



Towards a Sustainable Delta:

An in-depth analysis for a Climate-inclusive M&E Framework for Bangladesh Delta Plan 2100

**Climate Adaptation and Resilience
(CARE) for South Asia Project**

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Sustainable Delta:**

An in-depth analysis for
a Climate-inclusive M&E
Framework for Bangladesh
Delta Plan 2100



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SM Tower 24th Floor No. 979/66-70 Phahonyothin Road,
Phaya Thai Sub-District Phaya Thai District, Bangkok 10400, Thailand
Telephone: +66 2 298 0681-92
Website: www.adpc.net

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EXECUTIVE SUMMARY

Asian Disaster Preparedness Center (ADPC) and Regional Integrated Multi-Hazard Early Warning System (RIMES) are jointly implementing a five-year (2020-2025) regional project called 'Climate Adaptation and Resilience (CARE) for South Asia,' with support from the World Bank. The overall objective of the project is to contribute to an enabling environment for climate resilience policies and investments in agriculture, transport, water, policy and planning, and finance sectors in South Asia. The national-level activities are being implemented in Bangladesh, Nepal, and Pakistan.

The project has two parallel but distinct components: RIMES is implementing the first component, which focuses on promoting evidence-based, climate-smart decision-making; ADPC is implementing the second component, which focuses on enhancing policies, standards, and capacities for climate-resilient development in South Asia.

The largest dynamic delta on earth and habitat of more than 160 million people, Bangladesh faces numerous climate change impacts, including natural disasters, water and environmental challenges, demographic and socio-economic vulnerabilities, and transboundary resource management issues.

The government of Bangladesh has formulated the Bangladesh Delta Plan 2100 (BDP 2100) to effectively address the above issues and ensure sustainable and climate-resilient development, primarily in the delta regions but extending to all regions of the country. BDP 2100 is a long-term comprehensive vision document for managing the country's water resources and land assets. It is expected to reference overall land and water development targets until 2100 (GED, 2018).

The Plan is built upon the core vision for sustainable and climate resilience water resources management, which is integral to natural resource management and the ecosystem-based livelihood of the people. It has six specific and three overarching goals for managing this unique delta. It is developed with support from the Government of the Netherlands, using the extensive experience of the Netherlands' delta management.

The General Economics Division (GED) under the Bangladesh Planning Commission (BPC) is the responsible authority for coordination, facilitation, and monitoring and evaluation (M&E) during plan implementation. The investment plan of BDP 2100 initially has a total of eighty (80) projects in the pipeline. These projects will be implemented by different ministries by 2030. The estimated total investment cost for the initial phase is approximately 37.0 billion (GED, 2018).

The Ministry of Water Resources (MoWR) and its partner organizations will implement many of the listed projects. GED will work in coordination with MoWR and the other ministries, perform M&E, and evaluate the outcomes of the projects against the targets of the BDP 2100.

The BDP 2100 provides a draft outline of the intended M&E framework for the selected investment plan. It additionally discusses strategies to address the data gaps, challenges, and potential drawbacks of implementing the M&E framework. Suggestions have been made in the Plan on the design and implementation of a Result Based M&E (RBM&E) framework in accordance with the guidelines provided in the country's 8th Five-Year Plan (8FYP).

This report presents the findings of a review performed for the suggested M&E framework of the BDP 2100 with considerations for climate adaptation and resilience. It was prepared in 2021 and revised in 2023. The review used information from the BDP 2100, other secondary sources, and an initial stakeholder consultation with GED. The duration of the relevance of recommendations is covered in the report's final page.

The institutional form of the M&E system includes a Delta Governing Council to support the administration, implementation, coordination, and M&E of the projects under the Plan (GED, 2018). A collaborative institutional form is assigned to create the entire M&E environment for the Plan. The implementing agencies will be responsible for conducting M&E at the project and sectoral levels. In parallel, the Implementation, Monitoring, and Evaluation Division (IMED) under the BPC will continue its regular M&E for all investment projects, including those under the Delta Plan. However, the M&E of the Delta Plan is exclusively assigned to GED.

The BDP 2100 is an adaptive plan designed to be adjusted during its implementation as circumstances change and outputs from plan implementation are achieved. The M&E system thus provides key data for the review and adjustment of the plan.

The current investment plan of BDP 2100 addresses the local challenges for water, natural resources, and livelihood. Governed by the Ministry of Water Resources (MoWR), more than five ministries will be responsible for implementing these investment projects. Each ministry will work with one or more of its partner organizations. As formulated in the Delta Plan, the Bangladesh Water Development Board (BWDB) will lead the implementation process by executing 23 projects independently. **Figure 1** shows the structure of the Delta Investment Plan.

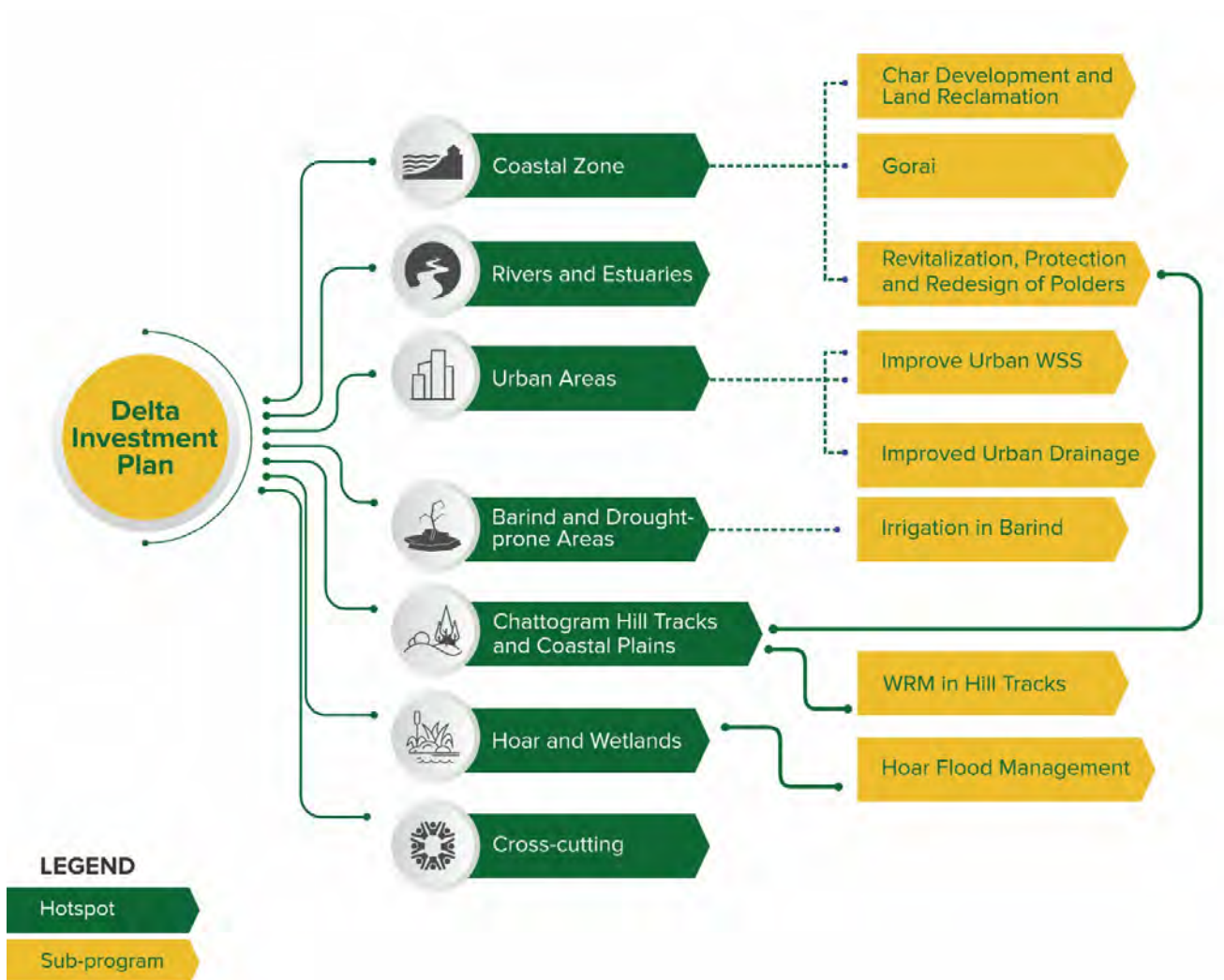


Figure 1: Structure of the Delta Investment Plan up to 2030 (Source: GED, 2018)

The M&E of the Delta Plan is comprised of a Development Results Framework (DRF) comprising a set of macro-level indicators. These indicators are distributed across six specific goals of the Plan and have baseline measures and minimum targets to be achieved by 2030 and 2050. An analysis of the DRF shows many indicators that evaluate the physical progress and outcome of projects towards the six BDP 2100 specific goals. Still, indicators for policy, regulation, and agency activity are lacking. The current indicators also do not effectively measure changes in economic, social, or environmental conditions within the BDP 2100 area, which is the high-level goal of the BDP 2100.

The review proposes adding indicators to measure economic, social, and environmental change, recommends using relevant SDG indicators, including some for SDG 13, and takes urgent action to combat climate change and its impacts.

The study identified an important knowledge base, i.e., the Delta Knowledge Portal (available at: <https://bdp2100kp.gov.bd>), which could potentially contribute to developing the intended M&E framework and supply essential data for the M&E system.

The assessment was supported by information from the management and monitoring experiences in three deltas - the Danube River Delta, the Mekong River Delta, and the Netherlands. Additionally, the study identified linkages with the country's Eighth Five Year Plan 2021-2025, opportunities for integration with sectoral goals (e.g., goals of water sector development), and correlations with the sustainable development goals (SDGs).

The World Bank found the BDP 2100 to be adequately adaptive and flexible to sustain the impact of climate change and human interventions in the delta over a long period. The M&E framework must inform the plan review process so that the BDP Investment plan to be adapted to these impacts. The DRF provides the technical reference and a systematic procedure for the GED to operate the M&E system for activities in the delta. However, like the current Bangladesh M&E practice, the indicators only report physical and financial progress. The indicators of the DRF are designed for the specific goals of the BDP 2100 but need to adopt a result-based approach and be supported by a system to track and report on the management performance of the institutions implementing, adjusting, and strengthening the BDP 2100.

The existing DRF is not disaggregated to assess performance in individual sectors; nor provide information on the sector agency's efficiency, accountability, and performance in learning. Rather, it sets targets accumulating the overall physical and financial outcomes of the projects implemented.

The following findings on the BDP 2100 Investment Plan provide context for the review of the BDP 2100 M&E framework.

- The BDP 2100 focuses on sustainability and climate resilience for its investment in the IWRM activities and follows the Netherlands Adaptive Delta Management (ADM) approach of the Delta Management Program.
- The first implementation phase is set with 80 projects for the horizon of 2030. The great majority of these projects are for infrastructure. The estimated capital investment cost for the first phase is about US \$37.0 billion.
- The investment is concentrated on and around the water sector for the first phase. The MoWR will execute 38 of the 80 projects; of these, at least 23 projects will be implemented by the BWDB. Additionally, the BWDB will implement some projects with other ministry departments.
- The focus of climate adaptation activity is currently to build capacity in livestock management.
- The GED is responsible for tracking the progress and outcome of the investments and for facilitating coordination and collaboration among the executing agencies.

Status of M&E Framework under the BDP 2100

- A total of 25 indicators are proposed in the DRF of the BDP 2100. These indicators are disaggregated into thirty (30) sub-indicators and grouped for the specific six (6) goals of the plan. The list of the DRF indicators is provided in Appendix-I of the main report.
- The benchmarks and minimum targets for the M&E indicators are set for 2016 (base year), 2030, and 2050. Beyond 2050, the DRF should be revised using the experience of Delta management.
- The indicators of the DRF mostly focus on the affected population, geographic area, and water flow volume. Many of these parameters are expressed as a percentage.
- Minimum targets for many indicators are yet to be decided for 2050. These values will be set using knowledge and experience gained from the M&E system.
- There is limited or no information on the technical definition of the indicators mentioned in the DRF. Therefore, the baseline and the minimum target values do not provide a strong basis for either monitoring plan implementation progress or supporting plan adaptation.
- The DRF needs further clarification for the linkage among the project-level, sectoral, and goal-specific indicators. The agencies should have adequate capacity building to accurately measure, relate, translate, and present this linkage.
- There is ample scope for connecting delta plan indicators and the SDGs.
- The investment plan includes many projects jointly executed by more than one ministry. It is challenging to define and design representative indicators for the participating ministries and the project as a whole. In this case, a rigorous technical study should be conducted with well-executed consultation among the sector stakeholders to confirm the recommendations.
- Outcomes of some projects may not be experienced immediately after the implementation is complete. The results may take a considerable duration to be visible. Therefore, evaluating such programs may require a long-term engagement in M&E.
- The principles of ADM allow results-based M&E to be developed. It could be established and effective by 2030.
- The indicators of the proposed M&E system are to be developed under the Development Result Framework (DRF). The DRF needs to be designed with adequate flexibility to incorporate or adjust necessary indicators under future uncertain scenarios.

Status of Climate-informed Indicators in the M&E Framework

- There is currently no “climate-informed” indicator in the DRF. However, many indicators, such as those for flood control and management, will be impacted by climate change, and the change in their values will reflect both plan implementation and the effects of climate change. Additional work is required to define indicators or procedures that can explicitly measure climate change impacts.

Comparison with the Sustainable Development Goals (SDGs)

- There is currently no direct linkage between the indicators of the DRF and the SDGs. It is noted that the first of the three Higher goals concerning economic progress is aligned with SGD 1.1 “By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day”.
- Since the first horizon of the plan is 2030, and it is also consistent with the design period of SDG, there is ample scope for re-evaluating the minimum targets in alignment with the SDGs.

- The indicators for several of the SDGs are directly relevant to the specific goals and could be included in the DRF. There are clear procedures for estimating the values of the SDG indicators.

Recommendations

Urgent action is necessary to implement these recommendations to strengthen the BDP 2100 M&E framework. Within three months of receipt of this report, GED should consult with the Support to Implementation of the Bangladesh Delta Plan 2100 project, convene working groups of relevant stakeholders, and arrange meetings to set clear tasks and timelines for responding to this review.

- A detailed study and gap assessment of the DRF indicators is required, which should include all government agency BDP 2100 stakeholders. The objective of this review should be to select indicators for each of the Specific goals that measure the planned and expected outputs and outcomes of projects and activities towards that goal.
- The M&E framework should provide evidence to justify the budget and energy spent in BDP 2100 development and implementation.
- Indicators should provide for Plan progress measurement resulting from soft projects (such as agency and stakeholder capacity building, gender and pro-poor sensitization and empowerment, nature-based solutions, etc.) as well as achievements of infrastructure projects.
- CARE for South Asia should be taken that the indicators can reflect the sustainability of all water resources (surface, groundwater, wetland ecological condition, and catchment values) and water resource developments. The experience of the Danube Transnational Monitoring Network development is relevant to the study.
- Additional indicators that monitor external conditions which may influence the progress of Plan implementation, or the selection of alternative adaptation pathways, programs, or projects, may be considered. These external condition indicators could include some to monitor climate change.
- This review has selected some additional indicators for each Specific goal to measure the Plan's achievements at the national level. These have been chosen from the World Bank's Country Partnership Framework (FY2023 – FY2027) and the SDG Global Indicator framework (updated for 2023).
- Mapping and listing project-specific and sectoral M&E needs should be performed using the principles of an RBM&E framework.
- An appropriate linkage among the project-level, sectoral, and goal-specific indicators should be established and communicated to the executed agencies of the BDP 2100.
- Adaptation tipping point indicators can be considered to support decisions on plan adjustments when specific trigger points are reached. These indicators should be selected during the design of alternative adaptation pathways.
- An institutional framework is essential to ensure the availability and a seamless flow of information in the M&E platform. Authoritative support from the Delta Governing Council is required to strengthen the data supply and development of the Delta Knowledge Portal. Legislation on water-related data collection and management might be considered. The Delta Knowledge Portal should integrate with regional data platforms to provide for its regional climate and hydrologic setting.
- Whether involved in managing or implementing the investment plan, the agencies should be provided with adequate capacity building and resources for the intended M&E framework and their roles.

- The institutional setup for this M&E framework should regularly be reviewed and updated accordingly. The Delta Governing Council should be informed about and support the operation of the institutional setup for the M&E framework.
- The delta plan governance should not only guide what to do but also what will be done and how it will be done to address the challenges and deficiencies experienced in the course of actions. If possible, the overall delta governance should be brought under a legal setup of the government with adequate management, regulation, and enforcement capacities.
- An additional monitoring and evaluation framework could be considered to assess and guide the development of the institutional aspects of the BDP 2100. The MRC's Organization Performance Monitoring System should be studied and may be a suitable model.
- There may be a technological intervention to support a seamless flow of delta-related information among the participating stakeholders and the development of the delta management knowledge platform. However, such a technological process may also need to be supported by institutional processes such as directions to government agencies from the Delta Governing Council.

