has been passed on to people for generations.

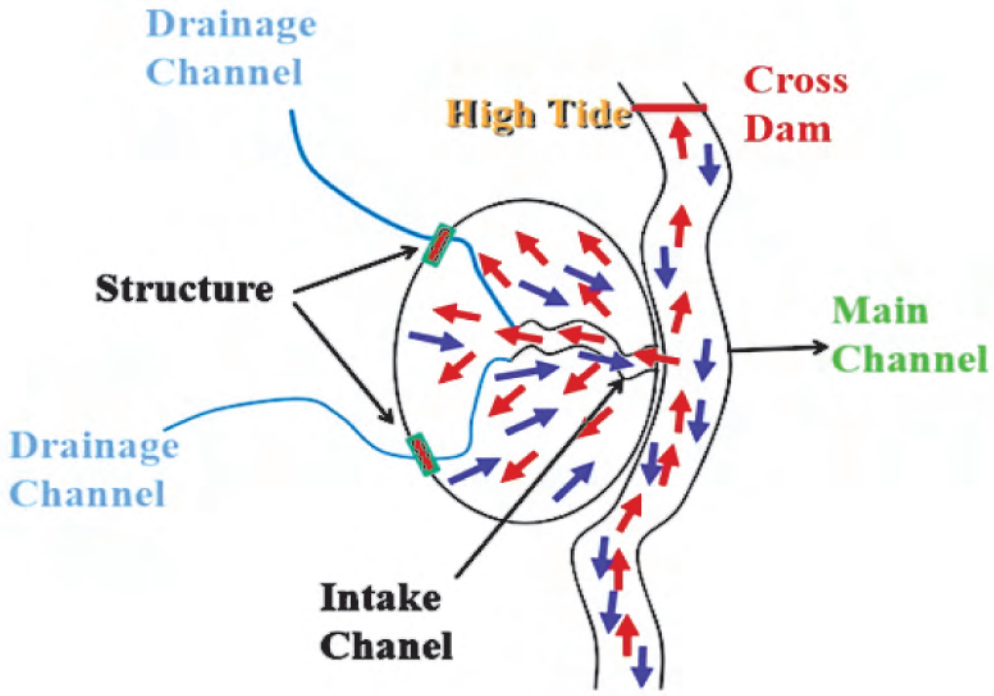


Figure 1.3. Fundamental Concept of TRM

The Bangladesh Water Development Board originally could not accept this public concept of sediment management and ignored the community-proposed TRM approach in the Khulna-Jeshore Drainage Rehabilitation Project (KJDRP). The government had set up KJDRP in 1994 in about 100,600 ha area (25% of the CEP area), located between the Khulna and Jeshore Districts, to mitigate constant flooding and improve drainage capacity in tidal rivers (IWM, 2007 and CEGIS, 2008). Although KJDRP was defined as the application of an Integrated Water Resource Management (IWRM) approach in Bangladesh (Gain et al., 2017), the concerned government authority did not integrate the community-initiated river management option.

However, in 1997, the local community again successfully implemented another TRM in Bhaina Beel, in the Hari-Mukteswari River system, within the KJDRP (EGIS I, 2001; Mutahara et al. 2017). After only three years, around 650 hectares of land in the Bhaina Beel floodplain was elevated by 1.0 to 1.5 metres. However, observing the result of the community-initiated TRM, and due to the strong influence of donor agencies (e.g., Asian Development Bank (ADB), the Dutch government, etc.), BWDB officially took up large-scale TRM under KJDRP in 2001 (Amir et al., 2013). Before that, in December 1998, a special project administration mission of the ADB concluded that "the Tidal River Management option is technically feasible and also attractive from the social and environmental point of view" (Aide Memoire, December, 1998).

Through the official introduction of the TRM process, water management in the Bangladesh delta had an opportunity to shift away from a structural management system to a participatory management system (Wesselink et al., 2015). Formalization of TRM as a government project created space for initiating bottom-up approaches in the Bangladesh delta water management system (Seijger et al., 2019; Mutahara et al., 2020). BWDB subsequently initiated three TRMs in KJDRP: Kadaria TRM (2002-2005); Khuksia TRM (2007-2012) and Kapalia TRM (2013, not implemented). However, BWDB failed to facilitate a truly participatory process in implementing TRM and, since 2013, no new TRM projects were developed in the Hari River system. The last TRM project was implemented in Pakhimara Beel, belonging to the Kabodak

river (locally called Kopotakkho) basin in Satkhira District from 2015 to 2021. But no TRM has operated since Pakhimara, due to lack of good water governance. Nevertheless, TRM has been included as a key mitigation strategy against waterlogging in various government projects and policy tools, such as the 20-year master plan on Polder 1, 2, 6 and 6-8 and the BDP 2100.

The features of the tidal wetlands of the southwest coastal Bangladesh and their adjacent river systems are unique compared to other tidal rivers of the country. Local communities depend on this unique river ecology and the Sundarban (Mutahara et al., 2017). Everyone – from academics to practitioners, from government to non-government organizations – agrees that the rivers of the southwest coastal region need to be protected in order to ensure that local communities and the natural ecosystem thrive (Sakkhar, 2017). Based on 25 years of practical experience and research (by academics, as well as government agencies such as CEGIS, IWM, etc.), communities and other stakeholders have found common ground in TRM, and see it as the best possible option to restore and revive the rivers of southwest Bangladesh, and mitigate the waterlogging crisis (CEGIS, 2010; Sakkhar, 2014). Several government, non-government and scientific organizations have proven that TRM is environmentally friendly and highly appreciated by local people (Amir et al., 2013; Mutahara et al, 2020). The recently developed Bangladesh Delta Plan 2100 specifically addressed the problem of siltation in the rivers and the resulting waterlogging problems, especially in the southwest region of the polder areas. It includes a suggestion to take up TRM pilot projects for the coastal zones, supported by research studies on tidal sediment management (GoB, 2018). As such, this project contributes directly to the BDP 2100.

CHAPTER 02

A People's Plan for Enhancing Coastal Resilience: A Community-Based and Integrated Approach

2.1. People's Plan: A Community-Based Approach

Development of a People's Plan entails an inclusive approach using a participatory, bottom-up planning process in which affected local people are the major decision-makers contributing to the plan. In order to ensure an equitable outcome, the process ensures the meaningful participation by and contributions from women, youth and other marginalised groups within society. The objective is to develop a concrete plan for ecosystem-based adaptation that enjoys local ownership and support from both local communities and local government authorities, providing a strong basis for the central government authorities to ensure its effective implementation.

The People's Plan for the Betna-Morirchap-Labangabati River Basin has been developed with communities and local institutional stakeholders of the area. The plan addresses hydrology, (community) resource management and livelihood planning for ecosystem-based adaptation in the southwest coastal region. Discussion with local people showed that they envision an approach that can alleviate waterlogging, keep rivers alive, tackle tidal flooding, control unplanned shrimp farming, contribute to a healthy environment, ensure proper maintenance of polder infrastructure, and encourage inclusive governance in which people and other stakeholders participate. In order to ensure that the above-mentioned, interrelated problems are addressed in a systematic and sustainable manner, the two-year planning process to develop the People's Plan focused on elaboration of a plan for Community-Based Tidal River Management. This ecosystem-based approach was chosen based on the demand from the people in the region to implement a truly community-based TRM.

2.2. The Methodology for Developing the People's Plan

The process to develop the People's Plan included seven main building blocks: 1) Identification and delineation of water system, 2) Awareness raising and empowering communities 3) Formation and strengthening local institutions 4) Joint fact-findings and situation analysis 5) Identifying pathway and scenarios for CBTRM, 6) Feedback on the Draft People's Plan 7) Handing over the People's Plan (Figure 2.1).

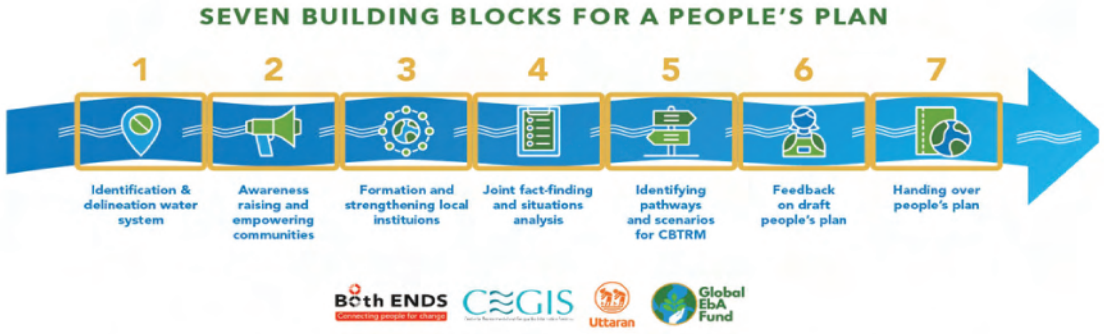


Figure 2.1: The Methodological Approach for the People's Plan for CBTRM

These seven building blocks have, in practice, allowed for a more dialectic approach by ensuring interaction between local/community knowledge and experiences and scientific insights (e.g., hydrological and sediment modeling for the river basin in different scenarios). This dialectic approach has enriched the People's Plan with new insights, making it contextually more appropriate and building local ownership of the approach among the local people, the local government, and other relevant stakeholders.

An inclusive planning approach has been paramount to ensure a socially equitable process and outcome. From a technical point of view, the participatory, bottom-up approach is also essential for avoiding pitfalls of earlier applied interventions in the region, particularly Tidal River Management, which failed due to a lack of social inclusion, resulting in social resistance. The key methods to interact with local stakeholders and collect information were Multiple Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs). Public Consultation Meetings (PCMs) were also conducted for documenting community knowledge about previous TRM experiences and to understand perceptions of risks and benefits.

For the technical and scientific study, the overall approach has included three major components. These components are: **(i) Review of data and literature, (ii) Environmental Assessment, and (iii) Feasibility Assessment.** Required data collection and review of literature were an essential part of the development of the project. Following this step, different sectoral assessments were conducted, namely water (modeling), agriculture, fisheries, ecology and socio-economic assessments for analysing the feasibility of CBTRM in this particular tidal river basin. An Environmental Management Framework (EMF) was suggested to complete the feasibility of the planning.

An **Inclusive Governance Model** has also been developed to institutionally embed the People's Plan for the CBTRM. A comprehensive review of existing policy and practices for water governance in Bangladesh was conducted to identify gaps with respect to planning and implementing CBTRM. The reports of previous TRM practices under KJDRP and Kobadak (Kopotakkho) River Restoration Project (2010-2011), and publications on the latest TRM practice in Pakhimara Beel were reviewed for information relevant to the current study. Several informal interviews with policymakers, researchers, CSO and NGO representatives, journalists, and community members were conducted at the local and national level to justify the recommendations for a participatory basin-level governance system. Several stakeholder consultation meetings were done in both the Betna and Morirchap-Labangabati River Basin area in Satkhira. Important discussions were conducted with Paani Committees in both river basins, and with other interested community and social organizations involved in water management activities in the southwest coastal area. The draft People's Plan for CBTRM was developed based on the above-mentioned assessments and their results. The feedback on the draft was incorporated into the final People's Plan.

