



Final Strategic Environmental Management Plan

Prepared for the
Strategic Environmental Assessment
of South West Region of Bangladesh for Conserving
the Outstanding Universal Value of the Sundarbans



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CEGIS
Center for Environmental and
Geographic Information Services

in association with

 **integra**
CONSULTING

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Suite of Linked Reports

This Strategic Environmental Management Plan is one report in a suite of reports arising from the SEA of SW region of Bangladesh for conserving the outstanding universal value of the Sundarbans. Earlier reports inform subsequent ones in a sequential manner, whilst later reports are back-referenced to early ones as regards specific details. The reports form an inter-linked suite. All earlier reports are available on the SEA website (www.seasw-sundarbansbd.org):

- Inception Report (March 2020);
- Mid-term Screening and Scoping Reports (September 2020)
- Prospectus (revised January 2021);
- Record of Stakeholder Consultations during August – November 2020 (January 2021);
- Final Screening Report (March 2021);
- Final Scoping Report (January 2021);
- Updated Record of Stakeholder Consultations during August 2020 - October 2021(November 2021);
- Updated Draft Final SEA Report (September 2021)
- Updated Draft Final SEMP (September 2021)
- Updated Draft Final SEMP (October 2021).

Authorship of Report

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Transparency Statement

This SEMP Report is intended as an open access document for sharing with all stakeholders, all those who have participated in the compilation process to date, and any other interested individuals or organisations. It is available to download at: www.seasw-sundarbansbd.org.

Revisions to Text of the SEMP

This final SEMP contains a range of revisions to the text of the Updated Draft Final SEMP (September 2021). The main changes include:

1. General edits throughout the text including correcting typographical errors, updates, clarifications, etc.
2. A new annex C listing written comments on the Updated Final Draft SEMP (September 2021) and the team's responses.

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Abbreviations and Acronyms

AM	Adaptive Management
AO	Administrative Officer
AOX	Adsorbable Organic Halides
BANBEIS	Bangladesh Bureau of Educational Information and Statistics
BBS	Bangladesh Bureau of Statistics
BCCT	Bangladesh Climate Change Trust
BEZA	Bangladesh Economic Zone Authority
BFD	Bangladesh Forest Department
BITAC	Bangladesh Industrial Technical Assistance Center
BIWTA	Bangladesh Inland Water Transport Authority
BLRI	Bangladesh Livestock Research Institute
BMET	Bureau of Manpower, Employment and Training
BOD	Biochemical Oxygen Demand
BPC	Bangladesh Parjatan Corporation
BPDB	Bangladesh Power Development Board
BR	Bangladesh Railway
BWDB	Bangladesh Water Development Board
CEGIS	Centre for Environmental and Geographic Information Services
CO ₂	Carbon dioxide
COD	Chemical Oxygen Demand
COVID-19	Coronavirus disease
DA	Data Analyst
DAE	Department of Agricultural Extension
DDM	Department of Disaster Management
DEO	Data Entry Operator
DGFood	Directorate General of Food
DGHS	Directorate General of Health Services
DLS	Department of Livestock Services
DoE	Department of Environment
DoF	Department of Fisheries

DPHE	Department of Public Health Engineering
DPSIR	Drivers, Pressures, State, Impact and Response model of Intervention
DSHE	Directorate of Secondary and Higher Education
DWA	Department of Women Affairs
ECA	Ecologically Critical Area
ECR	Environmental Conservation Rules (1997)
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESOs	Environmental and Social Objectives
GHG	Greenhouse Gas
GoB	Government of Bangladesh
HIC	High Income Country
IAS	Invasive Alien Species
ICTD	Information and Communication Technology Division
IEE	Initial Environmental Examination
KCC	Khulna City Corporation
KWASA	Khulna Water Supply and Sewerage Authority
LGED	Local Government Engineering Department
LID	Low Impact Development
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MoA	Ministry of Agriculture
MoCAT	Ministry of Civil Aviation and Tourism
MoDMR	Ministry of Disaster Management and Relief
MoEDU	Ministry of Education
MoEFCC	Ministry of Environment, Forest and Climate Change
MoFL	Ministry of Fisheries and Livestock
MoHFW	Ministry of Health and Family Welfare
MoHPW	Ministry of Housing and Public Works
MoI	Ministry of Industries
MoL	Ministry of Land

MoLGRDC	Minsitry of Local Government, Rural Development Cooperatives
MoP	Ministry of Planning
MoPA	Ministry of Public Administration
MoPEMR	Ministry of Power, Energy and Mineral Resources
MoR	Ministry of Railways
MoRTB	Ministry of Road Transport and Bridges
MoS	Ministry of Shipping
MoU	Memorandum of Understanding
MoWCA	Ministry of Women and Children Affairs
MoWR	Ministry of Water Resources
MPA	Mongla Port Authority
NGO	Non-Governmental Organization
NIPORT	National Institute of Population, Research and Training
NOSCOF	National Oil and Chemical Spill Contingency Plan
NO _x	Nitrogen Oxides
NRM	Natural Resources Management
OUV	Outstanding Universal Value
PM	Particulate Matter
PM _{2.5}	Particulate matter 2.5 micrometers or less in diameter
PMO	Prime Minister's Office
PPP	Policy, Plan, Programme
RAB	Rapid Action Battalion
RHD	Roads and Highways Department
RMMRU	Refugee and Migratory Movements Research Unit
RPTI	Regional Population Training Institute
SAC	SEMP Advisory Council
SAR	Synthetic Aperture Radar
SCU	SEMP Coordination Unit
SEA	Strategic Environmental Assessment
SEMP	Strategic Environmental Management Plan
SID	Statistics and Informatics Division
SMART	Spatial Monitoring and Reporting Tool

SO _x	Sulphur Oxides
SRDI	Soil Resource Development Institute
SRF	Sundarbans Reserve Forest
STD	Sexually Transmitted Disease
SUFAL	Sustainable Forests and Livelihoods
SW	South West
SWR	South West Region
TA	Technical Advisor
ToR	Terms of Reference
UDD	Urban Development Directorate
UNESCO	United Nations Educational, Scientific and Cultural Organization
WARPO	Water Resources Planning Organization
WHO	World Health Organization
WHS	World Heritage Site

Bengali Terms

Baor	Oxbow lake
Beel	A large wetland depression
Chatal	A low lying area with some permanent water – smaller than a beel
Chingri	Shrimp
Gher	Gher farming is a traditional agriculture system in Bangladesh. A pond is dug into a rice field to use for fish farming, with the dugout soil used to create dykes around the pond for growing vegetables.
Haor	A bowl- or saucer-shaped shallow wetland depression. During monsoon, haors receive surface runoff water from rivers and canals to become vast stretches of turbulent water. They turn into a vast inland seas within which the villages appear as islands.
Jalmahal	Physically defined state-owned water bodies for which the fishing rights are auctioned out by government
Khas	Government-owned fallow land
Upazila	Sub-district

Executive Summary

This Strategic Environmental Management Plan (SEMP) is based on the results of Strategic Environmental Assessment (SEA) of the SW region of Bangladesh for conserving the outstanding universal value of the Sundarbans conducted during January 2020 and November 2021. The SEMP and the SEA report are critically linked documents. Both also refer to detailed baseline materials and analyses contained earlier reports produced during the SEA process: Inception Report (March 2020); Prospectus (revised January 2021); Updated Record of Stakeholder Consultations during August 2020 -October 2021(November 2021); Final Screening Report (March 2021); and Final Scoping Report (January 2021).

The Sundarbans contains the world's largest area of natural mangrove forests. The area has both local, regional and global significance due to its diversity, uniqueness, biological productivity and rich ecosystems, with a number of rare or endangered species, including tigers, aquatic mammals, birds and reptiles. Its habitats provide essential ecological services such as nursery grounds for many fish species, and coastal erosion protection against storms, tidal surges and cyclones. In 1997, 23% of the Sundarbans Reserved Forest (Bangladesh) has been designated by UNESCO as World Heritage Sites.

But, recently, concerns have been raised about the potential impacts on the Sundarbans of existing and planned developments in the South West (SW) region of Bangladesh. In this regard, UNESCO suggested to the Government of Bangladesh (GoB) to undertake a Strategic Environmental Assessment (SEA) to assess the impacts of development at a landscape and regional scale to help Bangladesh uphold the outstanding universal value (OUV) of the Sundarbans. The overall aim is to ensure the sustainable development of the SW region whilst also ensuring the conservation of the Sundarbans.

One of the key objectives of the SEA was the formulation of a ***Strategic Environmental Management Plan (SEMP)*** for the SW region to support decision-making and monitoring of the implementation of policies, plans and programmes (PPPs) that are likely to affect the region, particularly the Sundarbans. This SEMP provides an ***over-arching framework*** for addressing the cumulative impacts of implementing the suite of PPPs for key sectors in the SW region over the next 20 years, and the existing and potential developments associated with them. The SEA focused at a meta level and has addressed 89 PPPs relevant to development in the SW region. The SEMP is similarly focused at a meta level and has been informed by what can realistically be undertaken and achieved.

The overall picture from the SEA is that there will be progressively more positive impacts and more beneficial outcomes if mitigation options are fully implemented; but progressively more risks and negative environmental and socio-economic impacts if they are not. The SEMP is a key instrument to guide the enhancement of benefits and promote synergies, and to avoid or mitigate negative outcomes and counteract antagonisms.

This SEMP sets out what needs to be done, who needs to do it, when and how, and indicates associated requirements (resources – financial, manpower, equipment). It also proposes a coordination mechanism for overseeing its implementation. The management actions detailed in this SEMP, and the indicators chosen for ongoing monitoring, are the best current options. It is anticipated that the SEMP will be refined and updated over time, based on the lessons learnt and changing circumstances during the process of implementation (2021 – 2041).

The organisation of this SEMP follows a standard, commonly used framework. It aims to guide future planning, management decisions and monitoring in the SW region as regards environmental, social and linked economic concerns. It was compiled through team meetings and consultation workshops with a SEMP Liaison Group comprising representatives of key government ministries that are likely to be responsible for its implementation. This aimed to ensure that the recommendations are realistic, practical and implementable, and that the main implementing parties are already aware of what is expected of them so that they can plan and budget for the necessary management actions to be taken.

However, the development of the SEA/SEMP faced unique challenges: knowledge of SEA/SEMP is in its infancy in the country, some important data are lacking or scarce, and the COVID-19 situation limited physical engagement with stakeholders. During the first phase of implementing the SEMP, more one-on-one consultations will be required with key persons in the institutions that have the sector mandates to undertake the various actions required for the operationalization of the SEMP. These consultations will help to fine-tune institutional arrangements, management, monitoring, data capture and reporting protocols. Thus, it is expected that the SEMP will be further refined in the future, based on the lessons learnt during its implementation, improvements in management and monitoring technology, and new insights gained from experience. Whilst this is normal and expected, the foundations laid by this first iteration should provide a solid platform for future versions.

As set out and elaborated in more detail in this document, there are **six categories** of responses required for the implementation of the SEMP. These are:

1. Establishing an appropriate institutional arrangement for managing the SEMP, inclusive of developing conducive working relationships with implementing and supporting sector agencies, mostly within government, but also with civil society, academia and the private sector. It is recommended that the Prime Minister's Office (PMO) would have overall responsibility for implementing the SEMP, through a close partnership between key sector agencies. The PMO should establish a SEMP Advisory Council (SAC) Chaired by Principal Secretary, PMO with Secretaries of 13 sectoral ministries, Executive Chairman, BEZA and at least three independent individuals (e.g. one each from civil society, the private sector and academia including at least one female member). The Secretary of SEMP Coordinating Unit (SCU) will act as Member Secretary of the SAC. A SEMP Secretariat will be established in the SCU. The SAC should establish a SEMP Coordinating Unit (SCU) and headed by the Secretary PMO.
2. Adjusting existing policies so that they are either (a) better able to respond to the needs of delivering progress towards achieving the goals of the Second Perspective Plan or (b) better aligned with each other – i.e. removing inter-sector contradictions and improving synergies.
3. Diligent application of existing social and environmental safeguards (e.g. EIA and EMP) using existing legal and regulatory frameworks, and perhaps improving these over time.
4. Monitoring of indicators – these are listed in Annex B of the SEMP. As noted in the SEMP and SEA report, data for many of the indicators are already being collected by various institutions for existing purposes. However, in some cases, there will be a need for “new” monitoring or management actions – things that have not previously done but which are regarded as important enough to institute a new management or monitoring activity.
5. Linked to response No. 5, is the need for undertaking new studies for issues regarded as important, but where information is lacking.
6. Suggested/advice actions for the improved management of the Sundarbans.

Chapter 1: Introduction

1.1 Background

Bangladesh aims to achieve high income country (HIC) status by 2041 – an objective set out in the Second Perspectives Plan (2021-2041). In contributing to achieving this goal, the SW region has significant prospects for development. The government is committed to ensuring that such development is sustainable and will not adversely affect the Outstanding Universal Value (OUV) of the Sundarbans.

The SW region (Figure 1.1) is one of the hydrological regions of Bangladesh. It is largely under tidal influence and dependent on sweet water supplies from upstream, many parts having a unique brackish water ecosystem. The region has vast low-lying areas enclosed by man-made polders. It is highly vulnerable to natural disasters including cyclones, storm surges and excessive flooding due to abnormally high rainfall. Such challenges are expected to be exacerbated by climate change impacts.

The Sundarbans contains the world's largest area of natural mangrove forests. The area has both local and global significance due to its diversity, uniqueness, biological productivity and rich ecosystems, with a number of rare or endangered species, including tigers, aquatic mammals, birds and reptiles. The area provides essential ecological services such as nursery grounds for many fish species, and coastal erosion protection against storms, tidal surges and cyclones, including livelihood opportunities for the local communities.

23% of the Sundarbans Reserved Forest have been designated by UNESCO as World Heritage Sites. But, recently, concerns have been raised about the potential impacts on the Sundarbans World Heritage Sites (the property) of existing and planned developments in the SWR. In this regard, UNESCO suggested to the Government of Bangladesh (GoB) to undertake a Strategic Environmental Assessment (SEA) to assess the impacts of development at a landscape and regional scale to help Bangladesh uphold the OUV of the property. The overall aim is to ensure the sustainable development of the SWR whilst also ensuring the conservation of the Sundarbans including the OUV of the property.

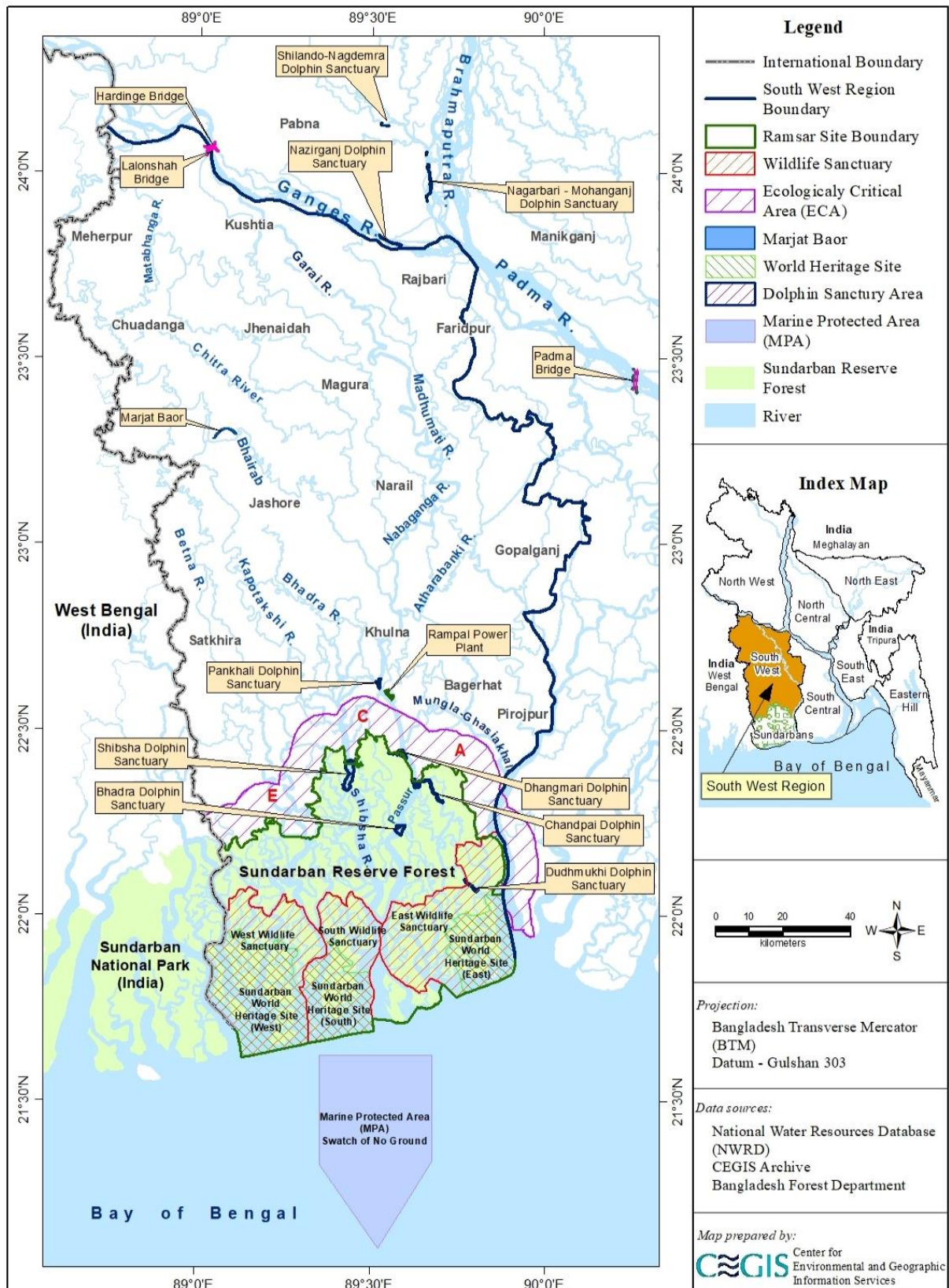


Figure 1.1: The SEA area of focus, World Heritage Sites and protected areas

The specific objectives of the SEA as set out in the Revised Terms of Reference were:

- Consideration of **environmental and socio-economic consequences** of existing policies, plans and programmes (PPPs) (national and SW region) and promoting that these issues be addressed when formulating and implementing future, as well as existing, PPPs with a view to promoting sustainable development in the region and conservation of the Sundarbans and its Outstanding Universal Value (OUV);
- Simultaneous assessment of the impacts of development initiatives on existing bio-physical settings and socio-economic conditions to facilitate informed decision-making regarding transitioning towards a sustainable, resilient and resource efficient economy;
- Identification of key stakeholders relevant to selected sectors and organizing consultation meetings to obtain knowledge on existing bio-physical settings and socio-economic conditions, impacts of current and proposed developments, and potential strategies for future development of the SWR;
- Development of alternative strategies to minimize the direct/indirect, domestic/transboundary and cumulative impacts of development on the Sundarbans and more widely in the SWR;
- Make recommendations to improve environmental performance management in both the public and private sectors as regards future development activities;
- Formulation of a comprehensive framework in the form of a Strategic Environmental Management Plan (SEMP) for the SW region to support decision making and monitoring of the implementation of policies, plans and programs that are likely to affect the environment and socio-economic conditions of the region and in particular the Sundarbans.

Thus, the SEA process has resulted in two companion final reports: (a) the Final SEA Report; and (b) the Final Strategic Environmental Management Plan (SEMP).

This document is the Final SEM

1.2 Role and Purpose of the SEM

As noted in the SEA, there is a risk of negative direct, indirect and cumulative impacts from developments over the next twenty years in the SW region – if appropriate and adequate mitigatory measures are not taken. These impacts will arise from developments within the nine key sectors and as a result of interactions between them.

This SEM is an over-arching framework for addressing the cumulative impacts of implementing the suite of PPPs for key sectors in the SWR and the existing and potential developments associated with them. The SEA has focused at a meta level and has addressed 89 PPPs relevant to development in the SWR. This means that the SEM must be similarly focused at a meta level and be informed by what can realistically be achieved.

The overall picture from the SEA is that the medium and high growth scenarios will flow seamlessly from one to the other as government policy under the Second Perspectives Plan (2021-2041) progressively unfolds. Along this trajectory, there will be progressively more positive impacts and more beneficial

outcomes if certain mitigation assumptions¹ are fully met; but progressively more risks and negative environmental and socio-economic impacts if those assumptions are not met. For both situations, the SEMP is a key instrument to guide the enhancement of benefits and promote synergies, and to avoid or mitigate negative outcomes and counteract antagonisms. Similarly, for the possibility (even if remote) that low growth will ensue, the SEMP can play a similar guidance role.

The assessment of the three growth scenarios fulfilled the function of a 'learning step' for the main assessment, prompting necessary refinements to the scenario narratives and adjustments to some of the objectives and indicators, so that all became more fully integrated. This step paved the way to the next phase of the assessment work which involved a deeper and more detailed assessment – on a sector-by-sector basis – of the developments that can be expected under the high growth scenario. This enabled the team to focus the SEMP on critical issues and identify the required roles and responsibilities of relevant institutions/agencies. In addition, it revealed where adjustments to existing PPPs might be appropriate – to prevent unwanted or avoidable negative impacts and particularly to enhance positive outcomes and build synergies between PPPs to deliver added benefits.

This SEMP sets out what needs to be done, who needs to do it, when, how, and associated requirements (resources – financial, manpower, equipment). It also proposes a coordination mechanism for overseeing its implementation. The management actions detailed in this SEMP, and the indicators chosen for ongoing monitoring, were the best selection at the time this SEMP was compiled. It is anticipated that the SEMP will be refined and updated over time, based on the lessons learnt during the process of implementation.

¹*Mitigation assumptions:* existing environmental and social safeguard policies, regulations and guidelines are fully and effectively implemented and enforced; the government implements effective measures to avoid, mitigate, minimise, restore or offset potential impacts of development, and ensures the use of clean and sustainable technologies, at least for new developments.

Chapter 2: SEA Findings

The SEA considered three alternative growth scenarios (high, medium and low) over the next 20 years – as influenced by a range of interacting driving forces and recognising a number of uncertainties, e.g. climate and water variability, future pandemics, commodity prices, and the nature of governance: Specialist reports, expert input and technical consultations culminated in a summary of baseline conditions and key environmental and socio-economic issues in the SW region (Table 2.1). These included transboundary issues.