ACRONYMS

6FYP	Sixth Five-Year Plan of Bangladesh (2011-2015)
8FYP	Eighth Five-Year Plan of Bangladesh (2021-2025)
ADM	Adaptive Delta Management
ADP	Annual Development Program of Bangladesh
ADPC	Asian Disaster Preparedness Center
BAU	Business As Usual scenario
BBS	Bangladesh Bureau of Statistics
BDP 2100	Bangladesh Delta Plan 2100
BDS	Basin Development Strategy
BIWTA	Bangladesh Inland Water Transport Authority
BLRI	Bangladesh Livestock Research Institute
BPC	Bangladesh Planning Commission
BWDB	Bangladesh Water Development Board
CARE	Climate Adaptation and Resilience for South Asia
CCD	Climate Change Database
CSICRD	Climate Smart Integrated Coastal Resources Database
DAE	Department of Agricultural Extension
DBHWD	Department of Bangladesh Haor and Wetlands Development
DLS	Department of Livestock Services, Bangladesh
DOF	Department of Forest, Bangladesh
DPHE	Department of Public Health Engineering, Bangladesh
DRB	Danube River Basin
DRBM	Danube River Basin Management Plan
DRF	Development Results Framework
DWASA	Dhaka Water Supply and Sewerage Authority
FFWC	Flood Forecasting and Warning Center of the BWDB
FYP	Fiscal Year Plan
GBM	Ganges-Brahmaputra-Meghna basin
GED	General Economics Division of the BPC
ICPDR	The International Commission for Protection of the Danube River (ICPDR)
ICZM	Integrated Coastal Zone Management
IHWDRD	Integrated Haor and Wetlands Resources Database of Bangladesh
IMED	Implementation, Monitoring, and Evaluation Division of the BPC
IT	Information Technology
IWRM	Integrated Water Resources Management
JCP BD-NL	Joint Cooperation Program, Bangladesh-The Netherlands
JRC	Joint River Commission under the Ministry of Water Resources of Bangladesh

KPI	Key Performance Indicator
KWASA	Khulna Water Supply and Sewerage Authority, Bangladesh
LGED	Local Government Engineering Department of Bangladesh
LGRD&C	Ministry of Local Government and Rural Development and Cooperatives, Bangladesh
M&E	Monitoring and Evaluation
MAA	Monitoring, Analyzing and Acting system, the M&E framework of the Netherlands Delta Program
MoA	Ministry of Agriculture of Bangladesh
MoEFCC	Ministry of Environment, Forest and Climate Change of Bangladesh
MoFL	Ministry of Fisheries and Livestock of Bangladesh
MoWR	Ministry of Water Resources of Bangladesh
LMRB	Lower Mekong River Basin
MRC	Mekong River Commission
NAP	National Adaptation Plan of Bangladesh
NDC	Nationally Determined Contribution
NDP	The Netherlands Delta Program
NWMP	National Water Management Plan of Bangladesh
NWPo	National Water Policy of Bangladesh
NWRD	National Water Resources Database
PAD	Project Appraisal Document
RBM&E	Result-Based Monitoring and Evaluation
RHD	Roads and Highways Department of Bangladesh
RIMES	Regional Integrated Multi-hazard Early Warning System for Africa and Asia
SDG	Sustainable Development Goals
SMART	Specific, Measurable, Attainable, Relevant, Time-bound
SWMI	Significant Water Management Issue
TNMN	Transnational Monitoring Network
WARPO	Water Resources Planning Organization of Bangladesh
WB	The World Bank Group
WFD	The EU Water Framework Directive

1. INTRODUCTION

1.1 Overview

Asian Disaster Preparedness Center (ADPC) and the Regional Integrated Multi-Hazard Early Warning System (RIMES) are jointly implementing a five-year (2020-2025) regional project called 'Climate Adaptation and Resilience (CARE) for South Asia,' with support from the World Bank. The project's overall objective is to contribute to an enabling environment for climate resilience policies and investments in South Asia's agriculture, transport, water, policy and planning, and finance sectors. The national-level activities are being implemented in Bangladesh, Nepal, and Pakistan.

The project has two parallel but distinct components: RIMES is implementing the first component, which focuses on promoting evidence-based climate-smart decision-making; ADPC is implementing the second component, which focuses on enhancing policies, standards, and capacities for climate-resilient development in South Asia.

This report presents the findings of a review of the suggested M&E framework of the BDP 2100, with considerations for climate adaptation and resilience. The BDP 2100 is a socio-economic plan to guide development primarily in the delta regions but extending to all regions of the country.

The report was prepared in 2021 and revised in 2023 to support the Government of Bangladesh with essential technical assistance and advisory services for designing and developing a comprehensive macro-level M&E framework for the BDP 2100.

1.2 Bangladesh: Country Context

Bangladesh, with a land area of approximately 148,000 sq. km, is one of the most climate-vulnerable countries in the world. According to the Global Climate Risk Index 2020, the country is ranked seventh among the most affected countries by impacts of weather-related loss events (Eckstein, 2019). The geographic position and shape make it the largest delta known on earth, and lies on the most downstream catchment of the great Ganges-Brahmaputra-Meghna (GBM) basin. Over time, climate change threats have become an acute concern for the nation.

The governing challenges are temperature rise, erratic rainfall patterns, droughts, frequent flooding, destructive morphological changes and river erosion, sea-level rise (SLR) and salinity intrusion, cyclones and storm surges, etc. (GED, 2018). Multiplied by unprecedented development factors such as human-altered water and natural environment, infrastructural development, increasing industrial facilities and wastes, increasing climate-threatening activities, etc., the consequences are now visible at an alarming scale, and the communities are becoming more frequently exposed to severe natural hazards.

Over decades, the government has implemented several small to large-scale initiatives to build local and nationwide resilience to climate change. As part of a regional effort to support the country's adaptation pathways to climate change, ADPC aims to support the Bangladesh government's priority actions identified in the country's Nationally Determined Contributions (NDCs), Bangladesh Delta Plan 2100, and the National Adaptation Plan (NAP).

1.3 Bangladesh Delta Plan 2100

The largest dynamic delta on earth and habitat of more than 160 million people, Bangladesh faces numerous climate change impacts, including natural disasters, water and environmental challenges, demographic and socio-economic vulnerabilities, and transboundary resource management issues.

BDP 2100 is a long-term comprehensive vision document for managing the country's water resources and land assets. It is expected to reference overall development targets until 2100 (GED, 2018). BDP 2100 is built upon the core vision for sustainable and climate resilience water resources

management, which is integral to natural resource management and the ecosystem-based livelihood of the people. The projects comprising the BDP 2100 were selected based on adaptive delta management principles.¹ The adaptive plan is directed with the following vision and mission statements:

Vision Statement

“Achieving a safe, climate resilient and prosperous delta.”

Mission Statement

“Ensure long term water and food security, economic growth and environmental sustainability while effectively reducing vulnerability to natural disasters and building resilience to climate change and other delta challenges through robust, adaptive and integrated strategies, and equitable water governance.”

BDP 2100 has three high-level and six specific goals defined for the delta, as illustrated in Figure 2.

BDP 2100	High-level Goals
	<ul style="list-style-type: none">• Goal 1: Eliminate extreme poverty by 2030• Goal 2: Achieve upper middle income status by 2030• Goal 3: Being a prosperous country beyond 2041
BDP 2100	Specific Goals
	<ul style="list-style-type: none">• Goal 1: Ensure safety from floods and climate change related disasters• Goal 2: Enhance water security and efficiency of water usages• Goal 3: Ensure sustainable and integrated river systems and estuaries management• Goal 4: Conserve and preserve wetlands and ecosystems and promote their wise use• Goal 5: Develop effective institutions and equitable governance for in - country and trans-boundary water resources management• Goal 6: Achieve optimal and integrated use of land and water resources

Figure 2: Goals of BDP 2100 (Source: GED, 2018)

¹ World Bank, 2022, Bangladesh Country Climate and Development Report, p30 “Adaptive Delta Management (ADM) represents a paradigm shift in planning and managing water-related interventions by (i) embodying a structured, iterative decision-making process for water-based development interventions to reduce uncertainty over time, thus minimizing the likelihood of over- or under-investment in the water-related challenges; and (ii) considering the links between demand in space and time.”
<https://openknowledge.worldbank.org/server/api/core/bitstreams/6d66e133-e49d-5ad9-b056-7b1a6c6206ed/content>

The plan is developed with support from the Government of the Netherlands and using the extensive experience of the Netherlands' delta management. The General Economics Division (GED) under the Bangladesh Planning Commission is the responsible authority for coordination, facilitation, and M&E for implementing the plan. The investment plan of BDP 2100 initially has a total of eighty (80) projects in the pipeline which will be implemented by different ministries by 2030. The estimated total investment cost for the initial phase is approximately US \$37.0 billion (GED, 2018). The Ministry of Water Resources (MoWR) and its partner organizations will implement many listed projects. GED will work in coordination with these ministries, perform M&E, and evaluate the outcomes of the projects against the targets of the BDP 2100.

BDP 2100 is an adaptive plan designed to be adjusted during its implementation as circumstances change and outputs from plan implementation are achieved. This flexible and adaptive strategy manages uncertainties, links short-term, medium-term, and long-term expected outcomes, and copes with the future dynamics of water, climate change, and other environmental issues. Well-designed and effectively implemented monitoring and evaluation are necessary to confirm implementation progress and provide updates to the baseline information needed to propose adjustments to plan components.

Chapter 13 of Volume 1 of the BDP 2100 provides a draft outline of the intended M&E framework for the selected investment plan. It additionally discusses strategies to address the data gaps, challenges, and potential drawbacks of implementing the M&E framework. The plan summarizes, with suggestions, the design, and implementation of a Result Based M&E (RBM&E) framework in accordance with the guidelines provided in the country's 6th Five Year Plan (6th FYP).

It is important to note that the investment projects under the BDP 2100 will be implemented and evaluated based on the current M&E practice of the involved sectors on an annual basis by the Implementation, Monitoring, and Evaluation Division (IMED) of the Bangladesh Planning Commission. The proposed M&E framework for the BDP 2100 may use and integrate information from these sector-specific M&E data to track the progress and investments made by the projects under the plan.

1.4 Study Objectives

The CARE for South Asia project includes an advisory service to be provided by ADPC for developing a comprehensive M&E framework for the BDP 2100. This report is a step toward a well-designed M&E framework for the BDP 2100, which will guide the development and implementation of BDP 2100 and, hence, strengthen its outcomes for the Plan beneficiaries. The proposed M&E framework will help the GED monitor and evaluate the investment plan and projects under the BDP 2100.

This report reviews the intended BDP 2100 M&E framework, as described in Chapter 13 and informed by consultations with the General Economics Division (GED) staff under the Bangladesh Planning Commission (BPC). The review concludes with a summary of issues and shortcomings in the current implementation stage of the M&E framework and makes recommendations for strengthening the M&E framework.

The review report will help GED prepare a guideline for developing the M&E framework and an M&E implementation strategy, as well as being a useful reference for preparing training material on the developed guideline. ADPC will later prepare and deliver this training to selected GED staff.

In addition to GED, the report's primary audience, the executing agencies for the BDP 2100 component projects are encouraged to read this report. The most relevant of these stakeholders are the Ministry of Water Resources, BWDB, the Department of Public Health Engineering, the Local Government Engineering Department, and the Department of Agricultural Extension since these agencies are responsible for guiding BDP 2100 component projects involving more than one ministry.

1.5 Review Approach and Methodology

The technical review of the M&E framework of the BDP 2100 has been performed based on available policy documents and guidelines published by various government and partner organizations. The reviewed materials include, but are not limited to:

- BDP 2100 Volume 1: Strategy
- Documents related to the implementation and monitoring of the BDP 2100
- Documents on the existing M&E system of the IMED, MoWR, and its partner organizations, namely, WARPO, BWDB, DBHWD, and JRC
- The M&E framework of the SDGs
- Documents on the commonly practiced M&E system for water resources across the globe

The section: References of this report provides the complete list of reviewed resources. Additionally, findings from the initial consultation with the sector focal point of GED (CARE for South Asia) were also incorporated into the assessment.

The review findings are detailed in Section 3, where an analysis framework is also presented. The analysis is based on the following:

- Effective definition of current BDP 2100 result indicators
- Alignment of indicators with relevant SDG indicators
- The need for additional indicators to measure progress toward equitable and sustainable development
- The suitability of the BDP 2100 M&E institutional structure for data collection, analysis, and reporting on the recommended indicators
- The existence of knowledge bases to support the recommended indicators

The analysis also comments on any perceived shortcomings of the current development results framework (DRF) indicators.

The findings from this initial assessment are subjected to validation by the GED and other governing implementation agencies of the BDP 2100 in the next step.

2. MONITORING AND EVALUATION (M&E) OF BDP 2100

2.1 M&E Objectives and Goals

Monitoring and evaluation (M&E) promotes accountability and transparency in public spending and ensures that resources are efficiently utilized for attaining the development goals (GED, 2018). It is noteworthy that the BDP 2100 is not only a large investment but also essential for the sustainability of the delta. Thus, an effective M&E system is essential for the successful plan implementation and ensuring the best utilization of investments made. The Delta M&E Framework is to help guide and ensure effective implementation. The M&E must measure progress and identify tipping points and possible changes in the pathway needed to achieve the overall plan objectives (GED, 2018). The BDP M&E is required to be result oriented but at the plan, not project level. Aggradation of project-level M&E will not provide reasonable estimates of plan-level results. Separate, plan-level results-based M&E is required and should be informed by project-level results-based M&E. This is being introduced by the Bangladesh government but not yet adopted. The BDP 2100 M&E must inform about the effectiveness of both project results and project coordination in producing plan-level results and allow assessment of whether these results are necessary and sufficient for the economic, social, and environmental conditions and updated projections of future conditions at the time of the assessment.

As noted in the following sub-sections, the current M&E system and its application within the proposed BDP 2100 M&E Framework is inadequate to ensure an adaptive delta planning process. Improvements to the results-based M&E are needed, including providing information on annual progress toward plan-level results through additional indicators and achieving strong coordination and cooperation between the BDP 21000 pipeline projects. Unless these improvements are achieved, necessary plan adaptation to changing economic, social, and environmental conditions in the Plan area, including but not limited to climate change, will delay, or even prevent, the achievement of the three Higher level goals of the BDP 2100.

2.2 Existing M&E System in Place for the Government's Programs

The current practice of M&E in the country focuses on physical and financial tracking of the projects or programs implemented. It focuses on the implementation progress of public spending - in terms of causes of delays and ways to accelerate project implementation. Development results, when presented, tend to be equated with inputs provided or outputs related to project investment.² The system is, therefore, not an effective M&E system because it cannot align the indicators with the project's actual intended result in terms of outcomes and impacts in a manner that allows a technical performance audit.³

This existing M&E system is also unsuitable for the ADM required in the BDP 2100. The BDP 2100 M&E must inform decisions on adjusting the Plan during its implementation by providing data on the outcomes and impacts of its constituent projects. It is important that a results-based M&E system must include baseline data and information to determine development progress.

The Implementation, Monitoring, and Evaluation Division (IMED) under the Bangladesh Planning Commission (BPC) is responsible for conducting M&E for the public sector development projects and programs under the Government's Annual Development Program (ADP).⁴ IMED is engaged at various stages of a project life-cycle which may begin from project preparation through post-implementation evaluation. To support tracking and evaluation, IMED prepares many M&E documents for each project in the ADP, including a logical framework, using its own capacity or by appointing external consultants. The implementing agencies conduct this project-specific M&E, which is reported in their annual performance appraisal (APA) reports. However, it is important to note that almost

² ADB 2021, TCR Validation Report, People's Republic of Bangladesh: Enhancing the Institutional Capacity of the Implementation Monitoring and Evaluation Division, Ministry of Planning. <https://www.adb.org/documents/bangladesh-enhancing-institutional-capacity-implementation-monitoring-and-evaluation>

³ Ibid.

⁴ IMED, 2019, M&E Policy Study

all development projects use physical and financial tracking as indicators and for project-monitoring within the implementation period. Results-based indicators are only reported after project completion.

The role of IMED is not limited to project tracking and reporting: it also provides guidance on project improvement and timely implementation. Every year, on an average, IMED monitors the progress of about 1200 projects under the Annual Development Program (ADP) and evaluates about 300 completed projects (GED, 2018).

From the 6th Five Year Plan (6th FYP, 2011-2015), the concept of Result-Based M&E (RBM&E) has been introduced and recommended for tracking the performance of the projects. The government has gradually been formulating the RBM&E system across all sectors and national-level plans and programs. However, it is not yet implemented at the project level.

The BDP 2100 formulation project completed a rigorous study to understand the present sources of information, existing M&E practice by individual sectors, the availability and validity of water, climate, and environment-related data, and the available national policies.

The study revealed that the existing M&E practice follows the National Water Policy 1999 and the National Water Management Plan (NWMP) 2001, although it is not adequately structured. Over 25 years from 2001, the NWMP suggested planning and implementing 84 national and regional level programs in the water sector. Many of these programs are yet to be implemented, and there is an opportunity to review and integrate these activities with the projects targeted under the BDP 2100.