CHAPTER 03

A People's Plan for CBTRM for the Betna-Morirchap-Labangabati River Basin

3.1 CBTRM: The Solution People Proposed

The **Community-Based Tidal River Management** approach has its origins in community-initiated tidal basin management. Community-based TRM was informally practiced in the early 1990s in Beel Dakatia (Hamkura River basin in Khulna District) and in 1997 in Beel Bhaina (Hari-Mukteswari River basin in Jeshore District), where local community people breached or cut the river embankment to get rid of stagnant water stuck inside the polder and to remove waterlogging in surrounding villages. The community-initiated practice of TRM in Beel Bhaina was widely recognized by environmental scientists as being a climate-proof and sustainable management option for the revival of tidal rivers in southwest Bangladesh.

Technically, CBTRM is premised on the coordinated and controlled opening of polders within a river basin, to allow sediment-rich water into adjacent tidal floodplains during high tide (see Figure 1.2 in Chapter 1). As the low tide sets in, sediment-free water rushes back forcefully into the river and toward the Bay of Bengal. This strong reverse flow naturally scours the riverbed, aiding in self-excavation. By doing so, the drainage capacity of rivers is increased while agricultural land is elevated and revitalized, thus strengthening the adaptive capacity of communities through increased flood resilience and improved agricultural production.

In 2013, BWDB prepared a Master Plan to manage the silt coming into the sedimentation-prone rivers in the southwest coastal region of Bangladesh, which included Tidal River Management as a short- to medium-term solution of waterlogging problems. The Master Plan suggested measures in Sathkhira, Jessore, and Khulna areas. For the drainage improvement of Polders 1, 2, 6-8 & 6-8 (Ext.) under Satkhira District, a project was proposed covering Kolaroa, Satkhira Sadar, Debhata, Assasuni, and Tala Upazilas. The drainage system of this area comprises Ichamati, Morirchap-Labangabati, Betna, Parulia Sapmara, Kholpetua, and Kobadak Rivers, and Satkhira Khal, along with a vast network of internal drainage khals. At present, these rivers have lost their conveyance capacity significantly due to river bed siltation. The Master Plan provided a comprehensive water management plan for polders 1, 2, 6-8, and 6-8 (Ext.) and management of sediment for the restoration of these rivers and adjacent drainage khals through TRM and structural measures.

The Bangladesh Delta Plan 2100 also outlines TRM as one of the five potential solutions, which range from conventional engineering approaches to nature-based strategies. It also agreed that TRM is one of the most viable strategies for sustainable water management in the southwest coastal region (GoB, 2018). However, the effectiveness of TRM and its sustainable adaptation has become uncertain based on previous experiences described above. Moreover, as a polder-level intervention, TRM practices inevitably have downstream implications, which remain largely unknown under the current approach. Thus, for the potential of TRM to be fully realized, it needs to be scaled to a basin-level approach, whereby the impacts of polder-opening on the broader basin are understood and managed in a coordinated manner. This, in turn, requires that changes to land and resource use resulting from polder opening are properly understood and offset through benefit-sharing mechanisms and livelihood alternatives. Since the success of the TRM approach ultimately hinges upon its acceptance by river-basin communities, a strong sense of local ownership is paramount. It is these challenges that CBTRM seeks to address.

3.2. Planning Actions of CBTRM in Betna-Morirchap-Labangabati River Basin

Based on an extensive field visit and a comprehensive evaluation of the beels in the Betna-Morirchap-Labangabati River Basin, the technical study report confirms Tidal River Management (TRM) as the most suitable management option to address the region's pressing environmental challenges and to provide sustainable, climate-adaptive livelihoods.

The process of selecting the most suitable beels for CBTRM implementation in the Betna-Morirchap-Labangabati River Basin was rooted in a multidisciplinary and community-inclusive framework. A comprehensive assessment of 22 potential beels was undertaken, combining insights from hydrodynamic modeling, geomorphological analysis, socio-economic factors, and local knowledge. Of these, 11 beels were mentioned in the Bangladesh Delta Plan 2100, while the remaining 11 were newly identified through intensive field visits, stakeholder discussions, and public consultations. The assessment process considered both the criteria outlined in the BDP 2100 and the suggestions of local people. There were four interconnected criteria: hydro-morphological conditions, size and shape of the low-lying land area, proximity to infrastructures, and community willingness to apply CBTRM in the particular beel (Figure 3.1).

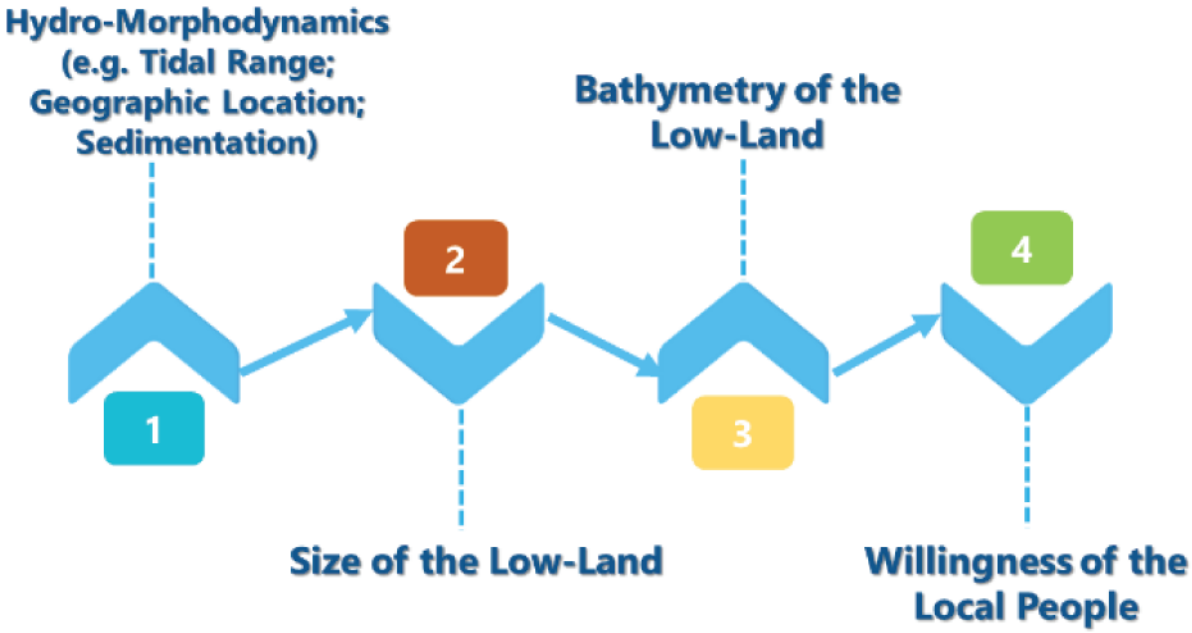
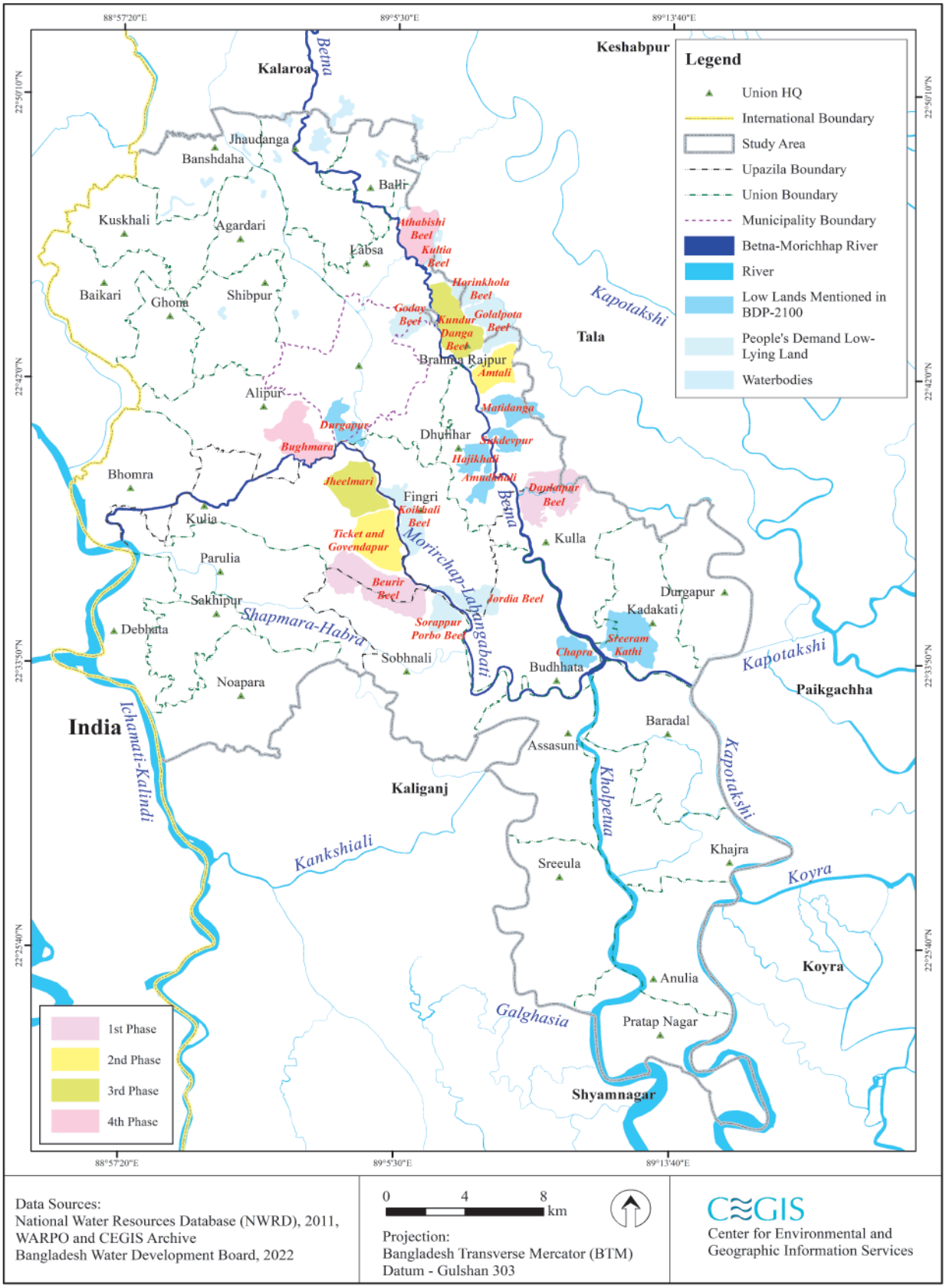


Figure 3.1: Process of Beel (Low-Land) Selection Was Based on Four Interconnected Criteria

After careful assessment and extensive field consultations, the technical study team has selected eight beels in which to start operation of the CBTRM process. These were considered Tier A – Highly Suitable Sites (green). The selected beels are all located within the administrative boundary of the project area in the Betna-Morirchap-Labangabati River Basin (Table 3.1 and Map 3.1). Four beels were considered Tier B – Moderately Suitable Sites (orange). In the future, the CBTRM process could be continued in these Tier B beels. An additional ten beels were considered Tier C (red) – Not Suitable. It should be noted that other possible beels within the administrative area and upstream were not investigated during the current study.

