Urban Development Directorate

Draft Report
Strategic Environmental Assessment
Preparation of Payra-Kuakata Comprehensive Plan focusing on Eco-tourism



May 2023

CEGIS

Center for Environmental and Geographic Information Services

Draft Report
Strategic Environmental Assessment

Preparation of Payra-Kuakata Comprehensive Plan
Focusing on Eco-Tourism

Acknowledgments

This Strategic Environmental Assessment (SEA) was commissioned by the Urban Development Directorate (UDD) of the Government of the People's Republic of Bangladesh (GoB). The Center for Environment and Geographic Information Services (CEGIS) is grateful to the UDD for entrusting our organizations with conducting this SEA. We would like to acknowledge Dr. Khurshid Zabin Hossain Taufique, Director, UDD and Mr. Sharif Mohammad Tariquzzaman, Senior Planner & Project Director of PKCP project for their overall guidance and advice, and for their considerable cooperation in arranging stakeholder consultations.

There is some overlap in the description of the background, approach, methodology and some of the baseline content in this report, with the January 2020 "Strategic Environmental Assessment of South West Region of Bangladesh for Conserving the Outstanding Universal Value of the Sundarbans". Also, the team that conducted that SEA is much the same as the team conducting this SEA, with the exception of Dr Barry Dalal Clayton, who was the Team Leader for the 2020 SEA. Some text in this scoping report has been sourced from the 2020 SEA.

Grateful thanks are especially due to all stakeholders, organizations and individuals who have provided perspectives, information, advice and support, and participated in video-based meetings to discuss key issues as well as the approach and focus of the SEA.

Authorship of Report

This report was compiled with the assistance of Dr Peter Tarr (SEA Team Leader) and the SEA Research Team of CEGIS (Appendix I).

Transparency Statement

This Scoping Report and all other reports prepared during the SEA process are intended as open access documents for sharing with all stakeholders, all those who have participated in the SEA process, and any other interested individuals or organisations. All documents are made available at the earliest opportunity to download on the SEA website to be established.

Table of Contents

List of Tables

List of Figures

Abbreviations and Acronyms

CIA	Cumulative Impact Assessment
CITES	Convention on International Trade in Endangered Species
DIA	Direct Influence Area
EIA	Environmental Impact Assessment
ESMF	Environmental and Social Management Framework
GIS	Geographical Information System
IIA	Indirect Influence Area
IUCN	International Union for the Conservation of Nature
IUU	Illegal, Unregulated, Unreported
KBA	Key Biodiversity Areas
PKCP	Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism
PFS	Pre-Feasibility Study
RAP	Resettlement Action Plan
SAP	Strategic Action Plan
SEA	Strategic Environmental Assessment
SEP	Stakeholder Engagement Program
SoP	Series of Projects
ToR	Terms of Reference
UDD-GoB	Urban Development Directorate of the Government of Bangladesh
UNFCCC	United National Framework Convention on Climate Change
VEC	Valued Ecosystem Component

Bengali Terms

Baor	Oxbow lake
Beel	Wetland depression
Chingri	Shrimp
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 sea within which the villages appear as islands
Jalmahal	State-owned waterbodies for which the fishing rights are auctioned out by government
Khas	Government-owned fallow land
Upazila	Sub-district

Executive Summary

The objective of this SEA is to "weigh and recommend environmentally-optimal regional land-use planning guidelines for coastal regions". The Terms of Reference state that "the present malaise is assessed, as regards inefficiencies, non-suitability, non-sustainability, enhancing factors of environmental degradation, and potentially destructive consequences of current land-use alteration". It is expected that the SEA will result in guidance for addressing key environmental and socio-economic concerns during land-use planning decision-making.

The overall goal of the PKCP is to lead the development or redevelopment of 'Payra-Kaukata Comprehensive Development Plan focusing on Eco-tourism' in order to enhance the residents' socio-economic circumstances through the following broad objectives:

- Consideration of environmental and socio-economic consequences of the preliminary proposed 'Payra-Kuakata Comprehensive Development Plan (PKCP)' and promoting that these issues be addressed during finalizing the PKCP plan with a view to promoting sustainable development in the PKCP area;
- Assessment of the impacts of the implementation of the PKCP Plan 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 PKCP area;
- Development of alternative strategies to minimize the direct/indirect, domestic and cumulative impacts of development on the Valued Environmental Components (VECs) including other major environmental and socio-economic components more widely in the PKCP area;
- Make recommendations to improve environmental performance management in both the public and private sectors as regards PKCP activities including other future development likely to affect environment and socio-economic conditions in the area;

The PKCP plan proposes various types of development such as urban core area development, potential future urban area development, facilitation of rural settlement zone, potential economic zone development, establishment of export processing zone, development of renewable energy generation zone, strategic service center/growth center, establishment of agricultural development zones, agriculture and fisheries product processing zones, establishment of eco-tourism zones/exclusive tourism zones, establishment of eco-tourism and recreation zones, repair, widening and new road construction, construction of rail tracks, airports and navigation routes along the jetty and/or ghats; coastal plantation/afforestation including greenbelt development. In addition, this plan includes the shipbreaking industry, sewage treatment plants where needed including central or industry specific ETPs, and waste treatment plants. Furthermore, the plan ensures the high-tech park in response the dizitalization of Bangladesh. Disaster management and cyclone shelters development is also included in the proposed plan.

During this scoping phase the team has attempted to define the project boundaries in terms of direct and indirect influence areas (DIAs and IIAs), so our ideas in this regard are still being formulated. As noted above, the SEA will need to concentrate its focus on the identified Series of Projects (SoPs) that will be undertaken. We understand that some of the SoPs will essentially be an upgrade/rehabilitation of existing infrastructure/systems in a brownfield sites, whilst others might be "brand new".

It is understood that the spatial boundary of SEA would consider the Kuakata-Patuakhali Regional Plan Area which was defined taking the Upazila administrative boundary of the potential interventions into consideration. Therefore, the study area would include the seven Upazilas-Patharghata, Barguna Sadar, Amtali, Taltoli, Galachipa, Kalapara, and Rangabali. It would thus include the footprint of the structural and strategic interventions, the Area of Influence (direct and indirect influence area) and the control area (**Figure E1**). It would cover the both mainland areas and the estuarine chars of the Patuakhali-Kuakata region.

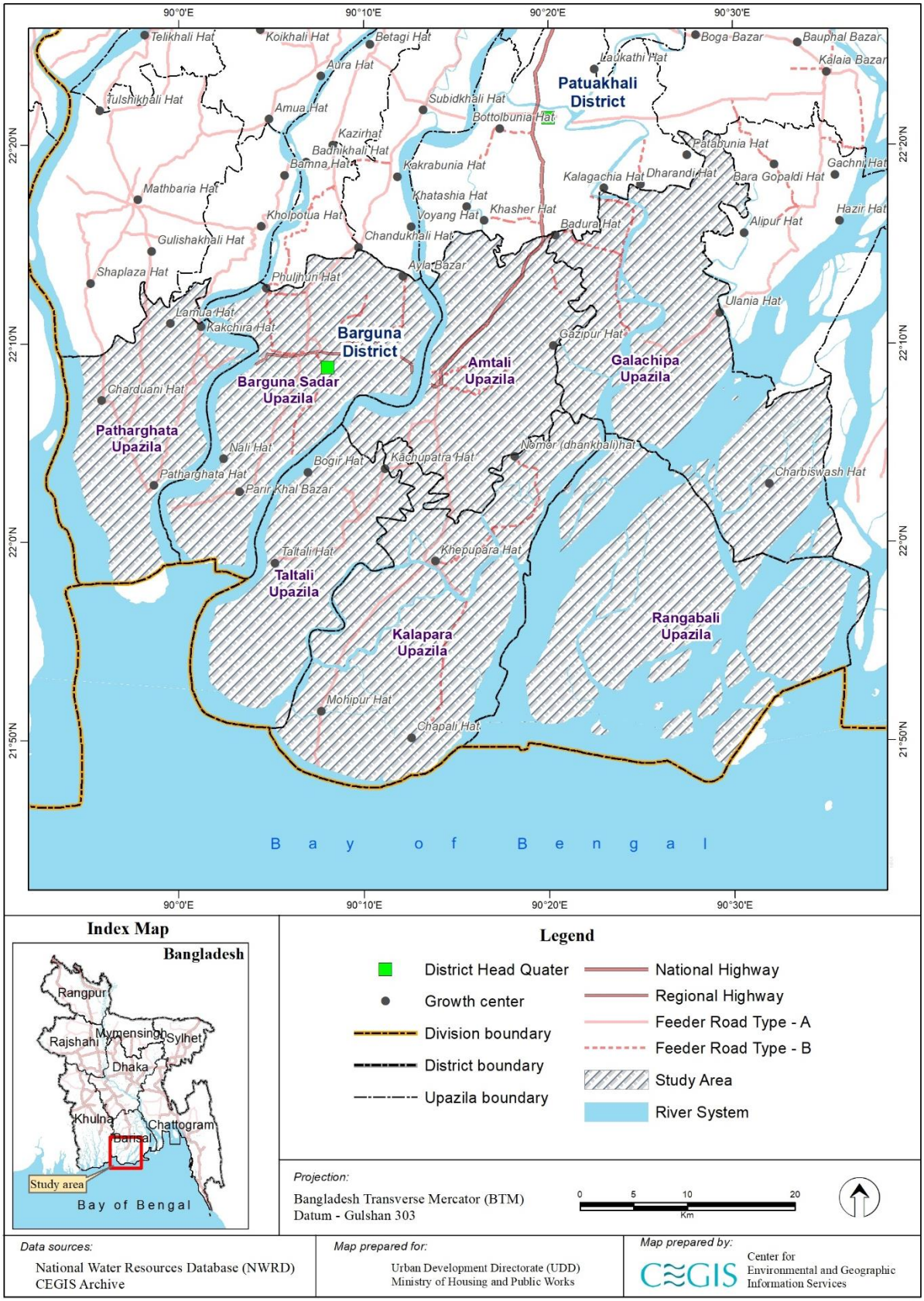


Figure E1: The SEA Area of Focus

Chapter 1 is an introduction to the assignment and a brief reflection on the ToRs that were issued to the consultant. The objective of this study was to "weigh and recommend environmentally-optimal regional land-use planning guidelines for coastal regions". The ToRs noted that the present malaise includes inefficiencies, non-suitability, non-sustainability, environmental degradation, and potentially destructive consequences of current land-use. It highlighted the expectation that the SEA will result in guidance for addressing key environmental and socio-economic concerns during land-use planning and related decision-making. This chapter notes that the structure of this SEA report was agreed during the Inception Phase and reconfirmed during Scoping. It reports briefly on the fieldwork that was undertaken, that included research, data collection, and stakeholder consultation.

Chapter 2 provides an introduction to SEA, to benefit the readers who are not familiar with this tool. It explains that where a SEA is done early and where there is good integration between it and the plan-making process, SEA has proven to be effective as "a plan shaper" (that helps make Polies Plans and Programmes, and the projects that inevitably follow, more sustainable), but may also be regarded as a "fine tuner". This chapter also notes that global experience has shown that SEA requires a flexible and iterative process. There is no template of procedures and methodologies such as those available in the application of project-level EIA. The methodology varies according to the purpose of the SEA. However, there is a growing set of evolving principles and criteria, which typically includes a range of analytical and participatory approaches. These aim to integrate environmental considerations into PPPs and evaluate the inter linkages with economic, social and other considerations. SEA can be described as a family of approaches, which uses a variety of tools, rather than a single, fixed and prescriptive methodology.