Seven major ministries and their implementing agencies work in the water sector (GED, 2018). All government agencies, including water sector ones, monitor their project activities by preparing, publishing, and tracking monthly, quarterly, and annual progress reports. The annual progress reports are prepared with the reference of the Annual Development Program (ADP) set for individual agencies. The frequency of progress reports other than the annual interval may vary between agencies. Though there is a lack of a comprehensive and state-of-the-art M&E system in place, all government agencies follow a consistent reporting format to track a project's physical and financial progress. For example, an excerpt of the annual performance and achievement report prepared and used by the MoWR is presented in Table 1. This table shows that the indicators relate to the physical outputs produced by the activity and not to the beneficial outcomes for the economy, society, or environment.

Table 1: Example of the annual performance and achievement report 2014-15 published by the MoWR

Strategic Objective	Weight of Strategic Objective	Activities	Performance Indicator(P)	Unit	Weight of PI	Target/Criteria Value				
						Excellent	Very Good	Good	Fair	Poor
						100%	90%	80%	70%	60%
		(1.6) Collection, compilation, and preservation of water resources data and information	(1.6.1) Agencies/ individuals provided data	Number	2.00	50	47	44	41	38
(2) Control flood and protect the township	25.00	(2.1) Construction and repair of flood control and coastal embankments	(2.1.1) Embankment constructed	Km	5.00	310	295	280	265	250
			(2.1.2) Embankment repaired	Km	5.00	2860	2600	2400	2200	2000
		(2.2) Excavation of drainage canals	(2.2.1) Canals excavated	Km	5.00	826	775	725	675	650
		(2.3) Construction, repair, and rehabilitation of flood control and drainage	(2.3.1) Flood control and drainage infrastructures constructed and repaired.	Number	5.00	820	790	760	730	700
		(2.4) Protective work of river bank of important towns and settlements	(2.4.1) River bank protected	Km	5.00	258	245	230	205	190

Strategic Objective	Weight of Strategic Objective	Activities	Performance Indicator(P)	Unit	Weight of PI	Target/Criteria Value				
						Excellent	Very Good	Good	Fair	Poor
						100%	90%	80%	70%	60%
(3) Development Haor and wetlands and water management of coastal regions	20.00	(3.1) Construction of cross-dams in the coastal areas to reclaim land from the sea and rivers	(3.1.1) Cross-dams constructed	Number	2.00	4	3	2	1	0
			(3.1.2) Land reclaimed	Acre	6.00	54	48	45	42	40
		(3.2) Development of habitat/ settlement	(3.2.1) Families rehabilitated on reclaimed land	Number of families 5.00	5.00	4000	3800	3500	3200	3000
		(3.3) Protection of coastal wetlands and the Sundarbans from salinity	(3.3.1) Salinity reduced	PPT	3.00	20	19	18	17	16

A more detailed analysis of GED's challenges with the existing M&E system is provided in Chapter 13 of Volume 1 of the BDP 2100.

The BDP 2100 also recognizes a gap in the existing M&E system at the project level as it is not result-oriented and at a satisfactory level (GED, 2018). To overcome the existing challenges and information gaps associated with project monitoring and evaluation, the BDP 2100 recommended the adoption of the RBM&E framework. The current DRF uses an indicative template of indicators and sub-indicators⁵, which may not meet all needs of the BDP 2100.

The minimum targets for these proposed key performance indicators (KPIs) are set for 2030 and 2050. However, for many indicators, the BDP 2100 suggests the minimum target for 2050 be revised based on a more sophisticated analysis. It is important to note that the KPIs developed for the DRF should be adjusted and validated as program results are achieved, and climate change projections are improved.

2.3 Institutional Form of M&E for the Delta Plan

The BDP 2100 has established a Delta Governing Council (DGC) to support the administration, implementation, coordination, and M&E of the projects under the plan (GED, 2018). The DGC is a high-level ministerial policy-making forum chaired by the Hon'ble Prime Minister. The Hon'ble Minister, Ministry of Planning, is the Vice Chairman of DGC. It is to meet once a year for:

- Policy making, decision-making, strategic advice, and direction
- Guidance in updating the BDP 2100
- Provide strategic direction to set up and use the Delta Fund

The BDP 2100 is following the recommendations in the 6th and later five-year plans in adopting the RBM&E system to support tracking the performance of the projects which will be implemented under the plan. However, the BDP 2100 M&E system is different from other M&E in Bangladesh as it tracks the results of multiple projects which are to be implemented by different agencies in a coordinated fashion.

The collaborative institutional structure for M&E of BDP 2100 is designed for seamless implementation and tracking of the projects under the plan. The implementing agencies will be responsible for conducting M&E at the project level. At the sectoral level, M&E will be executed by the respective ministries. In parallel, the IMED will continue its regular M&E for all investment projects, including those under the Delta Plan. However, since the responsibility of M&E of the Delta Plan is assigned to GED if a project is included in the Delta Plan, IMED will act to support the GED, which is to remain accountable for maintaining the M&E system, producing annual reports on the status of the BDP 2100, and disseminating information to the public.

Thus, multiple layers of M&E may exist in an investment project under the Delta Plan. GED and IMED need to assure appropriate integration among the several M&E processes and outputs and collaboration among the involved agencies and sectors. To operationalize the M&E system, the BDP 2100 suggests preparing progress and evaluation reports at two intervals: annual, and in every 3-5 years (GED, 2018).

2.4 Investment Plan and Projects to be Monitored under the BDP 2100

With a vision to establish a prosperous and climate resilient delta, and three "Higher level goals: Goal 1: Eliminate extreme poverty by 2030; Goal 2: Achieve upper middle-income status by 2030 and Goal 3: Being a Prosperous Country beyond 2041", the BDP 2100 outlines a pipeline of numerous development projects, to address and resolve current challenges in the delta, convert the challenges into growth or development opportunities and, in the long run, make the nation poverty free and resilient against the natural hazards. The plan's strategy focuses on "water" because the

⁵ See Table 7.2, Indicative Results Based Monitoring and Evaluation Framework, page 96, Institutional Framework and Arrangements, BDP 2100, GED 2018

sustainability of the delta and its development depends on the management efficiency of this primary resource.

Implementation of the programs under the BDP 2100 is targeted toward the sectoral strategies for water, environment, land, and agriculture (including forestry, livestock, and fisheries). The BDP 2100 includes new policies, institutional reforms, and investments (GED, 2018). The overall plan splits the investment priorities into two phases; the first is up to 2030, and the second is beyond 2030. The investment plan is to be prepared through a rigorous, consultative, and inclusive process following Adaptive Delta Management (ADM) principles. The investment will be for physical measures, knowledge, institutional setup and reform, and capacity building (GED, 2018).

In the first phase of investment, a total of 80 projects will be implemented by various ministries. The MoWR and its partner organizations will implement many of these projects. Sixty-five projects are for physical works and the remaining projects target capacity building. Beyond 2030, the plan recommends the situation be reassessed and adaptive planning used to decide on the investment considering the overall performance of the ongoing activities and the climate scenario.

The investment plan also integrates two vital scenarios in its formulation, i.e., the business as usual (BAU) scenario and an adaptive delta plan scenario. The BAU scenario is built upon considerations made in the government's vision of 2041, the Perspective Plan, and the latest Five-Year Plan. The adaptive Delta Plan scenario combines the BAU options with the principles of the BDP 2100 to secure resilient and sustainable growth by addressing climate change, transboundary water management, and other delta challenges.

The development of an adaptive delta plan (ADP) consists of six steps.⁶ The current BDP 2100 has effectively completed the first two steps and partially completed steps 3, 4, and 5. Step 6 is critical to complete adaptive delta planning and is the focus of this BDP 2100 M&E framework review.

- The first step is the problem analysis, which provides insight into the urgency, nature, extent, and timing of possible problems under different future developments.
- The second step is the identification of measures that might solve the problem and quantifying the effects.
- The third step is the design of multiple adaptation pathways consisting of the identified measures in step two. These paths show when decisions should be made and the possible measures to choose from. The paths generate insight into the consequences of the initial measure in terms of lock-ins and options that are still open. Opportunities arising from other planned investments in the region may be considered to adjust the timing of implementation.
- The fourth step is the design of an adaptive plan. This requires an evaluation of the different adaptation pathways with regard to the economic and sociocultural feasibility, governance, robustness, and flexibility of the pathways. The adaptive plan might be considered robust if the desired result can be reached under various circumstances and assumptions. In addition, it is necessary to identify critical values (triggers) beyond which adjustments need to be made. These triggers initiate a change in the adaptation pathway. (This is referred to in BDP 2100 as a "tipping point" and "transfer stations.") Tracking these critical values may need to be included in the ADP M&E.
- Step five is the implementation of the plan. This step is crucial as it requires not only the execution of infrastructural projects, but also the implementation of measures to keep options open that might be needed in the future.
- The sixth step is to stimulate adaptive capacity by setting up a monitoring system of the critical trends and the institutional mechanisms, allowing adjustment of the adaptation strategy when needed.

⁶ Adaptive Delta Management, Brochure, Deltares <https://understandrisk.org/wp-content/uploads/Brochure-Adaptive-Delta-Management.pdf>

The process is shown in a diagram in Figure 3



Six basic steps of Adaptive delta management

(adapted from Haasnoot et al, 2013)

Figure 3: Six basic steps of Adaptive delta management (Source: Haasnoot et al., 2013)

The fiscal policy strategy outlines various options and strategies to secure the investment. The plan's success depends on the government securing necessary financing from the public and private stakeholders, regional and global funds, and strengthening its ability to implement a complex, coordinated, and adaptive plan.

To better address the local challenges for water, natural resources, and livelihood, the investment plan includes the implementation of some sub-programs under different hotspots, as shown in Figure 4,

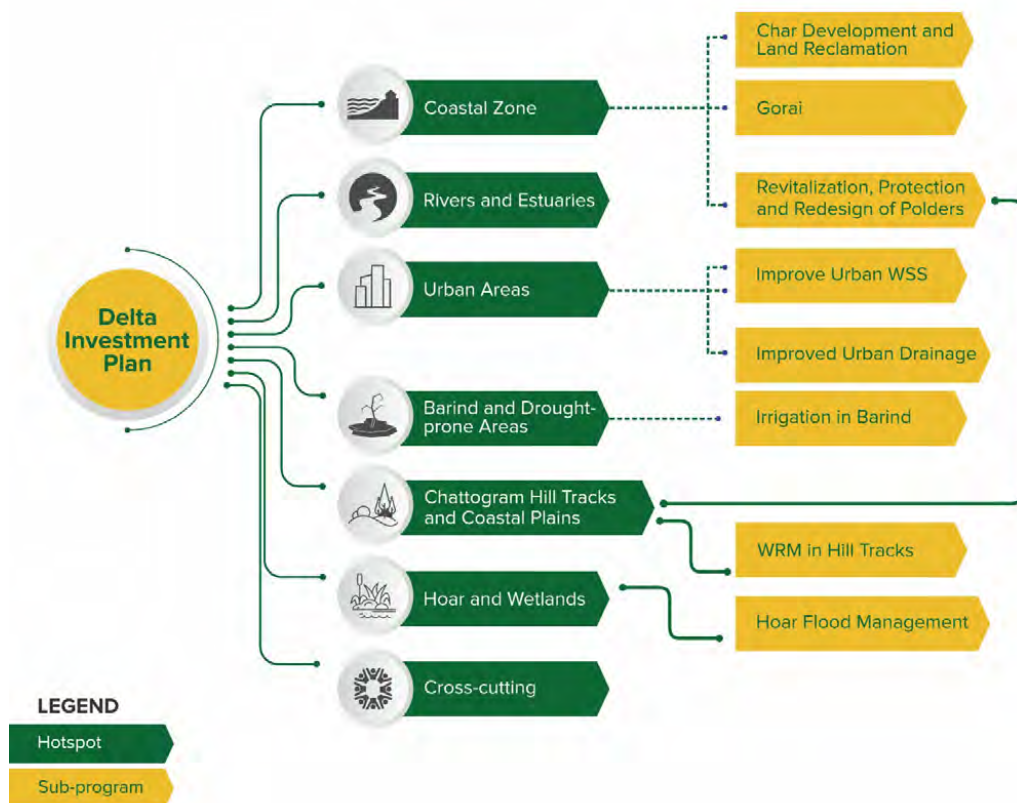


Figure 4: Structure of the Delta Investment Plan up to 2030 (Source: GED, 2018)

The investment plan of the BDP 2100 is a guide to identify the leading agencies for the M&E framework. Implementation responsibility is crucial information for the M&E framework since the execution pattern of the ministry may influence the governing assumptions and parameters. With authorization from the Delta Governing Council, the MoWR is to coordinate more than five ministries that are to be responsible for implementing these investment projects. Each ministry will work with one or more of its partner organizations.

In the current plan formulation, the BWDB will implement 23 projects independently. Additionally, they will implement some projects where the executing agency is from the same or another ministry.

Though many of the proposed projects include climate adaptation actions, the list has at least three projects identified that explicitly address “climate-smart” or climate resilience” in their titles. All three projects are capacity-building initiatives, and they will be implemented by the Department of Livestock Services (DLS), Bangladesh Livestock Research Institute (BLRI), BWDB, and WARPO.

3. REVIEW FINDINGS

3.1 Delta M&E Framework

Volume 1 (Strategy) of the plan outlines a results-based M&E system needed to utilize investment plans appropriately. This M&E outline must be elaborated and strengthened, and GED must be equipped with adequate capabilities for coordination, monitoring, and evaluation of the performance of the projects for effective management of plan implementation. The plan provides insight into some useful indicators that can be configured for the intended M&E framework and relates those indicators with the plan's specific goals. These indicators are arranged as a Development Result Framework (DRF). The current design of the DRF comprises a set of macro-level indicators to track the outcome of the projects and programs under the BDP 2100 and measure the accomplishment of the specific goals of the plan. These indicators have baseline measures, and minimum targets to be achieved by 2030 and 2050 are provided in Appendix-I (Source: GED, 2018).

An overview of the analysis of this current BDP 2100 DRF is given in Table 2. This analysis shows many of the indicators evaluate physical progress and outcome of projects towards the six BDP 2100 specific goals but that indicators for policy, regulation, and agency activity are lacking and may, by implication, suggest weakness in the BDP 2100 in these areas. The current indicators also do not effectively measure changes in economic, social, or environmental conditions within the BDP 2100 area, which is the high-level goal of the BDP 2100.

Discussion of the issues arising in the choice of M&E indicators from each of the six specific goals is presented in Section 3.2, and considerations for the indicators concerning climate change are discussed in Section 3.3. The analysis found that additional indicators may need to be considered by GED to fully reflect the monitoring needed to track progress towards the overall objectives of BDP 2100 and its specific goals. A discussion of these suggested additional indicators is presented in Section 3.4.