Table 3.1 Suitability Matrix of the Beel Areas for CBTRM Implementation in the Betna-Morichap-Labangabati River Basin

SL	Potential Beel and River Basin	Suitability Tier	Upazila	Average Elevation of the Beel Area (m above MSL)	Area (Ha)
1	Amtali (Betna)	A	Satkhira Sadar, Tala	0.49	343.15
2	Matidanga (Betna)	B	Satkhira Sadar, Tala	0.68	277.61
3	Sukdevpur (Betna)	C	Satkhira Sadar	0.49	159.21
4	Hajikhali (Betna)	C	Satkhira Sadar	0.79	211.94
5	Amudkhali (Betna)	C	Satkhira Sadar	0.59	121.26
6	Chapra (Betna)	C	Assasuni	0.54	261.75
7	Sreeram Kathi (Betna)	B	Assasuni	0.70	609.38
8	Bughmara (Morirchap-Labangabati)	A	Satkhira Sadar, Debhata	0.85	551.43
9	Durgapur (Morirchap-Labangabati)	C	Satkhira Sadar	0.74	240.78
10	Jheelmari (Morirchap-Labangabati)	A	Debhata	0.94	561.59
11	Ticket & Govendapur (Morirchap-Labangabati)	A	Debhata	0.47	584.00
12	Sorappur Porbo Beel (Morirchap-Labangabati)	C	Assasuni	0.59	200.80
13	Koikhali (Morirchap-Labangabati)	B	Satkhira Sadar	0.80	349.00
14	Beurir (Morirchap-Labangabati)	A	Assasuni, Debhata	0.30	906.70
15	Jordia (Morirchap-Labangabati)	B	Assasuni, Satkhira Sadar	0.55	308.57
16	Goday (Betna)	C	Satkhira Sadar, Tala	1.05	267.23
17	Golalpota (Betna)	C	Satkhira Sadar, Tala	0.53	443.03
18	Horinkhola (Betna)	C	Satkhira Sadar, Tala	0.60	151.13
19	Kundur Danga (Betna)	A	Satkhira Sadar, Tala	0.78	573.29
20	Kultia (Betna)	C	Satkhira Sadar, Tala	1.11	76.61
21	Athabishi (Betna)	A	Satkhira Sadar, Tala	1.04	416.56
22	Daulatpur (Betna)	A	Satkhira Sadar, Tala, Assasuni	0.78	691.41
			Overall Beel Area		**8306.42**



Map 3.1: Selected Beels (Low-lying areas) for the CBTRM in the Betna-Morichap-Labangabati River Basin

The eight selected beels feature low average bed elevations, typically below or near one meter Mean Sea Level (MSL), allowing for effective tidal water retention and sediment deposition. Moreover, their proximity to the Betna and the Morirchap-Labangabati river systems ensure the effective movement of tidal flux, a critical factor for the success of TRM. The selected areas also align with community demand for solutions to waterlogging, making them highly suitable for the intervention. The selected beels fulfilled the requirements, ensuring that CBTRM will not only manage waterlogging and improve river connectivity, but also provide long-term agricultural, fisheries, ecological and socio-economic benefits to the region.

The eight beels are strategically located in both the Betna and Morirchap-Labangabati catchments, with each phase of the project targeting specific areas based on their readiness and suitability. The implementation will take place in multiple phases, ensuring a focused and efficient long-term approach for maximum benefit. Below is the detailed breakdown of the selected beels and their respective implementation phases (1-4) under the CBTRM project (Table 3.2).

Table 3.2 Selected Beels for the CBTRM Project

Serial Number	Beel Name	River Name	Area (Ha)	Chainage (km)	Phase
1	Beurir	Morirchap	906.70	17.5	Phase 1
2	Daulatpur	Betna	691.41	12.8	Phase 1
3	Ticket-Govendapur	Morirchap	584.00	22.7	Phase 2
4	Amtali	Betna	343.15	21.06	Phase 2
5	Jheelmari	Morirchap	561.59	26.22	Phase 3
6	Kundur Danga	Betna	573.29	27.51	Phase 3
7	Bughmara	Morirchap	551.43	32.73	Phase 4
8	Athabishi	Betna	416.56	33.22	Phase 4

3.3. Implementation Action Plan for CBTRM

To ensure that TRM is implemented in a structured, evidence-informed, and institutionally embedded manner, a phased and rotational framework has been proposed. The approach introduces a Paired-beel Operational Model (POM), in which TRM interventions are carried out concurrently in one beel area each from the Betna and Morirchap-Labangabati catchments during every implementation phase. Through this model, the hydrological and ecological benefits extend beyond the individual intervention sites to the wider Betna and Morirchap river systems, including the Kholpetua, ensuring balanced outcomes across both basins. POM also provides opportunities for parallel learning, optimization of resources, and the efficient use of institutional and community infrastructure.

The first pair of TRM sites are the Beurir Beel in the Morirchap-Labangabati system and Daulatpur Beel in the Betna system. Both have been studied in detail and are projected to require approximately four years to complete successfully. Beyond this initial stage, subsequent phases will be determined based on updated field data, hydrodynamic and morphological assessments, and evolving community perspectives. Rather than using a fixed timeline, the plan remains flexible, allowing future TRM initiatives to adapt to sediment dynamics, local socio-economic conditions, and broader water governance needs as they emerge.

3.3.1 Stage 1: Preparation of CBTRM (Two Years)

The preparation stage is critical for operationalizing the Tidal River Management (TRM) intervention on the ground. Spanning the first year, this stage focuses on building the institutional, social, and physical

readiness required for successful TRM execution across the selected beels.

A major focus during this stage is the resolution of socio-economic concerns raised by local communities, such as solving land documentation issues. This includes preparing a detailed list of Project-Affected Persons (PAPs) and initiating a transparent compensation distribution process through the formation of a dedicated Compensation Distribution Committee involving, for example, a local organization and a local contact from the BWDB or relevant authority etc. This committee will ensure that individuals impacted by temporary water retention or infrastructure development are properly compensated, thereby promoting community trust, reducing resistance to TRM operations and increasing local ownership.

Infrastructural preparations will include the completion of key structural elements, such as peripheral embankments, link canals, outlet structures and compartmentalization zones, all of which are necessary to initiate and control tidal inflow and outflow during the operational phase. Where necessary, river re-excavation works may also be undertaken to improve flow conveyance and sediment delivery into the designated beels. To support participatory governance and localized oversight, this phase will establish several institutional bodies, including:

- **Water Management Organizations (WMOs)** to facilitate ongoing community-based water governance;
- **Livelihood Groups** to implement alternative income-generating activities in temporarily inundated areas;
- **Water Control Structure Committees** to oversee the regulated operation of regulators, sluices, inlets and outlets;
- **A Multistakeholder Forum**, comprising representatives from local government, government agencies, NGOs and community members, to provide oversight, resolve disputes, and coordinate inter-agency functions.

Furthermore, dedicated offices for the Beel Management Committees and Multistakeholder Forums should be established near the TRM sites. These offices will serve as the administrative hubs for coordination, planning, grievance redress and local engagement. This phase will also focus on community mobilization and awareness-building, ensuring that local populations are well-informed about the objectives, benefits and operational mechanics of TRM. Capacity development activities such as training sessions and orientation workshops will be conducted to empower communities in participating actively in water regulation, sediment management and ecological monitoring.

3.3.2 Stage 2: Operation and Monitoring (Approximately Four Years)

The Operation and Monitoring (O & M) Phase constitutes the active implementation window of the Tidal River Management (TRM) strategy and spans the remaining four years of each TRM cycle. During this period, TRM interventions are operationalized simultaneously in one selected beel from each of the Betna and Morirchap-Labangabati River Basins. This phase focuses on executing the ecological and hydraulic processes necessary for land accretion, flood regulation and river rejuvenation through controlled tidal exchange and sediment management. The core of this phase revolves around the regulated conveyance of tidal waters into and out of the designated beels through strategically constructed inlet and outlet structures. These tidal movements facilitate natural sediment deposition within the beels while simultaneously inducing scouring in adjacent riverbeds, thereby improving both the elevation of beels and the flow

capacity of silted-up river channels. Sediment accumulation will be carefully monitored (thrice a month) and, where needed, redistributed to achieve uniform land build-up across the beel compartments.

A comprehensive silt management strategy will be implemented throughout this phase. This includes periodic clearing of sediment deposits near inlets and outlets to maintain unobstructed tidal flow, internal distribution of silt to optimize land formation, and maintenance dredging where necessary to ensure connectivity between link canals and the main river. The process will be community-supported and guided by technical teams to ensure ecological balance is maintained.

Bank erosion mitigation measures will be proactively applied to protect embankments and adjacent agricultural land from the potential erosive forces generated by increased tidal flow and sediment movement. Nature-based erosion control methods, such as bamboo fencing, brush layering, planting of vetiver grass with hollow blocks, etc., could be explored where the lateral flow of water is weak. The opening and major connecting link canal, however, should be reinforced with concrete canvas blocks. These interventions will be designed to stabilize banks while preserving the natural morphology of the river system. Routine maintenance of physical structures is a critical activity throughout the operational period. This includes inspection and repair of inlets, outlets, regulators, sluices, embankments and link canals to ensure that all TRM infrastructure functions effectively throughout the monsoon and dry seasons. Maintenance teams comprised of local Water Management Organizations, technical staff, and volunteers will coordinate these tasks with support from local government bodies.

An intensive information campaign will also be deployed to ensure ongoing community engagement and transparency. Public meetings, targeted outreach, and mass communication materials (e.g., posters, television announcements, local theater) will be used to inform the population about inundation schedules, sediment movement updates, safety precautions and the broader benefits of TRM. This campaign will help manage expectations, build trust and reinforce local ownership of the intervention. During this stage, monitoring activities will be carried out regularly to evaluate hydrodynamic changes, sediment behavior and ecological health. Parameters such as sediment depth, water level fluctuation, flow, velocity and beel elevation gain will be tracked to assess the effectiveness of the TRM intervention and make necessary adaptive adjustments. These findings will be used not only for immediate improvements, but also to inform the design of future phases. In parallel, any compensation to newly impacted stakeholders, particularly those experiencing prolonged inundation or temporary livelihood disruptions, will be administered in a timely and transparent manner. This will ensure that affected communities remain cooperative and engaged, preserving the social license necessary for long-term TRM success.