Chapter 3 provides a comprehensive overview of the Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism (PKCP). It explains that the Sustainable development of the Payra-Kuakata Coastal Region is the desired goal of the regional plan. It is intended to be achieved by integrated planning and implementation through multi organizational involvement and community participation for optimum utilization of resources and reduction of poverty.

The objectives are to achieve coordination and integration of proposed planning initiatives as follows:

- make optimal use of development opportunities;
- minimize negative externalities on existing development;
- safeguard ecological processes;
- ensure equitable distribution of benefits for poverty alleviation.

The specific objectives of the plan are to:

- translation of outputs from upper tier plan at Regional Plan to integrate coastal zone with the mainstream of development process of the country;
- assess functional and land use requirement for a Regional Plan in area with hazard vulnerability;
- formulate Strategic Development Plan for Regional Plan considering functional and land use requirement with hazard vulnerability;
- formulation of urban area plans and action plan at local level.

This chapter also provides a summary of the main projects that are likely to be pursued in the study area (**Table E-1**)

Table E.1: List of Developments Directly or Indirectly linked to the PKCP

Ref #	Major Investment (thematic cluster)	Summary of key Components, Locality, Size, etc.
1.	Industrial expansion and establishment of industrial areas (EPZ)	Location: Kalapara, Patuakhali. Work is underway to set up an EPZ in Patuakhali centering the Payra sea port. Land required is 413.03 acres. An investors' club is also being set up on 2.25 acres of land in Kuakata.
2.	Airport, port, roads, rail and bridges (various)	• Location: Kalapara, Patuakhali Construction of 50-kilometer stretch of Marine Drive from Kuakata Zero point to Kauar Char to Alipur to Kuakata Zero Point. • Road Construction Project (Ferry Ghat) Location: Barguna, Patuakhali • Patuakhali-Amtali-Barguna Road over Paira River • Lebukhali - Dumki-Boga - Dashmina- Galachipa - Amragaci road over Galacipa River • Barguna-Patharghata Road over Biskhali River • Baliatoli Bridge over Anadarmanik River, Kalapara • Four-lane connection road of national highway with Payra port - Location: Kalapara, Patuakhali • Construction of Broad-Gauge Railway Line - Location: Amtali and Kalapara, Patuakhali • Proposed Airport at Payra sea port. Location: Kalapara, Patuakhal. Will require ancilliary infrastructure such as passenger facilities, electricity, water supply, roads, gas, etc. • Payra Port - Location: Rangabali, Patuakhali • Boroitola Ferry Terminal - Bainchotki Ferry Terminal - Location: Barguna Sadar, Barguna
3.	Electricity generation and Distribution	Location: Barguna Sadar, Barguna This project will improve the power supply of the PKCP project area and hence improve various power-driven tourism services and amenities.
4.	Exclusive tourism zone with associated facilities, including marine aquarium and museums, mosques, hotels, motels, watch towers, fire safety facilities	• ETZ - Location: Sonar Char, Rangabali, Patuakhali. Would require tourism centres, ancilliary infrastructure such as electricity, water supply, roads, gas, etc. • Marine aquarium and museum - Location: Kawar Char, Kalapara, Patuakhali • Establishment of a Parjatan Motel near the Khash Pond of Shuvo Shondha beach, Taltoli • Kuakata Dak Banglo construction - Location: Kalapara, Patuakhali – tourist accommodation • Patharghata Model Mosque - Location: Patharghata, Barguna • Barguna Sadar Model Mosque - Location: Barguna Sadar, Barguna • Barguna Circuit House - Location: Barguna Sadar, Barguna • Location: Watch tower at engragiri Eco- Park, Taltoli to observe the unique mangrove flora and fauna of this region. • Taltoli Fire Service Office Location: Taltoli, Patuakhali to improve the fire safety (for both hosts and guests) of the PKCP project area. • Mahipur Fish Landing Station - Location: Kalapara, Patuakhali
5.	Tourism sea and river cruises	Location: Fakirhat, Taltoli Introduction of Sea Cruise/ River Cruise to visit Sundarbans and Swatch of No Ground (SNoG)This project will open a new door of Marine tourism in this region as Katka sea beach and Swatch of No Ground (SNoG) are only 30 kilometers and 70 kilometers away from Fakirhat, respectively.

Ref #	Major Investment (thematic cluster)	Summary of key Components, Locality, Size, etc.
6.	Improved forest protection, conservation and Coastal Embankment Improvement	Location: Overall PKCP Area
7.	Restoration of canals	Location: Taltali, Barguna Restore 12 canals and 7 ponds to explore the Fatrar Char, Taltali, Barguna by Forest Department This project will create an opportunity for adventure tourism in this area.
8.	Farmar Training institutions	• Location: Patharghata, Barguna • Location: Amtali, Patuakhali
9.	Fire service and civil defense station construction project	Location: Galachipa, Patuakhali

Chapter 4 provides an overview of the methodology followed in conducting this SEA. It explains that a stepwise approach was followed to ensure that the foundations laid earlier in the process were logically built-upon subsequently. However, the steps are not strictly linear, but rather iterative. The team engaged in vertical and horizontal thinking throughout the process, and team members engaged with each other in an integrated way to avoid sectoral thinking.

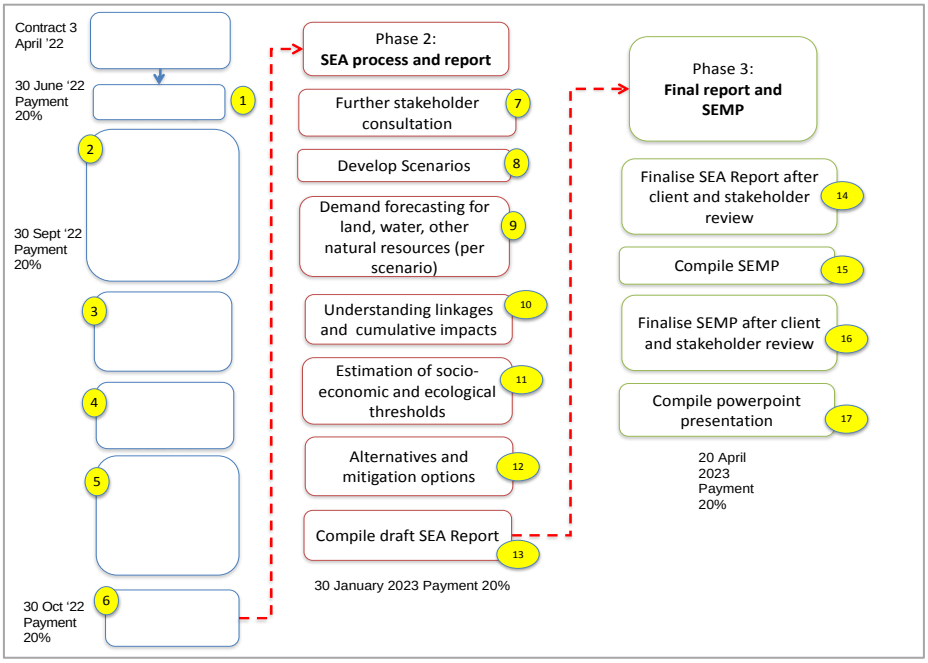


Figure E.2: An Overview of the SEA Process

The approach followed provided an opportunity to focus the SEA on the important issues to maximize its usefulness to the authorities, decision-makers and public. To the extent possible, the process has been open and iterative, involving key stakeholders. As required in the Terms of Reference 13 thematic baseline reports were compiled and delivered as a stand-alone 600-page volume on 2nd October 2022. In addition to contributions from the core team, compiling the baseline reports included inputs from various experts from outside the team. The reports relied mostly on existing data and literature, but the consultant also undertook extensive field visits, met with stakeholders, and gathered primary data. Additional information was sourced from key informants who were identified on the basis of their subject knowledge and expertise.

This chapter also reports that the assessment of cumulative impacts was a key aspect of the SEA (see later).

For the purposes of this SEA, it was assumed that the key projects will be implemented over approximately the next 10 years. It was also assumed, based on the analysis provided in the ToRs, that the existing development trajectory in the study area is undesirable and the environmental and social impacts evident are equally undesirable. Therefore, our self-evident conclusion was that the interventions envisaged through the PKCP are desirable from a sustainable growth perspective, and that adverse impacts can be mitigated providing the SEMP is implemented. The SEA therefore did not compare the impacts of the "no-go" alternative to the pursuit of the PKCP.

Chapter 5 provides an overview of the baseline situation in the study area. As noted earlier, the team prepared 13 thematic baseline papers, identifying the key environmental, social and economic issues and concerns on which the SEA could focus. They show that the coastal zone of Bangladesh is located in the tropical region that is highly vulnerable to climatic hazards, especially tidal inundation induced from occasional horrendous cyclones and storm surges that is followed by consequent intrusion of saline water. Land subsidence is also quite prominent in the coastal area. Moreover, being enclosed by man-made polders, the region is often subjected to water logging resulting from inadequate in-polder water management.

However, the baseline overview also reports that the coastal zone of Bangladesh is rich in natural resources that provide various national benefits. The mangrove, fisheries, tourism, sea culture activities, shipping and inland navigations, etc. are some examples of these benefits. Water resources of coastal region play a key role in the livelihood and economic stability of the local people.

It is evident that the rivers are very dynamic in the delta of Bangladesh especially in the south-central region. Baleshwar, Bishkhali, Burishwar-Payra, Andharmanik, Lohalia, Rabnabad and Tentulia are the major rivers in the study area. At present all the water flow and sediment of the Ganges and Brahmaputra merge with the Meghna River at Chandpur and fall in the Bay of Bengal through the Meghna Estuary. The western part of the study area has eroded slightly, whilst the estuary of Tentulia has experienced deposition of sediment as well as formation of new islands.

The baseline studies report that to increase agricultural production and other economic activities, embankments were constructed in the coastal area during the 1950s and 1960s. The purpose was to prevent salt-water flooding of the floodplain areas inland and provide increased security for monsoon-season rice production. Sluices in the embankments prevented the inflow of salt-water at high tide and allowed ponded rainwater to drain away at low tide. Tide normally governs the navigation in the tidal rivers. Sediment enters the tidal system during flooding and exits during ebbing. But due to tidal asymmetry, sediments result in rivers becoming silted up. As a result, dredging the channels is difficult and expensive.

The findings indicate that the land use pattern is continuously changing, while the suitability of land is also changing. Mainly the agricultural land has been converted to other land use, whilst many wetlands have also been converted over the past 10 years. In 2020, about 1762 hectares of land has been changed into settlements which is about 1.34% of the total area of PKCP region. But about 670 hectares' forest land has increased by the year of 2020.

Chapter 6 provides an overview of the policy, legal and institutional environment in Bangladesh. It reports that the process of EIA in Bangladesh includes screening, scoping, alternative analysis, identification and assessment of impacts, and preparation of an EMP. Current EIA process typically do not include Cumulative Impact Assessment from multiple projects in the same site etc. This is one of the reasons that this SEA was needed – i.e for understanding of cumulative impacts.

The following figure shows the evolution of EA Bangladesh.