Table 2: BDP 2100 Development Results M&E Review Framework

Analytical questions concerning the M&E indicators	Are there indicators in the current M&E DRF for this Plan objective?	Are these current indicators effectively defined?	Are the current indicators aligned with SDG reporting?	Are additional or revised indicators needed?	Does the M&E institutional form suit reporting on these indicators?	Is there a knowledge base for these indicators?	Additional comment on shortcomings in the current DRF indicators
<p>Goal 1: Ensure safety from floods and climate change-related disasters</p>	<p>Yes. 1A. Areas of zones free of natural disaster risk, 1B. Population vulnerable to natural disasters by natural disaster causes.</p>	<p>No. Measures of the hazard area, total people exposed but not economic exposure or the vulnerability. The term “Vulnerable people” is undefined: likely a vulnerable person is anyone living in a ‘risk’ area.</p>	<p>No. Use should be made of SDG goal 11.5, which has 3 relevant indicators, and indicator 11. b.2. Please note that SDG indicator 11.5.1 is the same as 13.1.1, 11.b.1 is the same as 13.2.1, and 11.b.2 is the same as 13.1.3.</p>	<p>Yes. Consider adding the number of people with access to disaster shelters (WB Country Partnership Framework, indicator 7.2) and SGD indicators: “11.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population, 11.5.2 Direct economic loss attributed to disasters in relation to the global gross domestic product (GDP), and 11.5.3 (a) Damage to critical infrastructure and (b) number of disruptions to basic services, attributed to disasters”; BDP 2100 indicators</p>	<p>Yes. The current and now proposed indicators suit existing institutional structures.</p>	<p>Yes. The current indicators will be supported by the BDP 2100 knowledge base, and the SDG indicators will be supported by SDG data collection and management.</p>	<p>The current indicators are designed for infrastructure projects. The benefits of soft projects and nature-based solutions will not be effectively captured by these indicators.</p>

Analytical questions concerning the M&E indicators	Are there indicators in the current M&E DRF for this Plan objective?	Are these current indicators effectively defined?	Are the current indicators aligned with SDG reporting?	Are additional or revised indicators needed?	Does the M&E institutional form suit reporting on these indicators?	Is there a knowledge base for these indicators?	Additional comment on shortcomings in the current DRF indicators
				focus on measuring effects of specific water-related disaster projects. SDG indicator “11. b.2 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies” could also be used.			
Goal 2: Ensure water security and efficiency of water usages	Yes. 2A. Dry season flow availability (Jan-May, % of total flow), 2B. Dry season irrigation area, 2C. Irrigation water efficiency (% of surface & groundwater supplied), 2D. Urban domestic water efficiency (% of surface & groundwater supplied), 2E. Rural population with safe drinking water	No. Water use efficiency cannot be effectively measured by the percentage of supplied water used and the area of dry season irrigation. The currently proposed indicators do not consider the sustainability of groundwater systems or that of water supply and irrigation systems.	Partly. Improved alignment of BDP and SDG indicators may allow a reduction in data collection and reporting.	Yes. Additional indicators might include aquifer status and water and irrigation tariff levels. Groundwater use, aquifer status, and estimated recharge, water, and irrigation tariff level could be added. SDG Goal 6.3 concerns water quality. Its indicators are: “6.3.1 Proportion	Currently, yes, but additional non-SDG indicators may require coordination oversight.	Significant gaps in data collection exist for the proposed groundwater indicators, which are proposed to be strengthened under the BDP 2100. The SDG indicators are supported by SDG data collection and management.	The value and productivity of water use are not considered. Increased water use efficiency in one part of the water system (e.g., surface supply) may have impacts on another part of the system (e.g., groundwater recharge)

Analytical questions concerning the M&E indicators	Are there indicators in the current M&E DRF for this Plan objective?	Are these current indicators effectively defined?	Are the current indicators aligned with SDG reporting?	Are additional or revised indicators needed?	Does the M&E institutional form suit reporting on these indicators?	Is there a knowledge base for these indicators?	Additional comment on shortcomings in the current DRF indicators
	<p>access (% of rural population), 2F. Rural population with safe sanitation (% of rural population), 2G. Surface water polluted by industrial wastes (% of total river areas), 2H. Surface water sources polluted by other wastes (% of total river areas)</p>			<p>of domestic and industrial wastewater flows safely treated” and “6.3.2 Proportion of bodies of water with good ambient water quality” SDG goal 6.4 concerns water use efficiency and has indicators: “6.4.1 Change in water-use efficiency over time” and “6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources”. An SDG indicator relating to WASH: 3.9.2 Mortality rate attributed to unsafe WASH may be considered. An agricultural production resilience indicator could be “Area under climate-resilient agricultural technologies</p>			

Analytical questions concerning the M&E indicators	Are there indicators in the current M&E DRF for this Plan objective?	Are these current indicators effectively defined?	Are the current indicators aligned with SDG reporting?	Are additional or revised indicators needed?	Does the M&E institutional form suit reporting on these indicators?	Is there a knowledge base for these indicators?	Additional comment on shortcomings in the current DRF indicators
				and practices (Hectare) including efficient water usage such as alternate wetting and drying (AWD)” (see WB Country Partnership Framework, indicator SPI 8.2)			
Goal 3: Ensure sustainable and integrated river systems and estuaries management	Yes. 3A. Erosion along the major rivers (Area eroded yearly along Jamuna, Ganges, Padma & Meghna), 3B. Area of reclaimed lands	No. While reducing riverbank erosion, maintaining river channel capacity, and improving water transport is important to work, sustainable and integrated river and estuarine management need to consider broader environmental management.	No. The currently proposed indicators are restricted to measuring the physical progress of engineering works and do not capture the necessary economic, social, and environmental outcomes.	Yes. Suggest adding the number of people benefiting from enhanced resilience to riverbank erosion or inundation damage and benefiting from enhanced access to inland water transportation services (see WB Country Partnership Framework, indicator 7.1). It will be important to consider progress in indicators for Goals 4 and 5 and SDG 13 to meet the aim of “sustainable and integrated river systems.”	No. Strengthened coordination and collaboration among agencies and projects is needed.	Yes. The current indicators will be supported by the BDP 2100 knowledge base, and the WB indicator is supported by: the Jamuna River Project.	The sustainability of river and estuarine systems requires good management of upstream and watershed areas. Thus, there is also a transboundary element to consider.

Analytical questions concerning the M&E indicators	Are there indicators in the current M&E DRF for this Plan objective?	Are these current indicators effectively defined?	Are the current indicators aligned with SDG reporting?	Are additional or revised indicators needed?	Does the M&E institutional form suit reporting on these indicators?	Is there a knowledge base for these indicators?	Additional comment on shortcomings in the current DRF indicators
<p>Goal 4: Conserve and preserve wetlands and ecosystems and promote their wise use</p>	<p>Yes. 4A. Permanent wetlands with connectivity (% connectivity), 4B. Seasonal wetlands with connectivity (% connectivity), 4C Habitat protection (Area of perennial, seasonal & marine aquatic habitat), 4D Harnessing of ecosystem services and goods (expert judgment, good, fair, poor)</p>	<p>No. The strategy in BDP 2100 seems limited to protective actions for haors. Protection of river and estuarine/marine environments will also be needed (as noted, "Restoration of river duars (deep depression) in the Surma and Kushiyara river systems."</p>	<p>No. Use should be made of SDG indicators for Goals 6.6, 14.2, and 15.1, which concern wetland protection and environmental water management.</p>	<p>Yes. Consider adding SDG indicators: 6.6.1 Change in the extent of water-related ecosystems over time, 14.2.1 Use of (Number of countries using) ecosystem-based approaches to managing marine areas, 14.4.1 Proportion of fish stocks within biologically sustainable levels. 14.7.1 Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries, and all countries, 15.1.1 Forest area as a proportion of total land area 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas,</p>	<p>No. Strengthened coordination and collaboration among agencies and projects is needed.</p>	<p>Yes, since the additional indicators proposed are in the SDG system</p>	<p>The outcomes of increased habitat area and quality, which might be measured by fish numbers or biodiversity, should be recorded</p>

Analytical questions concerning the M&E indicators	Are there indicators in the current M&E DRF for this Plan objective?	Are these current indicators effectively defined?	Are the current indicators aligned with SDG reporting?	Are additional or revised indicators needed?	Does the M&E institutional form suit reporting on these indicators?	Is there a knowledge base for these indicators?	Additional comment on shortcomings in the current DRF indicators
				by ecosystem type, 15.2.1 Progress towards sustainable forest management, and 15.3.1 Proportion of land that is degraded over a total land area			
Goal 5: Develop effective institutions [agencies] and equitable governance for in-country and transboundary water resources management	Yes. 5A. Rural people with adequate capacity for WRM (% of rural population), 5B. Equitable share of water among users (expert judgment, good, fair, poor), 5C. Adequate monitoring mechanism (expert judgment, good, fair, poor), 5E. O&M budgeting (% of Delta Plan budget)	No. The proposed indicators do not cover all aspects required to measure “effective institutions and equitable governance.” Except for O&M budgeting, the indicators are subject to a value judgment and hence not firm.	No. SDG 6.5.1 and 6.5.2 indicators should be used.	Yes, “6.5.1 Degree of integrated water resources management” and “6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation.”	No. But suitable processes and procedures are well set out by UNEP for these SDG indicators.	No. But in addition to the UNEP process and procedure, comprehensive support is available from UNEP in training, documents, and advice.	In-country workshops of widely selected stakeholders should support the completion of the survey. UNEP instructions must be carefully followed, and data collection must be made accordingly.

Analytical questions concerning the M&E indicators	Are there indicators in the current M&E DRF for this Plan objective?	Are these current indicators effectively defined?	Are the current indicators aligned with SDG reporting?	Are additional or revised indicators needed?	Does the M&E institutional form suit reporting on these indicators?	Is there a knowledge base for these indicators?	Additional comment on shortcomings in the current DRF indicators
Goal 6: Achieve optimal and integrated use of land and water resources [planning and implementation processes]	Yes. 6A Spatial zoning of integrated land and water uses (expert judgment, good, fair, limited), 6B Spatial standardization of drainage density (expert judgment, good, fair, none), 6C. Flood control, drainage, and irrigation capacity (Scheme areas for Irrigation, Drainage, Irrigation & drainage, Flood control & drainage, FCD & irrigation, Coastal FCD, Coastal FDCI)	No. The proposed indicators are not aligned with the commonly accepted understanding of how to plan for and achieve integrated use of land and water resources. Integrated land and water resources planning is well described by the Global Water Partnership (GWP) as IWRM. It is an iterative process that includes extensive stakeholder engagement.	No. SDG 6.5.1 and 6.5.2 indicators should be used.	Yes, “6.5.1 Degree of integrated water resources management” and “6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation.”	No. But suitable processes and procedures are well set out by UNEP for these SDG indicators.	No. But in addition to the UNEP process and procedure, comprehensive support is available from UNEP in training, documents, and advice.	The process which should be followed to achieve this goal is to prepare and implement ‘river basin management plans’ for each of the Hydrological Regions of Bangladesh, applying the IWRM methodology of the GWP.

3.2 Review of the M&E Indicators of the DRF

The current framework has 25 indicators and 30 sub-indicators. The BDP 2100 does not provide full technical details of individual indicators and their minimum targets in the current DRF. These indicators comprise three quantitative measures: area, population, flow (water), and some qualitative parameters.

It is important to understand the differences between the indicators required in the DRF of the BDP 2100 and M&E indicators used in sectoral, national, or local projects in Bangladesh. The current sectoral implementations focus on two parameters – physical progress and financial progress and none of them consider the impact on the communities. Physical and financial progress may help measure progress during project implementation, but such measures are insufficient to indicate project outcomes and long-term impacts. These indicators may be necessary but cannot be considered sufficient for an RBM&E system. Neither is such an M&E system suitable as an RBM&E system for the BDP 2100 when supported by impact evaluation studies.

The IMED conducts conventional impact evaluation studies for selected projects. Still, it has limited capacity for such evaluations (as previously noted, it completes about 300 each year) and opportunities for disseminating its findings and recommendations, which are currently limited to GED and the project implementing agency.

3.2.1 Indicators for Goal 1

The currently proposed indicators measure include the following.

- The areas:
 - » Flooded under an average flood that usually inundates the low-lying floodplain regions of the country and causes minimal damage to lives and property
 - » flooded under a catastrophic flood, which may have an average annual return period of 1 in 50 years or more, results in major damage to life and property and leave devastation in its wake
 - » free of extreme drought that entails a cumulative effect of meteorological, hydrological as well as agricultural drought
 - » affected by storm surge, including in the polder area of the 19 districts of the Coastal Zone⁷
 - » in the Coastal Zone free of the dry season (Jan-May), surface water salinity
 - » free of waterlogging
- The total number of people vulnerable:
 - » to flood (catastrophic), exposed by living in flood liable area, or not having access to a flood refuge facility?)
 - » to cyclone (exposed by living in a coastal zone? or not having access to a cyclone refuge?)
 - » to waterlogging (living in areas that are assessed as needing improved drainage)

The indicators appear to be designed from a perspective of expected outcomes of particular (infrastructure?) projects and need better definitions to provide accurate data. The term “Vulnerable people” is undefined: likely a vulnerable person is anyone living in a ‘risk’ area. Unless a scenario modeling process is used to estimate the data, it will be subject to the effects of variations in the climate. Additionally, these indicators cannot evaluate the achievement of the goal of “safety from floods and climate change-related disasters.”

⁷ MWR 2005, Coastal Zone Policy, “Integrated Coastal Zone Management Project” (ICZMP) WARPO Bangladesh (old.warpo.gov.bd/policy/czpo_eng.pdf)

The current indicators do not capture economic exposure or effectively assess the vulnerability of populations. Nor do the current indicators for disaster management evaluate the institutional aspects.

To address these shortcomings, it is proposed to add an indicator used in the World Bank's Country Partnership Framework (FY2023 – FY2027) and 4 of the SDG indicators relevant to disaster management (as updated for 2023), namely:

- WB indicator 7.2: Disaster preparedness as measured by: Number of people with access to disaster shelters (cyclones, storm surges, and floods)
- SDG indicator 11.5.1: Number of deaths, missing persons, and directly affected persons attributed to disasters per 100,000 population
- SDG indicator 11.5.2: Direct economic loss attributed to disasters in relation to the global gross domestic product (GDP)
- SDG indicator 11.5.3 (a) Damage to critical infrastructure and (b) number of disruptions to basic services attributed to disasters
- SDG indicator 11.b.2: Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies

Adding these indicators is expected to allow the benefits of soft projects and nature-based solutions to be effectively captured.

3.2.2 Indicators for Goal 2

The currently proposed indicators measure

- Dry season flow availability (Jan-May, % of total flow)
- Dry season irrigation area
- Irrigation water efficiency (% of surface & groundwater supplied)
- Urban domestic water efficiency (% of surface & groundwater supplied)
- The rural population with safe drinking water access (% of rural population)
- The rural population with safe sanitation (% of rural population)
- Surface water polluted by industrial wastes (% of total river areas), and
- Surface water sources are polluted by other wastes (% of total river areas).

The indicator for irrigation water use efficiency needs to be redesigned as irrigation water use efficiency cannot be properly estimated as a percentage of water supplied used in irrigation. The currently proposed indicators do not consider the sustainability of groundwater systems or the sustainability of water supply and irrigation systems achieved through maintenance works.

To address concerns about estimates of irrigation water use efficiency, it is recommended to replace the current indicator with

- SDG indicator 6.4.1: Change in water-use efficiency over time, and
- SDG indicator 6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

To reduce the monitoring effort, it is recommended to replace the two current pollution indicators with the following:

- SDG indicator 6.3.1: Proportion of domestic and industrial wastewater flows safely treated, and
- SDG indicator 6.3.2: Proportion of bodies of water with good ambient water quality, and

- SDG indicator 3.9.2 Mortality rate attributed to unsafe WASH could also be considered

To monitor adaption to the effects of climate change, an agricultural production resilience indicator included in the Country Partnership Framework could be added SPI 8.2 “Area under climate-resilient agricultural technologies and practices (Hectare) including efficient water usage such as alternate wetting and drying (AWD).”

Significant gaps in data collection exist for the proposed groundwater indicators, but these are proposed to be strengthened under the BDP 2100.

3.2.3 Indicators for Goal 3

The currently proposed indicators measure areas of erosion along the major rivers (Area eroded per year along Jamuna, Ganges, Padma & Meghna) and the area of reclaimed lands.

These indicators do not effectively measure progress towards Goal 3, “Ensure sustainable and integrated river systems and estuaries management.” The currently proposed indicators seem restricted to measuring the physical progress of engineering works and do not capture the necessary economic, social, and environmental outcomes. While reducing riverbank erosion, maintaining river channel capacity, and improving water transport are important to work, sustainable and integrated river and estuarine management need to consider broader environmental management, such as the productivity and sustainability of instream environments.

It is suggested to add an indicator for the number of people benefiting from enhanced resilience to riverbank erosion or inundation damage and enhanced access to inland water transportation services. It will be important also to consider progress in indicators for Goals 4 and 5 (of BDP 2100) and SDG 13 (climate change) to better assess the aim of “sustainable and integrated river systems.”

- WB indicator 7.1: Total number of people benefiting from enhanced resilience to riverbank erosion or inundation damage and benefiting from enhanced access to inland water transportation services (Source: Jamuna River Project (P172499))

The sustainability of river and estuarine systems requires good management of upstream and watershed areas. Thus, there is also a transboundary element to consider because the upstream catchments of most of Bangladesh’s rivers are in another country.

3.2.4 Indicators for Goal 4

The currently proposed indicators measure:

- Permanent wetlands with connectivity (% connectivity)
- Seasonal wetlands with connectivity (% connectivity)
- Habitat protection (Area of perennial, seasonal & marine aquatic habitat)
- Harnessing of ecosystem services and goods (expert judgment, good, fair, poor)

The current strategy in BDP 2100 for Goal 4 seems limited to protective actions for haors. River protection (and connection with estuarine/marine environments) will also be needed. This is noted in Sub-strategy HR 4.2, where it states, “Restoration of river duars (deep depression) in the Surma and Kushiyara river systems.” SDG indicators for Goals 6.6, 14.2, and 15.1 could be used to monitor these conditions since they concern wetland protection and environmental water management. Some, possibly not all, of these indicators could meet the need:

- SDG indicator 6.6.1 Change in the extent of water-related ecosystems over time
- SDG indicator 14.2.1 Use of (Number of countries using) ecosystem-based approaches to managing marine areas
- SDG indicator 14.4.1 Proportion of fish stocks within biologically sustainable levels

- SDG indicator 14.7.1 Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries, and all countries
- SDG indicator 15.1.1 Forest area as a proportion of total land area
- SDG indicator 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type
- SDG indicator 15.2.1 Progress towards sustainable forest management, and
- SDG indicator 15.3.1 Proportion of land that is degraded over total land area

Progress towards Goal 4 will require greater collaboration and communication among agencies concerned with implementing river use, erosion control, fisheries, and environmental management projects.