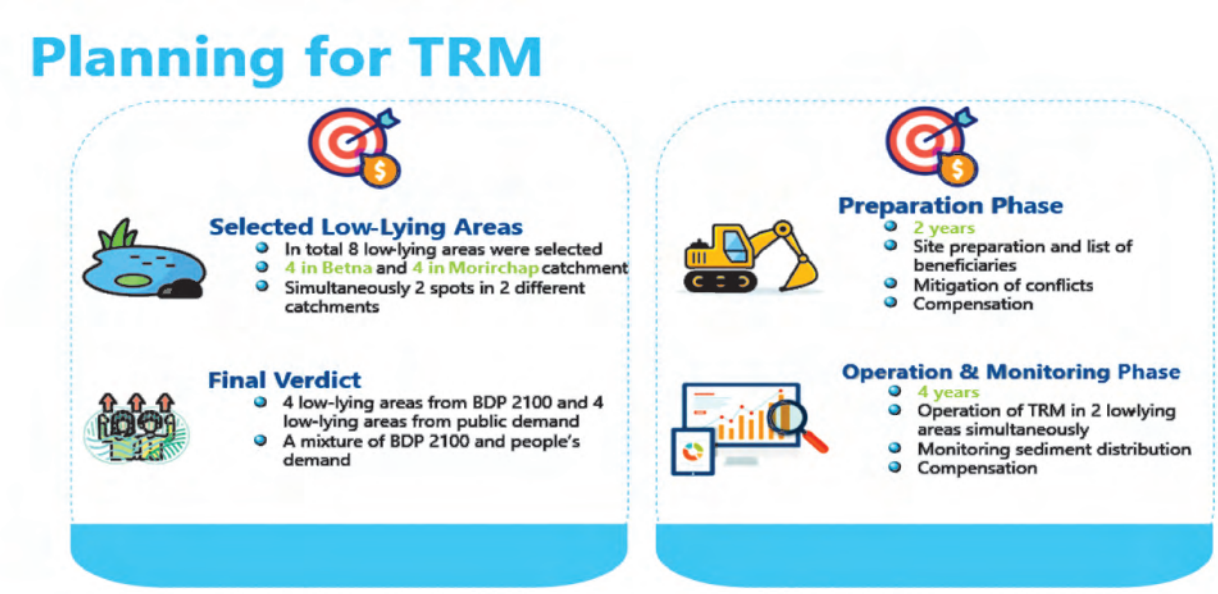


Figure 3.2: Implementation Plan of CBTRM (Tier A Beels/Low-Lying Areas)

3.3.3 Stage 3: Post-TRM Completion Phase (Approximately Two Years) – Guideline for Sustainable

Transition

Although this stage is not formally included within the current project scope and overlaps with the second phase of TRM implementation, it is imperative to provide a forward-looking guideline for what should follow once each TRM cycle concludes. The post-TRM completion phase should span approximately two years and should aim to facilitate the rehabilitation of reclaimed land, restoration of drainage systems and institutional closure of TRM operations. The following strategic actions are recommended:

- **Clearance and Rehabilitation of Drainage Channels:** After completion of sediment inflow and water regulation, the internal drainage network within the TRM basin often accumulates excess silt and debris. It is critical to clear these feeder canals, link drains and exit outlets to re-establish proper water conveyance. This drainage clearance will help prevent inactivity, ensure smooth surface runoff and make the land suitable for agriculture, aquaculture, or mixed land use in the post-TRM stage.

- **Plot-Wise Demarcation and Land Reallocation:** Reclaimed beel areas should undergo a detailed plot demarcation process, based on updated cadastral maps and participatory boundary verification. Using geospatial tools and land record validation, individual plots should be clearly marked and handed back to the rightful landowners or beneficiaries. This transparent process will prevent disputes, restore ownership confidence and enable long-term land planning by communities and local institutions. This process should be monitored by the District Commissioner (DC) of Satkhira.

- **Land Levelling and Preparation for Agricultural Reuse:** One of the natural characteristics of TRM is uneven sediment deposition across the basin. While some areas may experience high accretion (e.g., >2 meters), others may receive little to no deposition. Therefore, the levelling of reclaimed land is essential to make it arable and usable for crop production or other

economic activities. Shallow depressions should be filled with locally available sediment and high points may be graded to ensure even surface profiles and optimize irrigation potential.

- **Strengthening and Levelling of Peripheral Embankments:** The peripheral embankments that enclose the TRM basin often experience degradation or deformation due to prolonged submergence and water pressure. This phase will require selective reshaping, compaction, and height adjustments of embankment segments. In some places, vegetative stabilization or stone pitching may be added to prevent future erosion, particularly in climate-sensitive zones. Rehabilitated embankments will also function as access roads and protective buffers for resettled communities and farmlands.

- **Continuation of Livelihood Support Measures:** Communities living in and around the TRM site should continue to receive livelihood support during this transitional phase. This includes assistance with restarting agricultural activities on levelled land, training in flood-resilient crops, aquaculture on residual wet areas and marketing support. Women, youth, and vulnerable groups should be prioritized in this support, particularly those who lost productive land or income during the TRM cycle.

- **Institutional Evaluation and Documentation of TRM Outcomes:** At the end of this phase, a comprehensive evaluation exercise should be conducted to assess the effectiveness of the TRM intervention. Key performance indicators should include: land accretion volume, drainage efficiency, socio-economic recovery, biodiversity outcomes and governance performance. These findings should be used to inform national TRM guidelines and serve as a blueprint for scaling TRM in other tidal zones of Bangladesh.

- **Organization of a TRM Closing Workshop:** To formally conclude the TRM cycle, a TRM Closing Workshop or Community Dissemination Workshop should be held at the community level. This event can serve multiple purposes: sharing success stories, displaying before-and-after land profiles, recognizing local champions, gathering community feedback and inviting policymakers to observe the benefits first hand. It also helps strengthen public trust and provides an opportunity for dialogue on future water and land management strategies.

By following this structured, post-TRM roadmap, implementing agencies and local institutions can maximize the long-term benefits of TRM, support inclusive recovery and reinforce sustainable water-land governance in the coastal delta. Although outside the current project timeline, this phase is a critical bridge between TRM completion and durable socio-ecological transformation.

Table 3.3: Summary of the Implementation Activities of CBTRM

Stages	Implementation Plan	Activities
1.	TRM Preparation (Two years)	**Institutional Preparation:** ▪ Advocacy, information and motivation campaign to build community trust and reduce resistance to TRM ▪ Formation of WMOs, Livelihood Groups, Sluice Gate Committee (other Beels), TRM Beel Committee, ▪ Compensation Distribution Committee ▪ Formation of Multi -Stakeholder Forum ▪ Set up office of Beel Committee & Multistakeholder Forum ▪ Collection of lan d records ▪ Identification of PAPs: complete list of affected people ▪ Compensation disbursement **Infrastructural Preparation** ▪ Peripheral embankment, outlet, link canal and compartmental ization ▪ River re-excavation (if necessary)
2.	TRM Operation and Monitori ng (Approx. four years)	▪ Silt management: Periodic clearing of sediment deposits near inlets and outlets ▪ Internal distribution of silt to optimize land formation, and maintenance dredging where necessary ▪ Ensure connectivity between link canals and the main river ▪ Bank erosion mitigation measures ▪ Inspection and repair of inlets, outlets, regulators, sluices, emban kments, and link canal, all the TRM infrastructure ▪ Maintenance teams comprised of WMOs, technical staff, and volunteers ▪ Provide livelihood and rehabilitation support ▪ Compensation disbursement (yearly) ▪ Monitoring and maintenance ▪ Information and motivation campaign
3.	After TRM Completion (two years)	▪ Clearance and rehabilitation of drainage channels of basin ▪ Plot-wise demarcation and land reallocation ▪ Land levelling and preparation for agricultural reuse ▪ Strengthening and levelling of peripheral embankments ▪ Continuation of livelihood support measures ▪ Institutional evaluation and documentation of TRM outcomes ▪ Organization of a TRM Closing Workshop and a TRM Fair

3.4. Long-Term Vision for CBTRM

The long-term vision for Tidal River Management (TRM) adopts a phased framework under a Paired-beel Operational Model (POM), with interventions rolled out concurrently in selected low-lying areas of both the Betna and Morirchap-Labangabati river systems. This approach enables synchronized sediment and water management, ensures equitable regional benefits and facilitates reciprocal learning across two interlinked tidal basins. Each phase is designed to build upon the experience of earlier ones, allowing for adaptive improvements, progressive policy integration and the gradual institutionalization of TRM as a sustainable water and sediment management practice. The whole process will be completed by aligning with the Adaptative Delta Management (ADM) strategies.

Phase 1 (2027–2031)

Target Sites:

Morirchap-Labangabati River: Beurir Beel (Chainage: 17.50 km | Area: 906.70 Ha)

Betna River: Daulatpur Beel (Chainage: 12.80 km | Area: 691.41 Ha)

As the foundation of the TRM rollout, this phase aims to validate the operational feasibility of TRM under controlled, real-world conditions. The selected beels have been chosen due to their chronic waterlogging problems, pronounced sediment accumulation and demonstrated community willingness to cooperate. Phase 1 serves as a real-time laboratory for testing TRM protocols and refining stakeholder engagement mechanisms.

Key Activities and Objectives:

- Construction of peripheral embankments and excavation of feeder canals to enable tidal inflow and outflow
- Installation of inlet-outlet structures and regulators for managing seasonal tidal cycles
- Establishment of community-led governance bodies, such as Water Management Organizations, Livelihood Groups, and Sluice Gate Committees
- Deployment of baseline monitoring tools to track water levels, sediment depth, flow velocity and ecological indicators
- Training programs for community institutions in TRM operation and adaptive maintenance
- Public awareness campaigns to foster ownership and promote benefits such as improved drainage, natural dredging, and land accretion

Phase 2

Target Sites:

Morirchap-Labangabati River: Ticket-Govendapur Beel (Chainage: 22.70 km | Area: 584.00 Ha)

Betna River: Amtali Beel (Chainage: 21.06 km | Area: 343.15 Ha)

This phase aims to extend TRM into more hydrologically and socially complex areas. The targeted beels are part of dynamic floodplains where khals, rivers and wetlands interact, offering ideal grounds for testing TRM's scalability and multifunctionality.

Strategic Priorities:

- Deepening floodplain connectivity to enhance water storage, fish migration and sediment redistribution
- Integration of hybrid solutions combining vegetative buffers with engineered structures like canvas concrete block-reinforced inlets
- Strengthening community co-management of inlet-outlet placement through participatory land-use planning and flood-adaptive cropping calendars
- Systematic documentation of elevation changes using geospatial tools for model calibration and future forecasting
- Expansion of TRM training curriculum to cover sediment modeling, conflict resolution and disaster preparedness

Phase 3

Target Sites:

Morirchap-Labangabati River: Jheelmari Beel (Chainage: 26.22 km | Area: 561.59 Ha)

Betna River: Kundur Danga Beel (Chainage: 27.51 km | Area: 573.29 Ha)

By this stage, key physical transformations such as riverbed deepening and beel sediment infill will begin to stabilize. The focus now shifts toward reinforcing the TRM system's resilience to climate stressors and optimizing sediment equilibrium across both basins.

Critical Focus Areas:

- Modeling sediment dynamics to ensure a balanced exchange between beel basins and riverbeds
- Cyclone-resistant embankment upgrades and adaptive infrastructure to withstand extreme events and salinity intrusion
- Implementation of ecological corridors that connect TRM sites with broader wetland and forest systems, enhancing biodiversity flows
- Institutional capacity development for WMOs to independently oversee operation and maintenance (O&M), monitoring and dispute resolution
- Salinity control innovations like vegetation buffers, community-managed freshwater reservoirs and sediment filtering chambers

Phase 4

Target Sites:

Morirchap-Labangabati River: Bughmara Beel (Chainage: 32.73 km | Area: 551.43 Ha)

Betna River: Athabishi Beel (Chainage: 33.22 km | Area: 416.56 Ha)

The final phase consolidates TRM as a formally recognized, government-owned mechanism for water and sediment management. With most physical transformations complete and communities empowered, this phase transitions TRM from a project-based intervention to a permanent, decentralized governance model. Transformational outputs:

- Legal integration of TRM practices into regional planning instruments, including the Delta Plan 2100, National Adaptation Plan (2023-2050), Water Act action plans and Local Government Standing Orders
- Institutionalization of TRM budgeting, planning and grievance redress under Union Parishads and Upazila Parishads
- Providing consolidated guidelines for implementation of Nature-based Solutions (vegetative buffer, coir rolls, hollow blocks, vetiver grass, etc.) in TRM
- Development of TRM-linked green livelihoods, such as aquaculture on residual wetlands, ecotourism around restored beels and community-run silt harvesting cooperatives.
- Creation of an inter-agency TRM Governance Board tasked with long-term supervision, replication strategy design and donor coordination.