Table 2.1: List of priority environment, social and economic issues

Issues	Comments
Environmental Issues	
Pollution and waste (solid and liquid): <ul style="list-style-type: none"> • Surface water pollution. Brackish and sea water • Groundwater pollution • Air pollution • Soil pollution • Oil • Waste treatment and disposal • Plastics 	Pollution & waste management is a major concern for the ecological integrity of the SWR of Bangladesh and the Sundarbans due to different developmental initiatives.
Water flow dynamics in rivers	Reduction of water flow in rivers of SWR may change the region's environmental and economic sustainability/integrity as well as livelihood patterns and crop production
Sedimentation and siltation (fluvial and tidal), dredging and disposal	Sedimentation and siltation management is a challenge to maintain river flows. Dredging (e.g. to restore river flows and river transportation, to facilitate the expansion of the Mongla Port, and of channels in and around the Sundarbans) may impact on benthic biodiversity and disposed dredged materials can affect the regeneration of trees & survival of existing forests as well as benthic aquatic biodiversity.
Salinity: <ul style="list-style-type: none"> • Groundwater • Soil 	Due to reduced flow of upstream fresh water and channel sedimentation/siltation, and resultant sea water intrusion/inundation, soil and groundwater salinity has increased and soil productivity has decreased as well as livelihood diversity
Noise	<ul style="list-style-type: none"> • Exposure to excessive noise, particularly in urban and industrial areas and from vehicles, can cause health problems. • Noise from the regular movement of ships (notably along major rivers of Sundarbans) can disrupt wildlife movement, cause localisation (fragmentation) of populations and result in inbreeding. • Underwater noise can have impacts on aquatic fauna. • Future expansion of urban areas, industries and transport networks could enhance noise related problems in the region.
Habitat isolation	Several large tracts of the Sundarbans are separated by wide rivers which tigers and other fauna tend not to cross. This may lead to genetic isolation. Increased numbers of vessels passing along the navigable channels, the noise they cause and use of lights at night may also disrupt the dispersal of fauna. These factors tend to disturb animal

Issues	Comments
	behaviour (eg feeding, breeding) and may lead to genetic isolation and also threaten effective biodiversity conservation.
Loss of biodiversity	Some environmental as well as regional & local activities may affect biodiversity (particularly in the Sundarbans), with loss of keystone species and their prey base due to poaching and habitat degradation as a result of anthropogenic activities. Biodiversity losses may also occur due to climate change and natural dynamic changes in the ecosystem
Invasive alien species (IAS)	Water hyacinth has become a major problem, clogging baors and ponds, and some water channels. <i>Prosopis juliflora</i> is also spreading on embankments. At present, there are no major issues with IAS within the Sundarbans. However, forest managers are concerned about their potential future spread and impacts.
River bank erosion	<ul style="list-style-type: none"> • River bank erosion is a particular concern in the Sundarbans due to river flow dynamics and changing river courses. It is linked to the formation of new islands and river bed siltation due to reduced freshwater flow. • Bank erosion also occurs due to bow-waves from the increased numbers of fast-moving ships and due to river bed siltation, formation of new islands and changed river courses, as well as increasing sea water inflow in SWR.
Climate change:	
Sea level rise	<ul style="list-style-type: none"> • Sea level rise is a global threat that will impact on the region.
Salt water intrusion	<ul style="list-style-type: none"> • Many factors have reduced river flow in the region, decreasing flushing time, with increased periods of saltwater exposure.
Erratic rainfall & distribution	<ul style="list-style-type: none"> • Shifting of monsoon with erratic rainfall has impacted on the cropping season and pattern
Increased average temperatures	<ul style="list-style-type: none"> • Climate models predict a significant temperature increase in the future.
Cyclones & storm surges	<ul style="list-style-type: none"> • Cyclones making landfall have an impact on lives and livelihoods and cause damage). Cyclone intensity is predicted to rise in the future.
Greenhouse gas emissions	<ul style="list-style-type: none"> • Rapid industrialisation and urbanisation is likely to lead to increased carbon dioxide emissions from power and energy sector (including transport). Expansion of flood-irrigated paddy rice has increased methane emissions. • Peat is extracted from areas around Gopalganj and Khulna are used as fuel which may increase GHG emissions
Flooding and waterlogging: <ul style="list-style-type: none"> • Freshwater floods (due to rain) upstream • Tidal • Poor drainage infrastructure and management 	<ul style="list-style-type: none"> • Exceptional freshwater flooding and waterlogging may occur due to heavy rain in the upstream/catchment areas of SWR, lack of drainage infrastructure and high tidal flow, as well as because of changing river flow dynamics and river siltation. • Due to lack of periodic maintenance and management, parts of the polder system have become waterlogged in Khulna and Satkhira Districts.
Industrialisation: <ul style="list-style-type: none"> • Power generation – oil, gas, coal • Pipelines • Petroleum 	Industrialization of the inland parts of SWR can create air & water pollution as well as other potential impacts on biodiversity & livelihoods of the region.

Issues	Comments
<ul style="list-style-type: none"> • Cement production • Brick production • Special economic zones 	
Urbanisation	Rapid urbanization in the 14 districts of SWR as well as in the environmentally critical area around the Sundarbans can affect the extent of air & water pollution and agricultural productivity etc.
Land use changes	Land use changes in areas north of the Sundarbans are arising due to population & economic growth of SWR, e.g. shrimp cultivation, infrastructures & urbanization, etc. Impacts of this include loss of biodiversity, reduced soil productivity and loss of livelihood opportunities
Conservation of protected areas	<ul style="list-style-type: none"> • Many highly sensitive & important biodiversity areas have been declared by law as protected areas. However, laws are not always strictly enforced and people lack adequate knowledge and awareness about the need for nature conservation in such areas.
Socio-economic issue	
Livelihoods:	
Conflicts between economic sectors	<ul style="list-style-type: none"> • Salinity intrusion causes conflicts, e.g.: shrimp cultivators vs crop producers; powerful/rich land controller's vs the powerless, smallholder and marginalized people, etc.
Access to resources (e.g. in Sundarbans)	<ul style="list-style-type: none"> • Access by forest-dependent people to forest resources (to support their livelihood options) is limited so as to prevent exploitation and to maintain a sustainable flow of resources – as prescribed in the Sundarbans Management Plan.
Salinity	<ul style="list-style-type: none"> • Causes health problems (e.g. skin conditions), reduces drinking water quality – impairing people's ability to work, and affects crop production, etc.
Out-migration	Out-migration (mainly poor people) is common in SWR, especially from coastal areas. Much is driven by disasters, indebtedness, dispossession/land grabbing, lack of livelihood options, etc. Poor people move to unhealthy urban slums and become further marginalised in an uneven job market. Some educated people move to urban areas /overseas for employment. Migrant remittances can supplement family incomes and contribute to the national economy.
Health & sanitation:	
Water-borne, respiratory & salinity-related diseases	Local people, especially children and elderly people, are particularly susceptible to water-borne, respiratory and salinity-related skin diseases
Diet	<ul style="list-style-type: none"> • Poor diet causes malnutrition.
Pollution from cooking and open burning	<ul style="list-style-type: none"> • Can have serious health impacts and air pollution.
Negative health impacts of indoor air pollution (mainly pollution by particulate matter and polycyclic aromatic hydrocarbons)	<ul style="list-style-type: none"> • Rural people still dominantly cook using fuelwood which, if indoors, can cause air pollution and can have serious health impacts.
Inadequate health facilities and access	<ul style="list-style-type: none"> • Health service providers are based in city/urban and peri-urban and rural areas. There are community clinics and some alternative medical treatment facilities in both urban and rural areas, i.e.

Issues	Comments
	<p>homeopathic, unani-ayurvedic. However, the specialized hospitals are located mostly in urban areas cannot be easily accessed by those requiring emergency treatment living in remote areas, due to poor communication networks.</p> <ul style="list-style-type: none"> Water supply and sanitation facilities in urban and semi urban areas (e.g. public toilets in public places and local markets) are either inadequate or in a poor condition.
Arsenic contamination of water, and possibly of irrigated rice	<ul style="list-style-type: none"> Arsenic contamination of drinking water is a serious issue in parts of the SW region. There is some evidence from a 2003 study of elevated levels of arsenic in paddy soils irrigated with groundwater in the north of the SW region, but no known subsequent published evidence. Research is needed to determine the situation and whether rice from such areas is contaminated to levels which would pose a health problem.
Gender-related issues	<p>Women face socio-political exclusion in decision-making processes - both in the home and society. They also bear a heavy burden for collecting potable water, fuelwood (from the Sundarbans and adjacent areas), etc. Women are often vulnerable while travelling alone to/from remote areas.</p>
Education:	
Dropout and poor attendance	<ul style="list-style-type: none"> Males from poor households need to support family income, resulting in high drop-out and/or lower attendance at school.
Low environmental awareness	<ul style="list-style-type: none"> Drop-out of students from poor households, particularly from secondary schools, is a significant problem. This can be due to: Poor transport network and low income in rural areas which often discourages/hinders school attendance. Early marriage, especially for women. The above problems result in low levels of environmental awareness
Loss of traditional knowledge	<p>Technological advancement & other development activities may be causing loss of traditional knowledge.</p>
Loss of cultural and natural heritage	<p>Due mainly to lack of proper maintenance & negligence of cultural sites due to low revenue return and inadequate budget allocation.</p>
Tourism	<p>There is concern regarding pollution and noise from tourism activities in and around Sundarbans area – noise is particularly disruptive to animal. If not properly and effectively managed, tourism could cause increasing problems, particularly as the sector grows</p>
Illegal activities: <ul style="list-style-type: none"> Poaching and hunting Poison fishing Illegal tree cutting Trafficking of wildlife products Corruption 	<p>These issues are of major concern in the Sundarbans, causing loss of habitat and biodiversity (terrestrial & aquatic) & economic loss for communities.</p>
Institutional issues	<p>Inadequate manpower, capacity development & logistics are major institutional issues – impeding environmental management and protection of the Sundarbans.</p>

The SEA provided a comparative picture of the likely combined impacts of overall development across all sectors in the SW region over the next 20 years under each scenario - reflected in terms of whether they will enhance or impede achieving objectives to address the key environmental and socio-economic issues. The scenarios were assessed against two situations (Table 2.2):

- various assumptions² being met (**'mitigated' outcome - M**), i.e. existing environmental and social safeguard policies, regulations and guidelines are fully and effectively implemented and enforced, and the government implements effective measures to avoid, mitigate, minimise, restore or offset potential impacts of development, and ensures the use of clean and sustainable technologies – thus enhancing realizing the environmental and socio-economic objectives.
- the assumptions are not met (**'risk' outcome - R**).

Table 2.2: Outcomes of scenario assessments compared

Scenario	Risk outcome (R)	Mitigated outcome (M)
High growth	<ul style="list-style-type: none"> • Mainly very negative environmental impacts – severely impeding realising the environmental objectives. • Rather than delivering anticipated socio-economic benefits, high growth would instead result in either no change in achieving about a third of the listed socio-economic objectives or in slightly to very negative effects which would significantly impede achieving two thirds of the socio-economic objectives. • The implication of this outcome would be that many of the current environmental and socio-economic challenges would continue or become worse. 	<ul style="list-style-type: none"> • Mainly significantly positive effect on achieving the majority of the environmental objectives, with <i>some very positive, slightly and moderately positive</i> effects on achieving a few of the objectives • Very and significantly positive effects on enhancing achieving socio-economic objectives
Medium growth	<ul style="list-style-type: none"> • Mainly moderately and very negative effects on achieving the environmental objectives. • Rather than delivering anticipated socio-economic benefits, medium growth would instead result in either no change in achieving about a third of the listed socio-economic objectives or in a slightly to moderately negative effect on achieving the other socio-economic objectives 	<ul style="list-style-type: none"> • Dominantly moderately positive environmental effects on achieving environmental objectives • Dominantly moderately positive effects on achieving two thirds of the socio-economic objectives, with either slightly or very positive effects for the remaining socio-economic objectives.
Low growth	<ul style="list-style-type: none"> • Dominantly very and significantly negative effects on achieving environmental objectives • Moderately negative effects on achieving two thirds of the socio-economic objectives; with either slightly or very negative effects on achieving the remaining socio-economic objectives 	<ul style="list-style-type: none"> • Dominantly neutral effects on achieving environmental objectives, with some slightly positive and slightly negative effects. • Slightly positive effects on achieving half of the socio-economic objectives, and no change as regards achieving the other half of the socio-economic objectives

² Existing environmental and social safeguard policies, regulations and guidelines are fully and effectively implemented and enforced, and the government implements effective measures to avoid, mitigate, minimise, restore or offset potential impacts of development, and ensures the use of clean and sustainable technologies – thus enhancing realizing the environmental and socio-economic objectives.

The overall picture is that the medium and high growth scenarios will flow seamlessly from one to the other as government policy under the Second Perspectives Plan (2021-2041) progressively unfolds. Along this trajectory, there will be progressively more positive impacts and more beneficial outcomes if the 'M' (mitigated) column assumptions are fully met; but progressively more risks and negative environmental and socio-economic impacts if those assumptions are not met.

The SEA's deeper assessment focused on the high growth scenario, examining nine key sectors: industry, transport³, urban, power and energy, forestry, fisheries, water, tourism and agriculture. They follow the same procedure used for the initial assessment. The results were assimilated into a combined analysis to indicate cumulative impacts.

The SEA concluded that high growth can result in *positive benefits* under all of the key sectors through enhancing achievement of the objectives for the key environmental and socio-economic issues that face the SW region. However, this is dependent on the above mentioned assumptions being met.

The SEA concluded that pollution of air (particularly particulate matter) and water presents a risk to the overall SW region, particularly the human population. There are also risks for fauna, flora, habitats and ecosystem functioning within the Sundarbans which needs to be investigated by research. The risk is more significant for the northern part of Sundarbans in the Mongla area which is expected to be influenced by the economic development in and around Mongla. This risk should be reduced by implementation of compensation measures – particularly to reduce emissions of air pollutants and discharges of water pollutants. Many PPPs include compensation measures (i.e. to reduce emissions of air pollutants and treat discharges of water pollutants) which should be implemented in a timely and efficient manner.

The use of linkage diagrams underlined the importance of ensuring that the SEMP is pursued with determination and commitment across government; and is fully and effectively implemented – in order to avoid, minimise or mitigate cumulative negative impacts. Indeed, investing in the SEMP will mean avoiding the economic costs of the risks involved – which are highly likely to be significantly greater than the costs of implementing the SEMP itself. In other words, implementing the SEMP will be a good investment.

Overall, the SEA concluded that the future threats to the Sundarbans can be managed provided that:

- the SEMP is effectively implemented;
- the Sundarbans Management Plan is updated appropriately to reflect the findings and recommendations of the SEA and the SEMP;
- effective liaison and cooperation is established (perhaps through a national level committee) between the Forest Department and other agencies that have activities that impact on the Sundarbans – particularly from shipping, dredging, fishing tourism and also all illegal activities to ensure that required coordination, management and mitigatory actions are taken.

³Includes transport by road, rail, water (including shipping, tourist and fishing boats) and air. These modes are assessed together as they are part of an integrated system with distinct links between them.

Chapter 3: Methodology

This organisation of this SEMP follows a standard framework commonly used for SEMP. As noted earlier, it is a framework that aims to guide future planning, management decisions and monitoring in the SW region as regards environmental, social and linked economic concerns. It was compiled through team meetings and consultation workshops (video conference-based due to COVID restrictions) with a SEMP Liaison Group comprising representatives of key government ministries that are likely to be responsible for SEMP implementation (Table 3.1). This aimed to ensure that the recommendations are realistic, practical and implementable, and that the main implementing parties are already aware of what is expected of them so that they can plan and budget for the necessary management actions to be taken.

Table 3.1: Members of SEMP Liaison Group

Name & Designation	Ministry/Department	Email
Ahmed Shamim Al Razi Additional Secretary (Development) Chairman-PMC	MoEFCC	shamim5731@gmail.com
Begum Lubna Yasmin Deputy Chief	Ministry of Civil Aviation & Tourism (MOCAT)	yasmin_lubna@yahoo.co.uk
Mr. Quazi Fazlul Hoque Senior Planner	Urban Development Directorate	fhaq321@yahoo.com
Dr. Fahmida Khanom	Director, NRM Department of Environment	fkhanom71@gmail.com
Captain Abdul Wadud Member (Harbor & Marine)	Mongla Port Authority	mhm@mpa.gov.bd
Md. Mahmud Hasan Deputy Secretary	Ministry of Water Resources	emahmud22@gmail.com dev4mowr@gmail.com
Mr. Nirod Chandra Mondal Deputy Secretary	Power Division	nirodmondal71@gmail.com
Mr. Muhammed Azizur Rahman Deputy Secretary	Ministry of Road Transport & Bridges	mazizrhmn@gmail.com
Mr. Hasan Ahmmmed Chowdhury Director, Finance & Planning	Department of Fisheries	hasanahmmmed2013@gmail.com

The SEA team (international and local consultants) engaged with the SEMP Liaison Group on a regular basis during April and May 2021 and jointly prepared the SEMP.

The SEA process and development of the SEMP faced unique challenges: knowledge of SEA/SEMP is in its infancy in the country, some important data are lacking or scarce, and the COVID situation limited physical engagement with stakeholders. Fortunately, the SEA team included a range of highly knowledgeable local experts who were able to make critical technical inputs. The team combined their knowledge and expertise to verify the appropriateness of assumptions, cross-referenced data sources and provided reality-checks on the contents of the SEMP. Finally, one-on-one consultations were and will continue to be held with key persons in the institutions that have the sector mandates to undertake the various actions required for the operationalization of the SEMP.

It is expected that the SEMP will be further refined in the future, based on the lessons learnt during its implementation, improvements in management and monitoring technology, and new insights gained from experience. Whilst this is normal and expected, the foundations laid by this first iteration should provide a solid platform for future versions.

Chapter 4: Implementing the SEMP

Six categories of responses will be required to implement the SEMP:

1. Establishing an appropriate institutional arrangement for managing the SEMP, inclusive of developing conducive working relationships with implementing and supporting sector agencies, mostly within government, but also with NGOs, academia and the private sector (See section 4.1).
2. Adjusting existing policies so that they are either (a) better able to respond to the needs of delivering progress towards achieving the goals of the Second Perspectives Plan and (b) better aligned with each other – i.e. removing inter-sector contradictions and improving synergies. Annex-6 of the SEA offers a comprehensive analysis of PPPs and legal instruments and recommendations for adjustments. This is not repeated in the SEMP.
3. Diligent application of existing social and environmental safeguards (e.g. EIA and EMP) using existing legal and regulatory frameworks, and perhaps improving these over time. Section 4.2 provides guidance for how the SEA can cascade down to project-level for effective monitoring.
4. Monitoring of indicators – these are listed in Annex B of the SEMP. As noted in the SEMP and SEA report, data for many of the indicators are already being collected by various institutions for existing purposes. However, in some cases, there is a need for “new” monitoring or management actions required – things that have not previously been done but which are regarded as important enough to institute a new management or monitoring activity (see Chapter 5).
5. Linked to response No. 4 is the need to undertake new studies for issues regarded as important but where information is lacking. The recommended studies are⁴:
 - a. extent and severity of water hyacinth infestations in the SW region,
 - b. extent and severity of arsenic contamination of irrigated paddy soils and paddy rice,
 - c. Stock assessment of mud crabs in the Sundarbans Reserve Forests (SRF)
 - d. extent and severity of underwater noise from ships and boats in the main and peripheral rivers of the Sundarbans Reserved Forest and in sensitive areas (e.g. dolphin sanctuaries)
 - e. various surface noise baseline reports and air pollution maps, and
 - f. conflicts over land use.
6. Suggested actions for the improved management of the Sundarbans Reserve Forest (See 4.4).

4.1 SEMP institutional arrangements

The SEA and SEMP are multi-sectoral and address an interacting mix of environmental, social and economic issues that cut across multiple ministries. So, it is critical that the SEMP is driven from a central authority in order to ensure effective inter sector cooperation in its implementation. Therefore, it is recommended that the Prime Minister’s Office (PMO) should have overall responsibility for implementing the SEMP, through a close partnership between key sector agencies. The organogram (Figure 1) shows the proposed organizational structure for implementing the SEMP.

The PMO should establish a SEMP Advisory Council (SAC) Chaired by Principal Secretary, PMO with membership as described in section 3. The Secretary of the SEMP Coordinating Unit (SCU) will act as Member Secretary of the SAC. The Principal Secretary of the PMO should appoint a SEMP Coordinating Unit

⁴See section 4.3 for elaboration

(SCU) to be headed by a Secretary within the PMO who should undertake this responsibility in addition to his/her regular duties.

Apart from its Head, the SCU will require four full-time staff members including a SEMP Technical Advisor (TA), Administrative Officer (AO), Data Analyst (DA) and a Data Entry Operator (DEO). These staff members could either be seconded from within government or hired from outside of government, but they should be engaged full time solely for this SCU responsibility. The SCU will need to be provided with necessary logistics, equipment and an operating budget within the PMO. The TA, assisted by his/her team, should be responsible for all day-to-day functions of the SCU as well as reporting.

The SCU should be responsible for managing all SEMP monitoring, communication and reporting activities as well as logistical arrangements, and it should report to the SAC. In effect, the SCU should be the SEMP “engine room”.

The functions of the SCU should be to:

- Establish and maintain procedural arrangements to ensure that the SEMP monitoring system runs effectively and that data collected from year to year are replicable, comparable and auditable. This should include:
 - regular liaison with focal persons in all SEMP implementing agencies to ensure that their monitoring responsibilities are established and undertaken (as required);
 - Collating all monitoring data gathered by different organizations/ departments (as specified in the SEMP). The SCU might use published data from BBS and other sources as well.
- Maintain/organize continuous dialogue and interaction (including through consultations and workshops as needed) as required with all implementing agencies;
- Evaluate and interpret submitted monitoring data along with the submitting agency and request necessary clarification/corrections, if required;
- Submit interpretative summary reports along with advice or recommendations;
- Develop and maintain an interactive SEMP website where all relevant reports and documents would be made available (the existing SEA website could be used as a starting platform);
- Liaise with the mass media if required;
- Identify needs to implement awareness-raising programmes on the SEMP targeted at implementing agencies, stakeholders, the public and private sector. This should cover: the needs and role of the SEMP (e.g. how it operates), key environmental and socio-economic issues that are being addressed, and how stakeholders can engage and provide inputs;
- Be responsible for arranging (and acting as Secretariat for) SCU bi-monthly meetings with all respective focal points of ministries and organisations including the three independent members.

To facilitate its proper and efficient functioning, it will be important to gazette the establishment of the SCU and the SAC so that its existence is understood to be “official” and not just an administrative “add-on” to existing structures. It is proposed that the mechanism for the gazetting be elaborated by the PMO, either before the SCU is inaugurated or within the first quarter of its first year of operation – since year 1, involves many critical tasks that will finalise aspects of the SEMP and establish its functioning. It is expected that this first year will focus on fine-tuning procedures, protocols, administrative details, institutional coordination, operational budgets, etc.

4.2 SEMP report

The SCU should prepare a SEMP annual report⁵ (see Box 1). The report will be compiled by the SCU-TA, supported by the SCU-AO, data analyst and data entry operator, and scrutinised and approved by the Head of the SCU. It should then be reviewed and approved by the **SEMP Advisory Council (SAC)**: distributed to all relevant government agencies/ministries and other stakeholders, and be made publicly available on the SEMP website.

Whilst it is currently envisaged that the SEMP Report will be annual, the SCU and SAC might decide to extend the intervals between reports (e.g. 2 or 3 years) if experience indicates that an annual report is unrealistically frequent. However, even if it is decided to extend the frequency of producing a formal SEMP report, annual (or more frequent) data sets should still be uploaded onto the website on a rolling basis along with interpretative analyses/reports on particular trends. The website could have a section called “incoming data” or “updated data”, so that interested persons don’t have to wait for a year or multiple years before being able to access data and interim reports.

Box 1: Recommended table of contents for the SEMP report

Title and period: e.g.

- SW Region SEMP Report, year (depending on the regularity that is agreed upon)
- Compiled by (Name) and date completed

Inside page

- Address of SCU
- Citation (e.g. SW Region SEMP Report, year. Published by the GoB)
- Disclaimers (if any)
- Place where copies of the report may be obtained (e.g. SEMP website)

Executive summary (<5 pages, includes key findings, conclusions and recommendations)

Acknowledgements

- Co-authors, focal points;
- Data gatherers and data providers
- Sponsors
- SEMP Advisory Council (SAC)

Environmental and socio-economic objectives (ESOs) in tabular form:

#	Name of ESO	Indicators	Status of performance	Comments

Assessment: Narrative report on status of performance – include tables/graphs that illustrate the most important trends. Key questions are:

- What are the root causes for good/poor performance?
- Are there lessons to be learnt?
- Is there a need for modifying the indicator?

⁵The frequency of reports can be modified in light of experience gained in implementation

- Do we need to improve/change monitoring methods?

Data sources: List who provided the data, and the locality of the data (for future reference). The data do not need to be in the SEMP report – it could be placed in annex.

Public consultation and input:

- List the extent to which communications or submissions were received from the public. Space permitting, letters/faxes/emails or SMSs can be attached, or at least referenced.
- List dates, venues, agenda and minutes of meetings held (if any).