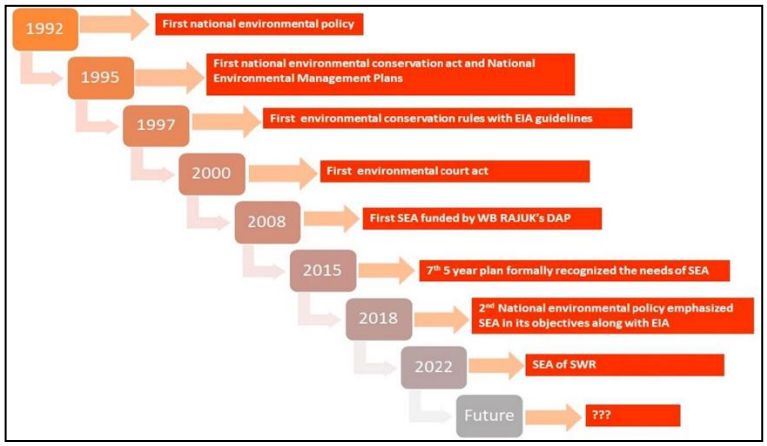


Figure E-3: Evolution of EA Bangladesh (from 1992 to 2022)

The main environmental regulations in Bangladesh are the Environment Conservation Act (ECA) 1995 (as amended) and Environment Conservation Rules (ECR) 1997. The ECA 1995 provides the requirements on environmental protection, improvement of environmental standards, and control and abatement of environmental pollution. Through the ECA 1995, the Department of Environment (DoE) is mandated to undertake any activity needed to conserve and enhance the quality of environment and to control, prevent and mitigate pollution.

Chapter 7 explains the stakeholder engagement process that was followed in conducting this SEA. This chapter notes that SEA should be a participatory process that enables stakeholders - including organisations and individuals that have a significant interest in, or who are likely to be directly or indirectly affected by, the PPP - to raise concerns and influence strategic decision-making in a meaningful way.

One of the initial steps in the SEA process was undertaking a 'stakeholder analysis' to help understand the power relations between different actors, their influences on the PPPs and, conversely, how the PPPs influence them, and also their mutual interactions with regard to the changing circumstances. Thereafter a Stakeholder Engagement Plan (SEP) was designed to:

- outline stakeholder consultation and communication activities throughout the SEA,
- identify the key stakeholder groups, and
- identify resources and time needed to achieve effective participation.

To assess the cumulative impacts of the SoPs in the PKCPs area of influence, the SEA team consulted widely and has taken into account the views of the relevant stakeholder groups.

Chapter 8 explains how the assessment of cumulative impacts, which is a key aspect of SEA, was undertaken. Cumulative impacts are environmental or socio-economic changes - either positive (beneficial) or negative (harmful) caused by the combined impact of past, present and future human activities and natural processes. They are the result of implementing multiple activities (e.g. individual PPPs and projects, activities or investment initiatives that arise from their promotion/implementation).

Individual direct impacts may be relatively minor but, in combination with others, they can result in significant environmental and socio-economic effects. The multiple impacts of different activities may have an additive, synergistic or antagonistic effect on one another and with natural processes. Cumulative effects can be difficult to predict and manage where baseline data is inadequate, processes (especially ecological ones) are complex, and due to the large scale at which human developments occur (e.g., across the study region).

Positive cumulative impacts can be expected if existing environmental and social safeguard policies, regulations and guidelines are fully and effectively implemented and enforced; and if 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. However, negative cumulative impacts will be likely to result if the opposite is the case, i.e. if existing environmental and social safeguard policies, regulations and guidelines are not fully or effectively implemented or enforced; and if no or ineffective mitigatory action is taken to avoid, minimise, restore, mitigate or offset potential impacts of development, and/or the use of clean and sustainable technologies is not compulsory (i.e. if the SEMP is not effectively implemented).

The way in which critical cumulative impacts (environmental and socio-economic) would be likely to arise for principal activities in individual sectors - as a result of implementing the main proposed or envisaged development initiatives, were examined using linkage diagrams. These diagrams plot how the principal activities may give rise to major impacts (positive or negative) each of which may then give rise to further impacts, which may then cascade to further tiers of impacts. The linkage diagrams indicate the pathways through which particular types of impacts will become cumulative (e.g. pollution, deforestation, deteriorating health, migration).

These diagrams provide a pictorial understanding of how such impacts might 'flow' from one to another, and their intended and unintended consequences. Understanding such linkages is fundamental to the study of the behaviour of complex, coupled social-ecological systems.

The 2018 Inception Report on Socio-Economic & other related Survey under PKCP, provides an initial overview of existing impacts on certain components of the environment. In the absence of the PKCP and any substantial impact avoidance or mitigation interventions, it is assumed that current trends will continue or even become exacerbated (because of population growth and organic development). As noted in the ToRs, the following are key existing environmental and, to a lesser extent, social concerns:

Table E.2: Key Environmental Concerns

Environmental Issues and Concerns	Comment /examples of Potential Impacts
1. Pollution and waste (solid and liquid): • Surface water pollution. Brackish and sea water • Groundwater pollution • Air pollution • Oil • Waste treatment & 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.
2. Water flow dynamics in rivers	Reduction of water flow in rivers of SWR may change the region's economic sustainability/integrity as well as livelihood patterns and crop production.
3. Sedimentation and siltation (fluvial and tidal) • Dredging and disposal	Sedimentation and siltation management is a challenge to maintain river flows. Disposed dredged materials can affect the regeneration of trees & survival of existing forests as well as benthic aquatic biodiversity.
4. Salinity: • Groundwater • Soil	Due to reduced flow of upstream fresh water and channel siltation, and resultant sea water intrusion/inundation, soil and groundwater salinity has increased and soil productivity has decreased as well as livelihood diversity

Environmental Issues and Concerns	Comment /examples of Potential Impacts
5. Noise - particularly due to shipping in the rivers, especially in Rabanabad Channel	Noise from the regular movement of ships (notably along major rivers of the project area) can disrupt wildlife movement, cause localisation of populations and result in inbreeding.
6. Habitat 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 behaviour (e.g. feeding, breeding) and may lead to genetic isolation and also threaten effective biodiversity conservation.
7. Loss of biodiversity	Some environmental as well as regional & local activities may affect biodiversity, with loss of keystone species and their prey base due to poaching and habitat degradation as a result anthropogenic activity. Biodiversity losses may also occur due to climate change and natural dynamic changes in the ecosystem.
8. Invasive alien species	Water hyacinth has become a major problem, clogging baors and ponds, and some water channels. *Prosopis Juliflora* is also spreading on embankments although it is used as a fuelwood by local people. At pre sent, however, forest managers are concerned about their potential future spread and impacts.
9. River bank erosion – due to port expansion and boats	River bank erosion is a particular concern in the project area 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 this area.
10. Climate change •Sea level rise •Salt water intrusion •Erratic rainfall & distribution •Increased average temperatures •Cyclones & storm surges •Greenhouse gas emissions	• Sea level rise is a global threat that will impact on the region. • Many factors have reduced river flow in the region, decreasing flushing time, with increased periods of saltwater exposure. • Shifting of monsoon with erratic rainfall has impacted on the cropping season and pattern. • There is no evidence of significant increased temperatures yet, but climate models predict a significant increase in the future. • Cyclones making landfall impact on livelihoods (killing people and causing damage). Cyclone frequency has decreased but may rise in the future. • Rapid industrialization and urbanization 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.
11. Exceptional floods (with potentially damaging water levels): • Freshwater floods (due to rain) upstream • Tidal • Poor drainage infrastructure	Freshwater flooding may occur due to: heavy rain in the upstream/ catchment areas of this area, lack of drainage infrastructure and high tidal flow.
12. Industrialization: • Power generation – oil, gas, coal • Pipelines	Industrialization of the inland parts of this area can create air & water pollution as well as other potential impacts on biodiversity & livelihoods of the region. Hilsa fish breeding ground is facing threats.

Environmental Issues and Concerns	Comment /examples of Potential Impacts
• Petroleum • Cement • Special economic zones	
13. Urbanization	Rapid urbanization as well as in the environmentally critical area can affect the extent of air & water pollution and agricultural productivity etc.
14. Land use changes	Land use changes are arising due to population & economic growth of this area, e.g. shrimp cultivation, infrastructures & urbanization, etc. Impacts of this include loss of biodiversity, reduced soil productivity and loss of livelihood opportunities.
15. Livelihoods: • Conflicts between economic sectors • Access to resources (e.g. in Sundarbans) • Salinity	• 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 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. • Causes health problems (e.g. skin conditions), reduces drinking water quality – impairing people's ability to work, and affects crop production, etc.
16. Out-migration	Both involuntary and economic out-migration (mainly poor people) is common in this area. Much is driven by disasters, indebtedness, dispossession/land grabbing, lack of livelihood options, etc. Poor people move to unhealthy urban slums and become further marginalized in an uneven job market. Some educated people move to urban areas /overseas for employment. Migrant remittances can supplement family incomes and contribute national economy.
17. Health & sanitation: • Water-borne, respiratory & salinity-related diseases • Diet • Negative health impacts of air pollution (mainly pollution by particulate matter) • Inadequate health facilities and access • Arsenic contamination (of drinking water & irrigated rice)	• Local people, especially children and elderly people, are particularly susceptible to water-borne, respiratory and salinity- related skin diseases. • Poor diet causes malnutrition. • The dominant way of cooking causes indoor air pollution which has a serious impact on human health. • Health service providers are based in city/urban and peri-urban areas. They are not easily accessible by people and/or emergency patients living in remote areas, due to poor communication networks. • Lack of public toilets in urban and semi urban areas. As a result, local people, especially women face problems during public gatherings and at local markets. • This is a serious issue in parts of the Ganges River floodplain and the northern part of the tidal floodplain.
18. Gender-related issues	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, Women often encounter security problem while travelling alone to/from remote areas.
18. Education: • Low environmental awareness • High male dropout	• Males from poor households need to support family income, resulting in high drop out and/or lower attendance at school. • Poor communication network in the rural area often discourages school attendance.

Environmental Issues and Concerns	Comment /examples of Potential Impacts
19. Loss of traditional knowledge	Technological advancement & other development activities may be causing loss of traditional knowledge.
20. Loss of cultural heritage	Lack of proper maintenance & negligence due to low revenue return, inadequate budget allocation, etc.
21. Security – kidnapping of resource extractors	Kidnapping of forest produce extractors for ransom is an important issue for the management of the forest.
22. Seasonal tourism	Uncontrolled tourism causes loss of biodiversity, disruptive noise and water pollution etc.
23. Illegal activities: • Poaching and hunting • Illegal tree cutting • Trafficking of wildlife products • Corruption	These issues are of major concern in this area, causing loss of habitat and biodiversity (terrestrial & aquatic) & economic loss for communities.
24. Institutional issues	Lack of manpower, capacity development & logistics are major institutional issues – impeding environmental management (In general).

Chapter 9 is the concluding chapter. It reports that the linkage diagrams show that for each sector, the key activities result in a range of impact pathways that lead ultimately to a limited number (usually two or three per sectoral main activity) of 'end' cumulative impacts (either intended/positive or unintended/negative). These are summarised in **Table E.3**.

Table E.3: Dominant Principal Cumulative Impacts of Development in the Study Area

Issue	Positive impact	Negative impact
Economy	Economic benefit	Economic cost
Habitats, biodiversity & ecosystem services	Enhance biodiversity and ecosystem services	Degradation of habitats, loss of biodiversity and/or ecosystem services
Health and quality of life	Improved health and quality of life	Increased diseases, sickness & health impacts
Food security	Improved food security	Deterioration of health and loss of livelihoods
Jobs	More jobs and improved skills	Deterioration of health and loss of livelihoods

This outcome provides a very clear signal of the logic and importance of ensuring that the Strategic Environmental Management Plan (SEMP) is pursued with determination and commitment across government; and is fully and effectively implemented – in order to avoid, minimise or mitigate these impacts arising. 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.

1. Introduction

The Contract for the SEA assignment was signed between the UDD-GoB and CEGIS on 3rd April 2022 in Dhaka, Bangladesh. The Contract is set to run for 12 calendar months and the SEA is thus scheduled to be completed by End-March 2023. However, the contract has been extended for another two months and to be completed by end of May 2023.

This is the Draft SEA Report for the assignment: Support to the Urban Development Directorate of the Government of the People's Republic of Bangladesh (UDD-GoB), to Prepare a Strategic Environmental Assessment of the Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP). It represents the final deliverable by the Consultant (CEGIS).