This sequenced and adaptive implementation plan enables TRM to evolve from a reactive, short-term measure into a strategic platform for regional transformation. It integrates hydrological science, local knowledge, climate adaptation and participatory governance, ultimately reinforcing the vision of a resilient, biodiverse and economically vibrant tidal delta system in coastal Bangladesh. Importantly, the completion of these four phases will not mark the end of TRM in the Betna and Morirchap-Labangabati catchments. Rather, TRM will continue as a rotational process, with future attention directed toward beels categorized as "Moderately Suitable," and the identification of other potentially suitable sites through ongoing field assessments. Any subsequent phases will follow the same systematic approach of progressing upstream from downstream, ensuring continuity, adaptability and long-term sustainability of the intervention.

3.5. Immediate Impact of CBTRM (After Phase 1)

The Community-Based Tidal River Management (CBTRM) intervention in the Betna-Morirchap-Labangabati River Basin is expected to have significant impacts on water resources, agriculture, fisheries and the overall socio-economic landscape of the region. In the Betna river catchment approximately 79.28% of the primary response zone (close to TRM sites) area will be free from waterlogging with after implementation of CBTRM Phase 1, whereas it will be about 74.27% free from waterlogging in the Morirchap-Labangabati river catchment. The technical study of the current project shows that there is an analytical discourse to the direct and indirect hydrological benefits of CBTRM across different spatial contexts. However, in this study the specific impact of CBTRM was assessed for only the first phase of TRM, which will be implemented in Daulatpur and Beurir Beels simultaneously. Model simulations predicted that after completion Daulatpur Beel is expected to rise by 1.11 to 2.83 meters, and Beurir Beel by 0.61 to 1.55 meters after 4 years of TRM operation. The predicted average rise in land elevation is 2 meters in Daulatpur Beel and 1.11 meters in Beurir Beel, which shows the fact that uneven sediment distribution has been addressed to a great extent in this approach.

While the implementation of CBTRM in Daulatpur Beel and Beurir Beel will significantly improve the

livelihoods of 2,207 directly dependent households, indirect benefits will also extend to the broader Betna-Morirchap-Labangabati system, home to approximately 211,402 households. This will significantly enhance agricultural productivity in the Betna-Morirchap-Labangabati River Basin. After the implementation of CBTRM, the agricultural land in Daulatpur is expected to rise by an average of 2 meters, while the adjacent river depth will increase by about 8 meters. It will restore navigability and drainage capacity of the river systems, as well as remove silt load from the Kolpetua river, the downstream of Betna and Morichap-Labangabati river. After the implementation of CBTRM in two beels, it will ensure year-round cultivation and will increase cropping intensity from 174% to 292% in the study area. This will result in an estimated production of 4,551 tons of rice, 324 tons of jute, 690 tons of vegetables and 1,840 tons of watermelon, translating to a market value of BDT 26 crore, nearly four times the current value. Similarly, in Beurir Beel, increase in land elevation will boost agricultural potential (cropping intensity reaching up to 180% from 115%), with a new cropping pattern including rice, watermelon and vegetables, raising the market value to BDT 16 crore, up from its current BDT 2 crore.

In terms of fisheries, while CBTRM will reduce fish production due to the shift from aquaculture to agriculture, the overall loss is mitigated by improvements in river health. Beurir Beel's fish production will decrease by 224 MT, from 892 MT to 668 MT, resulting in a loss of BDT 5.74 crore, while Daulatpur Beel will see a decrease of 152 MT, from 529 MT to 337 MT, with a loss of BDT 4.55 crore. However, the improved river depth and habitat conditions are expected to support diverse fish species in the long term.

Socially, the CBTRM intervention is expected to generate **93,845 labour-days** in Daulatpur Beel and **66,120 labour-days** in Beurir Beel, contributing an estimated **BDT 5.9342 crore** and **BDT 4.2302 crore** respectively to local income. The key driving factor behind this projected impact is the anticipated shift in land use patterns within the low-lying areas once TRM is implemented. As land use evolves, the structure of employment and the nature of income-generating opportunities are also expected to change, creating new avenues for work and local economic growth. Additionally, avoided costs from improved drainage and navigability across the Betna-Morirchap-Labangabati system are estimated at BDT 50.5620 crore annually, leading to long-term savings and reduced reliance on mechanical dredging. These combined benefits demonstrate TRM's potential to transform agricultural productivity, fishery management and socio-economic conditions in the region. Below is the summary of the overall benefits of CBTRM in the study area:

Benefit Component	Indicators	Units	Present without CBTRM	Future with CBTRM	Net Benefit After CBTRM	Impact
Agricultural	Crop Production	BDT in Lac/year	108	2600	2493	Positive
Fishery	Fish Production	BDT in Lac/year	4161	3132	-1029	Negative
Social	Employment Generation	BDT in Lac/year	1167	2183	1016	Positive
	Avoided Costs from Improved Drainage and Navigability	BDT in Lac/year	-	5056	5056	Positive
Reduction of Waterlogging	Reduction of Waterlogging - Pre-Monsoon – Data, (PRZ)	Betna	22.402 km²	4.536 km²	79.75%	Positive
		Morirchap–Labangabati	16.730 km²	4.514 km²	73.01%	
Total		**BDT in Lac/year**	**5435**	**12971**	**7536**	**Positive**
		BDT in Crore/year	**54.35**	**129.71**	**75.36**	
Overall Impact Status		**Positive**				

Table 3.4: Summary of the Overall Benefits of CBTRM

This table demonstrates the overall economic benefits of implementing CBTRM in the Betna-Morirchap-Labangabati River Basin. The total benefit increases from BDT 54.35 crore to BDT 129.71 crore, showing a net benefit of BDT 75.36 crore annually. Despite a decline in fish production, the significant increase in agricultural productivity, employment generation and avoided costs from improved drainage and navigability highlights the positive impact of CBTRM on the region's socio-economic development. The benefit along the total basin could be projected by an advanced socio-economic impact assessment study to support the long-term process of adapting CBTRM in the Betna-Morircchap-Labangabati River Basin. This could also give an indication for further CBTRM projects in other tidal river basins in southwest Bangladesh.

3.6. Challenges for Adapting the CBTRM

During field investigation, community people said that previous TRM projects in their district were not sustainable because the implementation of TRM caused financial losses for landowners and livelihood losses for beel-dependent people. Some of the respondents also mentioned that compensation was not provided properly. It was supposed to be given to landowners on a yearly basis, but they only received it for the first one or two years. After TRM project activities were completed, most of the lands were not cultivable due to increased salinity, and it took a long time and effort to make it cultivable again. The lands were uneven and it was very expensive to make the land even for cultivation. For their part, landless people indicated that the previous TRM project did not include them in the compensation plan and it was very difficult for them to find income- generating activities. Land dependent people were the most affected group due to the fact that the land was not usable.

According to the local respondents, the following points need to be ensured to face the challenges of implementing the CBTRM project:

- Good social campaign about the objectives of CBTRM
- Involve community people from the primary stages of the planning and implementation stages
- Timely advocacy program to inform the community about the impacts and benefits of CBTRM in a tidal river basin
- Assess the proper amount of compensation
- Identify the true landowners and land size
- Provide support in preparing and updating land documents, and assist in applying for compensation
- Ensure proper and easy way of compensation distribution throughout the whole project period
- Ensure transparency and tracking of compensation distribution
- Ensure compensation packages (i.e. alternative livelihood options) for beel or floodplain dependent people and day laborers
- Involve local people in different project-related activities (e.g., land preparation, maintenance, monitoring, etc.)
- Ensure resettlement and livelihood restoration facilities for local people
- Ensure alternative livelihood income-generation trainings and support
- During the implementation period, local people should be allowed to catch fish from the beels freely
- Ensure quick response if there are complaints or complexities in project activities
- Ensure livelihood and basic assistance to the affected community (e.g., access to safe drinking water, toilet facilities, free treatment, education etc.)

In sum, the major findings from the community consultation and focus group discussions show that the main challenges for successfully implementing CBTRM is the compensation and governance process. In the remainder of this chapter, the compensation process is discussed in detailed. In Chapter 4, the governance process is discussed.

3.7. Compensation Process and Socio-economic Safeguards

During the TRM process, it is not possible to do any agriculture or aquaculture within the TRM basin area, since the basin gets inundated. It is absolutely necessary for the state to compensate the local people who own the land inside the basin area. Generally, the CBTRM process has been proposed to last four years. Therefore, landowners will lose their main crops for a minimum four years. Landowners may be marginal farmers whose livelihood primarily depends on their land. Since their only source of income becomes obsolete during the TRM implementation, they will need to be compensated in a competitive and timely manner, so they will have no objection to the CBTRM process. Beyond landowners, it is important to identify other people who are expected to be affected by the operation of CBTRM and ensure socio-economic safeguards for them. The implementation authority should strictly follow the land acquisition and reacquisition policy to provide the compensation for the Project-Affected Persons (PAPs).

3.7.1. Identification of Project-Affected Persons

Project-Affected Persons (PAPs) are individuals or groups who are impacted by project activities, either directly or indirectly. These impacts may include the loss of land, property, livelihoods or access to resources due to interventions such as land acquisition, infrastructure development, environmental changes or the implementation of specific programs. Project Affected Persons (PAPs) will be identified through:

- **Detailed Assessment and Survey:** A thorough assessment and survey will be conducted to identify PAPs.
- **Census:** A 100% census will be conducted to gather detailed information on individuals directly or indirectly affected by the project.
- **Socio-Economic Survey (SES):** A socio-economic survey will be conducted to identify PAPs by assessing their socio-economic status, livelihoods, and vulnerabilities.
- **Community-Focused Group Discussions (CFGD):** Community-focused group discussions will be conducted to engage local stakeholders and collect valuable input on identifying PAPs. These discussions will provide a deeper understanding of the project's impact on the community and help pinpoint those who are most affected.

After identifying the PAPs, a detailed database of PAPs needs to be prepared which will include:

- Annual average income of landowners from crop/land (for whole project period)
- Annual average income of Gher owners (for whole project period)
- Assess the investment of the leaseholders of crop/fish Ghers
- Assess the damage on lands and structures
- Assess indirect losses of other dependent PAPs and vulnerable groups (for whole project period)

3.7.2. Compensation Mechanism

The feedback from the public consultation provided the foundation for evaluating the following compensation options:

i. Monetary compensation for lost crops: During CBTRM operations, landowners and farmers cannot cultivate crops in the submerged basin. Compensation for lost crops would be provided in cash, with the government sourcing funds from domestic or foreign resources.

ii. Compensation to land-dependent people, day laborers and vulnerable groups: Along with the landowners, the land dependents such as: leaseholders, sharecroppers, day laborers, fish (Gher) workers and vulnerable groups will have no source for income generation. Alternative livelihood generation should be ensured based on the needs of the affected group.

iii. Livelihood support as compensation: Alternative livelihood support can serve as compensation for the PAPs who are not landowners but are dependent on the CBTRM beel. This may include providing job training, credit facilities or access to alternative income-generating opportunities.

iv. Non-Monetary Assistance: Alternative compensation programs, such as providing substitute land, housing, livelihood opportunities, free treatment facilities and education of children can be introduced for project-affected people.