Annexes (results, lab reports, photographs, etc)

4.3 SEMP Advisory Council (SAC)

It is recommended to establish a broad-based **SEMP Advisory Council (SAC)**: that supports the functioning of the SCU. Its composition should be not more than 17 persons (efforts should be made, where possible, to ensure the SAC has an appropriate gender balance), comprising representatives from 13 sectoral ministries (as recommended in Figure 4.1) together with the Executive Chairman of BEZA and at least three independent individuals (e.g. one each from civil society, the private sector and academia including at least one female member, preferably all from the SW Region). Additional members may be appointed or co-opted on an ad-hoc basis, if required. These additional members would be ex-officio. The recommended membership of the SAC is provisional and needs to be considered further by government and finalised.

Existing GoB officials should serve on the **SAC** as part of their existing job descriptions.

The functions and duties of the **SAC** should be to:

- Provide guidance and oversight for the work of the SCU – steer the work of the SCU, facilitate when needed, advise, help open-doors where necessary, assist with sourcing/leveraging funds for SEMP activities, and otherwise provide help wherever possible;
- Act to provide liaison with other actors to support the SCU in ensuring that the SEMP is effectively implemented, and intervene to find solutions when any problems arise;
- Advise the MOEFCC on the appointment/reappointment of the SCU TA, AO, data analyst and data entry operator (may be on a 5-year contract, renewable);
- Approve the annual work plan and budget;
- Review and approve the annual SEMP progress report⁶;
- Review the overall SEMP document (this document) periodically (not less frequently than every three years) to identify whether revision is required (i.e. new components are needed, revision is required for particular elements, deletion is needed if components are no longer necessary, etc). The SCU should draw to the attention of the SAC if such revision may be required.
- The three independent individuals (one each from civil society, the private sector and academia) should be appointed for a term of two years (renewable);
- The **SAC** will not assume any operational responsibilities for the SEMP – that should be the responsibility and mandate of the SCU

⁶The regularity may be changed

⁷ Respective ministry will provide budget as required.

It is recommended that the **SAC** meets three times per annum at suitable times. The first meeting of the year will approve the annual work plan and budget⁷ (within first month of the financial year), while the second meeting will review progress and the draft annual SEMP report. At the third meeting, the **SAC** will be in a position to finalise the report so that it can be circulated to stakeholders and released to the public (via the website).

If a member of the SAC faces a conflict of interest over an issue being discussed during a SAC meeting, then that member should be required to withdraw from the discussion and should not take part in any vote required for that issue.

4.4 Acquiring new data

Data for many of the indicators are already being collected by various institutions for existing purposes. So there should not be a major effort required to collect much of the required data for the SEMP. The availability of data, and the fact that it is already routinely collected, was taken into consideration in selecting the SEMP indicators. However, in some cases, there will be “new” monitoring or management actions required – things that are not previously done but which are regarded as important enough to institute a new management or monitoring activity.

The SCU might need to outsource some field work to specialist institutions, especially for this “new” work. Thus, there will need to be a budget (possibly a combination of GoB and donor) to pay for the outsourcing (e.g. consultants, travel, equipment, laboratories, surveys, etc.) provided by the respective ministry/department.

4.5 Monitoring and auditing

Monitoring and auditing of implementation of the SEMP is required to assess whether the objectives to address key environmental and socio-economic issues are being met. A monitoring and auditing programme should be developed for this purpose.

The indicators, formulated as part of the SEA and set out in Annex B of the SEMP should be used to monitor the extent to which the objectives are being met. Monitoring and auditing serves to indicate when there might be a need to adjust the SEMP or any projects being undertaken to implement PPPs, as to indicate the extent to which enabling investments are being made and institutions are functioning adequately.

The information obtained through monitoring and auditing is required for completion of the SEMP report and to signal any need to refine the environmental and socio-economic objectives, their associated indicators and data gathering methods. Also, it should be noted that monitoring does not end with the collection of data/information, but includes their evaluation, interpretation, reporting and recommendations for corrective action. Information received through monitoring can be of assistance when considering appropriate remedial action by the relevant stakeholders.

Thus, the SCU, with assistance from its many partners, must produce a SEMP report that provides a clear indication of what targets are being exceeded, met or not met, as the case may be. The recommended structure for the SEMP report is shown in Box 1.

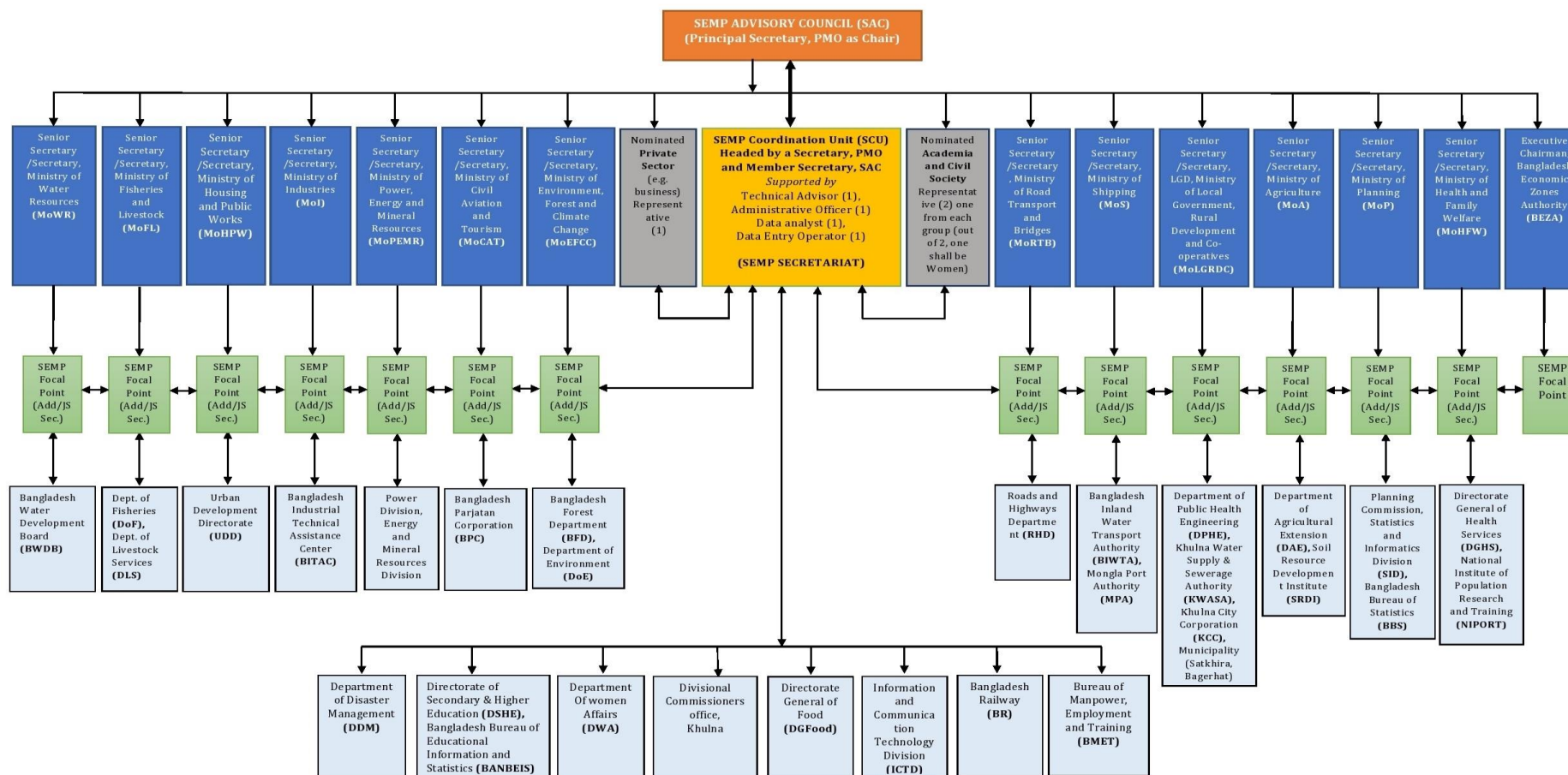


Figure 4.1: The proposed organizational structure for implementing the SEMP

4.6 Mitigation

Alternative strategies and management actions recommended to minimize impacts

As discussed in sections 2.3.10 and 5.1 of the SEA report, the SEA addressed a significant number of PPPs (89) from all key sectors and it was not possible to assess the impacts of every one of these PPPs individually or alternatives to them. Nevertheless, Annex 6 of the Updated Draft Final SEA report does provide recommendations for many PPPs and their associated legal instruments (see section 10.20 of the Updated Draft Final SEA report).

It was necessary to ensure that SEA was 'strategic' itself. Thus, it considered three meta-level alternatives in the form of growth scenarios (low, medium and high). The entire SEA and SEMP focus on the most appropriate strategies (overall management responses) to minimize or mitigate the range of individual, interacting and cumulative impacts arising with regard to particular environmental and socio-economic pressures and as a result of developments in key sectors as PPPs are implemented. Table 6.1 in the SEMP sets out specific management actions required for key sectors. However, most impacts will arise from implementing individual development projects or activities (which the SEA does not and address). Routinely, such project-level impacts will be identified during project environmental impact assessments (EIAs) and relevant mitigation measures then recommended in project environmental management plans (EMPs).

Throughout the SEA report and SEMP, a number of generic strategies are identified which are designed to address the issues and impacts occurring across multiple sectors. These include:

- Implement the full suite of existing Bangladesh environmental and social safeguards in full and effectively, including enforcing laws, regulations and penalties for infringements. However, some safeguard standards might need review and revision (e.g. in order to improve standards towards those set by WHO).
- Implement the SEMP in full and effectively. The SEMP is designed as an integrated package to be implemented in a coordinated manner involving all sectors acting together to counteract the negative impacts of development. Many impacts are the result of tiered cause-effect chains and are cumulative. The SEMP will be less effective if it is disaggregated or implemented partially or in a piecemeal manner.
- Ensure that EIAs and EMPs required for individual projects address key relevant issues identified by the SEA. Annex 8 of the SEA report identifies core issues that future SEAs for key sectors should address. EIAs for individual projects in these sectors should also address these issues.
 - Promoting green and sustainable practices and technologies in all sectors.
 - Harmonise PPPs and legal instruments for sectors where their aims, objectives and means of application may be in conflict with each other, and revise PPPs where they do not adequately address issue identified by the SEA. Annex 6 of the SEA report sets out recommendations for individual PPPs and legal instruments.
- Improving inter-sectoral and inter-agency coordination to manage environmental and social challenges.
 - Making full use of bilateral and multilateral forums to discuss and identify means to address issues (and impacts) which are the result of transboundary processes (e.g. air and water pollution, dry season flows of fresh water).

Table 4.1 summarises the most significant impacts and response strategies and actions which are specific to key sectors.

Table 4.1: Strategies and actions to minimize the most significant impacts of development in key sectors on the Sundarbans and more widely in the SW region.

Notes:

- Targeted SEAs are recommended for each key sector. Core issues that each sectoral SEA should address are provided in Annex 8 of the Updated Draft Final SEA report.
- Management measures for developments in each key sector are recommended in Table 6.1 of the SEMP.
- EIAs should be conducted for all development projects in key sectors, and EMPs should be fully and effectively implemented and audited.

Sector	Major concerns and issues	Management strategies
1. Power and Energy	<ul style="list-style-type: none"> • Air pollution (PM, NO_x), and emissions of CO₂ from coal-fired power stations and from heavy (emission intensive) industries (e.g. brick kilns and cement factories). • Air pollution (PM and polycyclic aromatic hydrocarbons) from cooking in households. 	<ul style="list-style-type: none"> • Pollution standards should be reviewed and tightened, where necessary, to improve towards WHO standards. • Introduction of energy efficiency measures in both production and consumption of energy. • Conversion of existing coal plants to natural gas. • Cancellation of planned new coal-fired plants. • Promotion of renewable energy production – particularly on islands and unproductive land through using solar and wind energy. • Effective pursuit of 3R (reduce, reuse and recycle) to minimize energy demand. • Support to switch from traditional manner of cooking to cooking using LPG or electricity. • It is noted that the government has recently announced its intention to cancel 5 coal-fired power plants and convert 5 others to LNG. • Improved capture, treatment and recycling.
2. Transportation and Communications	<ul style="list-style-type: none"> • Air pollution, particularly from (increasing) road transport. • Water pollution from boats and ships. 	<ul style="list-style-type: none"> • Conversion to green vehicle fleet (i.e. electric and hybrid cars/lorries). • Improve rules, regulations and operating guidelines for vessels, including monitoring and enforcement. • Implementation of NOS COP.
3. Fisheries	<ul style="list-style-type: none"> • Conversion of agricultural land to shrimp farms. • Depletion of wild fish resources and over-harvesting of wild fish larvae. • Water pollution by agro- and bio-chemicals used on shrimp farms. • Salinisation of shrimp farm soils. 	<ul style="list-style-type: none"> • Ban conversion of further agricultural land to shrimp farms. • Stricter enforcement of regulations and control of illegal fishing, poison fishing and maintain mesh size of gears. • Ban and stricter enforcement of regulations on shrimp fry collection and net fishing. • Limit use of chemical and bio-additives in shrimp farms and aquaculture; and educate producers on their use/misuse. • Promote reclamation of salinized land by encouraging use of saline-tolerant rice varieties. • Conservation of natural breeding ground, especially in the Sundarbans through <i>co-management approach</i>.
4. Forestry	<ul style="list-style-type: none"> • Loss of biodiversity. • Degradation of mangrove and riverine habitats. 	<ul style="list-style-type: none"> • Revise Sundarbans Integrated Management Plan to address finding of the SEA and incorporate relevant recommendations of SEMP (include use of modern

Sector	Major concerns and issues	Management strategies
	<ul style="list-style-type: none"> • Loss of ecosystem services. • Habitat isolation. 	<p>technology to counter illegal activities e.g. poaching, poison fishing, etc.).</p> <ul style="list-style-type: none"> • Fully and effectively implement management plans for the 3 wildlife sanctuaries (including WHS). • Establish an Inter-ministerial Coordination Committee for Management of the Sundarbans. • Control of air, water, noise and light pollution due to increased ship movement through the Sundarbans including the unloading points (e.g Harbaria). • Ban night movement of all ships through the Sundarbans.
5. Industry	<ul style="list-style-type: none"> • Air pollution (PM and NO_x and most particularly in Mongla area), and water pollution. • Emission of CO₂. • Conversion of agricultural land for industrial development. 	<ul style="list-style-type: none"> • Pollution standards should be reviewed and tightened, where necessary, to improve towards WHO standards. • Introduction of energy and material efficient technologies should be supported. • Industries located in new economic zones in the SW region should adopt technologies with minimum/no emissions of NO_x and SO_x. • Brownfield sites should be used wherever possible; and industrial development should be concentrated in industrial zones with approved overall EMPs.
6. Water resources	<ul style="list-style-type: none"> • Low dry season freshwater flow in Distributary Rivers. • Freshwater flooding and waterlogging following excessive rainfall in wet season (mostly in upstream areas). 	<ul style="list-style-type: none"> • Dredging of rivers to enhance dry season flow through the Sundarbans. • Dredging of the Sundarbans silted-up channels to ensure regular inundation of the forest floor. • Construction of diversion structures to augment dry season flow and control flooding. • Improvements to drainage network/system infrastructure and management.
7. Tourism	<ul style="list-style-type: none"> • Noise and water pollution. • Tourist carrying capacity of the Sundarbans & its biodiversity conservation. 	<ul style="list-style-type: none"> • Tourist, local tour operators, tourist boat owner and other stakeholders should follow updated eco-tourism guidelines. • Ban/restrict tourism in sensitive protected areas of the Sundarbans in order to conserve biodiversity. • Carrying capacity for tourism activities in the Sundarbans should be scientifically determined, and tourist visitors/activities managed accordingly.
8. Agriculture	Water pollution from agro-chemicals, especially as agriculture becomes more industrialized.	<ul style="list-style-type: none"> • Education/training on appropriate use of agro-chemicals. • Promote increased use of bio-fertilizer. • Promote balanced agricultural practice, e.g optimum use of fertilizer, water, etc.
9. Urban	<ul style="list-style-type: none"> • Unsafe disposal of liquid and solid waste, and pollution of water bodies. • Air pollution and associated health hazards from traffic. 	<ul style="list-style-type: none"> • Improved management, treatment and recycling of liquid and solid wastes. Conversion to green vehicle fleet (i.e. electric and hybrid cars/lorries). • Improved public transport system – to reduce urban vehicle numbers.

The Updated Draft Final SEA report (Chapter 9) used linkage diagrams to assess direct, indirect and cumulative impacts of major activities expected in the future development of the region. These linkage diagrams show the consequences of major development activities and the knock-on effects that these are likely to have on various social factors and ecological components of the environment.

Of course, for every major activity there are also many sub-activities. But the SEA could not address all of these. It was necessary to remain strategic and provide clear, straight-forward and targeted messages and recommendations to decision-makers. It would be possible - though not necessarily helpful - to construct significantly larger and more complex linkage diagrams as there is virtually no end to social-ecological-economic inter-connectedness. Thus, the linkage diagrams presented in this SEA are a compromise between illustrating complexity but maintaining clarity through simplicity.

The yellow “lightning bolts” depicted in the linkage diagrams indicate where interventions are needed to avoid or reduce unintended consequences. Recommended actions to address the “lightning bolts” are provided in Table 4.2. However, this table should not be read in isolation. For a full understanding of strategies and actions needed at both strategic and project levels, Tables 4.1, 4.2 and 6.1 need to be referred to as a set for guidance.

Thus, this Final SEMP is only a beginning regarding what is needed as interventions signalled by the “lightning bolts”. It is expected that further consultations, especially with regards to institutional responsibilities, targets and indicators, will be required to build on these initial suggestions.

Table 4.2: Principal development activities for key sectors and proposed “Lightening Bolt” interventions

Note: All major projects will benefit from and EIA and EMP.

Sector	Key activities during 2021-2041 (and corresponding Figure in Final SEA report)	Impacts requiring Interventions (lightning bolts)	Recommended avoidance or mitigation measures
Industry	Rapidly expanding industrialization in an efficient way (Figure 9.1).	Increased use of agrochemicals.	<ul style="list-style-type: none"> • Provide information, training and extension support on appropriate use of agrochemicals. • Promote application of tailor-made fertilizer based on soil testing, favouring environment-friendly and organic products • Promote the use of bio-fertilizer. • Promote conservation agriculture where possible. • If use of artificial chemicals is unavoidable, ensure correct use and storage and disposal, as per manufacturer’s recommendations/research-based findings.
		Air, water, noise and soil pollution during construction and operations.	<ul style="list-style-type: none"> • Ensure new developments conform to national pollution standards. • Ensure industries in new economic zones adopt technologies with minimum emissions of NOx and no emissions of SOx.
		Increased waste and e-waste.	<ul style="list-style-type: none"> • Waste should be sorted at source and disposed of in accordance with applicable laws, standards and guidelines. • Apply or install best available technology (bearing in mind affordability) to minimize pollution.
		Land take.	<ul style="list-style-type: none"> • Brownfield sites and existing servitudes should be used wherever possible; and industrial development should be concentrated in industrial zones with approved overall EMPs • Special effort to ensure that the needs of marginalized and vulnerable sections of society (especially women and children) are carefully considered when land take is envisaged.
		Increased water demand.	<ul style="list-style-type: none"> • Industries in new economic zones should adopt water-wise technologies. • Incentives might be considered to promote water saving, and penalties for both excessive use and causing pollution.
		Increased demand for energy.	<ul style="list-style-type: none"> • Energy efficient technologies should be supported.
Transport	<ul style="list-style-type: none"> • Expansion and or upgrading of the road and rail network (Figure 9.2). 	Accidents and inconvenience to commuters during construction.	<ul style="list-style-type: none"> • Ensure safeguards are in place to avoid or minimize ribbon development, and especially to prevent people establishing informal housing or businesses in the registered servitudes.
		Accidents due to increased traffic and faster driving on better roads.	<ul style="list-style-type: none"> • Adequate signage on roads (speed limits, overtaking, curves, etc.).

Sector	Key activities during 2021-2041 (and corresponding Figure in Final SEA report)	Impacts requiring Interventions (lightning bolts)	Recommended avoidance or mitigation measures
			<ul style="list-style-type: none"> • Speed control measures (e.g. rumble strips, traffic rules enforcement, camera traps, etc.).
		Air, noise, dust and soil pollution during construction, GHG emissions from vehicles.	<ul style="list-style-type: none"> • See under “industry”. • Enforce Regulations on emission standards for vehicles – with penalties for older vehicles (e.g. extra license fee). • Regular vehicle roadworthy tests. • Lead-free and low sulphur fuel.
		Localised flooding from roads.	<ul style="list-style-type: none"> • Careful location of roads and rail, avoiding flood-prone areas, or, if avoidance is impossible, design to minimize vulnerability to floods. • Appropriate infrastructure designs (e.g. culverts, bridges) that prevent water build-up. • Good waste management, as culverts and storm water drains often get clogged by litter, thus causing flooding. • Maintain good (multistoried) vegetation cover in catchment areas (to increase percolation and decrease surface runoff). • Better planning and enforcement of plans – so people are prevented from settling in flood-prone areas. • Improved early-warning systems, so people have time to plan adaptation measures or evacuate.
		Land take.	<ul style="list-style-type: none"> • Locate projects in brownfield sites or existing servitudes wherever possible. • Special effort to ensure that the needs of marginalized and vulnerable sections of society (especially women and children) are carefully considered when landtake is envisaged.
		Pollution from spillage from in and around construction sites.	<ul style="list-style-type: none"> • Ensure projects have approved site management plans that include spillage control.
	<ul style="list-style-type: none"> • Upgrading, maintenance and re-instatement of the river transport network (Figure 9.3). 	<ul style="list-style-type: none"> • Increase pollution, waste, noise and GHG emission. 	<ul style="list-style-type: none"> • Ensure works conform to national standards. • Vessels and berthing facilities must be properly maintained and equipped with technologies that minimize all types of pollution. • Waste (on board or on land) to be sorted at source and disposed of in accordance with applicable laws, standards and guidelines. • Apply or install best available technology (bearing in mind affordability) to minimize pollution.