3.2.5 Indicators for Goal 5

The currently proposed indicators measure

- Rural people with adequate capacity for WRM (% of rural population)
- Equitable share of water among users (expert judgement, good, fair, poor)
- Adequate monitoring mechanism (expert judgement, good, fair, poor)
- O&M budgeting (% of Delta Plan budget)

The work needed to progress toward Goal 5 is critical for successfully implementing BDP 2100. The proposed indicators do not cover all aspects required to measure “effective institutions and equitable governance.” Except for O&M budgeting, the indicators are not firm and are subject to a value judgment. It is highly desirable to adopt indicators that are less able to be influenced by institutional forces. This requirement might be met by using the SDG indicators for institutional issues in SDG 6, Ensuring the availability and sustainable management of water and sanitation for all. There are two relevant indicators:

- 6.5.1 Degree of integrated water resources management, and
- 6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation

A suitable process and procedure for assessing the values of these SDG indicators have been well set out by UNEP. In addition to the UNEP process and procedure, comprehensive support is available from UNEP in training, documents, and advice. It is recommended that workshops of widely selected stakeholders (both national and regional) should support the completion of the survey. It is important that the UNEP instructions are carefully followed and data collection made accordingly.

3.2.6 Indicators for Goal 6

The currently proposed indicators measure

- Spatial zoning of integrated land and water uses (expert judgement, good, fair, limited)
- Spatial standardization of drainage density (expert judgement, good, fair, none)
- Flood control, drainage and irrigation capacity (Scheme areas for Irrigation, Drainage, Irrigation & drainage, Flood control & drainage, FCD & irrigation, Coastal FCD, Coastal FDCI)

The currently proposed indicators are not aligned with the commonly accepted understanding of planning for and achieving integrated use of land and water resources. Integrated land and water resources planning is well described by the Global Water Partnership (GWP) as IWRM. IWRM is an iterative process that includes extensive stakeholder community engagement.

SDG 6.5.1 and 6.5.2 indicators should be used to assess progress in implementing and adopting IWRM. These two indicators are:

- 6.5.1 Degree of integrated water resources management, and
- 6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation

The process for achieving integrated use of land and water that should be followed is to prepare and implement ‘river basin management plans’ for each of the Hydrological Regions of Bangladesh, applying the IWRM methodology of the GWP.

3.3 Status of the Climate-specific Indicators in the DRF

The DRF of the BDP 2100 includes M&E indicators for flood and water logging, drought, storm surge, irrigation, water use efficiency, river erosion and navigability, aquatic life, water quality (salinity), water pollution, etc. As is obvious, many of these parameters will be directly impacted by climate change and climate variability. However, the proposed framework does not explicitly quantify the impact of and adaptations to climate change in the parameters. There is a scope for further subdivision of the indicators, including measures for climate impact and actions. However, such inclusion requires the availability of a climate-informed database and extensive scientific analysis. In addition, it could be challenging to include climate-related KPIs and set minimum targets for a short interval (e.g., annual, five years, etc.).

For example, the SDGs follow the RBM&E framework in their targets and indicators on global targets. The indicators used in SDGs can serve as a reference for cross-referencing and aligning the M&E framework for 2030 and beyond. Though Goal 13 of the SDGs focuses on climate action, indicators from other goals of the SDGs which have direct or indirect relation with climate change and IWRM aspects can be considered in this context.

3.4 Requirement for Additional M&E Indicators in the DRF

The present DRF includes a parameter for operations & maintenance (O&M) budgeting to tracking the spending for the BDP 2100 as the plan proceeds. Given the size, scope, and importance of M&E in BDP 2100 and its required use in adaptive delta management, strengthening the capacity of GED will be needed, at a minimum, by increasing staff levels. This is noted in Volume 1, Strategy, Section 12.4 Issues and Challenges in Integrated Water Management, page 601. Additionally, the M&E system and its technological platform should be operable by the GED, and M&E data supplied by project implementing agencies should be unambiguous.

3.4.1 Project and Sector Indicators

One of the major deciding factors for the effectiveness of the M&E framework is the ability to translate project- or sector-specific goals to the specific- and high-level goals of the BDP 2100. The project-executing agencies need to easily identify, process and convert, measure, and report the progress and status of outcomes. For example, under the plan, WARPO will develop a climate-smart integrated coastal resources database (CSICRD - project ref.: CZ 4.1). The CSICRD project M&E indicators and minimum targets must be capable of being translated to fit in the BDP 2100 indicators. Minimum targets for each indicator and each horizon should be SMART (S-specific, M-measurable, A-attainable, R-relevant, T-time bound). WARPO should convert project M&E data, or make new measurements, to report as BDP M&E data to GED. All other executing ministries and departments will need to arrange and report their M&E in the same way. This will be challenging when more than one agency is responsible for a single project and even more so when different ministries are involved.

Overall, the required symbiosis and translation-ability among the goal-specific, sectoral, and project-specific indicators can be illustrated in Figure 5.

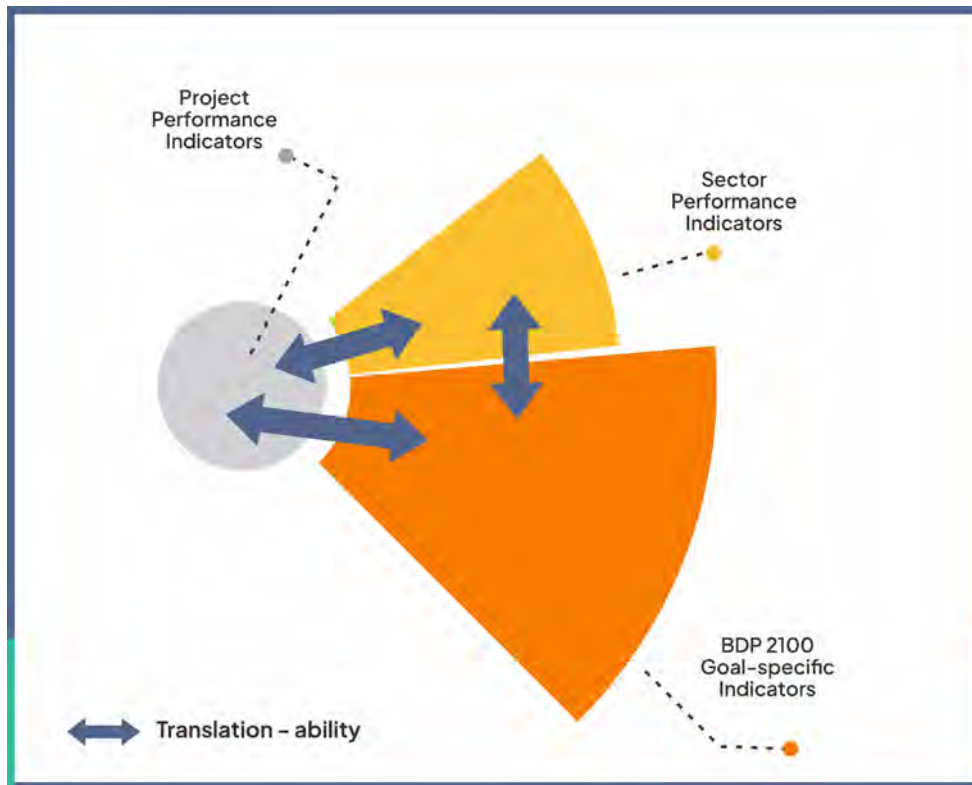


Figure 5: Relationship among different level indicators of the required M&E framework for the BDP 2100

The project-specific and sectoral indicators should allow the inclusion of the projects implemented by more than one agency under single or multiple ministries.

3.4.2 SDG Indicators

Additional indicators are recommended to monitor progress towards the three Higher goals at the level of the six Specific goals. To reduce the effort required and to avoid duplication of data collection, these additional indicators are recommended to be those designed by the UNEP and agreed to by the Bangladesh Government for reporting on SDG Goals. The details of the recommended additional SDG indicators have been given in Section 3.2.

3.4.3 Adaptation Tipping Point Indicators

The ADP process is described in Section 2.4. This process involves decisions on plan adjustments based on specific trigger points being reached. This is described in BDP 2100 in Volume 1, Section 5.2, and in more detail in Section 6 (for example, Section 6.4.6, page 252). The M&E system should help collect data to track these critical values and inform decision-makers on reaching the trigger point to allow a decision on whether to initiate a “transfer station.” However, the since the adaptation pathways within the Delta scenarios have not yet been fully defined (see, for example, Section 6.5.4) and the trigger points are unknown in many cases, further work needs to be done before this component of the M&E system can be designed.

3.5 Knowledge Base and Decision Support Development

For the intended M&E system, the GED will require to deal with two categories of knowledge:

- The information available and produced outside the scope of BDP 2100, and
- The knowledge acquired from the implementation of the BDP 2100

It is essential to organize this information to support the M&E framework.

GED is to be responsible for BDP level data, not for project-specific or sectoral data, but the information must flow from the projects and sectors to the BDP 2100 M&E system. There is no common platform yet established to support this information flow.

The BDP baseline study no. 23 identified the available knowledge bases and stakeholders for the BDP (GED, 2018). The identified databases are the National Water Resources Database (NWRD), Integrated Hoar and Wetlands Resources Database (IHWRD), Climate Change Database (CCD), road network databases of the Local Government Engineering Department (LGED), and the Roads and Highways Department (RHD), the Bangladesh Bureau of Statistics (BBS) database, etc.

Two knowledge platforms are being developed under the delta plan formulation project to provide decision support for the implementation of the delta plan⁸, namely:

- a. Bangladesh Delta Portal
- b. BDP Meta Model

3.5.1 Bangladesh Delta Portal

The Bangladesh Delta Portal can be accessed at the following URL <https://bdp2100kp.gov.bd>

The current interface of the platform is shown in **Figure 6**. The portal uses and integrates geospatial information on infrastructure and the environment. With a need for data updating, maintenance, and system improvement support, the portal provides a base-level foundation for the delta plan. Currently, the portal has limited scope for direct utilization of the proposed M&E framework because many datasets are outdated. For a functional and effective M&E system, there should be a constant inflow of accurate and up-to-date data. Therefore, data updating and maintenance are two critical challenges in this matter.

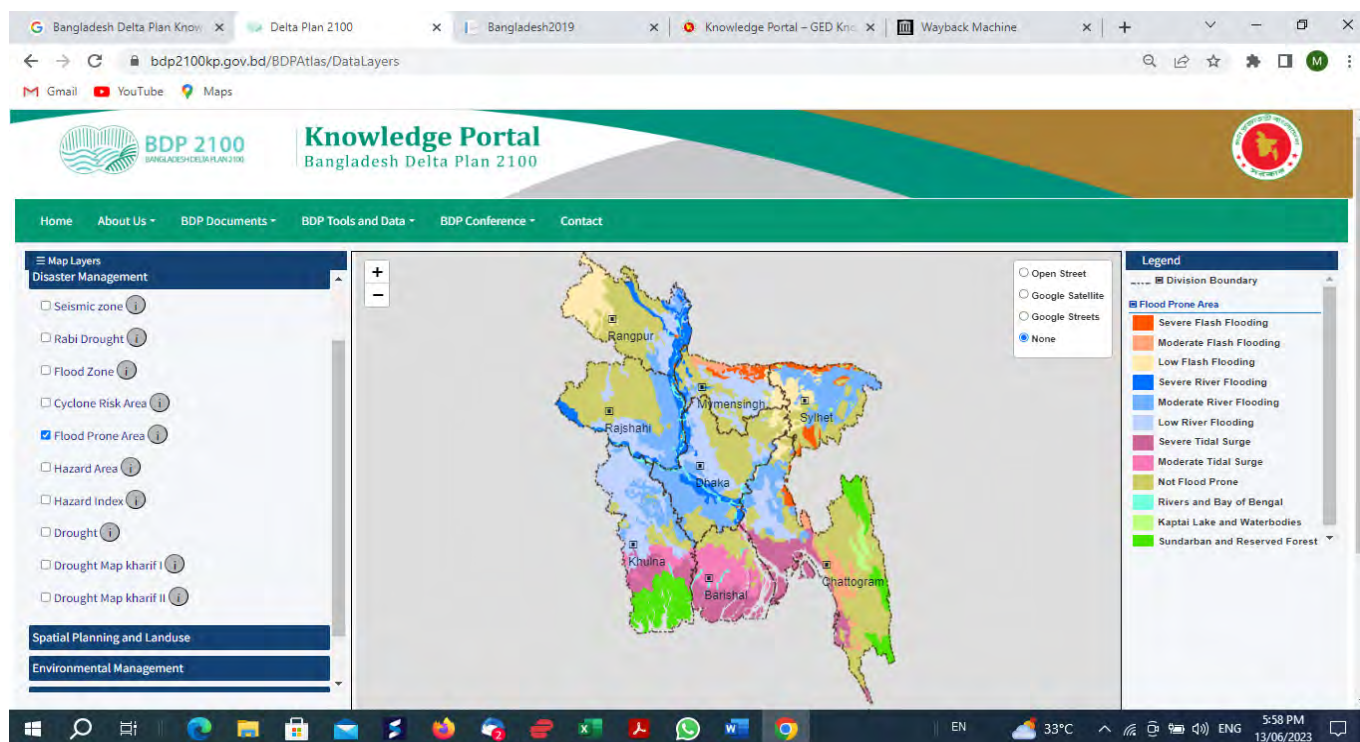


Figure 6: Flood-prone areas view of the Bangladesh Delta Portal (Source: GED)

⁸ Source: Joint Cooperation Program, Bangladesh-The Netherlands

3.5.2 Bangladesh Meta Model

The **consortium** of Deltares, IWM, CEGIS, and WUR is developing the Bangladesh Meta Model. It is a decision support **tool** to assist delta plan implementation. It is also known as the BDP Meta Model. The model and supporting documents are available at the following link: <http://www.jcpbd.nl/bdpMetaModel.php>

The Joint Cooperation Program between the governments of Bangladesh and **the** Netherlands (referred to as the JCP BD-NL) **supports** the development of the Meta Model.

The main objective of the tool is to develop adaptive pathways that consider climate-related uncertainties and provide information impact and investment requirements of future projects under different scenarios, thereby guiding decision-making on the BDP Investment Plan. The tool considers benefits, risks, and costs into account, as well as projects' social, economic, and environmental aspects.

The Meta Model allows the impact of multiple projects to be considered together using indicators such as food security, annual flooding, and crop yields, and has different components such as fisheries module, agricultural waste demand module, and salinity module.

Bangladesh Meta Model integrates nine sophisticated models, as illustrated in Figure 7. Once the scenario, programs, and projects to be modeled are selected and input through the dashboard, the Model uses State indicators to estimate the output Decision support indicators.

METAMODEL COMPONENTS AND MODULES

Metamodel Engine

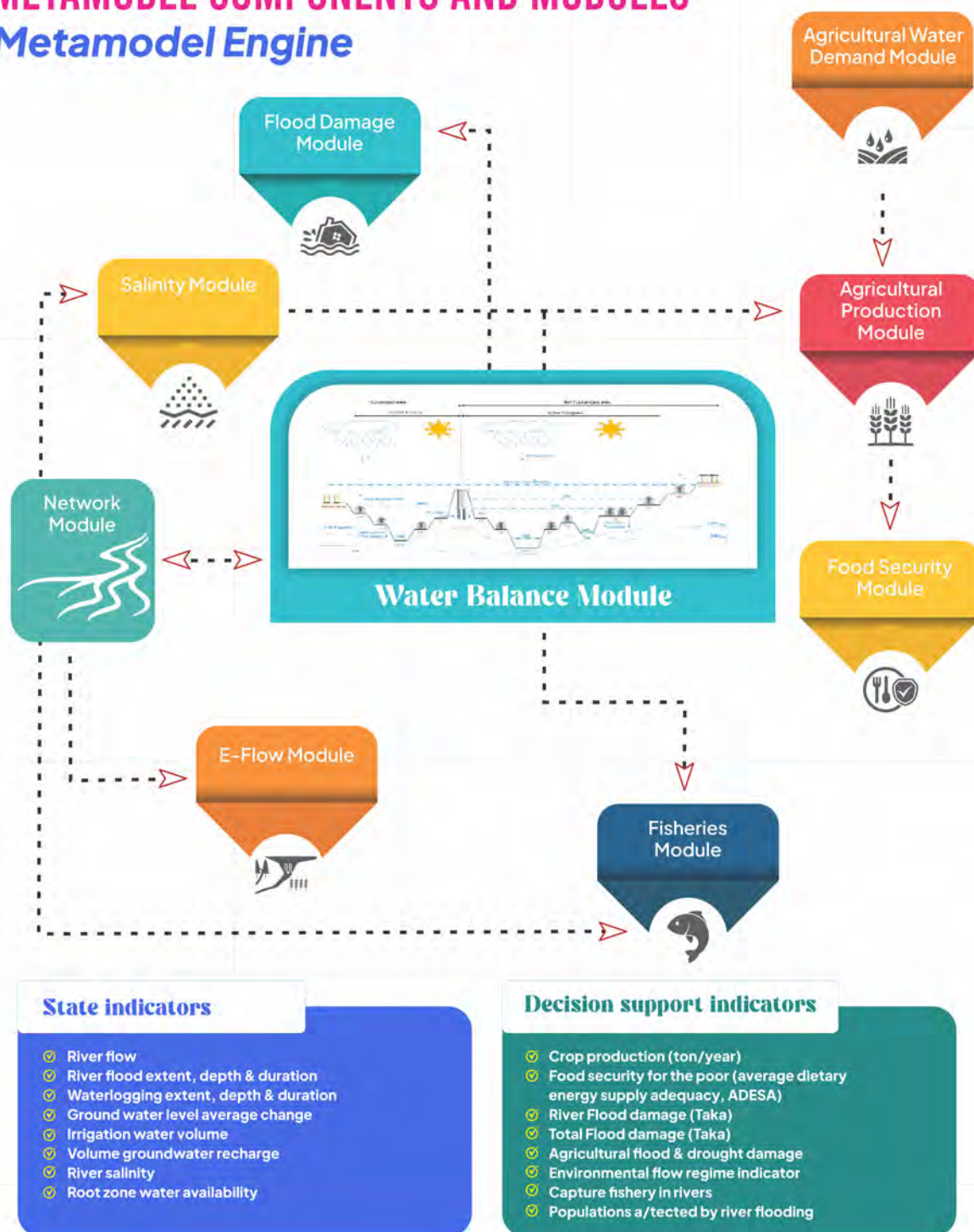


Figure 7: Bangladesh Meta Model Components (Source: Bangladesh Meta Model Brochure, JCP BD-NL)

The JCP BD-NL includes provisions for capacity building to support O&M and ownership of the meta-model. Model development is in progress, and GED has been assigned model ownership.