3.7.3. Compensation Distribution

The compensation can be given once every year during the implementation period or it can be provided as periodic cash payments to enhance sustainability. After identifying the PAPs, all the assistance programs, such as the livelihood restoration, alternative income and other support, should be provided to PAPs properly. A budget should be allocated for training the *Gher* workers on alternative agricultural activities. Additional assistance, such as training on microenterprise, emergency medical support, and temporary job opportunities in TRM related activities should also be considered. A few steps need to be taken before disbursement of the compensation:

- Establish a verified bank account or other digital payment system
- Ensure transparency of compensation disbursement details
- Ensure a mechanism to monitor the proper distribution of the compensation to the affected people

3.7.4. Resettlement Process

The TRM may cause people to resettle due to the project interventions. There may also be landless settlers in the area who will need to be moved from the area. These people need to be considered for resettlement, which can be to cluster houses. In addition to cluster houses, consideration should be given to:

- Proper infrastructure and amenities (roads, toilets, electricity, drinking water, health care, education)
- Ownership and tenure
- Efficient design and layout of the houses

3.7.5. Alternative Livelihood Generation

During the CBTRM implementation period, the lands will remain unusable for a long period. Apart from the compensation, livelihood development and restoration need to be considered. For this reason, alternative activities need to be offered to local people who are dependent on the CBTRM flood plain or beel, such as income-generating or capacity development activities. These include:

- Creating alternative job prospects in other industries or through government-sponsored projects (since unemployment will increase due to land unavailability)

- Providing agricultural tools and machineries, as well as subsidized seeds, fertilizers and pesticides for farmers

- Offering training programs or skill-development initiatives to help affected workers acquire new abilities that are in demand in other industries

- Including local people in different project construction/land preparation activities as day laborers

- Trainings and providing support for alternative livelihood facilities

- Providing different social facilities which might be difficult for the locals to afford due to limited income (e.g. healthcare, education, etc.)

During the CBTRM period, a huge number of fish can be found in the floodplain. Local people should have the exclusive right to access/catch these fish, and non-local people should be prohibited from doing so. In this way, local people will secure fish for their own consumption and for sale on the market. During the long-term project, as more land becomes available in the sedimented beel area, more people will have the opportunity to work in agriculture. For this reason, advanced training on agriculture needs to be provided to increase crop production.

An Environmental Management Framework (EMF) is integral to ensuring that TRM interventions are environmentally sustainable, socially inclusive and institutionally viable. It establishes safeguards across every stage from planning to post-implementation while embedding participatory governance at the core. By combining technical monitoring, ecological safeguards, and social equity measures, the EMF provides a comprehensive system that enables TRM to function as a resilient, nature-based solution for the southwest coastal delta of Bangladesh.

CHAPTER 04

Inclusive Governance: Inclusion & Participation

4.1. Inclusive Governance Model for the Delta Water Management

The concept of TRM is based on indigenous knowledge, and its process requires active participation of the local community people in every stage of implementation and maintenance. It also requires a participatory system of local water governance that has the ability to integrate governments, civil society organizations and local communities in decisions that affect their lives and livelihoods (Mutahara et al., 2020).

The present study aims to develop and propose an Inclusive Governance Model (IGM) to support the People's Plan for implement CBTRM in the the Betna-Morirchap-Labangabati River Basin which could also be applicable for other tidal river basins in the southwest coastal area in Bangladesh.

Inclusive governance has emerged as a fundamental approach to addressing the needs of diverse groups and communities (Hariram et al., 2023; Yates et al., 2024). This model encourages the adoption of specific strategies that seek to optimize the government's response to these groups.

For implementing CBTRM, an Inclusive Governance Model is a structured approach to decision-making that ensures equitable representation, participation and collaborations of diverse stakeholders within the system.

4.2. Assessment: Reviewing the Existing System and Analyzing the Gaps

Below we discuss the existing policies in water resources management, which are common and create challenges for practicing TRM in the southwest river basins in Bangladesh (Sakkhar, 2017). These were experienced by the local people in the previous TRM practices in Hari River basin under Jashore and Khulna Districts, and Kobadak (Kopotakhkho) River basin in Satkhira. The policy regulations were not efficiently applied to ensure community participation and implement an effective compensation mechanism in TRM practices (Mutahara et al., 2020). As a result of these experiences, during the project consultation local participants indicated that the existing policy and institutional framework are not sufficient for inclusive and participatory implementation of TRM in the southwest coastal river basins. The affected population and their local stakeholders of the river basin also believe that lack of transparency and the absence of inclusive community participation in planning, implementation and compensation process cause major challenges in adapting sustainable TRM projects.

The proposed "Inclusive Governance Model" (IGM) for CBTRM seeks to ensure that the government authority can plan and implement the People's Plan in an inclusive and participatory way by building on, or modifying, existing rules, guidelines, policies, and institutional frameworks. The most relevant Acts, rules and policies are:

- The **National Water Policy (NWPo) 1999**, which emphasizes the issues of participatory water management and highlights the importance of stakeholders' participation (CEGIS, 2010; Uttaran, 2018). The latest TRM project in Beel Pakhimara under the Kobadak River

Basin management project in Jessore and Satkhira was planned (2010-2011) following the NWPo

- The **Guidelines for Participatory Water Management (GPWM) 2000** were developed by the Ministry of Water Resources and issued as government guidelines applying to all agencies working in the water sector (GPWM, 2001).

- **Bangladesh Delta Plan 2100**

- In the previous TRM project, compensation was provided through **the Acquisition of Immovable Property Manual 1997** under the **Acquisition and Reacquisition of Immovable Property Ordinance 1982**

- The **Acquisition and Requisition of Immovable Property Act (ARIPA) 2017** is the latest legal framework on land acquisition in Bangladesh.

Analyzing these plans and policies, as well as the initiatives in previous TRM projects, the current study identified various gaps in 1) Policies and 2) Practices for successful TRM implementation process. The major gaps are as follows:

Policy Gaps:

- Coordination and collaboration gaps exist between the policy frameworks adopted by the MoWR (Ministry of Water Resources) and other ministries. This coordination gap is not only at the central level, but also at the local level.

- Application of the **Guidelines for Participatory Water Management (GPWM) 2000** in TRM projects shows gaps in participation of local stakeholders in all stages of project implementation and maintenance

- GPWM-initiated Community Water Management Groups (WMOs) did not sustainably work.

- Since the adoption of the GPWM, the implementing agencies have never opened any room for local self-help groups and NGOs in the TRM projects

- The GPWM do not outline specific roles for media and civil society and activists

- Inadequate Project-Affected Persons (PAPs) analysis: According to GPWM, all the Project-Affected Persons will be compensated. However, during implementation only PAPs whose land has been taken are being compensated.

- Bangladesh Delta Plan 2100: The strategies relevant to TRM are admirable, but are not prepared through community consultation and neither are they validated through a proper representative stakeholder process.

- The **Acquisition of Immovable Property Manual (AIPM) 1997 under the Acquisition and Reacquisition of Immovable Property Ordinance 1982** is very complex and highly bureaucratic. The main challenge regarding the successful implementation of TRM is compensation. Thus far, the existing policy has been a main barrier for rural PAPs to access compensation easily and properly.

- The **Acquisition and Requisition of Immovable Property Act, 2017** provides compensation for land and fixed assets but lacks provisions for restoring income,

livelihoods, or living standards of Project-Affected Persons (PAPs). It also excludes specific support for day labors, vulnerable groups like, women-headed households, the elderly, and persons with disabilities.

- **Resettlement Action Plans (RAPs)** for each project should be different according to PAPs census. However, in previous TRM processes, there were no specific guidelines of RAP framed out.

Gaps in Practices

- Complete top-down approach leaves the community-based water organizations on policy implementation to a certain extent.
- Limited practices of Multistakeholder Approach, poor communication and commitment between project implementing authority and other stakeholders.
- No decision support system institutionalized to support water management projects.
- Inadequate Monitoring and Evaluation System (MES)

4.3. Planning: Policy Update or Formation of Special Act

The full potential of TRM can be unlocked if the gaps in the existing policy frameworks and practices can be addressed through the proposed update or modification plan (Figure 4.1).

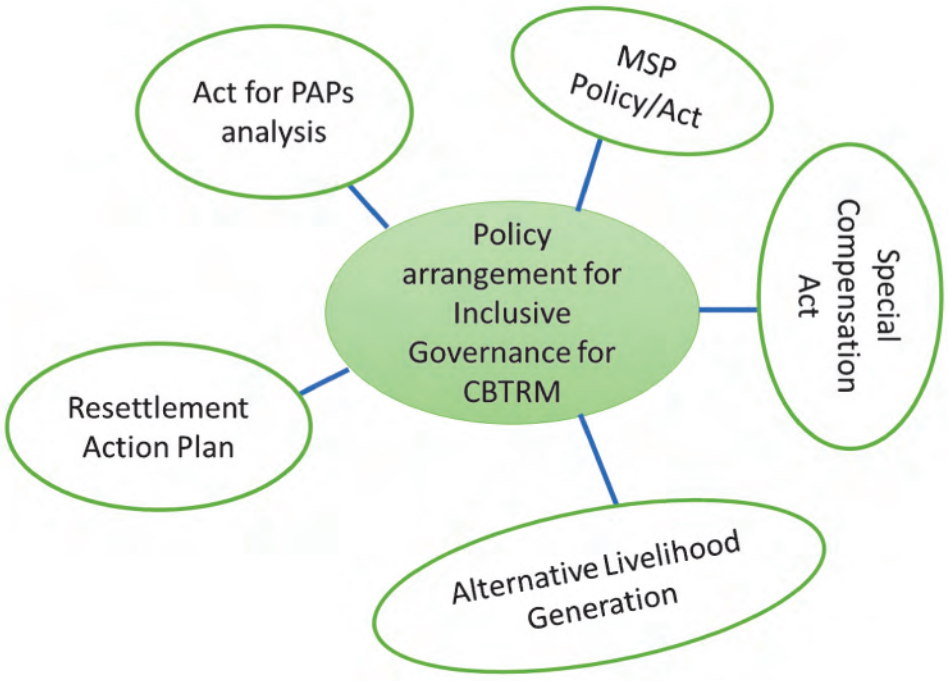


Figure 4.1: Proposed Modification or Formation of the Policy Framework for Sustaining CBTRM

4.3.1 Act for PAPs analysis

In TRM practices, proper PAPs analysis is essential. People can be affected by different dimensions of the process of TRM (See chapter 3: Section 3.4.1), including:

- Loss of land and crops,
- Loss of crop for certain years,
- Loss of livelihoods or damage to income sources
- Need to migrate (in some cases)
- PAPs may need to be relocated to new land or structures

A specific act or guidelines for PAPs analysis is needed for future TRM practices. This could be an update in the GPWM. It should address who will conduct the PAP analysis, and this should not be only the implementing agency or assigned organization, rather local stakeholders (i.e. NGOs, CBOs, WMOs and members of local government) are more reliable for identifying PAPs and categorizing them.