Sector	Key activities during 2021-2041 (and corresponding Figure in Final SEA report)	Impacts requiring Interventions (lightning bolts)	Recommended avoidance or mitigation measures
		Oil spill, cargo/ship accident and management.	<ul style="list-style-type: none"> • Works should have an approved oil spill and accident management plan. • Implementation of National Oil Spill and Chemical Contingency Plan (NOS COP).
		Increased river bank erosion.	<ul style="list-style-type: none"> • All boat operators should adhere to the code of conduct, e.g: no speeding (boats/ships) so as to avoid excess noise, and bow waves.
		Habitat degradation and biodiversity loss.	<ul style="list-style-type: none"> • Avoid establishing infrastructure in areas of high biodiversity importance (e.g. Protected Areas, Sundarbans Reserved Forests and ECA etc) – select brownfield sites wherever possible.
Urban	<ul style="list-style-type: none"> • Expansion and modernisation of cities and towns (Figure 9.4). 	Pollution (air, water, noise, dust and soil) and GHG during construction-and ongoing.	<ul style="list-style-type: none"> • See “industry”. • For both new and existing coal-fired power plants, technology to reduce emissions of mercury should be identified and used that is appropriate to the type of coal being used.
Increased volume of waste.			
Increase demand for potable water.			
Land take and conversion.	<ul style="list-style-type: none"> • Locate projects in brownfield sites or existing servitudes wherever possible. 	<ul style="list-style-type: none"> • Increased pressure on urban infrastructure and services. 	<ul style="list-style-type: none"> • Ensure good town planning so that inhabitants derive maximum benefits from modernization initiatives, including (but not limited to): <ul style="list-style-type: none"> ○ Improved access to utilities such as roads, transport systems, shops, schools, green spaces, etc; ○ Set up locally accessible health and law-enforcement services; ○ Good waste management; ○ Improve construction and design of houses and infrastructure; ○ Adopt Low Impact Development (LID) concepts in town planning; ○ Special effort to ensure that the needs of marginalized and vulnerable sections of society (especially women and children) are carefully considered during town planning.
<ul style="list-style-type: none"> • Increased traffic and congestion. 			
Increase in crime associated with city environment.	<ul style="list-style-type: none"> • See above regarding good town planning. • Maximise community involvement in crime prevention and promote cooperation between citizens and police. • Special effort to ensure that the needs of marginalized and vulnerable sections of society (especially women and children) are carefully considered in crime prevention initiatives. 	More cash spent on social ills.	<ul style="list-style-type: none"> • Education regarding dangers of inappropriate behavior, including STDs. • Use community structures to sensitise communities

Sector	Key activities during 2021-2041 (and corresponding Figure in Final SEA report)	Impacts requiring Interventions (lightning bolts)	Recommended avoidance or mitigation measures
			<ul style="list-style-type: none"> • Provide adequate policing in areas where such behaviour is experienced. • Special effort to ensure that the needs of marginalized and vulnerable sections of society (especially women and children) are carefully considered as they are usually the victims of various types of social ills.
Power and energy	<ul style="list-style-type: none"> • New or upgradation of power plants and transmission and distribution systems (Figure 9.5). 	Air, water, noise, dust and soil pollution during constructions and operation GHG emissions.	<ul style="list-style-type: none"> • See “industry”.
		Generation of waste, including e-waste.	
		Land take.	
		Electromagnetic radiation and (if nuclear) radiation leakages.	
	Bird collisions with power lines.	<ul style="list-style-type: none"> • Alignment for powerlines should avoid wetlands and other important bird habitats. • Incorporate ‘bird flappers’ (diurnal and nocturnal designs) to increase power line visibility, especially at river crossings or known pathways. 	
	<ul style="list-style-type: none"> • Technology investment for increased energy efficiency (Figure 9.6). 	Air, water, noise, dust and soil pollution and GHG emissions.	<ul style="list-style-type: none"> • See “industry”
Habitat degradation, biodiversity and ecosystem services loss.	<ul style="list-style-type: none"> • Avoid establishing infrastructure in areas of high biodiversity importance (e.g. Protected Areas, Sundarbans Reserved Forests etc.)- select brownfield sites where possible. 		
More cash spent on social ills.	See “Urban”.		
Forestry	<ul style="list-style-type: none"> • Conservation of Sundarbans forests (Figure 9.7). 	Reduced livelihood opportunity and increased demand for the Sundarbans resources.	<ul style="list-style-type: none"> • Ensure affected communities are adequately consulted during planning and, raise awareness about importance of conservation and creation of sustainable alternative livelihood opportunities.
		Increased external demand for illegal wildlife products.	<ul style="list-style-type: none"> • Appoint Forest officer(s) to enforce laws, rules assisted by community structures. • Establish rules to minimise use of wildlife or wildlife parts as an ingredient for feed/use, and to minimize poaching (these rules must be well publicized, understandable and accessible).
		Increased human-wildlife conflict.	<p>As above, but also:</p> <ul style="list-style-type: none"> • Assist communities to protect their lives , livestock, houses and agricultural land from wildlife;

Sector	Key activities during 2021-2041 (and corresponding Figure in Final SEA report)	Impacts requiring Interventions (lightning bolts)	Recommended avoidance or mitigation measures
			<ul style="list-style-type: none"> Involve communities in conservation and tourism, including deriving benefits (that might compensate in case of livestock losses to wildlife); Clear zonation so that everyone knows where access is permitted and where it is not; Quick delivery of the compensation due to wildlife disturbance/casualties.
		Pollution and noise.	<ul style="list-style-type: none"> Apply polluters pay principles as well as penalties for pollution/implement remedial measures/ compensate affected people. Limit noise level of ships in case of movement through the Sundarbans.
	<ul style="list-style-type: none"> Promotion of social forestry on farmland in the SW region (Figure 9.8). 	Monoculture.	<ul style="list-style-type: none"> Encourage communities and developers to practice intercropping with mixed indigenous species wherever possible/feasible. Encourage the practice of conservation agriculture/forestry.
		<ul style="list-style-type: none"> Invasive alien species should not be allowed for plantation. 	<ul style="list-style-type: none"> Enforce regulations on the importation, breeding or keeping of any declared alien-invasive species, whether plant, animal or otherwise.
		Increased use of agrochemicals	See "Industry"
		Inefficient cooking with fuel wood.	<ul style="list-style-type: none"> Promote fuel-efficient stoves, including using community structures and NGOs to do so – includes subsidizing such stoves. Educate communities regarding health hazards of indoor cooking using wood and dung.
		More cash spent on social ills.	See "Urban".
Fisheries	<ul style="list-style-type: none"> Increased shrimp and fish production (capture and cultured) (Figure 9.9). 	Conversion of agricultural land and reduced agricultural production.	<ul style="list-style-type: none"> Case-by-case assessment needed to determine whether the conversion is beneficial (economically and socially) or not for communities or households – and then plan according to assessment results. Ensure affected people are part of the assessment. Avoid, where possible, conversion of land zoned for agriculture.
		Increased salinization.	<ul style="list-style-type: none"> Prevent further expansion of shrimp farming and particularly illegal admission of saline water into poldered areas. Limit shrimp farming to designated areas Promote use of salt-tolerant rice varieties.
		Increased feed, fertiliser and antibiotic use.	See "industry" regarding agrochemicals.
		Increase GHG.	See "Industry".

Sector	Key activities during 2021-2041 (and corresponding Figure in Final SEA report)	Impacts requiring Interventions (lightning bolts)	Recommended avoidance or mitigation measures
		<ul style="list-style-type: none"> Elite domination. 	<ul style="list-style-type: none"> Case-by-case assessment needed to determine whether the project is locally owned or whether elite capture is likely and then plan according to assessment results. Ensure affected people are part of the assessment. Depending on trends, it might be necessary to introduce new laws or regulations to prevent elite capture.
Water	<ul style="list-style-type: none"> Dredging of rivers and construction of diversion structures (to enhance dry season flow and control floods) (Figure 9.10). 	More cash spent on social ills. Pollution of land and water from dumping of dredging materials.	See "Urban". <ul style="list-style-type: none"> Identify brownfield areas on land where dredge materials can be dumped. Avoid dumping into the open water (so as to avoid increasing sediments and for conserving benthic community). Avoid dumping on the forest floor EIA and EMP is required for dredging project.
		Altered hydrodynamics as a result of changed bottom and benthic profiles from dredging and constructions.	<ul style="list-style-type: none"> Understand baseline profiles prior to dredging Establish the risk of adverse changes before going ahead.
		Turbidity, noise and fumes during dredging and constructions.	<ul style="list-style-type: none"> Use equipment and vessels that have adequate noise abatement and pollution reduction installations. Consult with nearby communities to find ways of minimizing inconveniences for them (e.g. time of day that dredging will take place).
		Disruption of shipping and trade during dredging.	<ul style="list-style-type: none"> Consult with river transport stakeholders to find ways of minimizing inconveniences for them (e.g. time of day or time of year that dredging will take place).
		More cash spent on social ills	See "Urban"
Tourism	<ul style="list-style-type: none"> Development of eco-tourism inside Sundarbans (Figure 9.11). 	Pollution from water vessels. Pollution from noise, general litter and sewerage. Inappropriate tourist behaviour and social interactions by foreign visitors.	<ul style="list-style-type: none"> For all protected areas, visitor numbers should be within carrying capacity to minimize impacts. Adhere to conditions and requirements as set out in the Sundarbans Management Plan, especially ensure all boat operators adhere to the code of conduct – e.g: <ul style="list-style-type: none"> No speeding (boats) so as to avoid excess noise, bow waves, collisions with dolphins; No noisy tourists, no use of loud speakers; No discharge of waste or pollution;

Sector	Key activities during 2021-2041 (and corresponding Figure in Final SEA report)	Impacts requiring Interventions (lightning bolts)	Recommended avoidance or mitigation measures
			<ul style="list-style-type: none"> ○ Boat engines regularly serviced to minimize fuel leakages, noise, exhaust emissions, etc; ○ Maintain a distance from wildlife (to avoid stressing the animals); ○ Avoid known wildlife and fish breeding areas and also the dolphin sanctuaries.
		Elite domination.	<ul style="list-style-type: none"> ● Promote local ownership and servicing of the tourism industry.
		Leakage of revenue.	<ul style="list-style-type: none"> ● On-line revenue payment system into a locally registered company. ● Promote buying local for as many services and products as possible.
		More cash spent on social ills.	See "Urban".
	<ul style="list-style-type: none"> ● Diversified tourism activities outside Sundarbans (Figure 9.12). 	Pollution from road and water transport.	<ul style="list-style-type: none"> ● Require tourist operators to use low-polluting vehicles. ● Ensure enforcement of tourism guidelines for the tourist, tour operators and the tour management authority - to ensure tourists behave in an appropriate manner. A separate management plan with zonation of heritage sites is required for effective conservation.
		Pollution from noise, general litter and sewerage.	
		Inappropriate tourist behaviour and social interactions by foreign visitors.	<ul style="list-style-type: none"> ● Penalise physical damage of the cultural sites. by tourism. ● Ensure all vehicle and boat operators adhere to a reasonable code of conduct – e.g:
		Physical damage of cultural sites.	<ul style="list-style-type: none"> ○ No speeding (boats) so as to avoid excess noise; ○ No noisy tourists (especially in sacred sites); ○ No damage of historical or natural sites; ○ No littering; ○ No inappropriate interaction with locals (use local tour guides as much as possible).
		More cash spent on social ills.	See "Urban".
Agriculture	<ul style="list-style-type: none"> ● Industrialisation of agriculture and increased production (Figure 9.13). 	Elite domination.	<ul style="list-style-type: none"> ● Case-by-case assessment needed to determine whether the project is locally owned or whether elite capture is likely and then plan according to assessment results. Ensure affected people are part of the assessment. ● Depending on trends, it might be necessary to introduce new laws or regulations to prevent elite capture.
		Increased use of agrochemicals.	<ul style="list-style-type: none"> ● Promote application of tailor-made (including bio) fertilizer based on soil testing, favouring environment friendly and organic products. ● Restrict excess use of phosphate and Nitrate fertilizer in agricultural field. ● Promote conservation agriculture where possible.

Sector	Key activities during 2021-2041 (and corresponding Figure in Final SEA report)	Impacts requiring Interventions (lightning bolts)	Recommended avoidance or mitigation measures
			<ul style="list-style-type: none"> • If use of artificial chemicals is unavoidable, ensure correct use, storage and disposal, as per manufacturers recommendations. • Prevent the use of agrochemicals, pesticides or poisons (supposedly purchased for agriculture) to kill or capture fish.
		Increased water use for irrigation.	<ul style="list-style-type: none"> • Develop strategy for irrigated crop production to address risk of over-abstraction
		Arsenic contamination of crops through irrigation.	<ul style="list-style-type: none"> • Introduce arsenic testing programme for irrigation water and rice to ensure health standards are not breached.
		Increased GHG.	<ul style="list-style-type: none"> • Increase the use of renewables like solar and wind • Increase energy efficiency in both production and consumption of energy.
		More cash spent on social ills.	See "Urban".

4.7 Linking the SEA and SEMP, to project-level EIAs

Since SEA is driven by the concept of sustainability, the logical consequence of a SEA should be guidance on how sustainability principles can be mainstreamed throughout the life cycle of plans and development programmes, activities and projects within the SW region. This guidance is provided through the SEMP which is intended to be operational over the next 20 years.

Even though this SEMP will be in place, developers might still be required to conduct environmental impact assessments (EIAs) for specific projects and to prepare/abide by site-specific Environmental Management Plans (EMPs). Also, each project will likely have a number of permit obligations that must be met for the developer to be in full compliance with the law (Figure 4.2). However, the information and guidance provided by the SEA and SEMP might mean that smaller or lower-impact projects - that would have required an EIA in the past - might now be able to obtain approval just on the basis of an EMP, especially if they can show that the baseline information and guidance provided by the SEA/SEMP has been adequately considered and is appropriately reflected in the project's EMP.

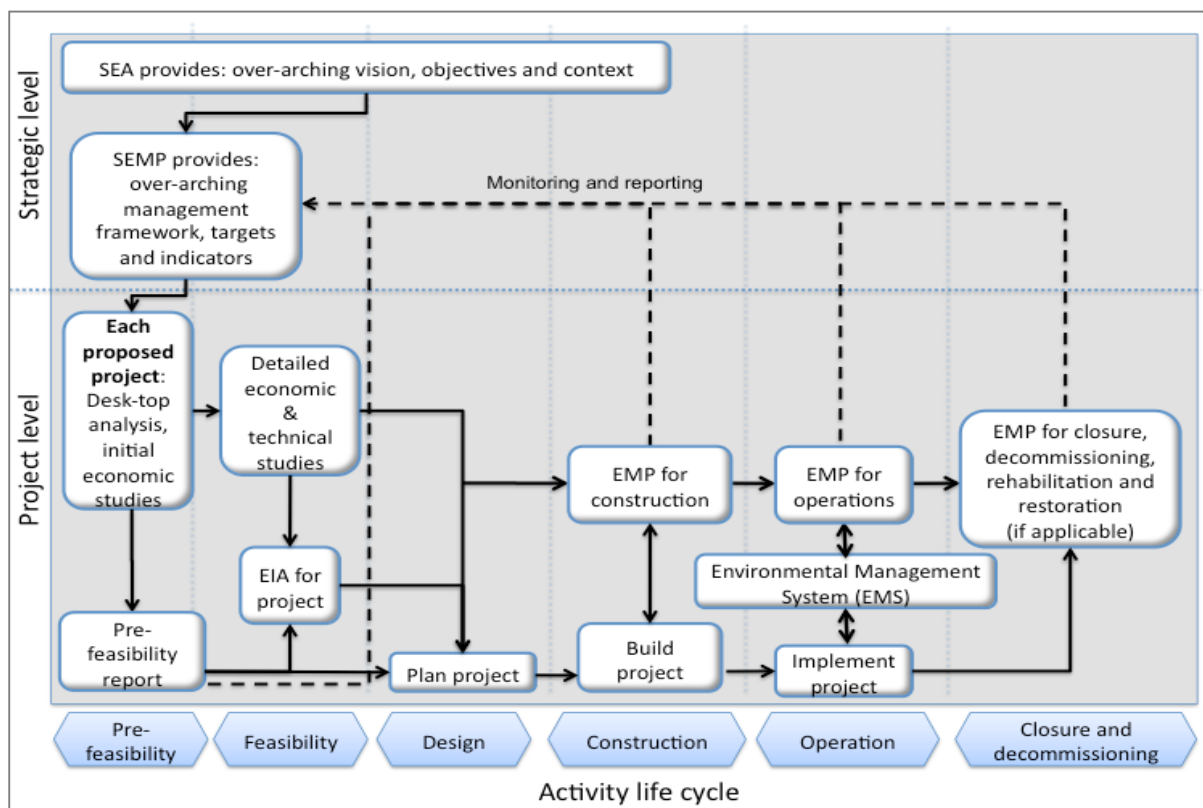


Figure 4.2: Planning hierarchy from strategic to project levels, and application of environmental safeguards

In the SW region, there are many existing activities (e.g. programmes and associated projects) within different sectors, initiated by individual developers (government or private sector) that may/may not be linked to each other. Many are being undertaken in isolation of each other. The SEA will probably not stop or change any of these projects since some (e.g. shrimp farms, industries, roads, urban expansion, etc.) have been in operation for many years and others are in an advanced stage of planning or construction. Also, many activities are undertaken at subsistence level and have been ongoing for hundreds, if not thousands, of years (e.g. traditional farming). These subsistence-level 'projects' are individually too small to trigger an EIA, but they could be causing major cumulative impacts. In such examples, it would be government policies and plans that might need to be reviewed/adjusted so that cumulative impacts can be minimised, and synergies enhanced.

However, since all formal projects need to revise their implementation plans and strategies from time to time, the proponents will still benefit from the SEA and SEMP. In many cases, there are projects still at the pre-feasibility stage, and some not yet identified. Such ‘newcomers’ should gain a great deal from the SEA and SEMP. Thus, the SEMP is intended to guide all developments in the SW region so that they do not unnecessarily compromise the natural, social, heritage, economic and physical environments, with special concern for the Sundarbans.

The SW region, including the Sundarbans, is important and complex. For its management to be effective, and based on principles of sustainable development, will require decision-makers at all levels to enter into meaningful partnerships with each other. This will be vital to ensure that they can utilise all available skills, institutions and resources. It is recommended that the GoB take overall responsibility for implementing the SEMP, through a close partnership between different agencies within government, academic institutions, donor agencies and civil society.

Annex B identifies those government and other institutions that will need to play primary and supporting roles in SEMP indicator monitoring. Table 4.3 will need to be completed by the SCU and SAC in the first few months of year 1 of the SEMP. The information that goes into this table can be directly transcribed from Annex B. The reason that Table 4.3 has not yet been populated, is that there will likely still be a number of discussions on institutional roles in the next few months. Table 4.3 is thus just an outline of what needs to be constructed and populated.

Table 4.3: Primary and supporting institutions that will be responsible for indicator monitoring

Institution	Monitoring Responsibility	Supported By

4.8 New studies and data gathering frameworks required

It is recommended to undertake the following studies for important issues for which data is currently lacking. The SCU should, in the first year of its operation, consult with relevant experts and authorities and determine appropriate methodologies for these studies and how they will be commissioned.

(a) Water hyacinth extent and severity

A baseline study is required to determine the extent and severity of water hyacinth infestations. This study should also prepare recommendations for appropriate control measures (including roles and responsibilities) and indicator(s) that can be monitored to track infestation trends and whether control measures are effective. Recent⁷ work in India suggests the suitability of using satellite imaging and other remote sensing practices, notably Synthetic Aperture Radar (SAR) Sentinel-1 to detect water hyacinth at an early stage of its life-cycle.

(b) Arsenic in paddy soils

A baseline study is required to determine the extent and severity of arsenic contamination in groundwater and in irrigated paddy soils in the SW region (and even across Bangladesh). Arsenic levels in rice grown on arsenic-contaminated soils should be monitored through grain surveys to determine if there is a problem and its scale.

⁷ Simpson *et al* (2020) –Monitoring water hyacinth in Kuttanad, India using sentinel-1 sar data. Faculty of Natural Sciences, University of Stirling, Stirling, UK

(c) Mud crabs in the Sundarbans

A survey is needed to assess the current status of the mud crab (*Scylla spp.*), which is a key indicator of aquatic biodiversity in the Sundarbans. The status should include number of species, population assessment, population age structure, reproductive capability, habitat and other survival requirements, etc. In addition to providing a baseline report, it is important to establish methods to calculate sustainable offtake quotas/annual allowable extraction limit, breeding and spawning period, a monitoring system and thresholds that provide an “early warning” that might trigger management interventions.

(d) Underwater noise

It is recommended that a baseline study of underwater noise levels is undertaken in the main rivers in the Sundarbans and in peripheral rivers and in sensitive areas (e.g., dolphin sanctuaries), and that underwater noise levels are monitored in the future as part of enforcing the proposed protocol/guidelines especially for ship/boat movement.

(e) Conflicts over land use

A study is recommended to cover both reported and unreported cases. It is understood that many conflicts are resolved at local-level using informal structures. Unresolved conflicts are usually escalated to more formal systems and eventually, courts may be asked to rule on cases. Data for formal processes are relatively available, but there is no idea about informal cases. The study should determine the situation pertaining to all levels, and the percentage of conflicts that require escalation. The trends over time will provide a valuable indicator of conflict and resolution trends. It is likely that local-level surveys will be required to gather the required data, as well as retrieving records from formal systems. The study will provide actual local level social need and next step for appropriate land use management.

(f) Noise

Noise data are required at landscape level, as existing data are from individual projects and it is not possible to extrapolate from this in order to produce landscape-level noise plume maps. Noise is a potential issue in a rapidly industrialising landscape, so careful thought is needed to determine where noise recording equipment must be installed. Important to note is that the equipment will be in place for the duration of the life of the SEMP as it is not advisable to move equipment around once it is in place. Criteria for deciding on where equipment will be installed include theft of equipment, representivity of the data (e.g. a mix of industrial, residential, retail, recreational and conservation areas), ease of access to the equipment for maintenance purposes, etc. It is assumed that all the measuring stations will be automated.

(g) Cropping pattern

It is recommended that research be commissioned to determine how the crop calendar and cropping pattern may need to be rescheduled to mitigate the adverse climatic conditions.

(h) Risks to biodiversity and ecosystems of the Sundarbans from pollution

There are risks for fauna, flora, habitats and ecosystem functioning within the Sundarbans from air and water pollution. The extent and levels of pollution and the risks these may pose to biodiversity and ecosystems throughout the Sundarbans should be investigated by a research programme. Special attention should be given to the impact of air pollution by PM (especially PM_{2.5}) on fauna and flora.

(i) Biological oxygen demand

Scientific research is recommended to identify the major contributors to pollution causing raised BOD levels in the river systems.

(j) Air and water quality monitoring and modelling

It is recommended to develop an air quality monitoring network based on automated stations to generate 'near-to-real-time' information on actual air quality and to make that information available to the public. The current air quality monitoring network should be extended to provide sufficient, representative and regular information on air pollutants concentrations across the region.

It is recommended to develop and regularly update an inventory of air pollutant emissions (in accordance with international standards).

Monitoring of water quality as well as important water pollution point sources should be extended by including additional pollutants (COD, oil pollution, hydrocarbon pollution, dissolved organic carbon, AOX, heavy metals).

Air and water quality modelling should be periodically re-run to incorporate up-dated and new data in order to provide revised information for the best management of pollution issues.

(k) Updating the thematic baselines papers

13 thematic baseline papers were developed during the scoping phase (listed in Table 3.1 of the Final SEA Report) covering key issues that the SEA has addressed. Each presents information and trends based on latest available data. Collectively, they provide a baseline which will inform the monitoring proposed in the SEMP. The baseline papers are intended as rolling documents and it is recommended that the government give consideration to commissioning further work (through the proposed SEMP Coordinating Unit) to amplify these documents and regularly update them and, where necessary, to undertake and incorporate new analyses to expand the thematic papers to maximise their utility as a resource for implementing the SEMP.

4.9 Key SEMP actions for the Sundarbans

As noted in the SEA, it is unlikely that the Sundarbans will be significantly affected by direct, indirect or cumulative impacts of the high-growth scenario, provided that:

- the recommendations in this SEMP are implemented;
- compensation measures to reduce air and water pollution are implemented efficiently and timely;
- existing environmental and social safeguard policies, regulations and guidelines are fully and effectively implemented and enforced;
- the government implements effective measures to avoid, mitigate, minimise, restore or offset potential impacts of development, and ensures the use of clean and sustainable technologies, at least for new developments.

Instead, negative impacts will predominantly occur in the SW region generally, but outside the Sundarbans. Exceptions are:

- Possible impacts on habitats and wildlife from increasing tourism within the Sundarbans (e.g. noise, litter, bow waves from fast-moving boats, pollution from waste, engine fuel and grease, etc.);
- Engine and propeller noise from ships passing to Mongla port which may impact on aquatic mammals, particularly river dolphins;
- Over-fishing and harvesting of fry; illegal activities (poaching, etc.);
- Possible impacts on vegetation, habitats and wildlife in the northern part of Sundarbans and in the Mongla are from increased concentrations of nitrogen oxides and particulate matter in the air (caused by economic activities in and around Mongla);

- Possible impacts on aquatic ecosystem from pollution of surface waters by phosphates.

Suggestions for managing such impacts are provided in Table 6.1.

4.9.1 Management recommendations for the Sundarbans

It is recommended to update the existing Integrated Resource Management Plan for the Sundarbans (current version is dated 2010-20) to reflect the findings and recommendations made in the SEA and SEMP; and also to fully and effectively implement the three up-dated Sundarbans Wildlife Sanctuary Management Plans (East, West and South).