The structure of this SEA report was agreed during the Inception phase and reconfirmed during Scoping. During Scoping there was substantial fieldwork that included research, data collection, stakeholder consultation, and an improved understanding of the PKCP and its relationship with other projects, potential cumulative impacts, the direct and indirect areas of influence of the plan, and Valued Ecosystem Components.

CEGIS has gathered a growing body of literature. From this and the fieldwork, an understanding of the biophysical and socio-economic components of the landscape, has been achieved. In addition, the fieldwork provided the team with adequate insight of the key sectors in the area and cross cutting aspects.

The SEA is an important tool that can provide guidance to the UDD-GoB and other stakeholders on systematically integrating environmental and socio-economic concerns in policy, regulations and planning. With this in mind, the likely series of projects (SoPs) in the area are expected to provide a significant boost to Payra-Kuakata's socio-economic development. The planned SoPs may, however, create adverse social and environmental impacts in a local and regional context. This is not just during their construction phase, but may extend into the operational phases. These impacts can affect the environment in a profound way because they may result in cumulative impacts, which overlap in time and space.

Despite there being similarities to a site-specific EIA, the SEA has a much larger scope in terms of time, space and coverage and enables a holistic assessment of the entire Payra-Kuakata area through identification and analysis of the cumulative and residual impacts of the PKCP and other developments.

The ToRs state that the objective of this study is to "weigh and recommend environmentally-optimal regional land-use planning guidelines for coastal regions". Apparently "the present malaise is assessed, as regards inefficiencies, non-suitability, non-sustainability, enhancing factors of environmental degradation, and potentially destructive consequences of current land-use alteration". It is expected that the SEA will result in guidance for addressing key environmental and socio-economic concerns during land-use planning decision-making.

The study was expected to:

- Identify relevant development PPPs (Policies, Plans and Programs) through screening for the relevant sectors likely to be affected by the UDD development plans till 2041 for both public and private segments;
- Conduct pre-screening beforehand to rapidly narrow down list of PPPs to determine whether the PPPs will be taken to the next level of screening or not;
- Scoping to identify the effect on existing environmental and socio-economic conditions due to development initiatives in the selected South-Central Region;

- Review of selected existing policies, laws and institutions relevant to the identified sectors as well as past national and international SEA studies for deeper understanding of the process and possible type of outcomes;
- Identify key environmental issues and challenges imposed by both natural and human interventions that significantly impact the conservation of the biodiversity and their habitats in the region including inshore marine environment;
- Development for pertinent objectives, indicators and targets for each environmental issues and identify specific criteria against which the performance of each selected PPP will be evaluated;
- Establish baseline on the current status of the study area (7 Upazilas) in line with the relevant sectors with respect to a selected period;
- Identify environmental and ecological parameters for the existing ecosystems which will be indicators in determining impacts;
- Identify the present and potential sources of pollution as well as pollutant carriers that are important for conservation of the different types of ecosystems exists there including inshore marine environment;
- Estimate probable future pollution levels and their impacts through internationally accepted standard mathematical modeling tools and techniques and prepare an environmental quality benchmark with projections for future levels of pollution;
- Identify key stakeholders pertinent to each individual sector (selected sectors) on the basis of the relevant challenges, issues and impacts of development initiatives through consultation of relevant agencies and expert judgment;
- Integrate the outcomes of the consultative meetings with stakeholders within the scoping process to obtain clear knowledge on relative bio-physical and socio-economic issues;
- Conduct multi-level stakeholder consultations at local and national level to identify the sustainability criteria for determining strategic alternative options;
- Assess the potential direct, indirect and cumulative impacts due to policies, plans and programs relevant to the identified sectors of the SEA;
- Recommend strategic alternative measures for formulation of future PPPs as well as adjustment of existing PPPs (if needed);
- Integration of environmental principles such as polluter-pays-principle and the precautionary principle into the development, appraisal, and selection of PPPs;
- Identify suitable alternatives by considering the strategic aims of the selected PPPs;
- Provide a Strategic Environmental Management Plan (SEMP) with identified strategic alternative measures; and
- Establish monitoring protocol and prepare comprehensive environmental auditing plan.

A 566-page comprehensive baseline report was compiled and submitted as a stand-alone document in November 2022. The ToRs required the following outputs:

- Screening and Scoping Report along with the database on primary data/information collected under this SEA;
- Detailed SEA Report;
- Detailed Strategic EMP Report;
- Monitoring and Auditing Framework;

2. Strategic Environmental Assessment

Strategic Environmental Assessment (SEA) is "a framework to assess the environmental and social implications of development policies, plans and programmes (PPPs) (OECD, 2012). Also, SEA is increasingly used in a geographical area where there is no specific PPP, but rather an incremental increase in developments and resultant cumulative impacts.

Where a SEA is done early and where there is good integration between it and plan-making process, SEA has proven to be effective as "a plan shaper" (that helps make PPPs more sustainable), but may also be regarded as a "fine tuner".

According to the OECD DAC Guidelines, development assistance is increasingly being provided through strategic-level interventions, aimed to make aid more effective. To ensure environmental1 considerations are taken into account by donors and developers, established environmental assessment (EA) tools at the project level need to be complemented by approaches fully adapted to policies, plans and programmes. SEA meets this need.

From our experience, we have learnt that SEA requires a flexible and iterative process. There is no template of procedures and methodologies such as those available in the application of project-level EIA. The methodology varies according to the purpose of the SEA. However, there is a growing set of evolving principles and criteria, which typically includes a range of analytical and participatory approaches. These aim to integrate environmental considerations into PPPs and evaluate the inter linkages with economic, social and other considerations. SEA can be described as a family of approaches, which uses a variety of tools, rather than a single, fixed and prescriptive methodology.

Thus, we believe a good SEA is adapted and tailor-made to the context in which it is applied. This can be thought of as a continuum of increasing integration: at one end of the continuum, the principal aim is to integrate environment, alongside economic, social and other concerns, into strategic decision making; at the other end, the emphasis is on the full integration of the environmental, social and other factors into a holistic sustainability assessment.

SEA is not a substitute for, but complements, EIA and other assessment approaches and tools (**Figure 2.1 and 2.2**).

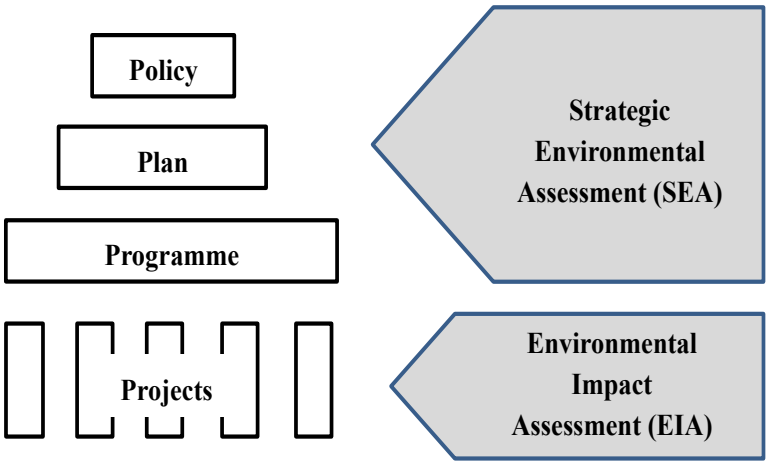


Figure 2.1: Hierarchy of Common Environmental Safeguard Tools (SEA and EIA)

[1] The term "environment" is defined broadly to include the ecological, social, health and other components of the environment, and their interactions with each other.

Used in this way, SEA has an important role in informing the planning process and helping to deliver more sustainable development outcomes. It will indicate whether the key long-term focuses of envisaged PPPs, and the goals set for them, can be driven forward in a way that balances the different pillars of sustainability; and to indicate whether there are likely synergies that would deliver sustainable development objectives more effectively.

The diagram below shows the linkage between SEA and project-level EIAs.

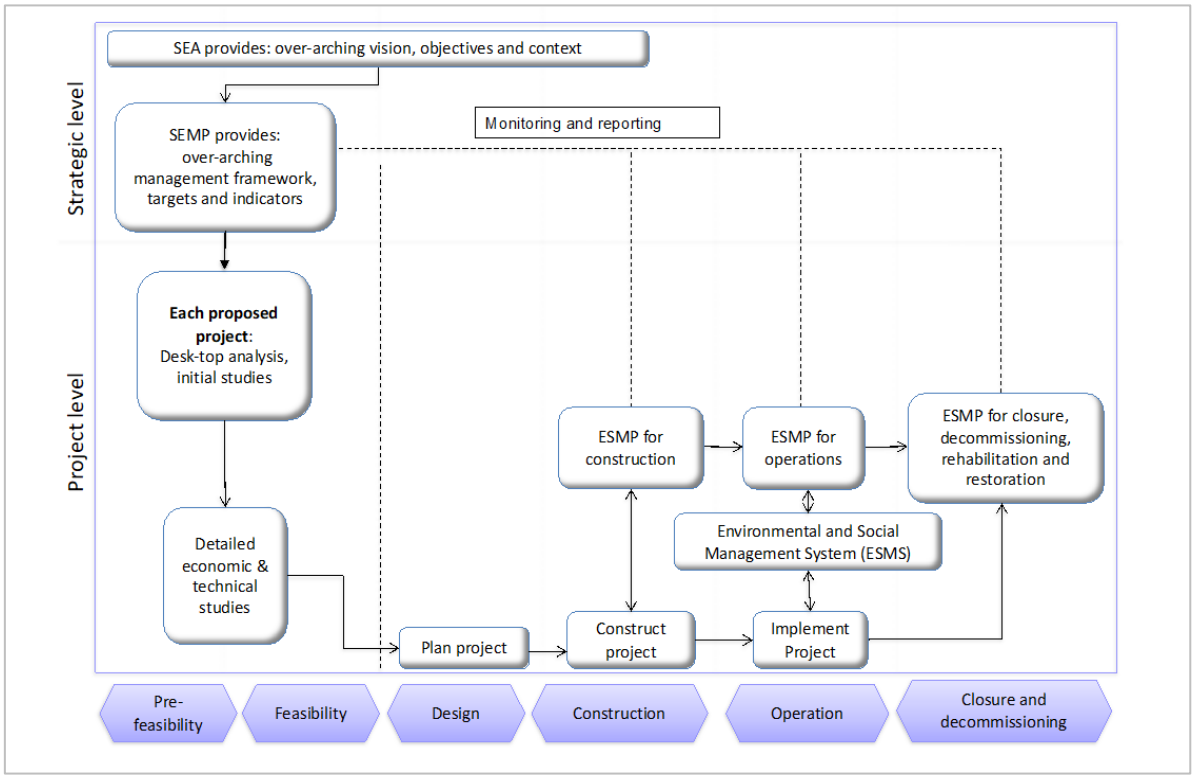


Figure 2.2: Linkages between SEA and Downstream Project-level EIAs

3. The Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism (PKCP)

3.1 Background, context and goals of the PKCP

Sustainable development of the Payra-Kuakata Coastal Region is the desired goal of the regional plan. It is intended to be achieved by integrated planning and implementation through multi organizational involvement and community participation for optimum utilization of resources and reduction of poverty. The planning area includes seven Upazilas from Patuakhali and Barguna district, namely, Galachipa, Kalapara, Rangabali, Barguna Sadar, Patharghata, Amtali, and Taltali.

The objectives to achieve coordination and integration of proposed planning initiatives are as follows:

- make optimal use of development opportunities;
- minimize negative externalities on existing development;
- safeguard ecological processes;
- ensure equitable distribution of benefits for poverty alleviation.