4.3.2 Act for Multi-Stakeholder Participation

For the efficient adoption of GPWM, a **Multi-Stakeholder Participation (MSP) Act or rules** should be established for a River Basin-level water management system like CBTRM. Since TRM was initiated by the local people, the process naturally demands strong local people's participation for ensuring a proper TRM. The GPWM 2000, under section 4, identifies the six stages of a water management project, including where the local stakeholders will participate and how the participation will be done in each stage. The GPWM 2000 should be closely followed and the new MSP Act should be incorporated to define the process and prospects of forming community WMOs in the TRM basin area, as well as the river basin area in order to ensure participation and develop collaboration in between the marginal and higher-level stakeholders. A **Multi-Stakeholder Forum (MSF)** in a River Basin would also be developed to implement the MSP Act effectively.

4.3.3 Special Compensation Act

A compensation mechanism and compensation distribution are the key challenges to successful adaptation of CBTRM (See Chapter 3: Section 3.4.1). According to section 3.2 and 4.3 of the GPWM 2000, it is clear that compensation needs to be provided to all the project-affected persons and a compensation and mitigation plan should be integral to project design.

Simplification of the compensation procedure and a more active, community-based institutional support are required to implement the GPWM 2000 properly. Experiencing the compensation process in the previous TRMs, the community people suggest that, in the case of CBTRM, the compensation mechanism could be modified. They suggested that it would be more effective to have a special compensation act following the local land leasing mechanism (locally called *"Hari"* system), which is prominently used in the shrimp farming sector (*Gher*).

The Acquisition and Requisition of Immovable Property Act (ARIPA) 2017 should be considered to specifically define the process of land acquisition and requestion. A clear compensation mechanism and distribution process should be developed under a **Special Compensation Act** for the CBTRM to successfully provide compensation to both land requisition and acquisition (if required) cases to all PAPs,

in line with the PAP analysis. This will ensure that all categories of PAPs, including landless people and landowners, will be compensated, and that compensation will be provided in an accessible mechanism throughout the project duration. This will help mitigate the challenge regarding the compensation mechanism and ensure smooth operation of the CBTRM process.

4.3.4. Feasible Resettlement Action Plan

CBTRM needs separate Resettlement Action Plans (RAP). The RAP is based on a census of PAPs, an inventory of losses and consultations with PAPs. The RAP stipulates provisions for resettlement, relocation and income restoration assistance. For the CBTRM project, it is suggested that the implementing stakeholders, community participants, or NGOs/CBOs produce one Resettlement Plan which covers both voluntary and involuntary settlement.

4.3.5. Policy guidelines for alternative livelihoods support

Many people living along the river basin area are directly dependent on the TRM beel. Not all the people living along the beel own land inside it. In fact, a good number of people work as day laborers. In addition, there are other people who extract natural resources from the selected beel for their livelihood. For example, there might be people who fish on the open water bodies inside the TRM basin area or people who collects reeds (wild grasses), shells etc. and sells in the local market for their livelihood. When the basin areas will be brought under the TRM process, these people will lose their jobs, particularly the agricultural laborers (See Chapter 3: Section 3.4.3).

Thus, alternative livelihoods are required for them in order to ensure their living and life. One of the best ways to provide alternative livelihoods for the affected families is to involve them in the earth and construction work of the TRM process under a policy framework, i.e. an **Alternative Livelihood Support policy (ALS policy).** For example, the laborers or landless peoples can participate in construction of peripheral embankments and the cross dam, in excavation of canals, or in maintenance work.

4.4. Implementation: Re-framing the Organizational Settings and Participation Approach

Along with policy changes, a change in organizational setting is required for implementing successful water management projects. The BWDB is the official authority for implementing large-scale (greater than 1,000 ha) coastal water management projects. In the 1990s, the BWDB formally introduced 'participatory planning' in the southwest coastal area as an important component of a sustainable water management plan under the Integrated Water Resources Management (IWRM) approach. This was an opportunity to shift governance in water resources management to other non-governmental actors, i.e. businesses, civil society, NGOs and community (Haque et al. 2015). However, water management projects are still being implemented with a completely top-down approach. There is very limited involvement of local stakeholders, and Community Water Management Organizations (WMOs) have been formed but not sustained effectively (CEGIS, 2010; Mutahara et al, 2020). The findings of this project's consultation meetings with different stakeholders and existing WMOs in the Betna-Morichhap-Lobangabati River Basin area at Satkhira sadar, Ashasuni and Debhata Upazila in Satkhira District confirm this picture (CEGIS, 2010; Mutahara et al, 2020).

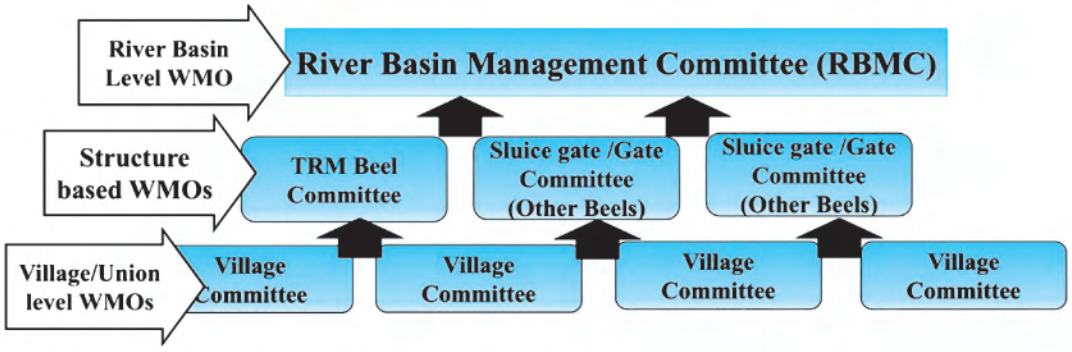
However, regular awareness building and monitoring work should be done by local stakeholders. The District Commission (DC) office normally leads the compensation activities. Although regional and local institutions such as LGIs, NGOs, development and civil society organizations, and other government

departments (agriculture, fisheries, forestry etc.) should be necessarily involved as participators. To minimize the major gaps in past coastal water management practices, including TRMs, the following actions and activities are proposed in the IGM for CBTRM:

4.4.1. A Multi-Stakeholder Forum (MSF) in the Basin Level

CBTRM takes a bottom-up approach to implementation. But due to the complex bureaucratic administrative system in Bangladesh, it is not easy to dispense with the top-down approach in water management. Therefore, an integrated approach of participation should be initiated for implementing CBTRM in the coastal river basins. This should be based on proper identification of micro (river basin level), meso (regional level: district and upazila) and macro (national level, etc.) level stakeholders, and their prioritization through a multi-stakeholder process. This should be the first step towards an integrated approach in governing a sensitive delta management system. Leadership skills need to be improved at both community and government agency levels, and a mind-set change to get collaboration should be facilitated to develop an effective Multi-Stakeholder Forum (MSF) at the river basin level, adopting the proposed Multi-Stakeholder Participation Act with GPWM.

A Multi-Stakeholder Forum (MSF) should be developed at river basin level including members from affected communities and livelihood groups, CSOs and NGOs, local government authorities and institutions, government departments (e.g. land, fisheries and agriculture), research and academic institutions (CEGIS, IWM, BUET, etc.), and members of the implementing organization, the Bangladesh Water Development Board (BWDB). The forum will pursue the development process of the local community WMOs in villages and intervention areas. The local WMOs should be followed the proposed structure within the river basin (see Figure 4.2).



Village / Union Committee: Village/Union Committee will include community people, livelihood groups, media person, social activists, teachers, student representatives etc. as members. Number of committees will be according to number of villages/unions in the river basin area.

Structure Based Committee: One committee will be established in TRM Beel (i.e. TRM Beel Committee) and rest are Gate Committees for all other management structures in other beels within the basin. Member should be elected by Village committee members.

River Basin Committee: Top of the local Water Management Groups (WMGs) in a River Basin area. The local NGOs, CSOs participation should be added in this level. President, secretary and members should be elected by Village committee and Gate committee members' vote.

Figure 4.2: Water Management Organization (WMO) framework for CBTRM

The MSF will also monitor the involvement of all stakeholders and the activities of the implementing organization, and advocate to enforce government policies in preparation and implementation of the project. Additionally, the implementing organization must be accountable to the MSF. The plan of the MSF for CBTRM is shown below (Figure 4.3).

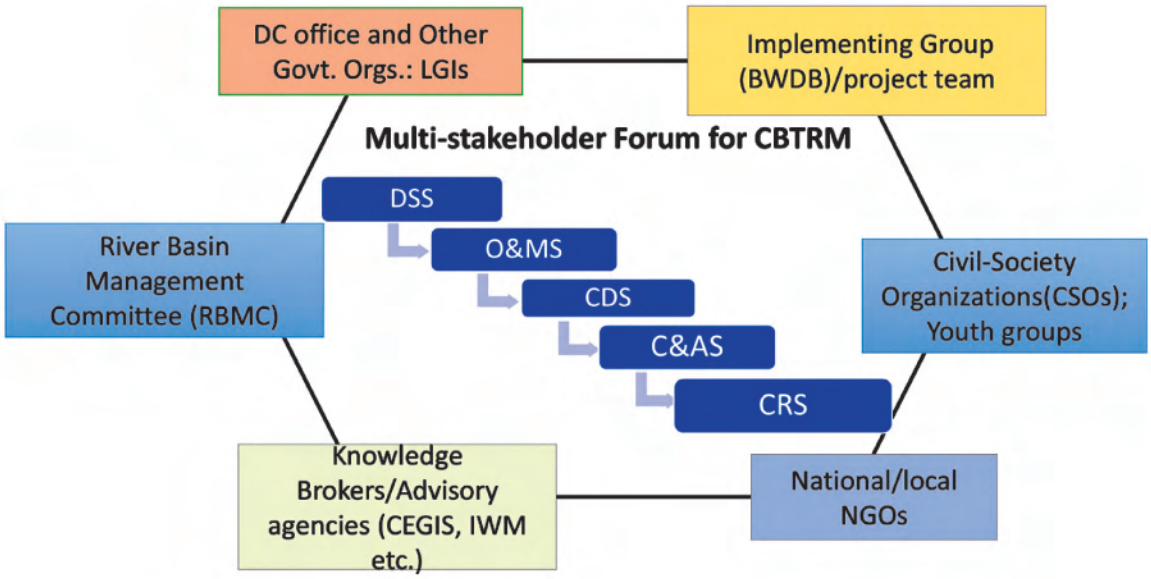


Figure 4.3: The Multi-Stakeholder Forum (MSF) for Governing the CBTRM

4.4.2. Participatory Decision Support System (PDSS)

A Participatory Decision Support System (PDSS) could be developed along with the project planning, however the PDSS will not be a project-based initiative. Rather, it will be established for river basin management to institutionalize participation from the local to regional to national level. In general, Decision Support System draws from a comprehensive set of tools aimed at informing and supporting decision making. However, Participatory Decision Support System (PDSS) to support the MSF includes local stakeholders, as well as authorities and concerned organizations in all stages of a management processes, from planning to implementation, through facilitate collaboration and knowledge sharing to achieve the sustainable management goal.