In particular, it is recommended to:

- Establish a scientifically-based tourism carrying capacity including the appropriate mix of tourism (e.g. low volume/high cost and high volume/low-cost), and place a moratorium on increasing and/or expanding tourism to Sundarbans beyond current levels until finalization of this study.
- Revise the code of conduct that all tourism operators are obliged to abide by, and ensure that this includes the control over tourist behaviour to prevent (for e.g.) noise and littering.
- Initiate a study regarding shipping routes and sensitive areas (e.g. sanctuaries) both within the Sundarbans and in peripheral areas. The objective is to refine zonation so that high-impact water-travel avoids or is highly restricted in such sensitive areas.
- Initiate a study regarding underwater noise and sensitive areas (e.g. sanctuaries) both within the Sundarbans and in peripheral areas. The objective is to refine zonation so that noisy water-travel avoids or is highly restricted in such sensitive areas. A first approximation could simply be an inventory of all boat types in the area, a sample noise assessment of the different types of boats (i.e. engine types) and then extrapolate across the fleet. This can be followed-up (triangulated) with placement of underwater noise monitors at selected points. Ultimately, a noise plume model is required and this needs to be overlaid over the distribution of sensitive receptor species (e.g. dolphins).
- In the context of the above, develop a protocol or guidelines (through agreement between all relevant agencies) (and perhaps a legal instrument to enable its enforcement) covering the operation of all vessels travelling in and through the Sundarbans (e.g. speed, noise emissions, crew/passenger behaviour).
- Initiate research and monitoring on habitat changes resulting from increased salinity in the Sundarbans and consequences for wildlife populations.
- Undertake a thorough valuation of all aspects of ecosystem services in the Sundarbans, and update the management plan accordingly. This is especially important in the context of upholding the Sundarbans outstanding universal value.
- Strengthen inter-agency coordination and cooperation by establishing a national level Sundarbans Coordination Committee including all ministries/agencies (in addition to MOEFCC) that operate in or have an effect on the Sundarbans (e.g. agencies responsible for water, dredging, shipping & others).
- Update the present SMART patrolling as an effective monitoring tool so that it can maintain information and data on poaching and wildlife trafficking in the Sundarbans for effective protection and future management.

Chapter 5: Monitoring Framework

A fundamental core of the SEMP and for monitoring is a set of 29 Environmental and Social Objectives (ESOs) for the SW Region generally, but especially in the context of avoiding or minimising negative impacts on the Sundarbans. Associated with these objectives are 71 indicators⁸, summarized in tabular form in Annex B. The table in Annex B present the issue of concern, indicators, a responsible party, time frame, and resource requirements. **Table 5.1** shows the structure of Annex B⁹ and explains how it should be used as the core of implementing this SEMP.

Table 5.1: Structure of the indicators and actions

Theme	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed
Name of theme	Number and name of objective	Number and name of indicator	Unit of measuring the indicator	Figure	Year	Source of data	Ministry primarily responsible	Institution that will gather the data	Institutions that will provide support in data gathering		

Data for many of the indicators are already being collected by various institutions or people for various purposes (e.g. fish surveys, wildlife monitoring, socio-economic research), but more work may be required to set up new monitoring programmes and establish the necessary sampling and reporting protocols (e.g. water quality). Where there are no data, but the indicator is regarded as crucial for understanding important social or ecological trends, the SEMP recommends that GoB finds the necessary resources¹⁰ to initiate and maintain data gathering, monitoring and reporting. Table 3 lists several indicators for which no data is currently available or regularly gathered. It is strongly recommended to invest in establishing the means to generate the required data. In the case of some issues (e.g. the spread of water hyacinth) a study will be required to establish a baseline for future monitoring. Recommendations in this regard will be made.

The information obtained through monitoring is required for the completion of a SEMP report and refinement of the ESOs, their indicators and data gathering methods - as may be required or become evident as the SEMP is implemented. It is important that procedural arrangements are established and maintained to ensure that the monitoring system runs effectively and that data from year to year are replicable, comparable and auditable. Information received through monitoring can be of assistance when considering appropriate remedial action by the relevant stakeholders.

⁸ This figure might change in light of on going refinement of the indicators

⁹ The SCU should further develop the table in Annex B (particularly in year 1) - especially the last column on resources needed. Populating this column will require one-on-one discussions with the relevant institutions. Also, Annex B will require to be updated as a continuing process over the next 20 years, particularly to revise objectives/indicators where necessary on the basis of experience gained in monitoring (eg some indicators may become unnecessary or unworkable; others may be needed, etc.)]

¹⁰ These might be human, financial, equipment, software, etc.

Chapter 6: Institutional Responsibilities

Based on the table in Annex B, Table 4.1 in Chapter 4 sets out the responsibilities of the key institutions regarding the monitoring of key indicators.

However, in addition to the monitoring of indicators, institutions (both public and private sector) also have a responsibility to undertake a variety of management actions (Table 6.1). These are actions required to avoid or minimise negative environmental and social impacts. In this regard, individual projects will need to be planned and implemented bearing in mind the ESOs summarised in Annex A. All proponents, including government and private sector, will need to assume roles and responsibilities for particular actions. Also, the regulatory authorities will have to apply their respective oversight duties with diligence and integrity. This means that existing laws, regulations and guidelines must be effectively and fully implemented and pursued.

For practical reasons, Table 6.1 lists sectors rather than institutions. It is assumed, of course, that the institutions (including proponents of development activities) working within the respective sector, will use the guidance provided in this table (and elsewhere in this SEMP) to improve the way they plan and implement their activities (notably programmes and projects).

Table 6.1: Management actions required per key sector

Issue/Sector	Key activities during 2021-2041	Management actions required to minimize project and cumulative impacts, and indicative responsible agency ¹¹
Environmental and social safeguards	<p>EIA guide and review, environmental management, pollution control, natural resources management, etc.</p> <p>Social safeguards include involuntary resettlement, conflict resolution, gender, labour, etc.</p>	<p>The MoEFCC is responsible for all matters relating to National Environmental Policy and regulatory issues, including EIA. It plays key roles in planning, reviewing, monitoring and environmental initiatives and ensuring that environmental concerns are properly handled. MoEFCC supervises the DoE and can formulate policies and rules. The DoE has constituted a Technical Committee for the review process.¹²</p> <ul style="list-style-type: none"> • Implementation of social safeguards to be elaborated further during initial phase of SEMP implementation. Primary responsibility for particular social safeguards is as follows: • <i>Gender</i>: Ministry of Women and Children Affairs (MoWCA); Department of Women Affairs (DoWA); • <i>Employment, Labour and working conditions</i>: Ministry of Labour and Employment (MoLE); Department of Labour (DoL); • <i>Community, occupational health and safety</i>: Ministry of Health and Family Welfare (MoHFW); Ministry of Local Government, Rural Development and Co-operatives (MoLGRDC); Department of Public Health Engineering (DPHE); • Land acquisition, restrictions on land use and involuntary resettlement: Ministry of Land (MoL); Deputy Commissioner of the District. (DC); • Indigenous peoples /minorities: Ministry of Cultural Affairs (MoCA); • Cultural heritage: Ministry of Civil Aviation and Tourism (MoCAT); Bangladesh Parjatan Corporation(BPC);

¹¹ Specific responsibilities will need to be elaborated and agreed during the first few months of SEMP implementation

¹² See Annex B for further elaboration

Issue/Sector	Key activities during 2021-2041	Management actions required to minimize project and cumulative impacts, and indicative responsible agency ¹¹
		<ul style="list-style-type: none"> • Stakeholder engagement: Ministry of Social Welfare (MoSW) and respective concerned organization; • Information disclosure: Ministry of Information and Broadcasting (MoIB); Directorate of Mass Communication.(DoMC); • <i>Social security (vulnerable and destitute people)</i>: Ministry of Social Affairs, (MoSA); Local Government Institute (LGI).
Conservation	Management of the Sundarbans.	<ul style="list-style-type: none"> • Bangladesh Forest Department (BFD) under the MoEFCC is mandated to manage the Sundarbans in a sustainable manner through co-management by involving local resource users, efficient and standardize effective patrolling, and proper ecological monitoring. The relevant GoB agencies at the national and local level, as well as Co-Management structures, must continue to implement mechanisms that improve the management of the Sundarbans. This must be achieved through four components¹³: <ul style="list-style-type: none"> ○ Coordination by the local representation of the BFD in Khulna of the different measures that are being implemented in the Sundarbans by government agencies, with other stakeholders, should be improved; ○ The participation of resource users (women and men) through co-management approach; ○ The logistics and capacities of the personnel of the local BFD must be improved; ○ In order to tackle illegal activities such as poaching and illegal fishing, close collaboration of all stakeholders and information exchange is crucial for ensuring its long-term protection. Central to this effort is the Spatial Monitoring and Reporting Tool (SMART) to help wildlife managers plan, evaluate and implement effective law enforcement and monitoring. • As recommended in the SEA report, additional coordinating committee is proposed, to (inter alia) improve effective local liaison mechanisms, e.g. among BFD, Police, RAB, Coast Guard, Mongla Port Authority, BIWTA, Bangladesh Tourism Authority, DoF, DoE and others.
Industry	<ul style="list-style-type: none"> • Rapidly expanding industrialization. 	<ul style="list-style-type: none"> • Conduct EIAs for all major projects, in accordance with the relevant GoB statutory requirements, and ensure that each project has an outcomes-based EMP. For complex, controversial or conflicting interest projects, consider an external/independent review of the EIA/EMP. • Based on EIA/EMP, ensure all projects obtain and comply with individual sector permits (including labour, pollution, water, land, biodiversity, cultural, etc.). • Integrate EMP requirements into the project budget (whether in-house or sub-contracted) and ensure compliance by all contractors and sub-contractors. • Ensure Interested and Affected Parties are adequately consulted during project planning and, where relevant and appropriate, during implementation.

¹³ <https://www.giz.de/en/worldwide/37949.html>

Issue/Sector	Key activities during 2021-2041	Management actions required to minimize project and cumulative impacts, and indicative responsible agency ¹¹
		<ul style="list-style-type: none"> • Appoint a dedicated environmental officer(s) to oversee project construction and implementation, especially for large projects (if necessary, provide adequate training to the officer(s)). • Locate projects in brownfield sites or existing servitudes wherever possible. • Apply or install best available technology (bearing in mind affordability) to minimize pollution. • Use local resources (input materials, labour and service providers) wherever possible and practicable. • Monitor the implementation of the EMP and periodically assess the effectiveness of impact avoidance or mitigation measures.
Transport	<ul style="list-style-type: none"> • Expansion and or upgrading of the road and rail network, and upgrading, maintenance and re-instatement of the river transport network. 	<ul style="list-style-type: none"> • Conduct EIAs for all major projects, in accordance with the relevant GoB statutory requirements, and ensure that each project has an outcomes-based EMP. For complex, controversial or conflicting interest projects, consider an external/independent review of the EIA/EMP. • Based on EIA/EMP, ensure all projects obtain and comply with individual sector permits (including labour, pollution, water, land, biodiversity, cultural, etc.). • Integrate EMP requirements into the project budget (whether in-house or sub-contracted) and ensure compliance by all contractors and sub-contractors. • Ensure Interested and Affected Parties are adequately consulted during project planning and, where relevant and appropriate, during implementation. • Appoint a dedicated environmental officer(s) to oversee project construction and implementation, especially for large projects (if necessary, provide adequate training to the officer(s)). • Locate projects in brownfield sites or existing servitudes wherever possible. • Ensure safeguards are in place to avoid or minimize ribbon development, and especially to prevent people establishing informal housing or businesses in the registered servitudes. • Ensure that dredging and alterations to waterways do not undermine ecological processes and thus the provision of ecosystem services. • Apply or install best available technology (bearing in mind affordability) to minimize pollution. • Use local resources (input materials, labour and service providers) wherever possible and practicable. • Monitor the implementation of the EMP and periodically assess the effectiveness of impact avoidance or mitigation measures. • Bigger vessels must not exceed the speed of 10 knots in the port channel along the Passur River. They must take on a pilot for entry to and departure from Mongla port (who will (inter alia) ensure compliance with this speed. • Regulations are needed for smaller river boats (to address speed, behaviour, etc).
Urban	<ul style="list-style-type: none"> • Expansion and modernisation of cities and towns. 	<ul style="list-style-type: none"> • Ensure good town planning so that inhabitants derive maximum benefits from modernization initiatives, including (but not limited to) :

Issue/Sector	Key activities during 2021-2041	Management actions required to minimize project and cumulative impacts, and indicative responsible agency ¹¹
		<ul style="list-style-type: none"> ○ Improved access to utilities such as roads, transport systems, shops, schools, green spaces, etc; ○ Set up locally accessible health and law-enforcement services; ○ Avoid clearing of trees and promote planting of indigenous and fruit trees; ○ Better planning and enforcement of plans – so people are prevented from settling in flood-prone areas; ○ Well-planned infrastructure designs (e.g. culverts, bridges) that prevent water build-up; ○ Good waste management, as culverts and stormwater drains often get clogged by litter; ○ Improved early-warning systems so people have time to plan adaptation measures or evacuate; ○ Improve construction and design of houses and infrastructure. ● Conduct EIAs for all major projects, in accordance with the relevant GoB statutory requirements, and ensure that each project has an outcomes-based EMP. For complex, controversial or conflicting interest projects, consider an external/independent review of the EIA/EMP. ● Based on EIA/EMP, ensure all projects obtain and comply with individual sector permits (including labour, pollution, water, land, biodiversity, cultural, etc.). ● Integrate EMP requirements into the project budget (whether in-house or sub-contracted) and ensure compliance by all contractors and sub-contractors. ● Ensure Interested and Affected Parties are adequately consulted during project planning and, where relevant and appropriate, during implementation. ● Appoint a dedicated environmental officer(s) to oversee project construction and implementation, especially for large projects (if necessary, provide adequate training to the officer(s)). ● Locate expansions in brownfield sites or existing footprints wherever possible. ● Apply or install best available technology (bearing in mind affordability) to minimize pollution. ● Use local resources (input materials, labour and service providers) wherever possible and practicable. ● Monitor the implementation of the EMP and periodically assess the effectiveness of impact avoidance or mitigation measures.
Power and Energy	<ul style="list-style-type: none"> ● New or upgrading of power plants and transmission lines, and technology investment for increased energy efficiency. 	<ul style="list-style-type: none"> ● Conduct EIAs for all major projects, in accordance with the relevant GoB statutory requirements, and ensure that each project has an outcomes-based EMP. For complex, controversial or conflicting interest projects, consider an external/independent review of the EIA/EMP. ● Based on EIA/EMP, ensure all projects obtain and comply with individual sector permits (including labour, pollution, water, land, biodiversity, cultural, etc.). ● Integrate EMP requirements into the project budget (whether in-house or sub-contracted) and ensure compliance by all contractors and sub-contractors.

Issue/Sector	Key activities during 2021-2041	Management actions required to minimize project and cumulative impacts, and indicative responsible agency ¹¹
		<ul style="list-style-type: none"> • Ensure Interested and Affected Parties are adequately consulted during project planning and, where relevant and appropriate, during implementation. • Appoint a dedicated environmental officer(s) to oversee project construction and implementation, especially for large projects (if necessary, provide adequate training to the officer(s)). • Locate projects in brownfield sites or existing servitudes wherever possible. • Apply or install best available technology (bearing in mind affordability) to minimize pollution. • Install bird flappers or other devices in areas where bird collisions are expected (e.g. wetlands, roosting sites). • Design power installations such that electrocutions of raptors and vultures are avoided. • Use local resources (input materials, labour and service providers) wherever possible and practicable. • Monitor the implementation of the EMP and periodically assess the effectiveness of impact avoidance or mitigation measures.
Forestry	<ul style="list-style-type: none"> • Conservation of Sundarbans forests and promotion of social forestry on farmland in the SW region. 	<ul style="list-style-type: none"> • The SEA did not identify significant negative impacts relating to this sector. It is thus regarded as relatively benign environmentally. However, proponents should avoid: <ul style="list-style-type: none"> • Planting alien-invasive or exotic species in social forestry practices; • Use of undesirable agrochemicals.
Fisheries	<ul style="list-style-type: none"> • Increased shrimp and fish production (capture and cultured). 	<ul style="list-style-type: none"> • Conduct EIAs for all major projects, in accordance with the relevant GoB statutory requirements, and ensure that each project has an outcomes-based EMP. For complex, controversial or conflicting interest projects, consider an external/independent review of the EIA/EMP. • Based on EIA/EMP, ensure all projects obtain and comply with individual sector permits (including labour, pollution, water, land, biodiversity, cultural, etc.). • Integrate EMP requirements into the project budget (whether in-house or sub-contracted) and ensure compliance by all contractors and sub-contractors. • Ensure Interested and Affected Parties are adequately consulted during project planning and, where relevant and appropriate, during implementation. • Appoint a dedicated environmental officer(s) to oversee project construction and implementation, especially for large projects (if necessary, provide adequate training to the officer(s)). • Locate projects in brownfield sites or existing footprints wherever possible - especially ensuring farms are not sited in critical habitats. • Minimise use of wild fish as an ingredient for feed. • Measure water quality parameters (nitrogen, phosphorus, oxygen levels, etc.) at regular intervals and remain within set limits. Treatment systems for waste-water need to comply with strict requirements. Prevent discharge of sludge.

Issue/Sector	Key activities during 2021-2041	Management actions required to minimize project and cumulative impacts, and indicative responsible agency ¹¹
		<ul style="list-style-type: none"> • Implement a health plan for the shrimp, including steps for biosecurity management, use of pathogen-free shrimp larvae for pond stocking. • Restrict use of medications, including antibiotics (see ASC guidelines). • Use local labour and service providers wherever possible and practicable. • Monitor the implementation of the EMP and periodically assess the effectiveness of impact avoidance or mitigation measures.
Water	<ul style="list-style-type: none"> • Dredging of rivers and construction of diversion structures (to enhance dry season flow and control floods). 	<ul style="list-style-type: none"> • Conduct EIAs for all major projects, in accordance with the relevant GoB statutory requirements, and ensure that each project has an outcomes-based EMP. For complex, controversial or conflicting interest projects, consider an external/independent review of the EIA/EMP. • Based on EIA/EMP, ensure all projects obtain and comply with individual sector permits (including labour, pollution, water, land, biodiversity, cultural, etc.). • Integrate EMP requirements into the project budget (whether in-house or sub-contracted) and ensure compliance by all contractors and sub-contractors. • Ensure Interested and Affected Parties are adequately consulted during project planning and, where relevant and appropriate, during implementation (include the users of waterways who might be inconvenienced by the dredging activities). • Appoint a dedicated environmental officer(s) to oversee project construction and implementation, especially for large projects (if necessary, provide adequate training to the officer(s)). • Ensure that dredging and alterations to waterways do not undermine ecological processes and thus the provision of ecosystem services. • Apply or install best available technology (bearing in mind affordability) to minimize pollution. • Use local resources (input materials, labour and service providers) wherever possible and practicable. • Monitor the implementation of the EMP and periodically assess the effectiveness of impact avoidance or mitigation measures.
Tourism	<ul style="list-style-type: none"> • Development of eco-tourism inside Sundarbans. 	<ul style="list-style-type: none"> • As far as possible, ensure local ownership and servicing of the tourism industry. • For all protected areas carrying capacity must be adhered to. • Adhere to conditions and requirements as set out in the Sundarbans Management Plan, especially ensure all boat operators adhere to the code of conduct – e.g: <ul style="list-style-type: none"> ○ No speeding (boats) so as to avoid excess noise, waves, collisions with dolphins; ○ No noisy tourists, no use of loud speaker; ○ No discharge of waste or pollution; ○ Boat engines regularly serviced to minimize fuel leakages, noise, exhaust emissions, etc; ○ Maintain a distance from wildlife (to avoid stressing the animals); ○ Avoid known wildlife breeding areas.

Issue/Sector	Key activities during 2021-2041	Management actions required to minimize project and cumulative impacts, and indicative responsible agency ¹¹
	<ul style="list-style-type: none"> • Diversified tourism activities outside Sundarbans. 	<ul style="list-style-type: none"> • As far as possible, ensure local ownership and servicing of the tourism industry. • Adhere to conditions and requirements as set out in the heritage laws, especially ensure operators and tourists adhere to the code of conduct – e.g: <ul style="list-style-type: none"> ○ No noisy tourists; ○ No discharge of waste or pollution; ○ No desecration of historical sites; ○ Always respect local communities and their traditional and cultural practices.
Agriculture	<ul style="list-style-type: none"> • Industrialisation of agriculture and increased production. 	<ul style="list-style-type: none"> • Conduct EIAs for all major projects, in accordance with the relevant GoB statutory requirements, and ensure that each project has an outcomes-based EMP. For complex, controversial or conflicting interest projects, consider an external/independent review of the EIA/EMP. • Based on EIA/EMP, ensure all projects obtain and comply with individual sector permits (including labour, pollution, water, land, biodiversity, cultural, etc.). • Integrate EMP requirements into the project budget (whether in-house or sub-contracted) and ensure compliance by all contractors and sub-contractors. • Ensure Interested and Affected Parties are adequately consulted during project planning and, where relevant and appropriate, during implementation. • Appoint a dedicated environmental officer(s) to oversee project construction and implementation, especially for large projects (if necessary, provide adequate training to the officer(s)). • Locate projects in brownfield sites or existing footprints wherever possible. • Apply or install best available technology (bearing in mind affordability) to minimize pollution. • Use local resources (input materials, labour and service providers) wherever possible and practicable. • Monitor the implementation of the EMP and periodically assess the effectiveness of impact avoidance or mitigation measures. These include (but not limited to): <ul style="list-style-type: none"> ○ Rotation crop cultivation and bio-char¹⁴ applications (to reduce CH₄ emissions); ○ Multiple drainage; ○ Alternate Wetting and Drying for reducing GHG emissions, water usage, fuel use and CH₄ emissions; ○ Application of tailor-made fertilizer based on soil testing, favouring environment friendly and organic products; ○ Preventing/minimizing elite capture & social exclusion.

¹⁴ Bio charis super charcoal made by heating any biomass.

Chapter 7: Going Forward: the Next Steps

The SEMP as presented here is a foundation and framework that needs to be built upon by the SCU and SAC in the coming months. The consultants engaged on this assignment can only take it so far: the next steps are the SCU and SAC taking ownership over the SEMP and building on this framework and filling in the gaps. It is recommended that in the first quarter of year 1 of the SEMP, the “missing pieces” are put in place once discussions and negotiations have been held with the relevant stakeholders, especially the institutions responsible for gathering data and implementing the various impact mitigation options. Also, note that the SEMP will always be “work in progress”, continuously refined and updated over time and with experience. It must be a “living document”.

Annexes

Annex A: Guidelines for EIA Terms of Reference¹⁵

The need for EIAs has become increasingly important and is now a statutory requirement in Bangladesh ¹⁶ with guidelines available - <https://moef.gov.bd/>.

Similarly, all major donors require some form of environmental analysis for a variety of projects. If an EIA is required, irrespective of the source of funding, the promoting agency will be required to either prepare it themselves or appoint others to do the study for them.

If the project is to be supported by a donor or UN agency and if the promoter intends to prepare the EIA study using its own staff, reference should be made to the publications prepared by the donors or UN agencies involved which will outline their own specific requirements and procedures. The World Bank Operational Directive 4.01 (1991) is perhaps the most comprehensive and well known manual and is a useful reference text. All international organizations and bilateral agencies frequently update their procedures and it is important to obtain the current version from the organization.

Usually government bodies do not employ sufficient staff to carry out EIAs. It is more cost-effective to appoint specialist consultants (local or foreign), universities or research institutions to carry out environmental assessments. In this case, terms of reference (ToR) will have to be prepared by the project promoter. As for any technical design or feasibility study, the ToRs for the EIA will determine its ultimate quality and value. The preparation of ToRs can cause considerable difficulties for non-experts and a brief guide to the major issues that must be addressed in the TOR are given below.

There are no universal formats for ToRs which will be suitable for every EIA. However, there are general rules which should be observed when preparing ToR for an EIA. The EIA should ensure that the consultants focus on the major issues and the most serious likely impacts. The opportunities for enhancing any positive benefits from the project should also be highlighted.