3.5.3 Relationship of the Delta Portal and Meta Model to M&E

The above two platforms are essential for successfully planning and managing the programs and projects under the Delta Plan, and the Portal is to be the key repository for the M&E data. Still, the

M&E and Meta Model indicators are separate and serve different purposes. The Meta Model predicts results and outcomes from the investment Plan under selected scenarios. The M&E is to measure the results and outcomes after the programs and projects of the Investment Plan during the implementation period. The Meta Model predicted results may or may not be achieved because, among other things, the planning scenario may or may not have resulted. The M&E data may be influenced by external factors such as weather or trade conditions. There are significant challenges in collecting M&E data, particularly for IWRM and environmental data that is not directly visible or easily accessible to the policymakers.

3.6 Other Important Perspectives

3.6.1 Stakeholder coordination

The BDP 2100 Formulation Project attempted in Baseline Study No. 23 to identify all government and private water-sector stakeholders. The study's findings indicate significant challenges in coordinating and harmonizing water-sector activities. Important information is not adequately organized and presented on a common platform. Water governance approaches, and processes differ between agencies, which deal with engineering, hydrogeological, agricultural, and other technical aspects of water resources and infrastructure. For example, WARPO formulated the IWRM guidelines in 2020 using administrative boundaries. WMO has delineated and modeled hydrologic regions in Bangladesh.⁹ The M&E framework and water governance must consider how to allow for these discrepancies in monitoring and updating the delta plan.

3.6.2 Linkage with The Eighth Five-Year Plan

The Government of Bangladesh published the Eighth Five Year Plan (8FYP) in December 2020 and formulated strategic directions from 2021 to 2025. The 8FYP reflects the government's vision of a climate-resilient delta and provides essential guidance on implementing the Bangladesh Delta Plan 2100 (BDP 2100).

The 8FYP recommends a multi-stakeholder consultation for designing BDP 2100 M&E system, with technical inputs from various IWRM knowledge partners. The plan sets a target for preparing a draft 8FYP M&E proposal by January 2022, implementing the M&E system within January 2023, and preparing the first M&E report for approval by the government by the beginning of 5th year of the plan, January 2025 (GED, 2020).

3.6.3 Summary of Stakeholder Consultations

During this review work, formal meetings were arranged with the sector focal point of GED to understand important issues associated with the existing M&E framework of the BDP 2100 and to identify the requirements of GED for the intended M&E framework. Key points from these consultations are:

- 80 projects are planned to be implemented by 2030. The M&E framework for projects beyond 2030 is not yet developed.
- The proposed M&E framework needs to consider geopolitical and socio-economic issues while addressing and evaluating the activities of the BDP 2100. The current plan has gaps as, in many cases, it focuses on only the technical aspects.

For example:

- » The plan sets the target to increase available basin flow in the dry season from 15% (approx.) to 30% (approx.). But it does not establish whether it is realistic nor provides a roadmap on how it can be achieved.

⁹ Alam MM. 2015. Process Development for Hydrological Region-wide Integrated Water Resources Management Model in Bangladesh Asian Journal of Applied Science and Engineering, 4, 137-146 publicationslist.org/data/ajase/ref-76/AJASE%2011.6.pdf

- » The plan emphasizes a reduction of groundwater extraction and an increase in surface water yield. However, it does not indicate or explain the implementation approach and its socio-economic impacts.
- The BDP 2100 includes shipping in the transport sector but does not address or consider the impact of the railway and road network on the basin. The spatial distribution and rapid growth of infrastructure of road and railway networks have a significant impact on the hydrological setting of the delta. The impact of the transport network needs to be measured and evaluated under the plan.
- Presently, GED plays a major role by providing advocacy support to the MoWR to arrange foreign financing for the projects of the BDP 2100. The GED deals with the Economic Relations Division (ERD) and helps prepare project lineups for financing.
- Among the 80 projects, the MoWR has started implementing four projects. GED has been monitoring the activities and progress of these projects. There is no established M&E system at GED for this purpose. However, the GED has assigned a small in-house team who monitors the activities of these projects. This team visits the project sites to oversee work progress and assess the implementation status.

4. LESSONS LEARNED FROM OTHER DELTA MANAGEMENT PROGRAMS

The BDP 2100 formulation project studied the experience of different delta management programs worldwide, focusing on the experience of the USA and the Netherlands. The BDP 2100 is founded on the Netherlands Delta Program (NDP) lessons, which applies Adaptive Delta Management (ADM).

This review study explored some additional successful delta management practices. The general findings are that the structure, governance, practice, and visibility of every delta M&E system are different, and the systems are tailored to fit the capabilities and governance practices of the delta management program location. This section briefly presents learnings from three delta management programs to understand how the monitoring and management systems provide for climate change impacts. More detail is given for the NDP M&E framework to allow its relevance to the BDP 2100 to be understood.

4.1 Danube River Delta Management

The Danube River Basin (DRB) is Europe's second-largest delta, with a more than 800,000.0 sq. km catchment area. The basin covers 10% of continental Europe and includes the territory of 19 countries (ICPDR, 2021). The DRB is the habitat and lifeline of about 79 million people and has a diverse ecosystem.

The International Commission for Protection of the Danube River (ICPDR) is responsible for the protection, management, and sustainable development of the DRB. The ICPDR develops and updates the Danube River Basin Management Plan (DRBM Plan) to better prepare the aquatic ecosystem for future challenges. The DRBM plan was last updated in 2021 (ICPDR, 2021). The plan focuses on four Significant Water Management Issues (SWMIs):

- i. Pollution by organic substances
- ii. Pollution by nutrients
- iii. Pollution by hazardous substances
- iv. Hydro-morphological alterations (also including since 2019 alteration of sediment balance)

The EU Water Framework Directive (WFD) establishes a legal framework for protecting the delta, managing the ecological and chemical balance, and protecting both the water ecosystems and human health and wellbeing. The WFD also specifies that climate change impacts must be evaluated and actions are taken as necessary to achieve the planned ecological and water quality targets of "good status."

Therefore, the DRB M&E system focuses on monitoring the status of pollutants, hydro-morphology, and sediment balance. The ICPDR launched the Transnational Monitoring Network (TNMN) in 1996 to support the implementation of the Danube River Protection Convention in the monitoring and assessment utilizing monitoring data assessed at the national level. It is used to track delta issues and operations, support the M&E, and meet the reporting requirements of the WFD. The TNMN involves regular collection and analysis of data on the status and trend of water resources. The impact of human interventions in the basin is reflected in the ecological and chemical status of the surface water and groundwater resources. The water resources management actions of individual nations or the ICPDR are based on TNMN data. Additionally, the ICPDR explicitly deals with the transboundary cooperation among the basin's countries.

The TNMN provides a solid platform for collecting, monitoring, managing, and operating the DRB. It meets the EU's WFD monitoring and reporting requirements, which focuses on evaluating the status of water bodies¹⁰. This aspect of DRB M&E – focusing on the status of water bodies - is relevant to

¹⁰ The WFD assessment methodology requires consideration and reporting on four aspects of water body health: ecological and chemical sta-

improving the BDP 2100 M&E framework.

4.2 Mekong River Delta Management

The Mekong River is the 12th longest river in the world, with a flow length of more than 4,800.0 km. The Mekong catchment area is about 795,000.0 sq. km, which includes China, Myanmar, Lao PDR, Thailand, Cambodia, and Viet Nam (MRC, 2016).

The Mekong River Commission (MRC) is an intergovernmental organization established for regional dialogue and cooperation in the Lower Mekong River Basin. It provides a regional platform for water resources management in the Mekong catchment within the territories of Lao PDR, Thailand, Cambodia, and Viet Nam (the Lower Mekong River Basin - LMRB).

The Strategic Plan 2021-2030, presented and approved with an updated Basin Development Strategy (2021-2030),¹¹ aims to guide strategic regional cooperation, coordinated planning, and operations to improve the state of the LMRB. The 10-year strategic plan focuses on five strategic priorities:

- i. Environment: Maintain the ecological function of the Mekong River Basin in good condition
- ii. Social: Enable inclusive access and utilisation of the basin's water and related resources
- iii. Economics: Enhance optimal and sustainable development of water and related sectors
- iv. Climate change: Strengthen resilience against climate risks, extreme floods and droughts
- v. Strengthen cooperation among all basin countries and stakeholders

There are a total of eleven specific outcomes associated with the strategic priorities.

The MRC maintains a major knowledge portal containing many current and historical data and information, including river flow, water quality, ecological health, mapping, remotely sensed imagery, and a decision support framework. It is online at <https://portal.mrcmekong.org/home>

The M&E Framework for the Basin Development Plan and Strategic Plan 2021-2030 has two monitoring systems:

- The Basin Impact Monitoring System, and
- Organization Performance Monitoring System

The M&E framework is illustrated in Figure 8.

tus of surface waters, and chemical and quantitative status of groundwater. The ecological status of surface waters assesses overall ecosystem health as expressed by biological quality elements — phytoplankton, macrophytes, phytobenthos, benthic invertebrate fauna and fish (for details see [CIS guidance document n°13](#)). The chemical status of surface water is assessed against standards for priority substances listed in the Environmental Quality Standards Directive. Good groundwater chemical status is achieved when concentrations of specified substances do not exceed those permitted by relevant standards. Good groundwater quantitative status is achieved by ensuring that the available groundwater resource is not deteriorated by the long-term annual average rate of abstraction.

¹¹ <https://www.mrcmekong.org/assets/Publications/BDS-2021-2030-and-MRC-SP-2021-2025.pdf>

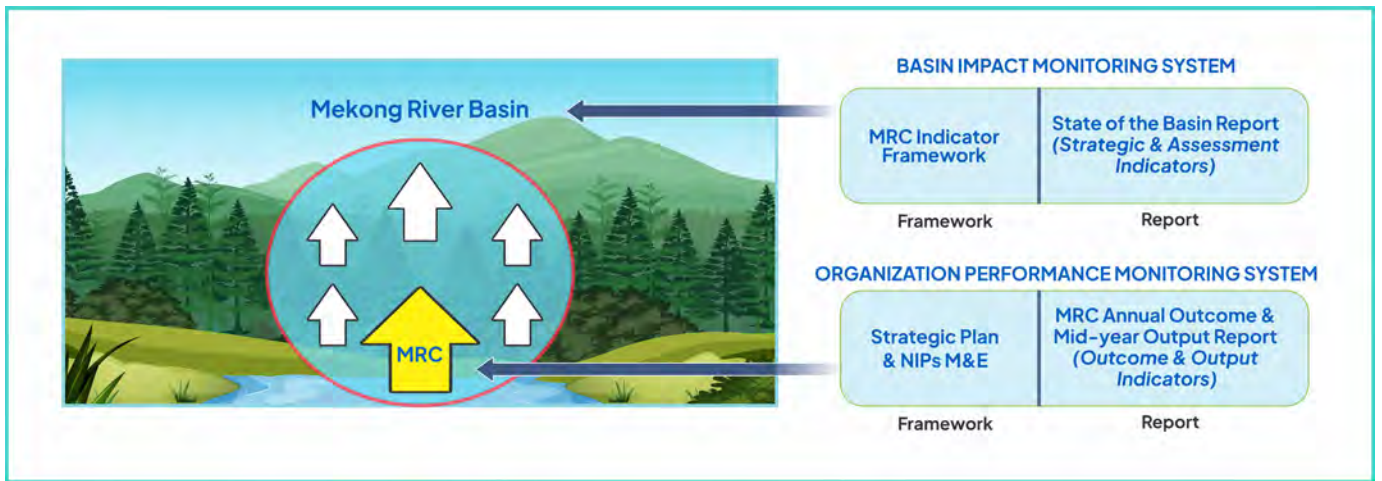


Figure 8: M&E framework of the Mekong River Strategic Plan 2016-2020 (Source: MRC, 2016)

The Basin Impact Monitoring System uses the MRC Indicator Framework (strategic and assessment indicators) to monitor and evaluate basin development and management status and trends. In contrast, the Organization Performance Monitoring System uses the Outcomes and Outputs indicators in the Strategic Plan to monitor and evaluate MRC organization performance.¹²

The Basin Impact Monitoring system tracks the BDS 2021–2030 implementation. It has a “dashboard to provide planners, decision-makers, funders, and other stakeholders with (a) information about the overall health of the Mekong basin in five dimensions (environment, social, economic, climate, and cooperation); (b) status and trends on key indicators that the BDS Outcomes and Outputs are trying to address, such as water flow and quality, food security, the value of water sectors, climate resilience, and cooperation value and benefits; and (c) what contributions are being made to the relevant SDG targets.”¹³ An example of the dashboard is shown in Figure 9.

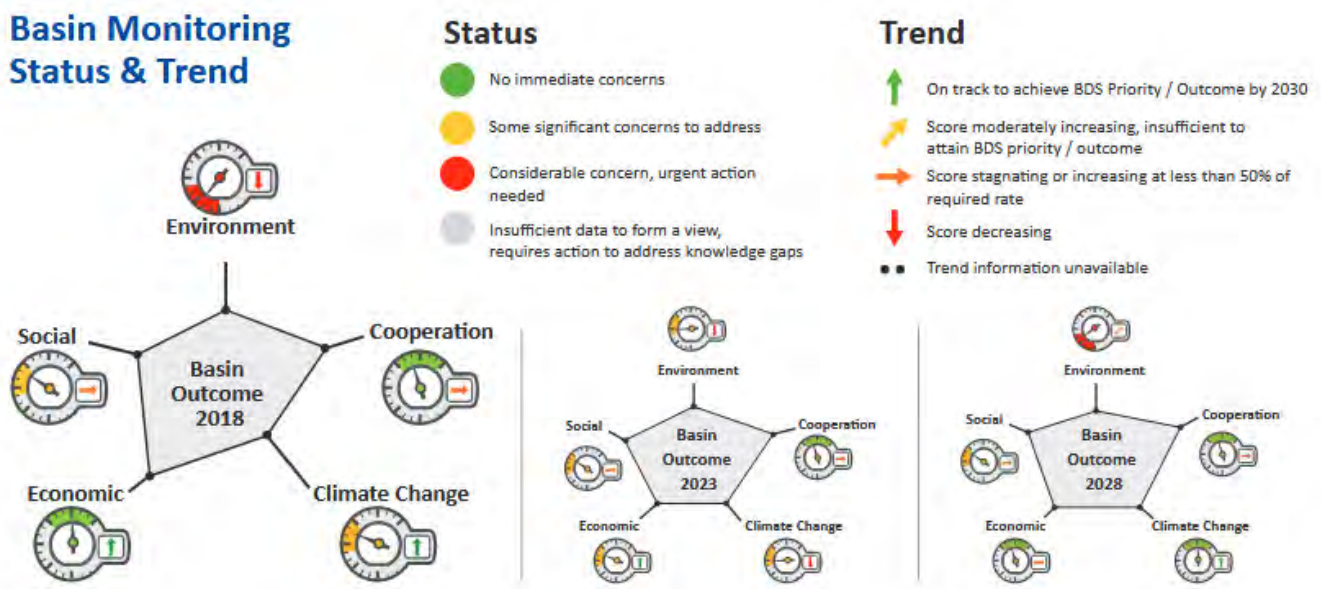


Figure 9: Sample representation of the MRC's dashboard for monitoring the status and trends in conditions across the basin

¹² <https://www.mrcmekong.org/interactive-publications/basin-development-strategy-2021-2030/me.html>

¹³ MRC BDS 2021-2030, Section 6.5, page 113 <https://www.mrcmekong.org/assets/Publications/BDS-2021-2030-and-MRC-SP-2021-2025.pdf>

A key feature of the 2021-2030 Strategic Plan is that its activity aims at improved and stronger management activity and does not include infrastructure development. This is because the national government agencies, not the MRC, implement development projects and undertake regulatory action on water use, pollution, and environmental impact. Two examples of the first priority, “Maintain the ecological function of the Mekong River Basin,” are shown in Table 3.