The specific objectives of the plan are to:

- translation of outputs from upper tier plan at Regional Plan to integrate coastal zone with the mainstream of development process of the country;
- assess functional and land use requirement for a Regional Plan in area with hazard vulnerability;
- formulate Strategic Development Plan for Regional Plan considering functional and land use requirement with hazard vulnerability;
- formulation of urban area plans and action plan at local level.

Table 3.1 provides a consolidated list of eleven thematic cluster initiatives or projects that, whilst not necessarily directly attributed to the PKCP, are related or aligned with the PKCP to a greater or lesser extent. For convenience and to enable the construction of linkage diagrams, sub-projects have been combined/clustered under an overall theme, even though they might not be in the same locality or nearby each other. The resultant thematic clusters are noteworthy because they will likely have direct impacts and/or they will combine with other components to result in cumulative impacts. Some of these clusters (e.g. Farmer Training institutions and Fire service and civil defense station construction project) are unlikely to have any significant adverse impacts, and will therefore not be assessed further.

Table 3.1: List of Developments Directly or Indirectly Linked to the PKCP

Ref #	Major investment (thematic cluster)	Summary of Key Components, Locality, Size, etc.
10.	Industrial expansion and establishment of industrial areas (EPZ)	Location: Kalapara, Patuakhali. Work is underway to set up an EPZ in Patuakhali centering the Payra sea port. Land required is 413.03 acres. An investors' club is also being set up on 2.25 acres of land in Kuakata.
11.	Airport, port, roads, rail and bridges (various)	• Location: Kalapara, Patuakhali Construction of 50-kilometer stretch of Marine Drive from Kuakata Zero point to Kauar Char to Alipur to Kuakata Zero Point.

Ref #	Major investment (thematic cluster)	Summary of Key Components, Locality, Size, etc.
		• Road Construction Project (Ferry Ghat) Location: Barguna, Patuakhali. • Patuakhali-Amtali-Barguna Road over Paira River. • Lebukhali - Dumki-Boga - Dashmina- Galachipa - Amragaci road over Galacipa River. • Barguna-Patharghata Road over Biskhali River. • Baliatoli Bridge over Anadarmanik River, Kalapara. • Four-lane connection road of national highway with Payra port - Location: Kalapara, Patuakhali. • Construction of Broad-Gauge Railway Line - Location: Amtali and Kalapara, Patuakhali. • Proposed Airport at Payra sea port. Location: Kalapara, Patuakhal. Will require ancilliary infrastructure such as passenger facilities, electricity, water supply, roads, gas, etc. • Payra Port - Location: Rangabali, Patuakhali. • Boroitola Ferry Terminal - Bainchotki Ferry Terminal - Location: Barguna Sadar, Barguna.
12.	Electricity generation and Distribution	Location: Barguna Sadar, Barguna This project will improve the power supply of the PKCP project area and hence improve various power-driven tourism services and amenities.
13.	Exclusive tourism zone with associated facilities, including marine aquarium and museums, mosques, hotels, motels, watch towers, fire safety facilities	• ETZ - Location: Sonar Char, Rangabali, Patuakhali. Would require tourism centres, ancilliary infrastructure such as electricity, water supply, roads, gas, etc. • Marine aquarium and museum - Location: Kawar Char, Kalapara, Patuakhali. • Establishment of a Parjatan Motel near the Khash Pond of Shuvo Shondha beach, Taltoli. • Kuakata Dak Banglo construction - Location: Kalapara, Patuakhali – tourist accommodation. • Patharghata Model Mosque - Location: Patharghata, Barguna. • Barguna Sadar Model Mosque - Location: Barguna Sadar, Barguna. • Barguna Circuit House - Location: Barguna Sadar, Barguna • Location: Watch tower at engragiri Eco- Park, Taltoli to observe the unique mangrove flora and fauna of this region. • Taltoli Fire Service Office Location: Taltoli, Patuakhali to improve the fire safety (for both hosts and guests) of the PKCP project area. • Mahipur Fish Landing Station - Location: Kalapara, Patuakhali
14.	Tourism sea and river cruises	Location: Fakirhat, Taltoli Introduction of Sea Cruise/ River Cruise to visit Sundarbans and Swatch of No Ground (SNoG)This project will open a new door of Marine tourism in this region as Katka sea beach and Swatch of No Ground (SNoG) are only 30 kilometers and 70 kilometers away from Fakirhat, respectively.
15.	Improved forest protection, conservation and Coastal Embankment Improvement	Location: Overall PKCP Area.
16.	Restoration of canals	Location: Taltali, Barguna

Ref #	Major investment (thematic cluster)	Summary of Key Components, Locality, Size, etc.
		Restore 12 canals and 7 ponds to explore the Fatrar Char, Taltali, Barguna by Forest Department This project will create an opportunity for adventure tourism in this area.
17.	Farmar Training institutions	• Location: Patharghata, Barguna. • Location: Amtali, Patuakhali .
18.	Fire service and civil defense station construction project	Location: Galachipa, Patuakhali.

The PKCP, and its relationship with other relevant plans, programmes and projects.

The study team identified the key sectors relating to the regional development plan and the area's natural resources. These key sectors are interlinked with the PKCP and all contribute to causing environmental and socio-economic impacts in the region. These PPPs were screened to determine which ones are likely to have significant environmental and/or socio-economic impacts, and therefore need to be included in the assessment process. The PPPs relevant to this SEA are listed in Appendix I.

3.2 PKCP Area of Influence and Spatial Extent of the SEA

The spatial boundary of SEA considers the Kuakata-Patuakhali Regional Plan Area which was defined as taking the Upazila administrative boundary of the potential interventions into consideration. Therefore, the study area includes the seven Upazilas-Patharghata, Barguna Sodor, Amtali, Taltoli, Galachipa, Kalapara, and Rangabali. It would thus include the footprint of the structural and strategic interventions, the Area of Influence (direct and indirect influence area) and the control area. It would cover both mainland areas and the estuarine chars of the Patuakhali-Kuakata region.

The temporal boundary of SEA was defined considering the past event which triggered major changes and the future plausible impacts. In Kuakata-Patuakhali region, inception of the Payra Port (the Payra Port Act was enacted in 2013 and the construction started soon after the enaction of the Act) and Payra Thermal Power Plant (EPC was signed in 2015 and the first unit came into operation in 2020) triggered infrastructural development, industrialization, economic development and overall socio-economic changes. The extent of ongoing Infrastructural Development Project in the Patuakhali-Kuakata Region is shown in **Figure 3.1**.

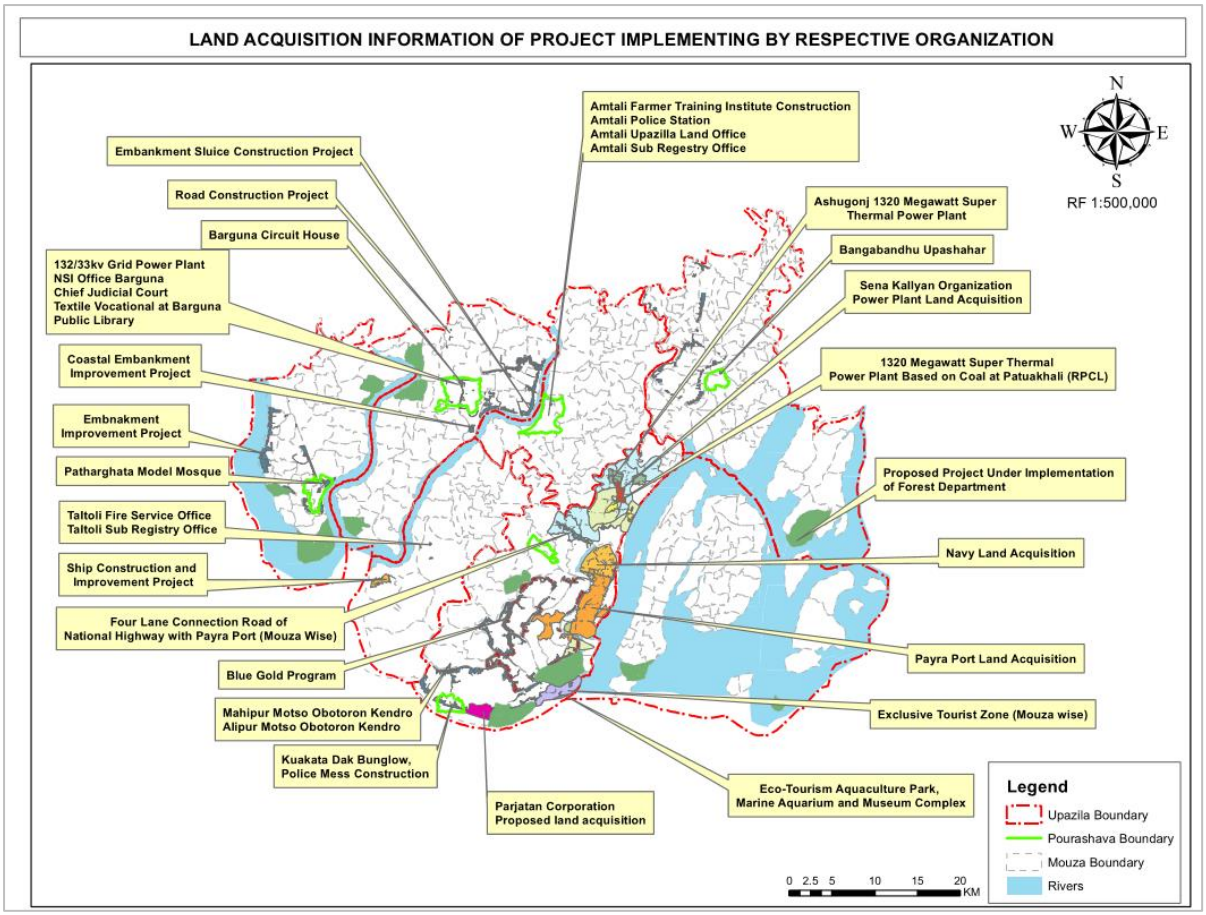


Figure 3.1: Ongoing Infrastructural Development Project in the Patuakhali-Kuakata Region

Therefore, the past temporal boundary can be considered as 2013. The future boundary would be defined considering timeline and the plausible impacts of the Patuakhali-Kuakata. The plan aims to achieve its outcome by 2041 in line with the country's Perspective Plan. Therefore, the future temporal boundary of the Sea can be considered as 2041 as well (**Figure 3.2**).