The EIA should identify the relevant natural resources, the eco-system and the population likely to be affected. Direct and indirect environmental and social impacts must be identified and any particularly vulnerable groups or species highlighted. In some instances, views will be subjective and the consultants should give an indication of the degree of risk or confidence and the assumptions on which conclusions have been drawn. In most cases, the output required will be a report examining the existing environment and social context, and the impacts of the proposed project on the environment and society, the impacts of the environment and socio-economic factors on the project- both positive and negative. The EIA should also identify the required mitigating measures and any actions needed. Interim reports, for example of baseline studies, should be phased to be of maximum value to parallel technical and economic studies.

The timing of the EIA is important. Scoping prior to a full EIA will enable the major issues to be identified. The terms of reference for the full EIA can then be better focused. The study should be carried out early enough in the project cycle to enable recommendations to be incorporated into the project design.

¹⁵Modified from <http://www.fao.org/3/V8350E/v8350e0d.htm>

¹⁶ EIA has been practiced in Bangladesh since the late 1980s but it is through the enactment of the Environment Conservation Act, 1995 and the Environment Conservation Rules, 1997 EIA gained formal status in the country.

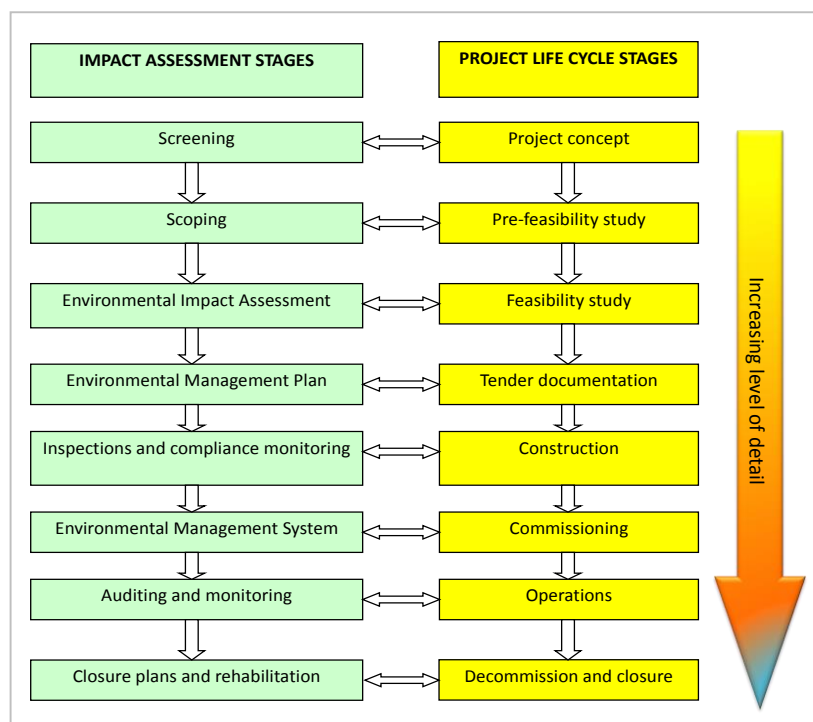


Figure A1: Synchronizing EIA with typical project life cycle stages

The requirements stated in the ToR will determine the length of time needed for the study, the geographical boundary of the EIA, its cost and the type of expertise required. Baseline data collection, if needed, can be time consuming and will have a major impact on the cost and time needed for the study. If considerable data exists (e.g. a good record of water quality information and hydrological statistics), the EIA may be possible without further primary data collection. If data are scarce or unreliable, time must be allowed for field measurement and analysis.

Prior to writing the ToR, the following questions should be asked:

- Is the study for an environmental scoping, a full EIA or other type of environmental or social assessment study? Before preparing the ToR the purpose must be clear.
- Is the study to be for a site-specific project or a regional or sectoral programme? The breadth of the study needs to be well defined.
- Will the EIA team be required to collect baseline data or does this already exist? The depth of the study and the type and quality of information already available or needed must be known.
- Who will use the final report? Different end-users will often require different information. Readers may not be technical experts and careful thought should be given to the presentation of complex information. A summary may be required in Bangla to make the material more accessible and understandable.
- What output is required from the EIA study? Is an Environmental Action Plan or Environmental Management Plan (EMP) to be prepared? A draft contents page for the final SEA report - as an annex to the ToR- will give some guidance to the team carrying out the study.
- Is the team responsible for all issues or are other organizations (universities, government departments) responsible for some environmental and/or social studies? The ToR should clearly delimit responsibilities and give information on other work being done. If it is a

requirement that the team liaise or work with other organizations, including NGOs, then this should be stated. Unabridged versions of the sub-contracted studies should be made available to the appraising authority for reference.

- What type of experts are needed in the team and for how long? An approximate estimate is needed to prepare a budget for the study and to estimate the time period. However, the TOR should not be too rigid on the number and type of expertise to be provided as there should be some flexibility for the team to decide on the most appropriate methodology and additional staffing.
- The ToR should commence with a brief description of the project. This should include a plan of the area that will be affected either indirectly or directly.
- An overview of the local environment should follow the general description. This will include socio-economic information, land use, land tenure, water use in the area and any particular aspect of the flora and fauna. If other relevant studies have been completed a list of available reports should be given.
- A brief description should be given of the most important institutions, including those responsible for the EIA, the project executing agency and future managers. This should be presented in the form of an organogram.
- A description of the work to be undertaken should give a general set of requirements for determining the potential impacts of, and impacts on, the proposed project. The TOR should require the consultants to cover the following points:
 - whether a range of proposals (alternatives) should be considered and, if so, whether they would be less environmentally damaging;
 - the main environmental and social effects of the proposed project, both in the project area and in the surrounding area and the timescale of the impacts;
 - the size and extent of the impacts - based as much as possible on quantitative data rather than qualitative assessment. In some cases, it may be necessary to highlight certain topics (such as waterlogging, resettlement, etc.) when a particular issue is known to be of concern. In most cases, however, it may be preferable not to mention any specific topic and make the consultant responsible for a complete review of all topics;
 - those groups that will benefit from or be disadvantaged by the project;
 - the impact on any rare species of plant or animal in the area;
 - the impact on human health;
 - the control and management aspects of the project to determine if they will be effective;
 - the need for further baseline data collection or other specialist studies;
 - the present policy, institutional and legislative situation and future needs;
 - the mitigating measures needed and how they should be incorporated into the project design;
 - the monitoring and evaluation activities that are required to ensure that mitigating measures are implemented and future problems are avoided (ie. The requirements for an EMP).

The TOR should give an indication of the team considered necessary for the study. Depending on the scope of the study, this may include one or several of the following: sector or subject specialists (e.g. water management, drainage, rural sociologist, ecologists (of various specializations), agriculture/fisheries, hydrologist, agronomist, soil chemist or physicist, economist, epidemiologist, archaeologist, etc). However,

as mentioned earlier, the team should not be rigidly imposed on the consultant and its composition must be determined by the nature of the project and the characteristics of the receiving environment.

It is important to make provision for technology transfer. Apart from enabling in-country expertise to be built up, this will promote more involvement and understanding of the issues raised by the EIA study. As most EIAs are of relatively short duration (usually a few months to a year), this is probably best achieved through the attachment of government staff to the consultants during the study or an insistence on the use of local government personnel for some of the tasks.

The expected date of commencement and time limit should be given. An environmental screening can be done quickly as part of the general project identification. In most cases, scoping (mainly to determine the key issues) can be done in one to three months using checklists or other techniques assuming adequate data is readily available. Up to 12 months is needed for a full EIA for a medium or large scale project although this could be longer if the project is complex or considerable primary data have to be collected or field measurement undertaken.

The budget limit should be given in the ToR. The type of experts, and whether foreign or local, and the duration of their inputs will usually be the deciding cost factors, although a large field survey or measurement programme with laboratory analysis could significantly increase costs.

Any assistance to be provided by the client should be clearly stated in the ToR. Reporting requirements should be clearly stated. An annex giving a draft table of contents for the final report (the Environmental Impact Statement) is helpful as this will standardize presentation and ensure all aspects are covered by the consultants.

Bangladesh EIA system

Bangladesh initiated environmental impact assessment (EIA) guidelines in 1992 for the water sector development. The country enacted the Environmental Conservation Act (ECA) in 1995 (including amendments) followed by Environmental Conservation Rules (ECR) in 1997 (including amendments) to govern all development activities, requirements of IEE/EIA studies based on the project categories and also obtaining of Environmental Clearance Certificate for each project. A number of evaluations have concluded that although performance is improving, it is not making full use of the potential of environmental and social impact assessment (ESIA).

The National Environment Policy 2018, makes EIA mandatory for all Red Category projects as per ECR 1997. The National Environmental Policy (1992) required EIA for all new public and private projects. The Environmental Conservation Act (ECA) (1995) introduced mandatory provisions for environmental clearance of all industrial units and projects. Formal status for EIA was also given through the Environmental Conservation Rules (ECR) (1997) which provided a procedure for granting environmental clearance under article 7. The Environmental Conservation Act was amended through the Environment Court Act (Act No. 11 of 2000) with further amendments introduced in 2002 and 2003. Further amendments to the Rules were made in 2012, and to the Environment Conservation Act in 2010. Additionally, ECA rules for public comments have been drafted. Additionally, in 2016, the government finally adopted the Ecologically Critical Areas Management Rules.

EIA-related guidelines are available for (a) industries (1997) and (b) the water sector - prepared under the Flood Action Plan (1992 and updated in 2003). The DoE has drafted EIA guidelines for several sectors including: coal mining, gas, pharmaceuticals, cement factories, water and transport sectors. The Water Resources Planning Organization (WARPO) and the Local Government Engineering Department (LGED) have developed their own EIA guidelines.

The Department of Environment (DoE) is the responsible body for implementing and enforcing EIA. Under the provision of the Environment Conservation Act, 1995, DoE and its six divisional offices, are authorized to review and approve the EIA reports and to process and issue environmental clearance for all types of industrial units and projects. They are also mandated to formulate environmental guidelines and advise

the Government to reject manufacturing processes, materials and substances likely to cause environmental pollution. Within the office of the Director, a unit coordinates EIA-related services.

The Ministry of Environment, Forest, and Climate Change (MoEFCC) is the principal government institution responsible for environmental activities in Bangladesh and for all matters relating to National Environmental Policy and regulatory issues. It plays key roles in planning, reviewing, monitoring and environmental initiatives and ensuring that environmental concerns are properly handled. MoEFCC supervises the DoE and can formulate policies and rules. The DoE has constituted a Technical Committee for the review process.

Project proponents pay a fee to obtain an Environmental Clearance Certificate, and a fee to renew the certificate once a year for Red, Orange – A and B category projects and once every three years for Green category projects.

Screening of projects is undertaken by the DoE based on a list contained in Schedule I of the Environment Conservation Rules (1997). Projects are placed in one of 4 categories based on location and impact on the environment (a location clearance is required for location and an environmental clearance is required for environmental impacts).

- Green - require no site clearance but an environmental clearance (all other categories require a site clearance);
- Orange A - requires a layout plan, process flow diagram and outlines of plans for relocation and rehabilitation;
- Orange B - require both an Initial Environmental Examination (IEE) and an EMP for clearance;
- Red - require a full EIA and an EMP.
- Sensitive areas: under the ECR (1997), the government may declare certain areas as sensitive. Projects in such areas require a full EIA.

After an IEE is approved and the proponent has obtained a Site Clearance Certificate for the project, the proponent is allowed to begin preparation works for the project. For Red category projects, the DoE prepares a Terms of Reference in conjunction with the proponent which is used by the proponent to prepare an EIA. Scoping mainly involves baseline studies.

The EIA Guidelines for Industries advise the use of checklists, matrix networks, overlays, environmental index using factor analysis, cost-benefit analysis and simulation modelling. It also suggests methodologies on impact evaluation, prediction and identification of mitigation measures. The guidelines suggest public participation. The public and NGOs are invited (discretionary) to give their views on the draft EIA report that is produced.

EIA reports are required to address standard contents:

- baseline studies;
- impact identification;
- impact prediction;
- impact evaluation;
- mitigation measures;
- monitoring program;
- special studies (for example risk assessment, rehabilitation study etc).

The DoE is responsible for EIA report review through a technical committee which follows the industrial and water sector guidelines on review. In general, the DoE offices in each of the six divisions receive applications and issue Environmental Clearance Certificates for proposed investments within that division.

The divisional offices verify supporting documents and the divisional head then assigns an inspector for follow-up. The inspection report is treated as follows:

- Green and Orange A category projects – application submitted to the district office for decision
- Orange B category projects – application submitted to the district office which conducts inspection and prepares a review report. This report is sent to the divisional/regional office for decision.
- Red category projects – application submitted to the district office which conducts an inspection and prepares a review report. This report is sent to the divisional office and is then forwarded to the DoE Head Offices ECC Committee for decision.

Rule 11 of the Environmental Conservation Rules prescribes that for projects under category Red, the EIA report shall be approved or the application for an environmental clearance certificate shall be rejected within 60 working days from when the EIA report was submitted. There are legal provisions for EIA compliance and monitoring. Monitoring is said to be conducted on an ad-hoc basis. Suspension of clearance is possible. The ECA provides that failure to comply with any part of it may result in the punishment of a maximum of 5 years imprisonment or a maximum fine of 100,000Tk or both.

The ECA 1995 (amended in 2010) requires that to obtain a clearance certificate, there must be a survey of public opinion, and information must be sought from the public about all related matters and reported in detail. In addition, the water sector guidelines suggest public participation at the early stage of an EIA study and recognize the need to consider socio-cultural, physical and biological impacts. According the EIA guidelines for industries, opportunities for the public to participate are under the discretion of the Director General of DoE.

The Environmental Courts Acts of 2000 establishes Environmental Appeal Courts for environmental offences (in general). Appeals can also be made to specialized magistrate courts where environmental laws provide for a penalty of an imprisonment not exceeding 2 years or a fine not exceeding 10,000Tk or both.

The decision on the issuance of an Environmental Clearance Certificate can be appealed.

Any person may appeal, within 30 days from the date of issuance of the notice. An appeal fee of 1000 Taka is charged to any appellant including the general public.

Annex B: ESO Objectives, Indicators and Institutions Responsible for Monitoring

This table is a work-in-progress. It will be updated again in the Final SEMP, and will require to be further developed by the SCU during year 1 in consultation with implementing agencies, and kept under rolling review throughout the next 20 years. In particular the final column needs to be populated following discussions with relevant institutions.

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
Forest, Protected areas and biodiversity	1 Reduce over-exploitation/ degradation of habitats, loss of biodiversity and ecosystem (s) integrity and services	1 Status of the mud crab (<i>Scylla spp.</i>) as a key indicator of aquatic biodiversity in the Sundarbans	None yet	None yet	None yet	None yet	Ministry of Fisheries and Livestock (MoFL) Secretary, MoFL, email: secretary@mofl.gov.bd , Phone: 9545700 & Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd , Phone: 9540481	Department of Fisheries (DoF) Director General, DoF email: dg@fisheries.gov.bd , Phone: 9562861 & Bangladesh Forest Department (BFD) Chief Conservator of Forests, BFD email: ccf-fd@bforest.gov.bd , Phone: 01999000001	Department of Fisheries (DoF) 1. Director, Finance & Planning, DoF. email: ddfinance@fisheries.gov.bd Bangladesh Forest Department (BFD) 2. Conservator of Forests, Wildlife and Nature Conservation Circle, BFD, Dhaka. email: mihir_fd@yahoo.com , Cell: 01712566001	Annual	
		2 Status of suitable habitat for dolphin (in	Poor Good Very good ¹⁷	Very good	2018-19	BFD, 2020	Ministry of Environment Forest and Climate Change (MoEFCC)	Bangladesh Forest Department (BFD) Chief Conservator of Forests, BFD.	BFD 1. Conservator of Forests, Wildlife and Nature	Propose Every 3 years	

¹⁷**Poor:** Where the environmental factors and food accessibility for dolphins is not enough for basic life cycle requirements and where interference by fishermen and boat movement disturbance is high.

Good: Where the environmental factors and food accessibility for dolphins is enough for basic life cycle requirements, and interference by fishermen and boat movement disturbance is low.

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
		sanctuaries & hotspots)					Secretary, MoEFCC, email: secretary@moef.gov.bd , Phone: 9540481	email: ccf-fd@bforest.gov.bd Phone: 01999000001	Conservation Circle, BFD, Dhaka. email: mihir_fd@yahoo.com, Cell: 01712566001 2. Conservator of Forests, Khulna Circle. Khulna, BFD, email: moyeenfd@gmail.com, Cell: 01818619161 3.DFO, N&WLC Division, Khulna, BFD		
		3 Status of suitable habitat for <i>Heritiera fomes</i> (Sundri) (less saline zone)	Poor Good Very good ¹⁸	Good	2017	BFD, 2017	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd , Phone: 9540481	Bangladesh Forest Department (BFD) Chief Conservator of Forests, BFD email: ccf-fd@bforest.gov.bd Phone: 01999000001	BFD 1.DCF, RIMS Unit email: z.iqbal60@gmail.com Cell: 01711443750	Every 5yrs	
		4 Forest and tree coverage in Sundarbans	Ha	399,900 (approx)	2018-19	GoB, 2019	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd , Phone: 9540481	Bangladesh Forest Department (BFD) Chief Conservator of Forests, BFD email: ccf-fd@bforest.gov.bd	BFD 1.DCF, RIMS Unit email: z.iqbal60@gmail.com Cell: 01711443750	Every 5yrs	

Very good: Where the environmental factors and food accessibility for dolphins is abundant for basic life cycle requirements, and there is no interference by fishermen and boat disturbance.

¹⁸**Poor:** High saline and water influenced area of the Sundarbans [water salinity 18-30 ppt; water salinity influence the soil salinity up to > 4 dS/m and influence the vegetation growth and composition]

Good: Moderate saline and water influenced area of the Sundarbans [water salinity 5-18 ppt; water salinity influence the soil salinity up to 2 to 4 dS/m and influence the vegetation growth and composition]

Very good: Less saline and water influenced area of the Sundarbans. [water salinity 0-5 ppt; water salinity influence the soil salinity < 2 dS/m and influence the vegetation growth and composition]

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,		
							secretary@moef.gov.bd , Phone: 9540481	Phone: 01999000001	2. Conservator of Forests, Khulna Circle. Khulna, BFD email: moyeenfd@gmail.com , Cell: 01818619161				
		5	Population size of Tiger in Sundarbans	No.	114	2018	Aziz et al, 2018	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd , Phone: 9540481	Bangladesh Forest Department (BFD) Chief Conservator of Forests, BFD email: ccf-fd@bforest.gov.bd , Phone: 01999000001	BFD 1. Conservator of Forests, Wildlife and Nature Conservation Circle, BFD, Dhaka. email: mihir_fd@yahoo.com , Cell: 01712566001	Every 2 yrs		
	2	Reduce illegal activities related to protected areas and biodiversity	6	No of reported cases of illegal resource extraction (e.g. poaching, illegal fishing, fish poisoning, & Illicit felling)	No.	772	2018-19	BFD, 2020	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd , Phone: 9540481	Bangladesh Forest Department (BFD) Chief Conservator of Forests, BFD email: ccf-fd@bforest.gov.bd Phone: 01999000001	BFD 1. Conservator of Forests, Khulna Circle. Khulna, BFD email: moyeenfd@gmail.com Cell: 01818619161	Annual	
			7	Seized products (timber)	Cubic m	104.61	2018-19	BFD, 2020	As above	As above	As above	As above	
	3	Reduce introduction and spread of Invasive Alien Species	8	Extent of water hyacinth	Hectares	None yet	None yet	None yet	DoE and DAE	To be determined	To be determined	annual	
Waste and pollution	4	Reduce poor management and	9	Capacity of recycling plants in SW region	Very good/ Good/ Moderat	Poor	2020	MIA, 2020	Ministry of Housing and Public Works (MoHPW) Secretary, MoHPW	Urban Development Directorate (UDD) Director, UDD	UDD 1.Senior Planner, UDD email: fhaq321@yahoo.com	Annual	

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
	unsafe disposal of solid and liquid waste (urban & industrial)		e/ Poor/ Very poor ¹⁹				email: secretary@mohpw.gov.bd , Phone: 9540465	email: director.UDD1965@gmail.com , Phone: 9562728, & Khulna City Corporation (KCC), Executive Engineer (Mechanical Khulna City Corporation, email: abdul.aziz.kcc@gmail.com , Cell: 01711132992	Cell: 01711-033800 KCC 1. Conservancy Officer Khulna City Corporation (KCC) E-mail: aniskcc@yahoo.com Cell: 01711981551		
10		% Plastic in secondary disposal sites (city dumpsite) being recycled	%/yr	69	2012	Zaman et al., 2012	Same as above	Same as above	Same as above	Annual	
11		Total volume waste per capita in Khulna City Corporation area	Kg/ person/ day	0.40	2018	Ahmed & Moniruzzaman, 2018	Ministry of Housing and Public Works (MoHPW) Secretary, MoHPW email: secretary@mohpw	Khulna City Corporation (KCC), Executive Engineer (Mechanical Khulna City Corporation, email:	1. Conservancy Officer Khulna City Corporation (KCC) E-mail: aniskcc@yahoo.com Cell: 01711981551	Annual	

¹⁹**Verygood** = The state where all the municipal solid waste in urban areas of SW region is recycled and properly managed without posing any threats to environment, and 70-90% of waste is converted into resources.

Good = The state where all the municipal solid waste in the urban areas of SW region is recycled and properly managed without posing any threats to environment, with 50-69% of waste converted into resources.

Moderate = The state where 50 -75% of the municipal solid waste in the urban areas of SW region is recycled and properly managed without posing any threats to environment, with 30-49% of waste converted into resources.

Poor = The state where around 25% of the municipal solid waste in the urban areas of SW region is recycled and properly managed only, with no waste converted into resources.

Very Poor = The state where less than 25% of municipal solid waste in the urban areas of SW region is recycled and properly managed, with no waste converted into resources.

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,		
							.gov.bd , Phone: 9540465	abdul.aziz.kcc@gmail.com, Cell: 01711132992					
		12	Solid waste sent to Khulna city facilities	%	35	2018	Ahmed & Moniruzzaman, 2018	Same as above	Same as above	Same as above	Annual		
	5	Reduce all forms of pollution (air, water, noise etc.)	13	Dry season water quality (nitrate) at Passur-Mongla Confluence	mg/litre annual avg	3.30	2019	CEGIS 2019	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd , Phone: 9540481	Department of Environment (DoE) Director General, DoE email: dg@doe.gov.bd Phone: 8181800	DoE 1. Director, NRM, DoE, email: dirnrm@doe.gov.bd, Cell: 01718114188 2. Director, Khulna Divisional Office, DoE, Email: khulna@doe.gov.bd, Cell: 01718591339 3. Deputy Director (Laboratory), Khulna Divisional Office, DoE, Email: saiful.doe11@gmail.com, Cell: 01748978129 4. Deputy Director, Bagerhat District Office, DoE, Email: bagerhat@doe.gov.bd, Mobile/Phone: 0468-64201	Annual	
		14	Dry season water quality (phosphate) at Passur-Mongla Confluence	mg/litre annual avg	0.30	2019	CEGIS 2019	Same as above	Same as above	Same as above	Annual		
		15	Dry season water quality (biological oxygen	mg/litre annual avg	3.00	2015	Rahman et al., 2015	Same as above	Same as above	Same as above	Annual		

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
		demand) at Passur-Mongla Confluence									
		16 Dry season water quality (nitrate) at Harbaria, Sundarbans	mg/litre annual avg	2.10	2019	CEGIS 2019	Same as above	Same as above	Same as above	Annual	
		17 Dry season water quality (phosphate) at Harbaria, Sundarbans	mg/litre annual avg	0.30	2019	CEGIS 2019	Same as above	Same as above	Same as above	Annual	
		18 Dry season water quality (biological oxygen demand) at Harbaria, Sundarbans	mg/litre annual avg	2.00	2015	Rahman et al, 2015	Same as above	Same as above	Same as above	Annual	
		19 No hrs. in which noise exceeds 45dBA in the 'Silent Zone' in the Sundarbans) ²⁰	Hrs./day	4-5 ²¹	2018	CEGIS 2018	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd, Phone: 9540481	Department of Environment (DoE) Director General, DoE email: dg@doe.gov.bd Phone: 8181800	DoE 1. Director, Department of Environment, Dhaka Laboratory Office E-mail: dhakalab@doe.gov.bd, Cell: 01712125880 2. Director, Air Quality Management, Department of	Method, duration and coverage to be revised	

²⁰Bangladesh standard (Environmental Conservation Rule-ECR-1997) for Silent zone (45 dBA)

²¹Discontinuously when Cargo and ships move and honk

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,	
									Environment,E-mail: nazmul@doe.gov.bd, Cell: 01819427358			
		20	No hrs. in which noise exceeds 60dBA in the 'Mixed Zone' at Mongla during daytime ²²	Hrs./day	6 ²³	2018	CEGIS, 2018	Same as above	Same as above	Same as above	As above	
		21	Underwater noise	dBa	None yet	None yet	None yet	MoEFCC	DoE	DoE BFD WCS	As above	
		22	Average Day time noise in mixed zone area of Mongla ²⁴	dBa	55-56	2018	CEGIS 2018	Same as above	Same as above	Same as above	As above	
		23	Ambient Concentration of PM2.5 at Khulna during worst case situation	µg/m ³ (Avg over 24 hr)	138	Jan, 2019	http://cas.e.doe.gov.bd	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd, Phone: 9540481	Department of Environment (DoE) Director General, DoE email: dg@doe.gov.bd Phone: 8181800	DoE 1. Director, Air Quality Management, Department of Environment,E-mail: nazmul@doe.gov.bd, Cell: 01819427358 2. Director, NRM, DoE, email: dirnrm@doe.gov.bd, Cell: 01718114188	continuous	As above

²²Bangladesh standard (Environmental Conservation Rule-ECR-1997) for Mixed zone (60 dBA) (Given projected values are the summation of discrete intervals)

²³ Discontinuous when cars, trucks, motorbikes, other heavy commercial vehicles and municipal activities occurs as well as noise from public gatherings.