Table 3: Defined BDS Output Indicators for MRC Strategic Priority 1

Outcomes	Outputs (2021-2030)	Output indicators (2021-2025)
1.2 Sediment transport managed to mitigate bank erosion and maintain wetland and floodplain productivity	1.2.1 Basin-wide sediment management plan developed and implemented	<p>Indicator: The approval status of the basin-wide sediment management plan</p> <p>Target: Basin-wide sediment management plan approved by basin countries for implementation</p> <p>Baseline: No basin-wide sediment management plan</p> <p>Assumptions: National governments, private developers, and industry cooperate in the provision of relevant data, information, and site access</p>
1.3 Ecosystem services from wetlands and watersheds ensured	1.3.1 Limits of acceptable change for key rivers and connected wetland habitats identified and implemented	<p>Indicator: Evidence that: 1) the identified limits of acceptable change are used in regional and national development planning processes, and 2) national management plans for relevant wetlands are updated based on the identified limits</p> <p>Target: At least 2 national wetland management plans have identified limits incorporated. Processes for proactive regional planning and at least one national plan are informed by the identified limits.</p> <p>Baseline: No regional limits of acceptable change have been identified for key river and wetland habitats in the Mekong River Basin</p> <p>Assumptions: Agreement can be reached with national agencies on appropriate and implementable limits for key regional environmental assets, drawing on sufficient technical support, and they have enough technical and resource capacity to update national wetland plans, informed by relevant limits.</p>

As can be seen from these examples, the indicators are guidelines, plans, and knowledge products. This contrasts with the requirement for M&E indicators for BDP 2100, which need to measure changes in real-world conditions. However, the MRC does monitor real-world conditions and report

on the status of the Mekong River Basin.

Strategic priority “iv. Climate change: Strengthen resilience against climate risks, extreme floods, and droughts” includes “A core river monitoring network for the mainstream and remaining national river monitoring networks consolidated” and “Integrated data and information systems for more effective basin-wide data management and sharing.” The first is for time series ground-based data systems e.g. flow, water quality, fisheries and ecological health, erosion and sediment, and environmental monitoring of mainstream hydropower and other infrastructure.

The second is for Strategic priority “v. Strengthen cooperation among all basin countries and stakeholders” which includes organizational development of the MRC. A strategic deliverable in this output is “Enhanced monitoring, evaluation, and reporting system of MRC SP, NIPs and other related projects/activities,” which was to be delivered in 2021.

These two knowledge bases and strategic information sources for the Mekong member countries are used to produce a five-yearly “Joint State of the Basin” report. The BDS Output indicators for this activity are shown in Table 4.

Table 4: Output Indicators for the Joint State of the Basin Report

Outcomes	Outputs (2021-2030)	Output indicators (2021-2025)
	4.1.5 Joint State of Basin Report	<p>Indicator: The extent to which China and Myanmar collaborate in preparing the SOBR 2023 and data gaps in all basin countries have been addressed in accordance with the MRB-IF</p> <p>Target: Data, information, and analysis from China and Myanmar are included in the SOBR 2023, and there are no substantial data gaps to implement the MRB-IF</p> <p>Baseline: Limited official data and information from China and Myanmar were made available for preparing the SOBR 2018, and substantial data gaps in all basin countries</p> <p>Assumptions: China and Myanmar are willing to contribute to the Joint SOBR 2023, and there is sufficient recognition of the need to improve data collection, assembly, and sharing with the MRCS across all basin countries</p>

The strategic plan presents a complete M&E framework by including the results, indicators, method of collection, indicator data collection schedule, and reporting routines.

The M&E system of the MRC is relevant to that of the BDP 2100 since it concerns the management of an Asian transboundary river system responding to climate change and development impacts with the support of bilateral and multilateral donors. The lessons which can be learned from the MRC M&E system and applied in the BDP 2100 M&E framework are:

- Monitor both the results (Basin Impact Monitoring) and the organizational performance, and
- Use strategic, output, and outcome indicators

4.3 The Netherlands Delta Program

The Netherlands is one of the most successful nations for sustainable management of river deltas under the changing climate and rising sea level. The BDP 2100 has adopted planning, implementation, monitoring, and management approaches from the Netherlands Delta Program (NDP) through direct technical assistance provided by the Government of the Netherlands. Therefore, it is no wonder that the M&E framework of the BDP 2100 is in alignment with the directions and strategies followed under the NDP.

The operational M&E system for the NDP is labeled as the Monitoring, Analyzing, and Acting (MAA) system. This MAA system was developed by the PBL Netherlands Environmental Assessment Agency (referred to as the PBL) by applying a reflexive approach. There are two principles of a reflexive approach in a comprehensive M&E system (PBL, 2016):

- a. A joint effort by all stakeholders to achieve adequate M&E during implementation
- b. Shared learning and accountability of the stakeholders.

A reflexive approach considers the activities' internal and external dynamics (PBL, 2016). The reflexive M&E framework was designed considering the following three considerations (PBL, 2017).

- i. A participatory approach for the NDP
- ii. Adaptive
- iii. Accountability

The goals for monitoring and evaluation, and design of the MAA system (Bloemen et al., 2019), according to the National Steering Group of the NDP, were to:

- Generate information on the external conditions which may require adjustment of policy framework, strategies and plans
- Enrich learning by sharing success and scope for improvements
- Provide a reference for justifying the budget and energy spent,

The MAA system is under regular review for its effectiveness for the NDP. It is expected that the system provides results for decision-making. In this context, the MAA system tries to answer the following major questions (Bloemen et al., 2019):

- Is the NDP on scheme and schedule?
- Is the implementation proceeding as planned? What are the critical challenges?
- Does the implementation follow an integrated approach?
- Does the program follow a participatory approach?
- Is there any new development that changes the scenario?

Under the changing climate scenario, the NDP and the M&E framework programs are subject to review and upgrading every six years. A special signal group created by the government monitors the program status and provides technical assistance and knowledge support for the required changes, predictions, and insights.

With the inclusion of the RBM&E framework, the MAA system is delta goal-oriented at the core. Additionally, it comprises a robust information base and translation capabilities to effectively report the status of the NDP. Figure 10 provides the conceptual structure of the MAA system (Bloemen et al., 2019).

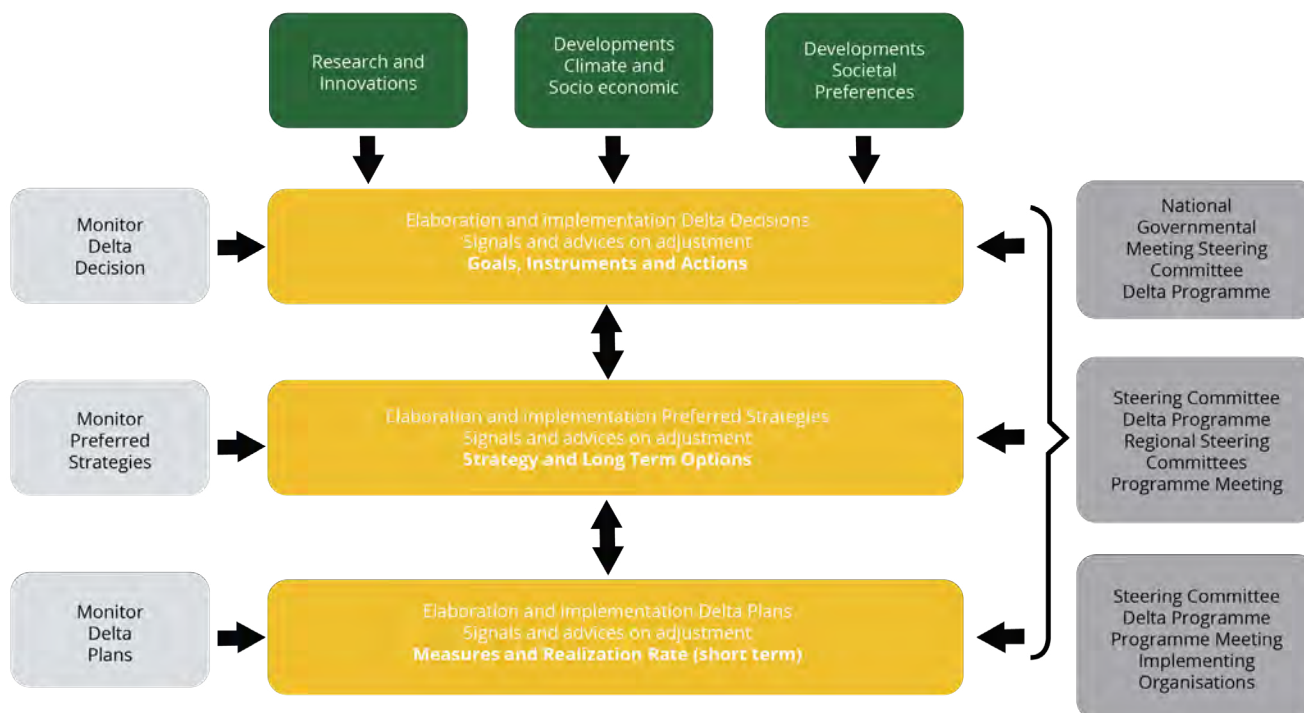


Figure 10 : System architecture of the MAA for the Netherlands Delta Program (Bloemen et al., 2019)

The BDP 2100 suggests the design and implementation of a similar M&E framework. The DRF indicators are designed accordingly, i.e., they are goal-oriented, but like the current Bangladesh M&E practice, the current indicators only report on the physical and financial progress. The BDP 2100 needs to be transformed into a result-based M&E framework.

The lessons from the Netherlands Delta Plan which are most relevant to the BDP 2100 M&E are:

- The two principles of a reflexive approach: i) a joint M&E effort by all stakeholders and ii) shared learning and accountability
- Provide information on the external conditions that require a planning response
- Provide an assessment of institutional performance supporting the Plan and identify the action needed to strengthen that support.
- Provide a reference to justify budget and other plan changes.

4.4 Policy Lesson for a Climate-informed M&E Framework

Water management and delta management under a changing climate brings greatly increased uncertainties and the need for continual change in planning and management to respond to changing external circumstances. The necessary changes will, over time, need to be in the type of interventions, and in the mix of infrastructure, regulation, nature-based solutions, and social and community support and training, in the physical distribution of interventions, the technical skills and combinations of knowledge and experience, the community engagement processes, the involvement of the private sector, and the institutional level at which activities are planned, organized and implemented. These changes can profoundly affect the Bangladesh water sector and its government, private and community stakeholders.

As demonstrated by the BDP 2100, water resources policy is changing to a risk management approach. This change is influenced by the Dutch flood management policy, which was dominated by a protection-oriented approach for a long time but is now a risk-oriented approach as described in the multilayered safety of the National Water Plan, 2009.¹⁴ Risk management is a response to the certainty of climate change but the uncertainty of climate change projections.¹⁵

The Dutch policy, the Dutch Delta Approach, is a trademark for exporting knowledge about adaptive delta management. It has been made into “a strong brand [using] a strong national network of stakeholders, sufficient resources, and the confluence of various developments.” Adopting a brand has been important for the policy transfer process, creating interest and opportunities for transfer. However, it should be noted that economic interests lie behind policy transfer processes, and some analysts think that marketing has been favored over sustainable impact by focusing on economic agendas.¹⁶

The BDP 2100 clarifies that well-implemented and effective results-based M&E is necessary to appropriately manage the uncertainties and risks that will arise during plan implementation.¹⁷ The M&E is needed to evaluate the achievements of component projects and to reassess, at intervals of, say, 5 years, the selection and timing of component projects that must be implemented to meet the 6 goals of the BDP 2100 (see Figure 2). The assumptions implicit in this M&E strategy are an effective baseline for measuring progress and well-selected indicators to track performance towards the 6 goals.

¹⁴ Van Buuren, Arwin & Ellen, Gerald Jan & Warner, Jeroen. (2016). Path-dependency and policy learning in the Dutch delta: toward more resilient flood risk management in the Netherlands?. *Ecology and Society*. 21. 10.5751/ES-08765-210443.

¹⁵ van Buuren, Arwin, 'The Dutch Delta Approach: The Successful Reinvention of a Policy Success', in Paul 't Hart, and Mallory Compton (eds), *Great Policy Successes* (Oxford, 2019; online edn, Oxford Academic, 24 Oct. 2019), <https://doi.org/10.1093/oso/9780198843719.003.0011>

¹⁶ Ellen Minkman, Arwin van Buuren, Branding in policy translation: How the Dutch Delta approach became an international brand, *Environmental Science & Policy*, Volume 96, 2019, p 114-122, <https://doi.org/10.1016/j.envsci.2019.03.005>.

¹⁷ BDP 2100, Vol. 2, Investment Plan, Part 1, Section 6, Monitoring and Evaluation

5. REVIEW OUTCOMES AND RECOMMENDATIONS

Review Outcomes

This review report made a consolidated effort to understand the current status of the M&E framework under the BDP 2100 and its requirement for further detailed development. It provides an understanding of the nature of the BDP 2100 and its implementation strategy and the current structure of the M&E system.

The World Bank found the BDP 2100 to be adequately adaptive and flexible to sustain the impact of climate change and human interventions in the delta for a long period.¹⁸ The M&E framework must inform the plan review process so that the BDP Investment plan to be adapted to these impacts. The DRF provides the technical reference and a systematic procedure for the GED to operate the M&E system for activities in the delta. However, like the current Bangladesh M&E practice, the indicators only report physical and financial progress. The principles and structure of the M&E system are derived from the ADM approach of the Netherlands Delta Program. The indicators of the DRF are designed for the specific goals of the BDP 2100 but need to adopt a result-based approach and be supported by a system to track and report on the management performance of the institutions implementing, adjusting, and strengthening the BDP 2100.

At the implementation level, several ministries and their partner organizations are involved in the plan. The existing DRF is neither disaggregated to the individual sector performance nor provides information on the sector agency efficiency, accountability, and performance in learning. Rather, it sets targets by accumulating the overall physical and financial outcomes of the projects implemented.

There are considerable challenges as well as opportunities in the current DRF. There is scope to include and integrate climate adaptation measures, establish a linkage between sector performance indicators and the indicators of the DRF, and design and aggregate performance indicators for the programs where the implementing agencies come from different sectors or ministries.

The following findings on the BDP 2100 Investment Plan provide context for the review of the BDP 2100 M&E framework.

- The BDP 2100 focuses on sustainability and climate resilience for its investment in the IWRM activities and follows the Netherlands Adaptive Delta Management (ADM) approach of the Delta Management Program.
- The first implementation phase is set with eighty (80) projects for the horizon of 2030. The great majority of these projects are for infrastructure. The estimated capital investment cost for the first phase is about US \$37.0 billion.
- The investment is concentrated for and around the water sector for the first phase. The MoWR will execute 38 of the 80 projects; of these, at least 23 projects will be implemented by the BWDB. Additionally, the BWDB will implement some projects with other ministry departments.
- The focus of climate adaptation activity is currently to build capacity in livestock management.
- The GED is responsible for tracking the progress and outcome of the investments and for facilitating coordination and collaboration among the executing agencies.

Current M&E Practice in the Country

- Current M&E at the project level only reports the physical and financial progress of works. There is limited information on result-based outcomes or achievement at project completion.

¹⁸ World Bank 2022, Bangladesh: Country Climate and Development Report, page 29. World Bank Group Washington USA

- Although recommended in the 6FYP and 7FYP, results-based M&E has been introduced at the macro-economic level but is yet to be developed and used by executing agencies.¹⁹ Implementing results-based M&E requires significantly increased organizational commitment and capacity building.
- The IMED is the apex body for project and program M&E. However, the IMED also follows a physical and financial progress approach to its responsibilities, and the Division has limited capacity.²⁰
- Many organizations in the government have now adopted or have been trying to adopt the indicators of the SDGs in their respective goal areas.
- The BDP M&E requires connecting existing project-based M&E to the intended goal-oriented M&E framework.