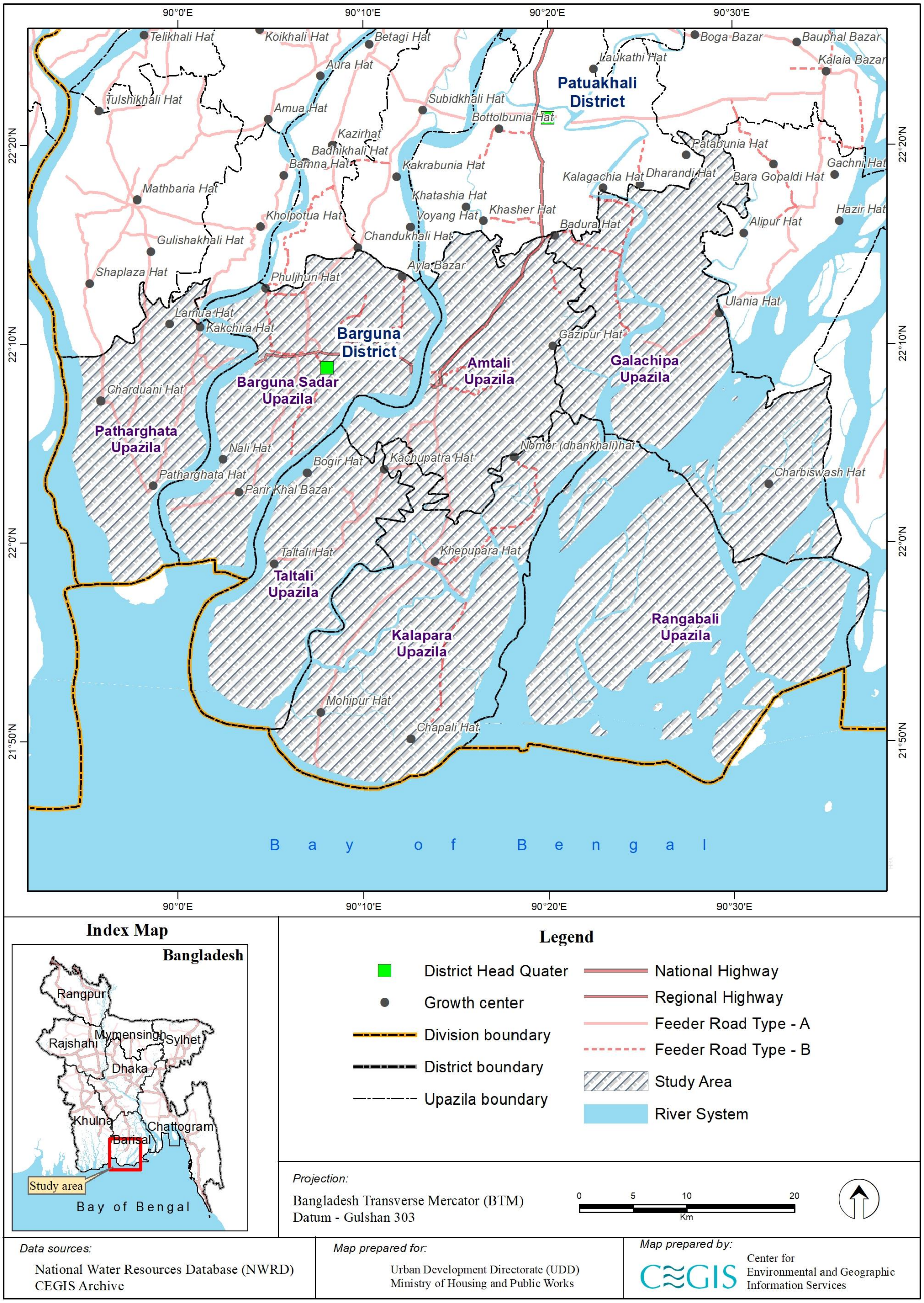


Figure 3.2: SEA Boundary

4. SEA Methodology

As illustrated in **Figure 4.1** a stepwise approach was followed to ensure that the foundations laid earlier in the process were logically built-upon subsequently. However, the steps are not strictly linear, but rather iterative. The team will engage in vertical and horizontal thinking throughout the process, and team members will engage with each other in an integrated way to avoid sectoral thinking.

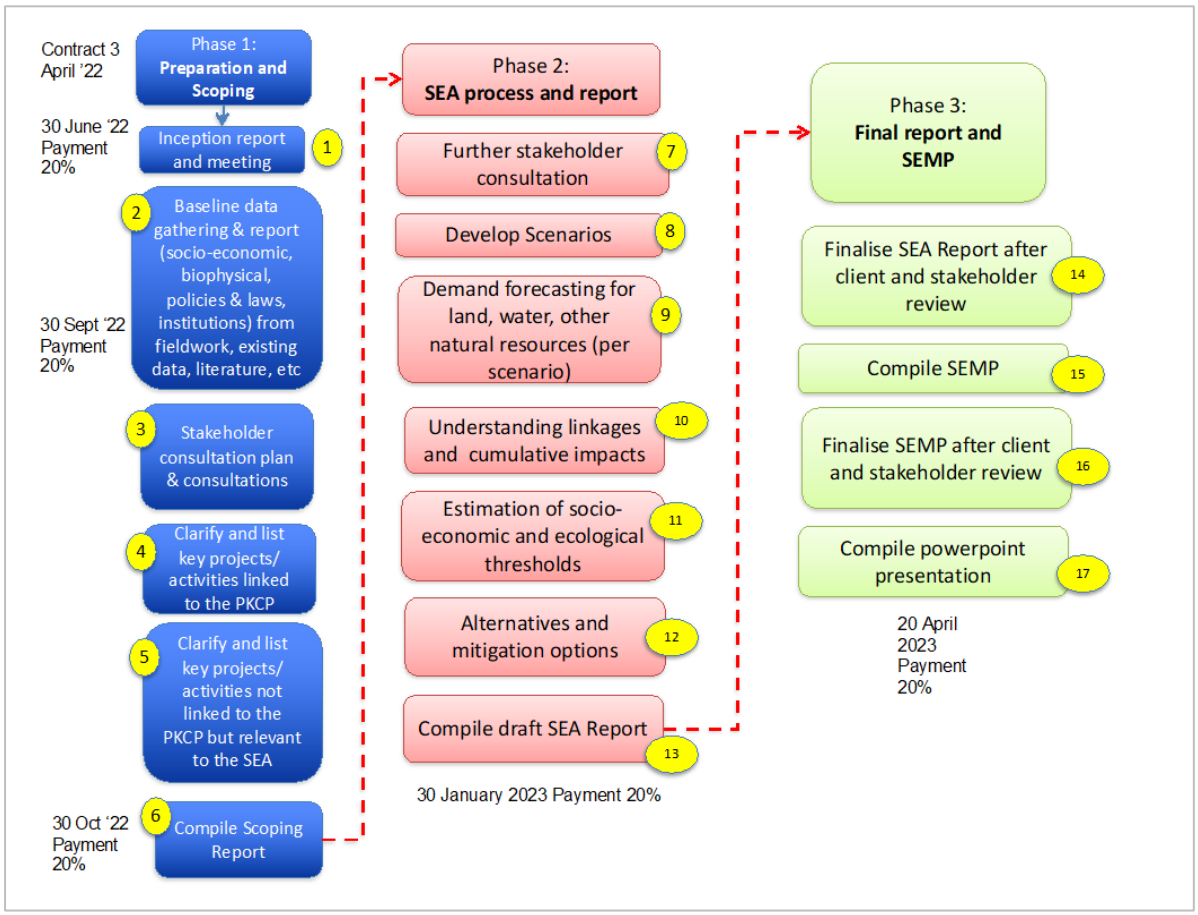


Figure 4.1: An Overview of the SEA Process

4.1 Scoping

The OECD SEA Guidance (2006) sets out the aims of scoping in SEA – it should:

- Establish the content of the SEA, i.e. the key issues that the SEA should focus on;
- Identify the relevant criteria for assessment, e.g. goals and objectives set out in national policies and strategies, preferably those that focus on sustainable development;
- Take a pragmatic view on how much can be achieved given the time-scale, available resources, and existing knowledge about key issues;
- Follow an open and systematic process;
- Actively engage key stakeholders to identify significant issues;
- Set objectives based on the identified key issues. Such objectives should represent goals to achieve such as reducing loss of biodiversity or improving employment

opportunities. These objectives will be used later to assess the impacts likely to arise when implementing PPPs;

- Identify decision criteria and suitable 'indicators' of desired outcomes.
- Recommend alternatives to be considered, suitable methods for analyses of key issues and sources of relevant data.

This is the approach that has been followed. It provided an opportunity to focus the SEA on the important issues to maximise its usefulness to the authorities, decision-makers and public. To the extent possible the scoping process has been open and iterative, involving key stakeholders.

As required in the Terms of Reference 13 thematic baseline reports were compiled and delivered as a stand-alone 566-page volume on 2nd October 2022. In addition to contributions from the core team, compiling the baseline reports included inputs from various experts from outside the team. The reports relied mostly on existing data and literature, but the consultant also undertook extensive field visits, met with stakeholders, and gathered primary data. Additional information was sourced from key informants who were identified on the basis of their subject knowledge and expertise.

Based on the baseline papers, the provisional list of key environmental, social and economic issues (included in the Inception Report) has been reviewed and some additional issues and sub-issues included. The list of key issues was further revised after stakeholder consultations. Thus, the thematic baseline papers provided the input from which to derive a baseline environmental and socio-economic profile of the study area to be included in the SEA Report. Chapter 5 of this SEA provides a summary of the baseline.

4.2 Cumulative Impacts Analysis

The assessment of cumulative impacts is a key aspect of SEA. Cumulative impacts are environmental or socio-economic changes - either positive (beneficial) or negative (harmful) caused by the combined impact of past, present and future human activities and natural processes. They are the result of implementing multiple activities (e.g. individual PPPs and the projects, activities or investment initiatives that arise from their promotion/implementation).

Individual direct impacts may be relatively minor but, in combination with others, they can result in significant environmental and socio-economic effects (**Figure 4.2**). The multiple impacts of different activities may have an additive, synergistic or antagonistic effect on one another and with natural processes. Cumulative effects can be difficult to predict and manage where baseline data is inadequate, processes (especially ecological ones) are complex, and due to the large scale at which human developments occur (e.g., across the study region).

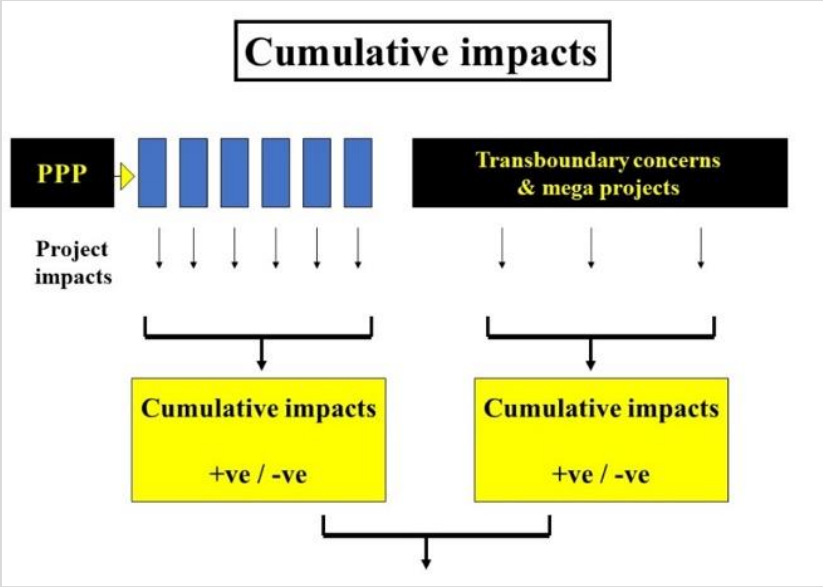


Figure 4.2: Cumulative Impacts

Positive cumulative impacts can be expected if existing environmental and social safeguard policies, regulations and guidelines are fully and effectively implemented and enforced; and if 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.

However, negative cumulative impacts will be likely to result if the opposite is the case, i.e. if existing environmental and social safeguard policies, regulations and guidelines are not fully or effectively implemented or enforced; and if no or ineffective mitigatory action is taken to avoid, minimise, restore, mitigate or offset potential impacts of development, and/or the use of clean and sustainable technologies is not compulsory (i.e. if the SEMP is not effectively implemented).

The way in which critical cumulative impacts (environmental and socio-economic) would be likely to arise for principal activities in individual sectors - as a result of implementing the main proposed or envisaged development initiatives were examined using linkage diagrams. These diagrams plot how the principal activities may give rise to major impacts (positive or negative) each of which may then give rise to further impacts, which may then cascade to further tiers of impacts. The linkage diagrams indicate the pathways through which particular types of impacts will become cumulative (e.g. pollution, deforestation, deteriorating health, migration).