²⁴This is a mainly residential area, and also simultaneously used for commercial and industrial purposes.

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,		
		24	Ambient Concentration of NO ₂ at Khulna during the worst case situation	µg/m ³ (Avg over 24-hr)	97.8	Feb, 2018 (Winter data)	http://case.doe.gov.bd	Same as above	Same as above	Same as above	continuous		
	6	Minimise emissions of greenhouse gases	25	Total emissions of CO ₂ from SW region	Million-ton CO ₂ eq/year	8.7	2019	Gains, 2020	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd, Phone: 9540481	Department of Environment (DoE) Director General, DoE email: dg@doe.gov.bd Phone: 8181800	DoE 1. Director (Climate change & International Convention), DoE email: dircc@doe.gov.bd, Cell: +8801720222363 2. Director, NRM, DoE, email: dirnrm@doe.gov.bd, Cell: 01718114188	Annual	
		26	Total emissions of CH ₄ for SW region	Million-ton CO ₂ eq/year	12.8	2019	Gains, 2020	Same as above	Same as above	Same as above	Annual		
Climate change and disasters	7	Reduce vulnerability to climate change and natural disasters (floods, storm surges, etc.)	27	Storm surge inundation	% of SW region	Cyclone Sidr: 10	2007	WB, 2011	Ministry of Disaster Management and Relief (MoDMR) Secretary, MoDMR email: secretary@modmr.gov.bd Phone: 9540877	Department of Disaster Management (DDM) Director General, DDM email: dg@ddm.gov.bd, Phone: 8835495	DDM 1. Deputy Director (Research) Disaster Management Division, email: nurulhaquechowdhury@gmail.com, Mobile: 01711399633	Event based – the data are only collected after the event	
		28 (a)	SW Salinity intrusion (into groundwater)	% of SW region: 1PPT	70	2011	CEGIS Bay of Bengal Model	Ministry of Water Resources (MoWR) Secretary, MoWR email: secretary@mowr.gov.bd, Phone: 9576773	Bangladesh water Development Board (BWDB) Director General, BWDB email: dg@bwdb.gov.bd, Phone: 22230011 &	BWDB Chief Engineer (Civil), Hydrology, email: ce.hydrology@bwdb.gov.bd, Phone: 029550815	Continuous		

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
							& Ministry of Local Government, Rural Development & Co-operatives	Department of Public Health Engineering (DPHE) Chief Engineer, DPHE, email: ce.dphe@gmail.com. Phone: 55130752	DPHE Superintending Engineer (Ground Water Circle), email: se.gwc@dphe.gov.bd, Phone: 02-9342485		
		28 (b) As above	% of SW region: 5PPT	45	As above	As above	As above	As above	As above	As above	
		29 Number of Households severely affected ²⁵ during extreme flood or related climate change event	No.	17,370 on average per annum (from 2009-2014)	2019	BBS, 2015a	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd, Phone: 9540481	Bangladesh Climate Change Trust (BCCT) Managing Director, BCCT email: md@bcct.gov.bd, Phone: 222290959	Bangladesh Climate Change Trust (BCCT) 1. Director (Monitoring & Evaluation), BCCT, email: dir-me@bcct.gov.bd, Phone: 222282593 2. Deputy Secretary, (Env-2), MoEFCC Email: env2moefcc@gmail.com, Mobile: 01711047882	calamity / event based Data collated annually	
		30 Length of embankment strengthened ²⁶	Km (future values in % of total)	180 Km (out of 1821Km -in 41 Polders) (9.88 %)	2020	(World Bank and BWDB)	Ministry of Water Resources (MoWR) Secretary, MoWR email: secretary@mowr.gov.bd, Phone: 9576773	Bangladesh water Development Board (BWDB) Director General, BWDB email: dg@bwdb.gov.bd, Phone: 222230011	BWDB 1. ADG Western Region ,BWDB email: adg.western@bwdb.gov.bd, Phonr: 02-222230060	Annual Data will be obtained from the relevant project annual reports, all of which are the MoWR - The	

²⁵Severely affected means: house, crops, livestock, fish farms destroyed

²⁶Strengthened means: raise the height, and widening, to cater future climate change impacts .

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,		
									2. Superintending Engineer (Civil), PMU, Coastal Embankment Improvement Project, Phase 1, email: pd.ceip@bwdb.gov.bd, phone: 029899373	Coastal Embankment Improvement Project (CEIP)			
Water	8	Increase dry season freshwater flow in rivers	31	Average daily dry season (Jan-May) discharge on Gorai at Railway Bridge	Cumec	84	1997-2019	BWDB	same as above	same as above	same as above	Daily	
	9	Reduce high/peak flows in rivers during monsoon season	32	Average daily monsoon (Jul-Aug-Sept) discharge in upstream river reaches Gorai at Railway Bridge	Cumec	8,880	1997-2006	BWDB	same as above	same as above	same as above	Daily	
Land degradation	10	Minimise loss of land due to degradation (e.g erosion of river banks/ water channels, soil salinity intrusion etc)	33	Eroded bank area	Ha / yr	350	2019	CEGIS	Ministry of Water Resources (MoWR) Secretary, MoWR email: secretary@mowr.gov.bd, Phone: 9576773	Bangladesh water Development Board (BWDB) Director General, BWDB email: dg@bwdb.gov.bd Phone: 222230011	Bangladesh water Development Board (BWDB) 1. Addl. Chief Engineer (Civil), South Western Zone (Khulna), email: ce.khulna@bwdb.gov.bd, Phone: 041760461 2. Addl. Chief Engineer (Civil), Western Zone (Faridpur), email: ce.faridpur@bwdb.gov.bd, phone: 063162735	annual	
			34	Extent of soil salinity in SW region	Million Ha	0.465	2015	SRDI and CEGIS	Ministry of Agriculture (MoA)	Department of Agriculture Extension (DAE)	DAE 1. Additional Director, DAE, Khulna, Email:	Annual	

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
							Secretary, MoA, email: secretary@moa.gov.bd, phone: 9540100	Director General, DAE email: dg@dae.gov.bd, Phone: 55028369 Soil Resource Development Institute (SRDI) Director General, SRDI, email: dg@srdi.gov.bd, Phone: 02-9113363	addldaekhulna@gmail.com, Mobile: 01700-715237 SRDI 2. Principal Scientific Officer, Gopalganj-Khulna-Bagerhat-Satkhira-Pirojpur Agricultural Development Project, SRDI, Khulna, email: sachinb_srdi@yahoo.com, cell: 01718691666		
Land use change	11 Minimise loss of agricultural land (e.g. conversion to shrimp ponds)	35 Extent of shrimp cultivation and fish farming (aquaculture) in SW region	Km ² or hectares	2,188	2019	CEGIS	Ministry of Fisheries and Livestock (MoFL) Secretary, MoFL, email: secretary@mofl.gov.bd, Phone: 9545700	Department of Fisheries (DoF) Director General, DoF email: dg@fisheries.gov.bd, Phone: 9562861	DoF 1. PSO (FRSS) / Director (Finance & Planning), DoF Email: ddfinance@fisheries.gov.bd, Mobile: 01712581599	Annual	
Economic growth	12 Ensure significant economic development and diversification, and increase in economic growth	36 Per capita GDP for SW region (in constant price of 2010)	PPP ²⁷ international \$	2096	2018-19	BBS, 2019	Ministry of Planning Secretary, Statistics and Informatics Division (SID) email: secy@sid.gov.bd, Phone: 02-55007373	Planning Commission Director General, Planning, Commission, E-mail: hamidul.haque@imed.gov.bd Phone (Office): 9180677, Mobile: 01718022712 & Statistics and Informatics Division (SID), Additional Secretary, Informatics	Bangladesh Bureau of Statistics (BBS) Director General, BBS, E-mail: dg@bbs.gov.bd, Phone: 02-55007056	Annual	

²⁷ PPP: purchasing power parity

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,		
								Wing, SID email: addlsecy@sid.gov.bd, Phone: 55007377					
		37	GDP for SW region (in constant prices of 2010)	PPP international \$ billion	44.29			same as above	same as above	same as above	Annual		
		38	GDP in SW region as share of national GDP	%	14	2018-19	Est.	same as above	same as above	same as above	Annual		
		39	Industry as share of GDP of SW region	%	24.08	2018-19	BBS, 2019	same as above	same as above	same as above	Annual		
Employment	13	Enhance opportunities for employment and new/improved livelihoods (particularly for fisheries, agriculture, eco-tourism)	40	People employed in agriculture and fisheries in SW region (entire value chain)	% of total people employed	75	2012	BBS, 2012	Ministry of Fisheries and Livestock (MoFL) Secretary, MoFL, email: secretary@mofl.gov.bd, Phone: 9545700 & Ministry of Agriculture (MoA) Secretary, MoA, email: secretary@moa.gov.bd, phone: 9540100	Department of Fisheries (DoF) 1. Director General, DoF email: dg@fisheries.gov.bd, Phone: 9562861 Department of Agriculture Extension (DAE) Director General, DAE, email: dg@dae.gov.bd, Phone: 55028369 Bangladesh Bureau of Statistics (BBS), Director General, BBS, E-mail: dg@bbs.gov.bd, Phone: 02-55007056	DoF 1. Director, Finance & Planning/PSO(FRSS), Department of Fisheries Email: ddfinance@fisheries.gov.bd, Mobile: 01712581599 BBS 2. Director, Census/computer Wing, Bangladesh Bureau of Statistics (BBS), email: mahfuz.bablu@gmail.com, phone: 02-55007331	5yrs.	
		41	People employed in industry in SW region	% of total people	20	2012	BBS, 2012	Ministry of Industries (MoI) Secretary, MoI, email:	Bangladesh Industrial Technical Assistance Centre (BITAC) Director General, BITAC	Bangladesh Industrial Technical Assistance Centre (BITAC)	Annual		

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,		
			employee				indsecy@moind.gov.bd, phone: 02-47120800	email: dg@bitac.gov.bd, phone:8870700	1. Executive Engineer, BITAC, Khulna Mobile: +8801711309980 Email: morshed_bitac@yahoo.com				
Health and sanitation	14	Improve health services and health of society (eg by reducing vulnerability to diseases)	42	No doctors per 10,000 population for SW region	No.	6.70	2018	DGHS	Ministry of Health and Family Welfare (MoHFW) Secretary, Health Service Division, MoHFW email: secretary@hsd.gov.bd, phone: 9577199	Directorate General of Health Services (DGHS) Director General (Health), email: alamdr2003@yahoo.com, phone: 55067172 & Bangladesh Bureau of Statistics (BBS) Director General, BBS, E-mail: dg@bbs.gov.bd, Phone: 02-55007056	DGHS 1. Director DGHS, Khulna Division Email: kdho@ld.dghs.gov.bd Mobile: 01711195754, 01716821339 BBS 2. Director, Census/computer Wing, Bangladesh Bureau of Statistics (BBS), email: mahfuz.bablu@gmail.com, phone: 02-55007331	Annual	
			43	Life expectancy	Yrs	72.10	2018	BBS, 2019	Ministry of Health and Family Welfare (MoHFW) Secretary, Health Service Division, MoHFW email: secretary@hsd.gov.bd, phone: 9577199	Directorate General of Health Services (DGHS) Director General (Health), email: alamdr2003@yahoo.com, phone: 55067172 & National Institute of Population Research and Training (NIPORT) Director General, NIPORT, email: dg.niport1977@gmail.com, phone: 9662495	RPTI 1.Regional Population Training Institute (RPTI), Khulna Mobile: 01556321674 Email: fwvtikhulna@gmail.com BBS 2. Director, Census/computer Wing, Bangladesh Bureau of Statistics (BBS), email: mahfuz.bablu@gmail.com, phone: 02-55007331	Annual	

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,	
15	Improve and extend water supply and sanitation services	44 (a)	Population connected to water supply in urban areas Khulna	%	95	2019	BBS, 2015a	Ministry of Local Government, Rural Development & Co-operatives Secretary, Local Government Division, Ministry of Local Government, Rural Development and Cooperatives email: lgsecretary@lgd.gov.bd phone: 029514478	1.WASA, Khulna Managing Director (MD/CEO), WASA, Khulna Email: mdkwasa@yahoo.com, Mobile: 01720030066 & 2. Urban Development Directorate (UDD) Director, UDD email: director.UDD1965@gmail.com, Phone: 9562728	WASA, Khulna 1. Managing Director (MD/CEO), WASA, Khulna Email: mdkwasa@yahoo.com, Mobile: 01720030066 2.UDD Senior Planner, UDD email: fhaq321@yahoo.com Cell: 01711-033800	Annual	
		44 (b)	Population connected to water supply in urban areas Bagherhat	%	95	2019	BBS, 2015a	Ministry of Local Government, Rural Development & Co-operatives Secretary, Local Government Division, Ministry of Local Government, Rural Development and Cooperatives email: lgsecretary@lgd.gov.bd phone: 029514478	1.Bagherhat Municipality UDD 2. Urban Development Directorate (UDD) Director, UDD email: director.UDD1965@gmail.com, Phone: 9562728	1.Bagherhat Municipality UDD 2.Senior Planner, UDD email: fhaq321@yahoo.com Cell: 01711-033800	Annual	
		44 (c)	Population connected to water supply in urban areas Satkhira	%	95	2019	BBS, 2015a	Ministry of Local Government, Rural Development & Co-operatives Secretary, Local Government	1..Satkhira District Municipality 2. Urban Development Directorate (UDD)	1.Satkhira Municipality UDD 2. Senior Planner, UDD email: fhaq321@yahoo.com	Annual	

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
							Division, Ministry of Local Government, Rural Development and Cooperatives email: lgsecretary@lgd.gov.bd phone: 029514478	Director, UDD, email: director.UDD1965@gmail.com, Phone: 9562728	Cell: 01711-033800		
		45 (a) Population connected to sanitation in urban areas - Khulna	%	90	2019	BBS, 2015a	Ministry of Local Government, Rural Development & Cooperatives Secretary, Local Government Division, Ministry of Local Government, Rural Development and Cooperatives email: lgsecretary@lgd.gov.bd phone: 029514478	1.WASA, Khulna Managing Director (MD/CEO), WASA, Khulna Email: mdkwasa@yahoo.com, Mobile: 01720030066 & 2. Urban Development Directorate (UDD) Director, UDD, email: director.UDD1965@gmail.com, Phone: 9562728	WASA, Khulna 1. Managing Director (MD/CEO), WASA, Khulna Email: mdkwasa@yahoo.com, Mobile: 01720030066 UDD 2.Senior Planner, UDD, email: fhaq321@yahoo.com, Cell : 01711-033800	Annual	
		45 (b) Population connected to sanitation in urban areas - Bagherhat	%	90	2019	BBS, 2015a	Ministry of Local Government, Rural Development & Cooperatives Secretary, Local Government Division, Ministry of Local Government, Rural Development and Cooperatives email: lgsecretary@lgd.gov.bd phone: 029514478	1. Bagherhat Municipality 2. Urban Development Directorate (UDD) Director, UDD email: director.UDD1965@gmail.com, Phone: 9562728	1.Bagherhat Municipality UDD 2.Senior Planner, UDD email: fhaq321@yahoo.com Cell: 01711-033800	Annual	

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,	
							email: lgsecretary@lgd.gov.bd phone: 029514478					
		45 (c)	Population connected to sanitation in urban areas - Satkhira	%	90	2019	BBS, 2015a	Ministry of Local Government, Rural Development & Cooperatives Secretary, Local Government Division, Ministry of Local Government, Rural Development and Cooperatives email: lgsecretary@lgd.gov.bd phone: 029514478	1.Satkhira Municipality 2. Urban Development Directorate (UDD) Director, UDD email: director.UDD1965@gmail.com, Phone: 9562728	1.Satkhira Municipality UDD 2.Senior Planner, UDD email: fhaq321@yahoo.com Cell: 01711-033800	Annual	
Education, skills and training	16 Improve access to education for all, increase attendance (by reducing drop-out rates), and improve skills	46	Enrolment in higher secondary education (16+ years)	% of population	35.81	2019	Banbeis	Ministry of Education (MoEDU) Secretary, MoEDU, email: Secretary@moedu.gov.bd Phone: 9576679	Directorate of Secondary and Higher Education (DSHE) Director General, DSHE, email: dg@dshe.gov.bd, Phone: 9553542 & BANBEIS Director General, BANBEIS, email: dg@banbeis.gov.bd, phone: 02-9665457	DSHE 1. Deputy Director, DSHE, Khulna Email: ddkhl@yahoo.com, Mobile: 01712141429 BANBEIS 2. Chief Statistics, BANBEIS, email: alamgir_asif@yahoo.com, phone: 02-55151815	Annual	

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,		
	development and training	47	Enrolment in tertiary education (national level)	Million	17.8	2018	GED	Ministry of Education (MoEDU) Secretary, MoEDU, email: Secretary@moedu.gov.bd Phone: 9576679	BANBEIS ²⁸ Director General, BANBEIS, email: dg@banbeis.gov.bd, phone: 02-9665457	BANBEIS 1. Chief Statistics, BANBEIS, email: alamgir_asif@yahoo.com, phone: 02-55151815	Annual		
		48	School drop out rates at secondary level	%	36.73 (11 To 15 yrs.)	2019	BANBEIS	Ministry of Education (MoEDU) Secretary, MoEDU, email: Secretary@moedu.gov.bd Phone: 9576679	Directorate of Secondary and Higher Education (DSHE) Director General, DSHE, email: dg@dshe.gov.bd, Phone: 9553542 & BANBEIS (Bangladesh Bureau of Educational Information and Statistics) Director General, BANBEIS, email: dg@banbeis.gov.bd, phone: 02-9665457	DSHE 1. Deputy Director, DSHE, Khulna Email: ddkhl@yahoo.com, Mobile: 01712141429 BANBEIS 2. Chief Statistics, BANBEIS, email: alamgir_asif@yahoo.com, phone: 02-55151815	Annual		
Migration	17	49	Reduce migration from rural (including disaster-prone and risk-prone) areas to	Rate of migration to urban areas in SW region	%	1.44	2019	BBS, 2019	Ministry of Planning Secretary, Statistics and Informatics Division (SID) email: secy@sid.gov.bd, Phone: 02-55007373	1. Bangladesh Bureau of Statistics (BBS) Director General, BBS, E-mail: dg@bbs.gov.bd, Phone: 02-55007056 2. Bureau of Manpower, Employment and Training (BMET)	Statistics and Informatics Division (SID) 1. Additional Secretary, Informatics Wing, SID email: addlsecy@sid.gov.bd, Phone: 55007377 BBS 2. Joint Director, BBS, Khulna, Email:	Annual	

²⁸ Bangladesh Bureau of Educational Information and Statistics)

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
	urban areas						& Ministry of Expatriates' Welfare and Overseas Employment	Director General, BMET, email: dg@bmet.gov.bd, phone: 49349925 3. Statistics and Informatics Division (SID) Additional Secretary, Informatics Wing, SID email: addlsecy@sid.gov.bd, Phone: 55007377	mostofa43@gmail.com, Mobile: 01720212215 2. Refugee and Migratory Movements Research Unit (RMMRU), University of Dhaka E-mail: info@rmmru.org, Tel: + 880-2-9360338		
Gender Equality	18 Improve gender equality	50 Economic Participation and Opportunity	1	.438	2020	Global Gender Gap report 2020	Ministry and Women and Children Affairs (MoWCA) Secretary, MoWCA, email: secretary@mowca.gov.bd, phone: 9545012	Department of Women Affairs Director General, Department of Women Affairs, email: dwadhaka@gmail.com, phone: 48319149	Department of Women Affairs (DWA) 1. Additional Director/Deputy Director, Department of Women Affairs, Email: skmuslimamoon@gmail.com, Mobile: 01778685521	Annual	
Social inclusion	19 Increase the inclusion of landless and marginal land holders in development activities of SW region	51 Landless/marginal Landholders (0- 0.04 acre) in SW region	%	38.73	2008	BBS, 2011	Ministry of Planning Secretary, Statistics and Informatics Division (SID) email: secy@sid.gov.bd, Phone: 02-55007373	Bangladesh Bureau of Statistics (BBS) Director General, BBS, E-mail: dg@bbs.gov.bd, Phone: 02-55007056	BBS 2. Director, Census/computer Wing, Bangladesh Bureau of Statistics (BBS), email: mahfuz.bablu@gmail.com, phone: 02-55007331 2. AC Land Office/DC office/Add. Commissioner (Rev.) Khulna.	Annual	
Conflicts and security	20 Reduce conflicts	52 No of fisher-farmer land-	No.	None yet	None yet	http://peaceobservatory-	Ministry of Public administration (MoPA)	Divisional Commissioner, Khulna Division	Divisional Commissioner office.	Annual	

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
	over use of land	related disputes / clashes				cgs.org/#/division/district	Secretary, MoPA, email: secretary@mopa.gov.bd, Phone: 02-9570100	email: divcomkhulna@mopa.gov.bd, phone: 01713400394	1. Additional Divisional Commissioner (Revenue) Email: sohelalam65@gmail.com, Mobile: 01711-933160		
Cultural heritage	21 Preserve heritage sites (historic buildings, archaeological and cultural sites and enhance cultural diversity (eg language, arts, etc.)	53 Management status of Sundarban WHS (there is a management plan for the Sundarbans (2011-2020)- reporting frequency is annual. Other Reports: As and when requested by UNESCO.	Poor Good Very good ²⁹	Good	2019	UNESCO, 1997 Ministry of Env Forestry and climate	Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moe.gov.bd, Phone: 9540481	Bangladesh Forest Department (BFD) Chief Conservator of Forests, BFD email: ccf-fd@bforest.gov.bd Phone: 01999000001	BFD 1. Conservator of Forests, Khulna Circle. Khulna, BFD email: moyeendf@gmail.com Cell: 01818619161	Annual for the Sundarbans, (6-yearly for UNESCO)	
Food	22 Improve food security	54 (a) Status of food security - as	Very good ³⁰	Moderate	2020	https://foodsecurityindex.eiu.com/Index	Ministry of Food Secretary, Ministry of Food, email:	Directorate General of Food	Regional Controller of Food	annual	

²⁹**Very good:** Physical condition is stable, safe to visit, not fragile and no visible impact due to increased pressure or human mobilization. Adequate budget and manpower available for regular monitoring and maintenance. Management is very prompt and functional to sustain the historical and cultural value of the site.