Status of M&E Framework under the BDP

- A total of 25 indicators are currently proposed in the DRF of the BDP 2100. These indicators are disaggregated into a total of thirty (30) sub-indicators and grouped for the specific six (6) goals of the plan. The list of the DRF indicators is provided in Appendix-I.
- The benchmarks and minimum targets for the M&E indicators are set for 2016 (base year), 2030, and 2050. Beyond 2050, the DRF should be revised using the experience of Delta management.
- The indicators of the DRF mostly focus on the affected population, geographic area, and water flow volume. Many of these parameters are expressed in percentages.
- Minimum targets for many indicators are yet to be decided for 2050. These values are to be set using knowledge and experience gained from the M&E system.
- There is limited or no information on the technical definition of the indicators mentioned in the DRF. Therefore, the baseline and the minimum target values do not provide a strong basis for either monitoring plan implementation progress or supporting plan adaptation.
- The DRF needs further clarification for the linkage among the project-level, sectoral, and goal-specific indicators. The agencies should build adequate capacity to accurately measure, relate, translate, and present this linkage.
- There is ample scope for connecting delta plan indicators and the SDG goals.
- The investment plan includes many projects jointly executed by more than one ministry. It is challenging to define and design representative indicators for the participating ministries and the project as a whole. In this case, a rigorous technical study should be conducted with well-executed consultation among the sector stakeholders to confirm the recommendations.
- Outcomes of some projects may not be experienced immediately after the implementation is complete. The results may take a considerable duration to be visible. Therefore, the evaluation of such programs may require a long-term engagement in M&E.
- The principles of ADM allow results-based M&E to be developed. It could be established and effective by 2030.
- The indicators of the proposed M&E system are to be developed under the Development Result Framework (DRF). The DRF needs to be designed with adequate flexibility to incorporate or adjust necessary indicators under future uncertain scenarios.

¹⁹ GED 2018, Background studies, Volume 6, Institutional Framework and Arrangements, BDP 2100, page 9

²⁰ Ibid,

Status of the Knowledge Base to Support M&E of the Delta Plan

- The Delta plan formulation project created a Delta Portal in 2014, intending to gather relevant information on a common platform. This platform provides a base foundation on the delta system. However, the portal needs further development (the MRC knowledge portal could be a guide), and systems to ensure data supplied by different agencies is consistent, to tag accuracy, provide regular updating and maintenance of information, and improve dissemination among stakeholders. Much of the available information is already outdated.
- In Bangladesh, data collection and management are distributed among the agencies, and there is no established single or centralized data platform. Therefore, it is challenging to accumulate information.
- The proposed M&E framework will eventually need the application of these data from various owners.
- The GED has been implementing a meta-model to support data acquisition for the initial investment projects. This model is used for adaption path and project selection. It is noted that the Meta Model indicators differ from the M&E indicators and serve different purposes, and their values are likely, not comparable.

Status of Results-based and Climate-informed Indicators in the M&E Framework

- There is currently no “climate-informed” indicator in the DRF. However, many indicators, such as those for flood control and management, will be impacted by climate change, and the change in their values will reflect both plan implementation and the effects of climate change. Additional work is required to define indicators or procedures that can explicitly measure climate change impacts.

Comparison with the Sustainable Development Goals (SDGs)

- There is currently no direct linkage shown between the indicators of the DRF and the SDGs. It is noted that the first of the three Higher goals concerning economic progress is aligned with SGD 1.1 “By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day”.
- Since the first horizon of the plan is 2030, and it is also consistent with the design period of SDG, there is ample scope for re-evaluating the minimum targets in alignment with the SDGs.
- The indicators for several of the SDGs are directly relevant to the specific goals and could be included in the DRF. There are clear procedures for estimating the values of the SDG indicators.

RECOMMENDATIONS

Urgent action is necessary to implement these recommendations to strengthen the BDP 2100 M&E framework. Within three months of receipt of this report, GED should consult with the Support to Implementation of the Bangladesh Delta Plan 2100 project, convene working groups of relevant stakeholders, and arrange meetings to set clear tasks and timelines for responding to this review.

- A detailed study and gap assessment of the DRF indicators is required, which should include all government agency BDP 2100 stakeholders. The objective of this review should be to select indicators for each of the Specific goals that measure the planned and expected outputs and outcomes of projects and activities towards that goal.
- The M&E framework should provide evidence to justify the budget and energy spent in BDP 2100 development and implementation.

- Indicators should provide for Plan progress measurement resulting from soft projects (such as agency and stakeholder capacity building, gender and pro-poor sensitization and empowerment, nature-based solutions, etc.) as well as achievements of infrastructure projects.
- Care should be taken that the indicators can reflect the sustainability of all types of water resources (surface, groundwater, wetland ecological condition, and catchment values) and water resource developments. The experience of developing the Danube Transnational Monitoring Network is relevant to the study.
- Additional indicators that monitor external conditions which may influence the progress of Plan implementation, or the selection of alternative adaptation pathways, programs, or projects, may be considered. These external condition indicators could include some to monitor climate change.
- This review has selected some additional indicators for each Specific goal to measure the Plan's achievements at the national level. These have been chosen from the World Bank's Country Partnership Framework (FY2023 – FY2027) and the SDG Global Indicator framework SDG (updated for 2023).
- Mapping and listing of project-specific and sectoral M&E needs should be performed using the principles of an RBM&E framework.
- An appropriate linkage among the project-level, sectoral, and goal-specific indicators should be established and communicated to the executed agencies of the BDP 2100.
- Adaptation tipping point indicators can be considered to support decisions on plan adjustments when specific trigger points are reached. These indicators should be selected during the design of alternative adaptation pathways.
- An institutional framework is essential to ensure the availability and a seamless flow of information in the M&E platform. Authoritative support from the Delta Governing Council is required to strengthen the data supply and development of the Delta Knowledge Portal. Legislation on water-related data collection and management might be considered. The Delta Knowledge Portal should integrate with regional data platforms to provide for its regional climate and hydrologic setting.
- Whether involved in managing or implementing the investment plan, the agencies should be provided with adequate capacity building and resources for the intended M&E framework and their roles.
- The institutional setup for this M&E framework should regularly be reviewed and updated accordingly. The Delta Governing Council should be informed about and support the operation of the institutional setup for the M&E framework.
- The delta plan governance should not only guide what to do but also what will be done and how it will be done to address the challenges and deficiencies experienced in the course of actions. If possible, the overall delta governance should be brought under a legal setup of the government with adequate management, regulation, and enforcement capacities.
- An additional monitoring and evaluation framework could be considered to assess and guide the development of the institutional aspects of the BDP 2100. The MRC's Organization Performance Monitoring System should be studied and may be a suitable model.
- There may be a technological intervention to support a seamless flow of delta-related information among the participating stakeholders and the development of the delta management knowledge platform. However, such a technological process may also need to be supported by institutional processes such as directions to government agencies from the Delta Governing Council.

REVIEW REPORT LIMITATIONS

The findings synthesized in this report are based on secondary sources. The study reviewed secondary sources and conducted an initial stakeholder consultation. Future interactions with and between GED and ministries will develop and enhance the required information and the M&E framework. The secondary sources are being frequently updated as work on developing the BDP 2100 and its M&E Framework is continuing at pace. With this knowledge and consideration, it is suggested that this report, its finding, and recommendations should be considered as soon as possible and should be confirmed for continued validity by checking with key actors after June 2024. ADPC will consider a request from GED to support its approach to the “Support to Implementation of Bangladesh Delta Plan 2100” project.

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APPENDIX-I: LIST OF THE DRF INDICATORS OF THE BDP 2100

The BDP 2100 Development Results Framework (DRF) is comprised of the following goal-specific indicators to support the M&E of the plan. This list is copied and reproduced from the BDP 2100, Volume 1, Strategy, p 631.²¹

No	Indicators	Sub-indicators	Unit	Parameters		
				2016	2030	2050
Goal 1: Ensure safety from floods and climate change-related disasters						
1A	Risk-free zones from the natural disasters	Avg. flood-affected area ¹	% of total area of Bangladesh	25	25	25
		Catastrophic flood affected area ²	"	60	55	50
		Drought (extreme) free area ³	"	53	75	90
		Storm surge affected area ⁴	% of total coastal zone ⁵	29	10	5
		Dry season salinity intrusion-free area ⁶	"	47	50	50
		Water logging-free area	"	97	100	100
1B	Population vulnerable to natural disasters	Flood vulnerable people	No. in million	88	60	20
		Cyclone vulnerable people	"	8	7	5
		Erosion vulnerable people	"	1	0.7	0.2
		Water logging vulnerable people	"	09	0.2	0.1
Goal 2: Ensure water security and efficiency of water usages						
2A	Dry season flow availability (Jan-May)	-	% of total flow	14	30	30
2B	Dry season irrigation coverage	-	Million ha	5.5	7	7
2C	Irrigation water efficiency ⁷	-	% of supplied water	30	40	50
2D	Urban domestic water efficiency ⁸	-	% of supplied water	60	90	100
2E	Rural population with safe drinking water access	-	% of rural population	87	100	100
2F	Rural population with safe sanitation	-	% of rural population	58	100	100

²¹ http://brri.portal.gov.bd/sites/default/files/files/brri.portal.gov.bd/page/7c888a53_3697_4e11_828b_75cc60b88ddf/BDP%202100%20Volume%201%20Strategy.pdf

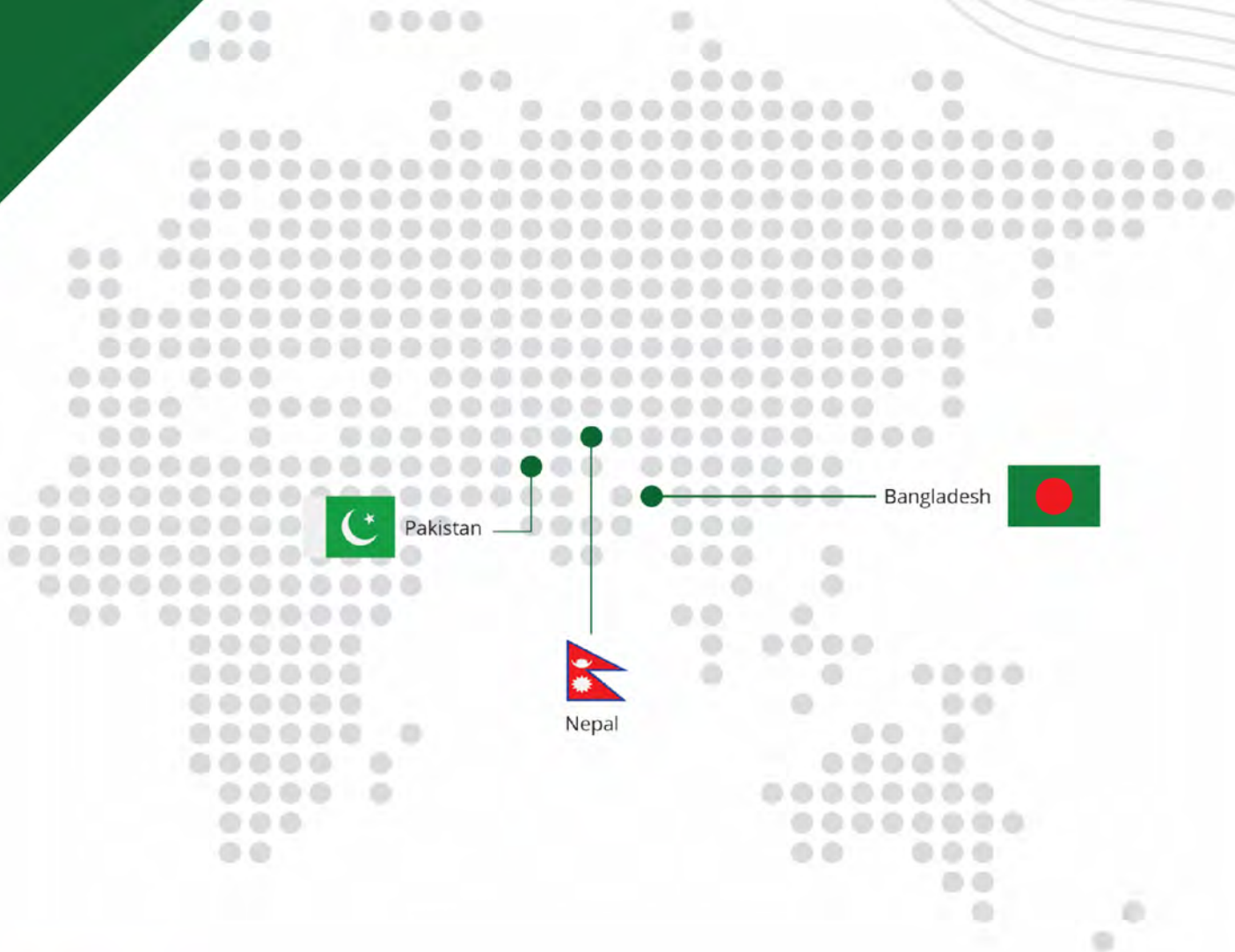
No	Indicators	Sub-indicators	Unit	Parameters		
				2016	2030	2050
2G	Surface water polluted by the industrial wastes	-	% of total river areas	11	9	5
2H	Surface water sources polluted by other wastes ⁹	-	% of total river areas	10	7	5
Goal 3: Ensure sustainable and integrated river systems and estuaries management						
3A	Erosion along the major rivers	Area eroded along Jamuna	Ha/year	1500	1000	400
		Area eroded along the Ganges	„	600	450	250
		Area eroded along Padma	„	1300	650	400
		Area eroded along Meghna	„	2900	2000	1200
3B	Area of reclaimed lands	-	ha	52313	170000 (approx.)	300000 (approx.)
Goal 4: Conserve and preserve wetlands and ecosystems and promote their wise use						
4A	Permanent wetlands with connectivity	-	% connectivity	Establish connectivity ASAP	Full maintenance	Full maintenance
4B	Seasonal wetlands with connectivity	-	% connectivity	Establish connectivity ASAP	Full maintenance	Full maintenance
4C	Habitat protection	Area of perennial aquatic habitat	ha	13200	15000	To be determined
		Area of seasonal aquatic habitat	„	30880	50000	To be determined
		Area of marine habitat	„	32300	50000	To be determined
4D	Harnessing of ecosystem services and goods	-	Expert judgment	Poor	Fair	Good
Goal 5: Develop effective institutions and equitable governance for in-country and transboundary water resources management						
5A	Rural people with adequate capacity for WRM	-	% of rural population	20	35	50
5C	Equitable share of water among users	-	Qualitative judgment	Poor	Fair	Good
5D	Adequate monitoring mechanism	-	Qualitative judgment	Poor	Fair	Good
5E	O&M budgeting	-	% of Delta Plan budget	5	25	25

No	Indicators	Sub-indicators	Unit	Parameters		
				2016	2030	2050
Goal 6: Achieve optimal and integrated use of land and water resources						
6A	Spatial zoning of integrated land and water uses	-	Qualitative judgment	Limited	Fair	Good
6B	Spatial standardization of drainage density	-	Qualitative judgment	None	Fair	Good
6C	Flood control, drainage and irrigation capacity	Area under irrigation schemes	Ha	672	800	To be determined
		Area under drainage schemes	"	878	1200	To be determined
		Area under drainage and irrigation schemes	"	434	800	To be determined
		Area under FCD schemes	"	1863	3000	To be determined
		Area under FCDI schemes	"	2209	3000	To be determined
		Area under coastal FCD schemes	"	1000	2000	To be determined
		Area under coastal FCDI schemes	"	28	40	To be determined
6D	Sectoral use of water	Surface water used for irrigation	Km3	6.62	12	To be determined
		Groundwater used for irrigation	"	24.88	24	To be determined
		Domestic water use	"	3.6	To be determined	To be determined
		Industrial water use	"	0.8	To be determined	To be determined
6E	Navigation capacity	Wet season navigation course	Km	5968	5968	To be determined
		Dry season navigation course	"	3865	4500	To be determined

Data Source: CEGIS 2015, CSIRO 2014, IWM 2015, BADC 2015

Notes:

- 1. Average flood:** The flood events that usually inundate the low-lying floodplain regions of the country and cause minimal damage to lives and property. In other words, it is the flood that we cannot live without.
- 2. Catastrophic flood:** This includes the one in 50 to one-in-100-year flood events that usually occur due to some unprecedented event, such as unusually high amounts of catchment precipitations coupled with superimposition of peak flows from more than one major river system, and generally leaves huge devastation at its wake and is associated with damage to life and property to a catastrophic degree.
- 3. Extreme Drought:** This entails a cumulative effect of meteorological, hydrological as well as agricultural droughts, the effects of which are more prominent in the northwestern regions of Bangladesh.
- 4. Storm surge-affected area:** This includes the polder area of the Coastal Zone.
- 5. Coastal Zone:** The Coastal Zone of Bangladesh was delineated as per the “Integrated Coastal Zone Management Project” (ICZMP) in 2005 with 19 coastal districts, a combined area that comprises approximately 30% of the total area of Bangladesh.
- 6. Dry Season Salinity:** This is the surface water salinity for the dry period (Jan-May).
- 7. Irrigation Water Efficiency:** This includes both surface and groundwater efficiency.
- 8. Urban Domestic Water Efficiency:** This includes groundwater supply.
- 9. Surface water sources polluted by other wastes:** This primarily includes domestic waste and solid waste dumping.



Asian Disaster Preparedness Center

SM Tower, 24th Floor, 979/66-70 Paholyothin Road,
Phayathai, Bangkok 10400 Thailand

Tel: +66 2 298 0681-92

Fax: +66 2 298 0012

Email: adpc@adpc.net

 www.adpc.net

 @ADPCnet

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