These diagrams provide a pictorial understanding of how such impacts might 'flow' from one to another, and their intended and unintended consequences. Understanding such linkages is fundamental to the study of the behaviour of complex, coupled social-ecological systems. Decision-makers need to be aware of the web of relationships between activities and understand the linkages between cause and effect. In all kinds of developments/projects, there are desired outcomes (which justify those developments). But there are also a series of unintended consequences which are often cumulative. The linkage diagrams help to show where "vicious circles", "downward spirals", "antagonisms" and "synergies" may occur. They also show where interventions are needed (set out in the SEMP) to ensure that negative unintended consequences are avoided, whilst the desirable outcomes are still achieved or even enhanced.

However, a good environmental and social baseline is essential as a platform for understanding cumulative impacts.

The 2018 Inception Report on Socio-Economic & other related Survey under "Preparation of Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP)", provided an initial overview of

existing impacts on certain components of the environment. In the absence of the PKCP and any substantial impact avoidance or mitigation interventions, it is assumed that current trends will continue or even become exacerbated (because of population growth and organic development).

4.3 Consideration of Alternatives and Scenarios

SEA aims to identify the impacts of a PPP. But a key principle is that the impacts of alternatives to the PPP in focus (or alternatives to elements of the PPP) should ideally also be addressed. However, in this case, there are a large number of PPPs covering multiple sectors across a broad landscape. It was not feasible to assess every PPP or alternatives to them.

For the purposes of this SEA, we have assumed that the key aspects of the PKCP, and other projects and initiatives listed in **Table 3.1**, will be implemented over the next 10-20 years. We have also assumed, based on the analysis provided in the ToRs, that the existing development trajectory in the study area is undesirable and the environmental and social impacts evident are equally undesirable. Therefore, there is a self-evident conclusion that the interventions envisaged through the PKCP (and activities beyond the PKCP) are desirable from a sustainable growth perspective, and that adverse impacts can be mitigated providing the SEMP is implemented. The SEA has therefore not expended any further effort in comparing the impacts of the "no-go" alternative to the pursuit of the PKCP.

4.4 Strategic Environmental Management Plan (SEMP)

This SEMP set out what needs to be done, who needs to do it, when and how, and indicate associated requirements (resources – financial, manpower, equipment). It has proposed a coordination mechanism for overseeing its implementation. This is exactly what the ToRs require.

The management actions detailed in this SEMP, and the indicators chosen for ongoing monitoring, are be the best current options but 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. Whilst this is normal and expected, the foundations laid by this first iteration should provide a solid platform for future versions.

The organization of this SEMP will follow a standard, commonly used framework. Its aim will be to guide future planning, management decisions and monitoring in the area as regards environmental, social and linked economic concerns. It will be 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 should 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.

Usually 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.
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 higher-level Plans 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 this over time.
4. Monitoring of indicators – these will be listed in the SEMP.

5. Linked to response No. 4, is the possible need for undertaking new studies for issues regarded as important, but where information is lacking.
6. Suggested actions for the improved management of the area.

5. Baseline Overview of the Study Area

As required in the Terms of Reference 13 thematic baseline reports were compiled and delivered as a stand-alone 566-page volume on 2nd October 2022. In addition to contributions from the core team, compiling the baseline reports included inputs from various experts from outside the team. The reports relied mostly on existing data and literature, but the consultant also undertook field visits, met with stakeholders, and gathered primary data. Additional information was sourced from key informants who were identified on the basis of their subject knowledge and expertise.

Where appropriate these thematic baseline reports will be revised/updated during the SEA process. Based on the baseline papers, the provisional list of key environmental, social and economic issues (included in the Inception Report) has been reviewed and some additional issues and sub-issues included. The list of key issues will be further revised after further stakeholder consultations.

Thus, the thematic baseline papers will provide the substrate from which to derive a baseline environmental and socio-economic profile of the study area to be included in the SEA Report. For simplicity, the 13 baseline reports referred to earlier have been clustered under four main headings (see below), summarised and shortened to avoid excessive bulk in this scoping report.

5.1 Biophysical

5.1.1 Water Resources

The coastal zone of Bangladesh is located in the tropical region and can be broadly divided into three regions: the deltaic eastern region, the deltaic central region, and the stable deltaic western region. It is highly vulnerable to climatic hazards, especially tidal inundation induced from occasional horrendous cyclones and storm surges that is followed by consequent intrusion of saline water. Land subsidence is also quite prominent in the coastal area. Moreover, being enclosed by man-made polders, the region is often subjected to water logging resulting from inadequate in-polder water management. However, the coastal zone of Bangladesh is rich in natural resources and provide various benefits towards the nation. The mangrove, fisheries, tourism, sea culture activities, shipping and inland navigations, etc. are some examples of these benefits. Water resources of coastal region play a key role in the livelihood and economic stability of the local people. Some development plans overlook environmental considerations in planning which encourages exploitation of the natural resources. On this point, water resources can be highlighted as it is widely discriminated in the process of implementing any project. Urban Development Directorate considers 7 upazilas for the PKCP plan of which 3 upazilas are from Patuakhali district and 4 from Barguna. But, in the study, for its own interest, the systems have been considered are consisting of seven associated districts (Faridpur, Madaripur, Shariatpur, Barisal, Patuakhali, Barguna and Bhola), to be potential for the purpose of understanding the entire systems relying the areas and are likely to be influenced by the PKCP project either directly or indirectly. The main reason for respecting the vast hydrologic system is to acknowledge the SEA principle of not only the proposed plan but also the upcoming development in the near future that will influence the cumulative impacts of the region. On this backdrop, a Strategic Environmental Assessment (SEA) is in progress and this report can be used as a baseline for the water resources management of area of interest under this project.

Hydrological Setting

The average total rainfall data for three stations located at the SC region is taken for analysis to represent the yearly and seasonal trend of the entire region. From the analysis of data, the overall trend of rainfall shows a decreasing pattern, which can be a precursor to less generated run-off and subsequent reduced flow in the rivers within the vicinity. From the analysis of seasonal variation of

the rainfall, it has been observed that the rainfall increases significantly in monsoon period (June-September) and again begins to decrease in the post-monsoon period and reaches to the least amount in December. Only 4% of the total rainfall occurs in the dry period (December-February), whereas 62% precipitation occurs in monsoon (June-September). The remaining 34% rainfall occurs during pre-monsoon (March-May) and post-monsoon (October-November) period.

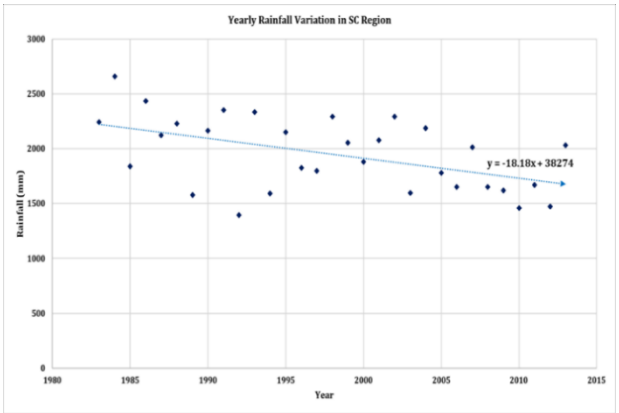


Figure 5.1: Trend of Yearly Rainfall in SC Region

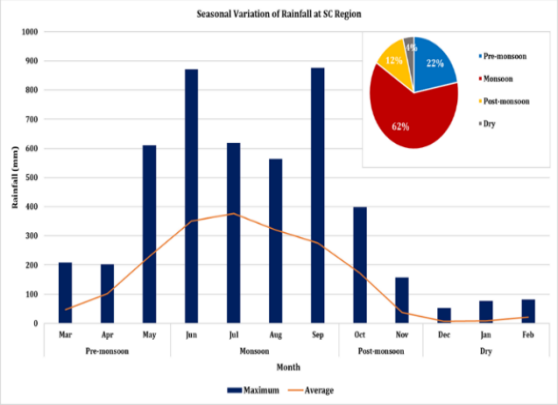


Figure 5.2: Seasonal Rainfall Variation at SC Region

For analyzing temperature and relative humidity, average value of six stations located within the SC region are considered as representative for the entire scenario of region. Temperature data has been analyzed for the period 1983-2013. Decreasing pattern has been found in both maximum and minimum. It indicates that the overall temperature at SC region is reducing. The highest temperature has been observed to rise up to 40.5°C in the month of May and lowest temperature is observed to occur in January.

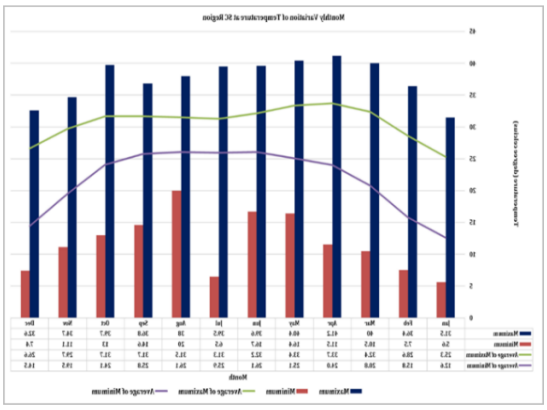


Figure 5.3: Monthly Variation of Temperature at SC Region

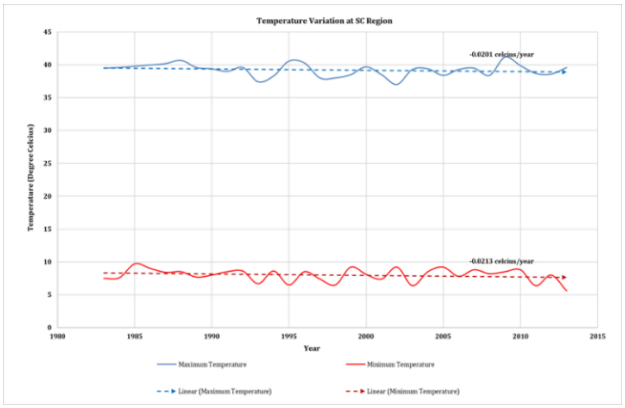


Figure 5.4: Trend of Yearly Temperature at SC Region

Main Rivers System

Several river systems provide fresh water in the South-Central region in Bangladesh. Among them Arial Khal River system and Meghna-Tentulia River system are the main source of fresh water to the south coastal region.

Availability of Freshwater

To analyze the freshwater inflow at SC region, Gorai Railway Bridge (99) in Gorai River, Chowdhury Char (4A) in Arial khan and Mawa (93.5L) in Padma River has been selected. The trend is observed to be decreasing for all the stations. The negative slopes of the trendline at the selected three locations translate to reduction in freshwater inflow in the SC region. The probable cause for such decreasing

flow may be due to lack of flow augmentation from upstream. Sedimentation at river beds of this delta results in reduction of conveyance capacity of the natural alluvial rivers. The Flow Duration curve for Mawa point shows that the discharge at this location exceeds 10,000 cubic in 70% of the time whereas at Gorai River and Arial Khan River, this huge discharge almost never occurs. Gorai River and Arial Khan River have low flow, and thus 2000 cubic flow is exceeded at these station in only about 25% and 27% of the time respectively.