Good: Physical condition is stable and not fragile. Visible impact is increasing due to increased pressure, human intervention or human mobilization. Budget and manpower is not adequate for regular monitoring and maintenance. Management body is functional but not manageable due to lack of proper budget and manpower.

Poor: Physical condition of the site is fragile and impact is visible due to increased pressure, intervention and human mobilization. No required budget and manpower for regular maintenance. Management is weak and not functional to retain or sustain the historical or cultural value of the site

³⁰Very Good: Food affordability, availability, quality and safety is good enough or surplus to all people at all time. It includes safe and nutrition food to meet dietary need.

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
		measured by availability,					secretary@mofood.gov.bd, phone: 029540088	Director General, Directorate of Food, Dhaka, email: dg@dgfood.gov.bd, phone: 02-9584834	Regional Food Department, Khulna Division Mobile: 01715-772948 Email: rcf.kln@dgfood.gov.bd		
	Improve food security	54 (b) quality	Good	Moderate	As above	As above	As above	As above	As above	As above	
	Improve food security	54 (c) safety food to all people at all time	moderate	Moderate	As above	As above	As above	As above	As above	As above	
Agriculture and fisheries	23 Increase agricultural and fish production	55 Milk demand	M M Ton/yr	0.21	2018	DLS, 2018	Ministry of Fisheries And livestock (MoFL) Secretary, MoFL, email: secretary@mofl.gov.bd , phone: 9545700	Bangladesh Livestock Research Institute (BLRI) Director General, BLRI email: dg@blri.gov.bd, phone: 224491676	Senior Scientific Officer and Site-In charge, Jashore Regional Station, BLRI, email: mdmasudrana2002@gmail.com, phone: 8801717105658	Annual	
		56 Meat demand	M M Ton/yr	0.20	2018	DLS, 2018	As above	As above	As above	Annual	

Good: Food affordability, availability, quality and safety is sufficient or just enough to feeding all the people at all time.

Moderate Good: Food affordability, availability, quality and safety is not enough to feeding all the people at all time.

Poor: Food affordability, availability, quality and safety is insufficient or deficit to meet demand and need improve access to sufficient, safe and nutrition food to meet dietary need.

Link SEA

https://en.wikipedia.org/wiki/Global_Food_Security_Index

<https://foodsecurityindex.eiu.com/Index>

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,		
		57	Rice production in SW region	M M Ton/yr	6.15	2018-19	BBS, 2020	Ministry of Agriculture (MoA) Secretary, MoA, email: secretary@moa.gov.bd, phone: 9540100	Department of Agriculture Extension (DAE) Director General, DAE email: dg@dae.gov.bd, Phone: 55028369	Department of Agriculture Extension (DAE) Director General, DAE email: dg@dae.gov.bd, Phone: 55028369	Annual		
		58	Fish production in SW region	M M Ton/yr	0.81	2018	DoF, 2019	Ministry of Fisheries and Livestock (MoFL) Secretary, MoFL, email: secretary@mofl.gov.bd, Phone: 9545700	Department of Fisheries (DoF) 1. Director General, DoF email: dg@fisheries.gov.bd, Phone: 9562861	DoF Director, Finance & Planning/ PSO(FRSS), Department of Fisheries Email: ddfinance@fisheries.gov.bd, Mobile: 01712581599	Annual		
		59	Extent of shrimp farms in SW region	Ha	218,828	2018	DoF, 2019	As above	As above	As above	5 Years		
Power and energy	24	Increase efficiency in production and consumption of energy	60	Power production in SW region (installed capacity)	MW	2,575	2020	BPDB, 2020	Ministry of Power Energy and Mineral Resources (Power Division) Secretary, Power Division, email: secy@pd.gov.bd, phone: 02-9511030	Bangladesh Power Development Board (BPDB) Chairman, BPDB, email: chairman@bpdb.gov.bd, Phone: 9562154	BPDB 1. Member, Generation, BPDB, email: member.generation@bpd b.gov.bd, phone: 9564667 2. Deputy Secretary, Development-5, Power Division Mobile: +8801817508251 Email: dev-5@pd.gov.bd	Standing indicator – only changes when a new power station is built	
	25	Increase production and consumption	61	Power production per capita (installed capacity)	W / capita	122	2020	BPDB, 2020 and Expert Judgement	Ministry of Power Energy and Mineral Resources (Power Division)	Bangladesh Power Development Board (BPDB)	BPDB 1. Member, Generation, BPDB, email: member.generation@bpd	Standing indicator – only changes when a new	

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,
	on of energy						Secretary, Power Division, email: secy@pd.gov.bd, phone: 02-9511030	Chairman, BPDB, email: chairman@bpdb.gov.bd, Phone: 9562154	b.gov.bd, phone: 9564667 2. Deputy Secretary, Development-5, Power Division Mobile: +8801817508251 Email: dev-5@pd.gov.bd	powerstation is built	
	26 Increase access to affordable energy	62 Power production per GDP (installed capacity)	W/ 1000 \$ international (PPP, constant prices of 2010)	58.1	2020	BPDB, 2020	Ministry of Power Energy and Mineral Resources (Power Division) Secretary, Power Division, email: secy@pd.gov.bd, phone: 02-9511030	Bangladesh Power Development Board (BPDB) Chairman, BPDB, email: chairman@bpdb.gov.bd, Phone: 9562154	BPDB 1. Member, Generation, BPDB, email: member.generation@bpdb.gov.bd, phone: 9564667 2. Deputy Secretary, Development-5, Power Division Mobile: +8801817508251, Email: dev-5@pd.gov.bd	Annual	
Tourism	27 Improve tourism management and behaviour to limit noise, pollution and other negative impacts and remain within the carrying capacity of	63 Visitors to Sundarbans	No.	189,570	2018-19	BFD, 2020	1. Ministry of Environment Forest and Climate Change (MoEFCC) Secretary, MoEFCC, email: secretary@moef.gov.bd, Phone: 9540481 2. Ministry of Civil Aviation & Tourism (MOCAT) Secretary, MoCAT, email: secretary@moecat.g	1. Bangladesh Forest Department (BFD) Chief Conservator of Forests, BFD. email: ccf-fd@bforest.gov.bd Phone: 01999000001 2. Bangladesh Parjatan Corporation (BPC), Chairman, BPC, email: chairman@parjatan.gov.bd, phone: +88 02 44826504	BFD 1. Conservator of Forests, Khulna Circle. Khulna, BFD, email: moyeenfd@gmail.com Cell: 01818619161 MOCAT 2. Deputy Chief, MoCAT, email: yasmin_lubna@yahoo.co.uk, cell: 01703-445803	Annual	

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,	
	the Sundarbans ³¹						ov.bd, phone: 02-9514884					
Infrastructure, transportation and communications	28 Improve connection of communities, and improve access to infrastructure, services and facilities	64	% of population (above 14 years) in SW region (Khulna Division) using mobile phones.	% / yr	84.2	2013	BBS, 2013	Minsitry of Posts and Telecommunications Secretary, Posts and Telecommunications Division email: secretary@ptd.gov.bd, phone: 9511043	Posts and Telecommunications Division, email: secretary@ptd.gov.bd, phone: 9511043 & Information and Communication Technology Division, Secretary, ICTD, email: secretary@ictd.gov.bd, phone: 02-41024031	Posts and Telecommunications Division, email: secretary@ptd.gov.bd, phone: 9511043 & Information and Communication Technology Division, Secretary, ICTD, email: secretary@ictd.gov.bd, phone: 02-41024031	Annual	
		65	Density of roads in SW region (national/regional highways and district roads only)	Km roads per 100 Km ²	11.38	2019	RHD, 2020	Ministry of Road Transport and Bridges Secretary, Road, Transport and Highways Division, email: secretary@rthd.gov.bd, phone: 02-9511122	Road, Transport and Highways Division Secretary, Road, Transport and Highways Division, email: secretary@rthd.gov.bd, phone: 02-9511122	Roads and Highways Division Deputy Secretary, Estate Branch, Roads and Highways Division, Email: dsestate@rthd.gov.bd, Mobile: 01716442348	Annual	
	29	Optimise the existing and future physical footprint of	66	Motorised traffic as percent of all traffic in SW region	% / yr	71.97	2020	RHD, 2020	Ministry of Road Transport and Bridges Secretary, Road, Transport and Highways Division,	Road, Transport and Highways Division Secretary, Road, Transport and Highways Division, email:	Roads and Highways Division Deputy Secretary, Estate Branch, Roads and Highways Division, Email:	Annual

³¹There is no current data or system for recording the status of tourism management. Recommendations for an appropriate indicator and system will be made in the SEMP.

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,	
	transport services (rail, road, air, waterways)						email: secretary@rthd.gov.bd, phone: 02-9511122	secretary@rthd.gov.bd, phone: 02-9511122	dsestate@rthd.gov.bd, Mobile: 01716442348			
67		Extent of railways in SW region	Km	467.05	2019	BR, 2019	Ministry of Railways (MoR) Secretary, Ministry of Railways, email: secretary@mor.gov.bd, phone: 9578199	Ministry of Railways (MoR) Secretary, Ministry of Railways, email: secretary@mor.gov.bd, phone: 9578199	Addl. Director General (Infra), Bangladesh Railway, Email: adgi@railway.gov.bd, Mobile: 01711505301	Standing figure until new railway is built Update figure annually		
68		Ships sailed (cargo and passenger) operating transboundary in SW region ³²	No. / yr	1,283 (Mongla Port)	2018-19	MPA, 2019	Ministry of Shipping (MoS) Secretary, MoS email: secretary@mos.gov.bd, phone: 9576770	Mongla Port Authority (MPA) Chairman, MPA, email: chairman@mpa.gov.bd, phone: 01404411800	MPA Member (Engineering & Development), Mongla Port authority, Email: mhm@mpa.gov.bd, Mobile: 01404411811	Annual		
		69	Domestic ships or inland vessels, Fishing vessels ³³	No./yr	200	2019	DoF	Ministry of Shipping (MoS) Secretary, MoS email: secretary@mos.gov.bd, phone: 9576770	Bangladesh Inland Water Transport Corporation (BIWTA) Chairman, BIWTA, email: chairman@biwtc.gov.bd, Phone: 9555249, 9634507	Bangladesh Cargo Vessel Owners' Association (BCVOA) PSO(FRSS)/Director (Finance & Planning) Department of Fisheries Mobile: 01712581599 Email: ddfinance@fisheries.gov.bd	Annual	

³² A ship is denoted as a motorized maritime vehicle which is used for carrying passengers using waterways.

³³ Not all the vessels operate at the same time. About 20% of them remain idle/ under maintenance at any time of the year. Controlling authority of these vessels are Bangladesh Cargo Vessels' Owners' Association (BCVOA) Rupsha.

Themes	Objective	Indicator	Unit	Baseline figure	Year of baseline data	Source	Concern Ministry	Institution responsible for data Gathering	Supported by	How often	Resources needed (budget,	
		70	Annual bulk cargo traffic movement in Khulna Port	Million MT/year	64	2018-19	Mongla Port Authority & BIWTA	Ministry of Shipping (MoS) Secretary, MoS email: secretary@mos.gov.bd, phone: 9576770	Bangladesh Inland Water Transport Corporation (BIWTA) Chairman, BIWTA, email: chairman@biwta.gov.bd, Phone: 9555249, 9634507 & Mongla Port Authority (MPA) Chairman, MPA, email: chairman@mpa.gov.bd, phone: 01404411800	MPA Member (Engineering & Development), Mongla Port authority, Email: mhm@mpa.gov.bd, Mobile: 01404411811	Annual	
		71 (a)	Annual bulk cargo traffic movement in Mongla Port	Million MT/year	Bulk 11.3	2019	Mongla Port Authority,	Ministry of Shipping (MoS) Secretary, MoS email: secretary@mos.gov.bd, phone: 9576770	Mongla Port Authority (MPA) Chairman, MPA, email: chairman@mpa.gov.bd, phone: 01404411800	MPA Member (Engineering & Development), Mongla Port authority, Email: mhm@mpa.gov.bd, Mobile: 01404411811	Annual	
		71 (b)	Annual containers movement in Mongla Port	Million MT/year	Container 0.48	2019	Mongla Port Authority	Ministry of Shipping (MoS) Secretary, MoS email: secretary@mos.gov.bd, phone: 9576770	Mongla Port Authority (MPA) Chairman, MPA, email: chairman@mpa.gov.bd, phone: 01404411800	MPA Member (Engineering & Development), Mongla Port authority, Email: mhm@mpa.gov.bd, Mobile: 01404411811	Annual	

Annex C: Responses to Comments on Draft SEMP

Comment	Response
SM Zobaidal Kabir, Deputy Secretary, Ministry of Fisheries and Livestock (MoFL)	
<p>Executive Summary or Non-Technical Summary</p> <ul style="list-style-type: none"> Should be with simple language and should reflect key issues of the report only. A revision is needed. 	<ul style="list-style-type: none"> The SEMP is specifically geared for technical people who will implement it. It is not really a document for generalists or the public. But the Executive Summary is already short (less than 2 pages) and relatively simple and reflects the content of the document.
<ul style="list-style-type: none"> A subsection on Adaptive Management can be added. 	<ul style="list-style-type: none"> Adaptive management (AM) is not commonly used in SEA and SEMP documents. At a strategic level, the consideration of alternatives is the correct idea. The SEMP provides a substantial list of ideas for how the mitigation hierarchy can be implemented during design, construction and ongoing management of activities or projects. AM usually refers to changing management practices if the initially-chosen mitigation isn't working or delivering the desired results. Then management is adapted to improve things. Thus, AM is more typically applied at project-level.
<ul style="list-style-type: none"> In monitoring section, clarification is needed between compliance monitoring and impact monitoring. 	<ul style="list-style-type: none"> This important point needs to be elaborated at the project-level. Every project will be different because of its characteristics and setting. Some projects are "compliant-heavy", but in many cases the indicators contained in the report are not linked to legally-required compliance, but rather desirable (from a sustainability perspective) outcomes. The SEMP simply needs to emphasize the importance of monitoring.
<ul style="list-style-type: none"> Table 2.1 page 5: there is a confusion about this table why it is there. Any consistency or relationship with SEA findings? 	<ul style="list-style-type: none"> The table is taken from the SEA report, so it is 100% consistent with the SEA. It is replicated in the SEMP for the reader's convenience and as a reminder of the SEAs findings (which is in fact the title of heading of that section of the SEMP).
<ul style="list-style-type: none"> Page 11: Instead of challenges, a sub-section on limitations can be mentioned. 	<ul style="list-style-type: none"> In the context of this section of the report, there is no big difference between "challenges" and "limitations".
<p>Chapter 4</p> <ul style="list-style-type: none"> In the methodology chapter of SEA report DPSIR model was used to understand the SEA issue. A matrix could be developed using DPSIR for each of the sectors or combining all sectors together in this chapter. This will allow to briefly understand the key Drivers, Pressure, State, Impacts and Response. This will help to understand the link between objectives of the SEA and necessary actions to achieve the objectives. 	<ul style="list-style-type: none"> The DPSIR model referred to in Chapter 4 of the SEA provided a good understanding, at strategic level, of the key drivers etc. Table 2.3 sets these out in some detail. This understanding informed the analysis of sector and cumulative impacts – see earlier response in the comments on the SEA Report on linkage diagrams and discussion about matrices.
<p>Chapter 5</p> <ul style="list-style-type: none"> Table 5.1 Observed value, frequency of monitoring of a particular indicator, and responsible agency can be added. Ministry/Department as responsible agency can be mentioned in one column rather 	<ul style="list-style-type: none"> Table 5.1 shows the structure of Annex B and explains how it should be used as the core of implementing this SEMP. Annex B: is ESO Objectives, Indicators and Institutions Responsible for Monitoring.

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than separately. Communication or reporting the monitoring results to DOE or a high-level committee/SEMP committee need to be mentioned.	As noted in the report, this table is a work-in-progress. It will be updated and further developed by the SCU during year 1 in consultation with implementing agencies, and kept under rolling review throughout the next 20 years .
Ashraf Uddin, DG Department of Environment (DoE)	
The report looks standard and well structured.	Thank you.
<p>Page 8:</p> <ul style="list-style-type: none"> ○ The following climate change issues and concerns could be added under the ‘climate change’: <ul style="list-style-type: none"> ● Increase of flooding; ● Increase of droughts. ○ The following issues and concerns could be added under the ‘Industrialization’-Textile dyeing, Garments washing, Tannery, Chemicals and its potential impacts should be included. 	<p>The table is taken from the SEA report, so it is 100% consistent with the SEA. It is replicated in the SEMP for the reader’s convenience and as a reminder of the SEAs findings (which is in fact the title of heading of that section of the SEMP).</p> <p>The industrial water pollutions are considered in the SEA and in the model assessment.</p>
Page 9: Pollution from cooking could be rewritten as: <i>Pollution from cooking and Open Burning</i> and example of potential impacts should be mentioned clearly.	We cannot find where on page 9 this comment would apply. We assume it refers to Table 2.1 which is taken from the SEA report (see comment immediately above) and lists the major issues identified by stakeholders and experts which was used to focus the SEA. It is not appropriate to alter this table at this end-point in the SEA process. But the issues mentioned are discussed in the scoping report and in Chapter 3 of the SEA Report.
<p>The following Environmental issues and concerns should be added:</p> <ul style="list-style-type: none"> ● New Roads & Highway construction: The new Roads & Highways construction is also a huge concern to the Sundarbans area-may cause sound and air pollution, increasing the development activities like housing, tourism etc. ● Ecologically Critical Area & Marine Protection Area: According to the ECA & MPA-the prohibited activities should be well defined and maintained respectively. ● Port and Ship/Dockyard: Port extension or establishment of ship dockyard are also the major concern in the Sundarbans that may increase the shipping movement and causing the river pollution of Sundarbans area. 	<p>The comment does not suggests where these issues should be added</p> <ul style="list-style-type: none"> ● Roads and highway construction is addressed consistently throughout the SEA report. ● It is not clear how this point requires any change/addition to the SEMP report. ● This issue is also addressed consistently throughout the SEA report.
Page 13: Methodology (Chapter 3) should be more elaborated.	The SEMP articulates how to mitigate impacts. There is not specific methodology involved other than consultation on options which is described in Chapter 3.
Page 20: Ministry of Land (MoL) and Ministry of Disaster Management and Relief (MoDMR) should be included in the proposed organizational structure (Figure 1) for implementing the SEMP.	This figure was developed in close consultation with the SEMP Liaison Group comprising representatives of key government ministries that are likely to be responsible for SEMP implementation. If needed SCU will take necessary steps and include the ministries.
Page 22:4.7 (a) Water hyacinth could be rewritten as-(a) Water hyacinth and invasive alien species: A baseline study is required to determine the extent and severity of water hyacinth including any other invasive or other exotic species which might be threatened to the biodiversity of Sundarbans.	Water hyacinth was identified by local experts as by far the most important alien invasive problem. So broadening this out to include all “invasive and exotic species” may dilute attention away from the known main problem. The word “exotic” is used very differently in different countries. An example is a flamboyant plant that is planted in a garden

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	<p>for its visual impact – referred to commonly as “exotic”. IAS is therefore the correct and widely understood term.</p> <p>There is an ongoing study on IAS in the Sundarbans under the SUFAL project. Water hyacinth is important for the whole of the SW region. For other IAS, respective departments can undertake necessary studies.</p>
<p>Page 29: An additional column titled ‘Responsible Agency’ could be added after the ‘management actions’ column under table 4 (Management actions required per key sector). Key responsible agencies could be listed in the new column.</p>	<p>Such a column can be added during the first stage of implementing the SEMP when further elaboration of this table will be developed by the SEMP Coordinating Unit through close consultation with potential implementation agencies/organisations. As sectors are mentioned there the SCU can easily find out the respective department/agencies.</p>
<p>Page 29: The sector ‘Environmental and Social Safeguards’ is focused only on EIA (Table 4). However, other key activities like environmental management, pollution control, natural resources management, etc., could also be considered.</p>	<p>Environmental and social safeguards is the term used globally to describe legally-required measures to avoid or minimize impacts, and the legally-required tool in Bangladesh (as in most countries around the world), is EIA. But it is correct that there are a multitude of other tools and actions, and these are noted where they are applicable.</p>
<p>Page 49: Objective 3: Reduce introduction and spread of Invasive alien Species-At the column of Concern Ministry, DoE and DAE could be replaced by MoEFCC and Ministry of Agriculture.</p>	<p>For spread of IAS, BFD is responsible for forest areas and the DOF is responsible for water bodies, so MoEFCC and MoFL should be there.</p>
<p>In term of SEMP: Table 4: Management actions under the key activities should be focused, time specific with the responsible organizations and considering the impact and mitigation measures illustrated in the SEA Report so that it keeps consistency throughout the document.</p>	<p>There is no Table 4 in the SEMP. Perhaps this comment refers to Chapter 4 where there are three tables (4.1, 4.2 and 4.3). But as it is not clear which table is being referred to, no change can be made, action needed should consider all the three tables.</p> <p>Table 4.2 of the SEMP report indicates responsible sectors for key activity wise impact mitigation measures, as well as monitoring plan for the respective department also mentioned in the table Annex B.</p>
<p>Power Division, Ministry of Power, Energy and Mineral Resources (These comments refer to the draft report dated 14 June 2021)</p>	
<p>Page 6: Chapter 2: SEA findings: Table 1: List of priority environment, social and economic issues (industrialization).</p>	<p>The table is taken from the SEA report, so it is 100% consistent with the SEA. It is replicated in the SEMP for the reader’s convenience and as a reminder of the SEAs findings (which is in fact the title of heading of that section of the SEMP). Table E.1 lists the major issues identified by stakeholders and experts which was used to focus the SEA. It is not appropriate to alter this table at this end-point in the SEA process. But the issues concerned with distribution of energy are discussed in the scoping report and in Chapter 3 of the Final SEA Report.</p>
<p>Chapter 6: institutional responsibilities: section on power and energy. Suggested to edit text: from ‘ New or upgrading of powerplants and transmission lines, and technology investment for increased energy efficiency’ to ‘New or upgradation of power plants and transmission and distribution systems, and technology investment for increased’ [sentence incomplete].</p>	<p>Accepted.</p> <p>New or upgrading of power plants and transmission lines, and technology investment for increased energy efficiency are in the chapter 6 of the table 6.1; responsible institution and monitoring are mentioned in the Annex B. with specific objectives 24, 25 & 26.</p>

Comment	Response
Dr Mashura Shammi, Associate Professor, Department of Environmental Sciences Jahangirnagar University	
EIA and SEA principles are not the same. SEA principle is like continual improvement within few years with different feedbacks from the stakeholders and reviewers. I would suggest that do not confuse the EIA and EMP principle to SEA. The report has become an enlarged version of EIA/EMP more or less since there was no SEA principle found in it and working methodology was close to EMP.	EIA and SEA principles are in fact very similar, but it's the level of assessment and the scale that sets them apart. Both are fundamentally a risk assessment though in SEA there is greater scope for taking advantage of opportunities simply because at a strategic level a greater range of alternatives are still available. Simply put, EIA is for projects and SEA for PPPs. EIA is ring-fenced spatially and usually for a finite timescale, while SEA looks at cumulative impacts and usually over a longer period. EIA and SEA steps are identical – screening, scoping, assessment, management plan, stakeholder engagement, implementation etc. No difference. In fact, a project-level EMP should also always include “continuous improvement” – otherwise what is the point of an EMP?
What messages are the decision-makers/ policy-makers going to receive from it? In fact, the message would be lost in translation. The report would not help them to get any guidelines unless it is written in a simple version. An abstract/summary can be written.	There is already a summary. It is not possible to simplify the SEMP without losing technical specificity or content which is necessary in detail for those who will have technical responsibility to implement it. The SEMP is not intended as a guideline or policy document.
Chapter 4: Implementing the SEMP: Implementing SEMP should be in line with Delta plan 2100 with “adaptive strategy making”.	The SEMP already includes adaptive strategy making.