In an Inclusive Governance Model (IGM), PDSS is a decision-making framework that will be actively involved to support the Multi-Stakeholder Forum (MSF), as well as to the entire management system. It is important to empower local communities and ensure that the local knowledge, community needs and priorities are integrated into a management decision. For CBTRM, the PDSS will use the following tools for participation actions:

- Participatory regional planning: preparation and execution of the People's Plan for identified river basins in the southwest coastal region
- Knowledge hub through information collection and analysis
- Identification of uncertainties and opportunities
- Validation with user in each level of management practices
- Communication and collaboration with true stakeholders
- Negotiation and decision-making

Proper use of a PDSS will support the governance system to face the existing management challenges at the river basins in the southwest region. It will create the following opportunities:

- To work with the People's Plan
- Learning and knowledge sharing; awareness-building
- Lead to more equitable and sustainable management practices
- Enhanced equity: to ensure that the needs and necessities of marginal stakeholders are addressed and considered.
- Increase ownership and responsibility
- Effective and better decision-making

4.4.3. Efficient and Responsive Operation and Maintenance Services (O&MS)

In TRM process, major operations are needed including construction of peripheral embankment, link canals, internal sediment management etc. If one of these basic requirements is not implemented in accordance with the TRM design, the TRM process will not be effective and local people will suffer. For example, if the peripheral embankment is not constructed in a timely manner, as suggested in the design, then it may break down during heavy rainfall or tidal surge and the people of the surrounding villages would be flooded. Regular monitoring and quick responses are therefore needed. The Operation and Maintenance Services (O&MS) of the CBTRM should be efficient and responsive in accordance to the project planning.

In public consultation for the CBTRM project, local stakeholders demanded continuous TRM by rotation in different beels in the same river basin. The previous study reports (CEGIS, IWM reports on KJDRP and Kopotakko River Basin) also recommend rotating immediately after the completion of one beel to another. Otherwise, the river will again become vulnerable to silt deposition. For example, in the case of the Hari River, waterlogging has once again returned to the Bhabadah area after not being able to rotate the TRM basin to Beel Kopalia from Beel Khukshia. The CBTRM in the Betna-Morichhap-Lobangabati River basin would be officially implemented under BWDB Satkhira Division. However, stakeholders should have easy access to complain on gaps in planning or actions beyond planning. The O&MS under the multi-stakeholder forum will ensure the effective and quick response to the basic requirements of CBTRM components.

This system should also include a Grievance Redress Mechanism (GRM): Establish a transparent system for affected individuals to file complaints, in which each grievance is recorded, tracked and resolved in a time-bound manner.

4.4.4. A Transparent Compensation Distribution System (CDS)

The CDS should be implemented through the formation of a dedicated Compensation Distribution Committee (including local NGOs, CSOs and local government institutions) under the MSF of CBTRM. This committee will ensure that individuals impacted by temporary water retention or infrastructure development are properly compensated, thereby promoting community trust and reducing resistance to CBTRM operations.

A transparent Compensation Distribution System (CDS) should be initiated by adapting the Special Compensation Act for CBTRM with the following features:

- A detailed list of affected people (PAP) should be published
- The compensation petition and distribution mechanism should be easy and accessible
- A compensation distribution committee will help to set land ownership documents
- Compensation should be given in advance for each cropping year

- Compensation distribution should be conducted from the MSF office or project office in the river basin area

4.4.5. Efficient Advocacy and Communication System (A&CS)

From the beginning of the informal practice of TRM, community motivation and facilitation were at its core. Civil society organizations and the news media , along with the local community, had pushed for the practices of TRM with more active participations of the stakeholders. As for example, the local communities, civil society and media persons together formed the Paani Committee, which is still fully active in the field of water management system in the southwest area. The committee, which has different tiers, has played a very effective role in popularizing the concept of CBTRM, pushing for better management of TRM beels, and providing support to access compensation procedure.

For the current CBTRM project, strong motivation and advocacy are required in the society to recognize common interests and priorities while implementing CBTRM. NGOs and civil society organizations need to be involved to convince people who are not aware about the importance or who have little scope to think beyond their living and livelihoods. Social campaigns will be required to deal with social uncertainties. The stakeholder consultation report indicates that existing CSOs, NGOs and youth groups are more reliable for advocacy work than the community WMOs set up by the implementing agency.

4.4.6. Conflict Resolution System (CRS) for dealing the Conflicts

In CBTRM practice, conflicts of interest between stakeholders may occur at the local level, as well as in regional and national water governance. The actions and power of political and social groups, as well as activities of implementing agencies may cause conflicts. Proper assessment and close monitoring of the participation, interrelationship, and behavior of stakeholders is necessary to understand the power relations among stakeholders. In the Inclusive Governance Model, a separate Conflict Resolution System could be formed according to the multi-stakeholder process to negotiate with conflicting groups and to seek resolution and cooperation. A conflict resolution group should be established with eligible persons from the locality (i.e. teacher, journalist, social activist etc.), members from WMOs, the Multi-Stakeholder Forum of CBTRM and government agencies.

4.5. Monitoring and Evaluation

Based on the findings from the public consultation, an organized Monitoring Action Plan (MAP) is required over the course of the project, especially for the post-implementation phase. Without it, a sustainable benefit will not be achieved. A MAP can be carried out by assigned monitoring groups under the MSF to increase accountability, provide insight on the success of the engagement process in reaching its intended objectives, and to learn from experience to improve practice in the future. Regular monitoring activities should be conducted with the following components:

- Hydrological Monitoring: Continuous water level monitoring using automatic gauges and discharge monitoring using Acoustic Doppler Current Profiler (ADCP)

- Waterlogging Extent: Measured monthly (dry season) and quarterly (wet season) using satellite imagery validated by field surveys

- Sediment and Bathymetry: Monthly in the first year, quarterly thereafter, to track beel infill and riverbed deepening

- Water Quality Monitoring: Includes Dissolved Oxygen (DO), Electrical Conductivity (EC),

turbidity, and salinity, conducted monthly

- Socio-Economic Monitoring: Annual household surveys to track livelihood restoration, income shifts, and employment generation
- Grievance Monitoring: Reports include number of grievances lodged, resolved, and pending

The Monitoring System should not be limited within a certain timeframe, but remain an ongoing process throughout the regional water management cycle. Monitoring should be conducted based on inclusive participation, responsiveness, accountability, transparency and equity. The effectiveness of practices and participation, efficiency of institutions, and the benefits of an improved governance system should be evaluated by ensuring regular monitoring. Government agencies could invite academic researchers and university students for learning the governance system and management processes, while making sure that invited researchers and students are able to 'connect' with the local people and their socio-cultural and historical context.

CHAPTER 05

Conclusion and Call to Action

5.1. Conclusion and Recommendations

A comprehensive, forward-looking framework for implementing Community-Based Tidal River Management (CBTRM) in the Betna and Morirchap–Labangabati River Basins of Satkhira District has been developed based on a participatory approach called the People's Plan. Established against intensifying sedimentation, chronic waterlogging, disrupted drainage, declining agricultural productivity, and ecological stress, this project reframes TRM as a community-driven, nature-based solution capable of delivering systemic benefits to both communities and ecosystems.

The plan for implementing CBTRM in the Betna and the Morirchap–Labangabati River Basin introduced here is not bound by a rigid timeline; rather, it proposes a rotational and adaptive approach that remains responsive to evolving hydrological conditions, land use patterns, and community perceptions. The Paired-beel Operational Model (POM) forms the backbone of this strategy, ensuring that in each phase TRM is implemented simultaneously in one beel of the Betna catchment and one of the Morirchap–Labangabati system. This parallel operational approach balances the hydrological system, distributes benefits more equitably and fosters parallel learning across two interconnected basins.

Institutionally, the project emphasizes the necessity of inclusive governance mechanisms. As TRM is a modified indigenous river basin management practice and nature-based solution, special and effective guidelines or implementation acts need to be added to the existing water management policy framework. Therefore, we propose an Inclusive Governance Model to support the People's Plan for implement CBTRM in the Betna-Morirchap-Labangabati River Basin, which could also be applicable for other tidal river basins in the southwest coastal area in Bangladesh.

Planning and implementation of CBTRM should be participatory, transparent, and socially legitimate. The following recommendations are proposed:

- Mainstreaming TRM into National Policy: Integrate CBTRM into the National Plans and Policies for Delta Management. Develop national TRM guidelines following the proposed Inclusive Governance Model for CBTRM.

- Compensation and Livelihood Restoration: Compensation Distribution needs to be started during the preparatory stage. Keep strong monitoring to ensure transparent and fair support to affected households. Provide livelihood restoration packages targeting women, youth, and landless groups, ensuring equitable reintegration into agriculture, aquaculture, or other income-generating sectors.

- Strengthening local and institutional capacity by empowering WMOs through legal mandates, devolved authority, and financial mechanisms. Provide systematic training on managing water control structures, monitoring sediment dynamics and applying nature-based and eco-engineering techniques.

- Safeguarding Technical Integrity: Carry out monthly inspections and maintenance of every hydraulic structure, and monitor sediment distribution. Conduct in-beel land leveling, river re-excavation, and bank stabilization based on real-time monitoring data to prevent over-siltation or channel slit.

- Feasibility Study: A detail Feasibility Study with comprehensive Environmental and Social Impact Assessment should be conducted to understand the potential effects of CBTRM on the area.

- Adaptive and Sustainable CBTRM Design: Ecological considerations should be integrated into the CBTRM design, ensuring that the management approach is adaptive and minimizes disruptions to the existing ecosystem.

- Mitigation and Management Strategies: To minimize the potential negative impacts of CBTRM on the environment and the society around the beels and the basin area, an effective Environmental Management plan needs to be established and considered in detail in designing of the CBTRM.

- Community Engagement and Awareness: Involvement of local communities, NGOs and CBOs in the planning and implementation of CBTRM and in promoting environmental awareness and social safeguards in the river basin area.

Transparency, Awareness, and Learning:

- Invest in awareness campaigns in moderately suitable sites to overcome perception barriers and prepare the ground for future TRM operations.

- Organize a closing workshop at the end of each TRM cycle to present achievements, visualize land transformation, recognize community efforts and gather lessons for scaling.

CBTRM must not be seen as a mid-term or short-term option for delta management options, but a major component of long-term water management processes. The current project, although initially structured in four phases, should be viewed not as limited to these phases, but as an ongoing, rotational process that adapts to changing hydrological, environmental, and social conditions. As we are dealing with a wicked problem, it requires a journey, rather than a one-time action. Upon the successful completion of the first four phases, the focus should naturally shift toward the moderately suitable low-lying areas already identified, while also remaining open to newly emerging sites as catchment conditions, land use patterns and community perceptions evolve. This ensures that the system does not stagnate, but remains dynamic and responsive to the realities on the ground. Future phases will continue to uphold the principle of progressing upstream from downstream, in line with natural tidal behavior, ensuring that sediment, water and drainage benefits are distributed equitably and sustainably across the basin. In this way, the long-term vision for CBTRM goes beyond short-term land reclamation to establish a cyclical, basin-wide management approach that can be reactivated wherever and whenever conditions are suitable.

Ultimately, this forward-looking plan positions CBTRM as a platform for ongoing delta adaptation, livelihood diversification, and good water governance, ensuring that even after the first implementation cycle is completed, the process remains viable, scalable, and adaptable for decades to come.

5.2. Call to Action

Being among the world's most vulnerable to climate change and sea level rise, people in southwest coastal Bangladesh are advocating for a safe and healthy living environment. To mitigate the risk of inundation in the tidal river basins in the southwest coastal districts, the community people propose a CBTRM water management system with direct participation of local stakeholders.

In order to protect the people in the southwest of Bangladesh from the impacts due to climate change and sea level rise, we call upon policymakers, financiers and development agencies to support and invest in the restoration of tidal river basins. The People's Plan for Community-Based Tidal River Management not only address severe waterlogging and climate resilience, but also contributes to food security and equitable economic development in the region.

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