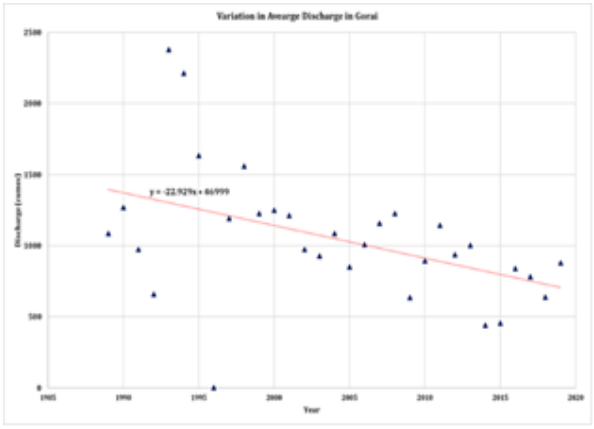


Figure 5.5: Trend in Discharge at Gorai Railway Bridge from 1989 to 2019

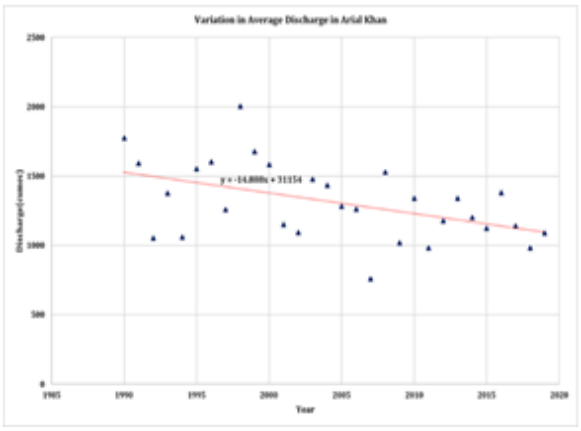


Figure 5.6: Variation in Discharge at Chowdhury Char from 1964 to 2019

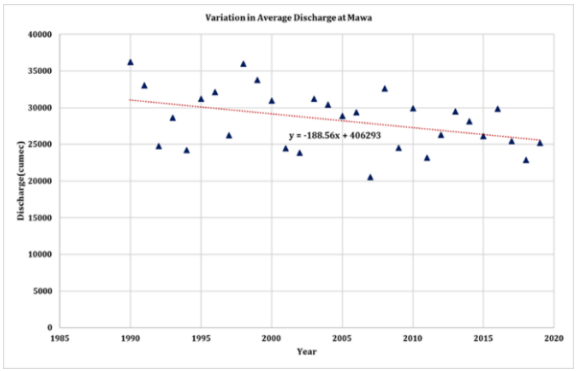


Figure 5.7: Discharge at Mawa from 1990 to 2019

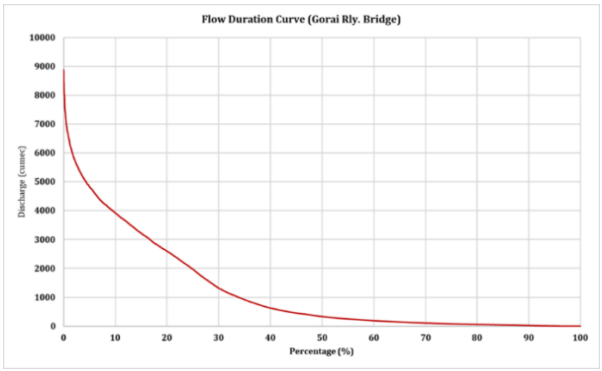


Figure 5.8: FDC Analysis at Gorai Railway Bridge

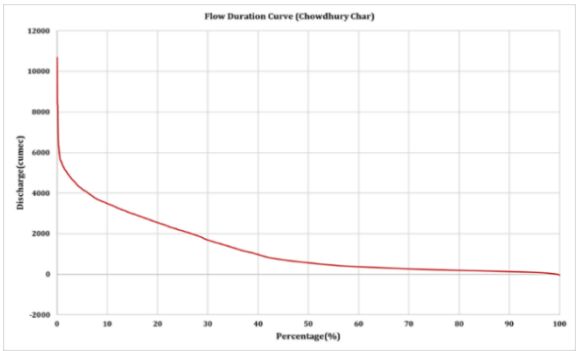


Figure 5.9: FDC Analysis at Chowdhury Char

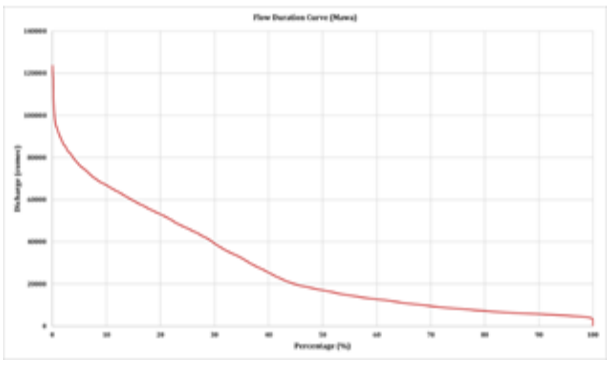


Figure 5.10: FDC Analysis at Mawa

Water Level and Flood Frequency Analysis

The water level is analyzed for four representative stations (Bhola Kheyaghat, Rayanda, Mirjaganj and Patharghata) to gather the overview of the entire SC region. Both the trend of the maximum and minimum water level show increasing pattern indicating that the water level at these stations have been increased from the past for all the station. Though the water level is highest at Bhola Kheyaghat (observed from the historical data analysis), the increasing trend is faster at Patharghata (Bishkhali River). This indicates that the water level is rising faster near the coast as Patharghata is way downstream of Bhola Kheyaghat. This rise in water level indicates the increased probability of tidal flood. The observed water level at Pathorghata reaches its peak, about 1.14 mPWD; at Bhola Kheyaghat it is about 1.8 mPWD; at Mirajganj 1.75 mPWD; at Rayanda 1.71 mPWD. From flood frequency analysis it can be observed that for 50-year return period, the water level at Patharghata is highest (4.14 mPWD). It is indicative of tidal flood occurring at SC region.

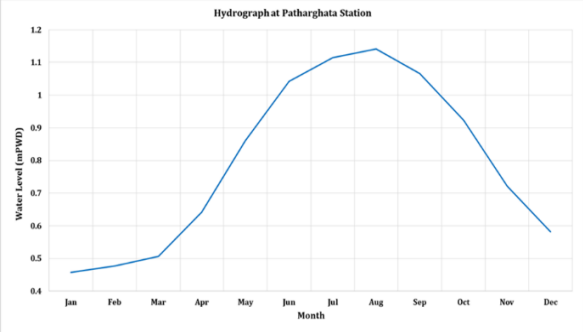


Figure 5.11: Trend of Water Level at Patharghata

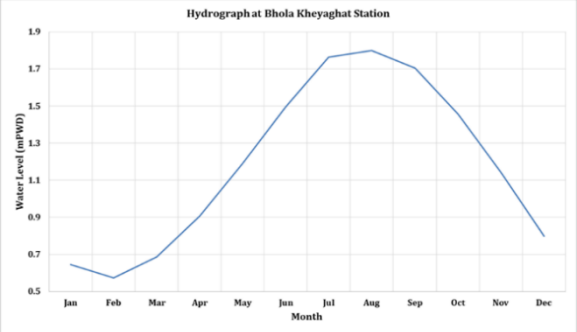


Figure 5.12: Trend of Water Level at Bhola Kheyaghat

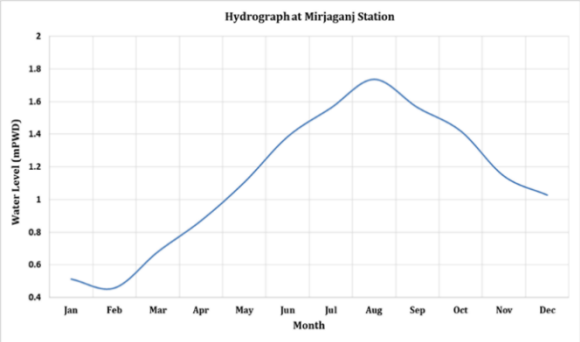


Figure 5.13: Trend of Water Level at Mirjaganj

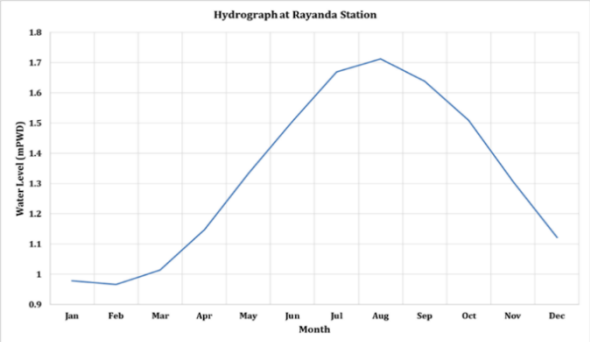


Figure 5.14: Trend of Water Level at Rayanda

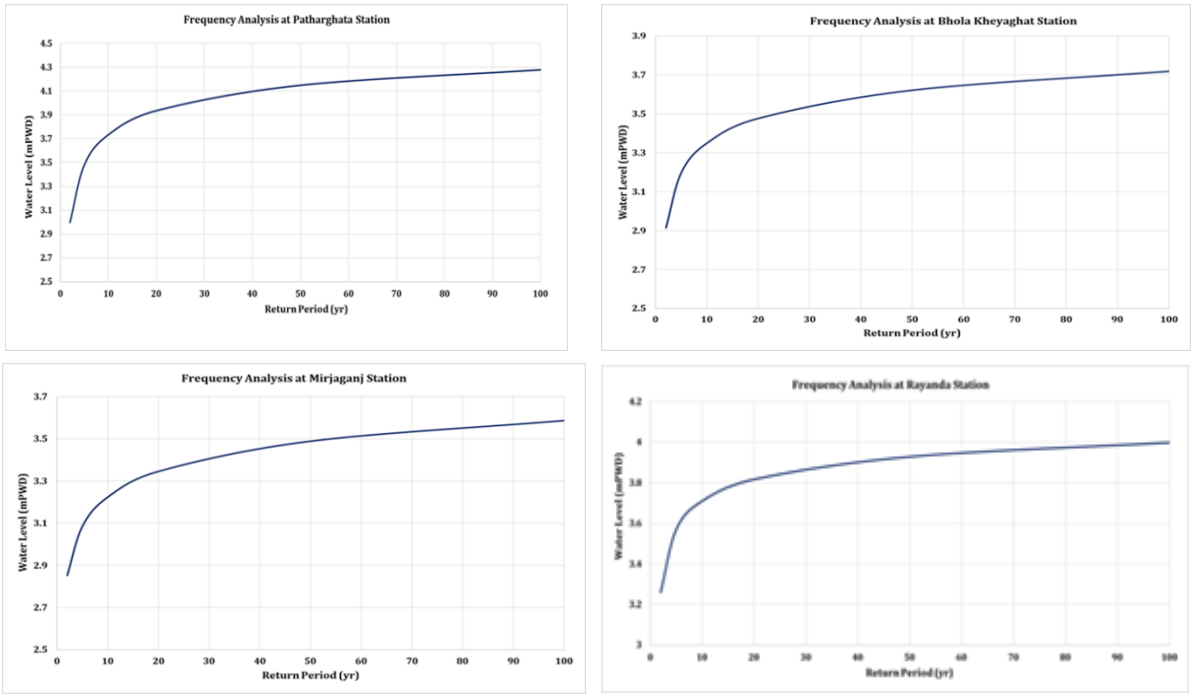


Figure 5.15: Water Level Corresponding to Various Return Periods at Four Tidal Stations

5.1.2 Morphological Setting

Rivers are very dynamic in the delta of Bangladesh especially in the south-central region. Baleshwar, Bishkhali, Burishwar-Payra, Andharmanik, Lohalia, Rabnabad and Tentulia are the major rivers in the study area. At present all the water flow and sediment of Ganges and Brahmaputra merge with Meghna River at Chandpur and fall in Bay of Bengal through Meghna Estuary. It can be seen that the west part of the study area has eroded slightly, whilst the estuary of Tentulia has experienced deposition of sediment as well as formation of new islands.

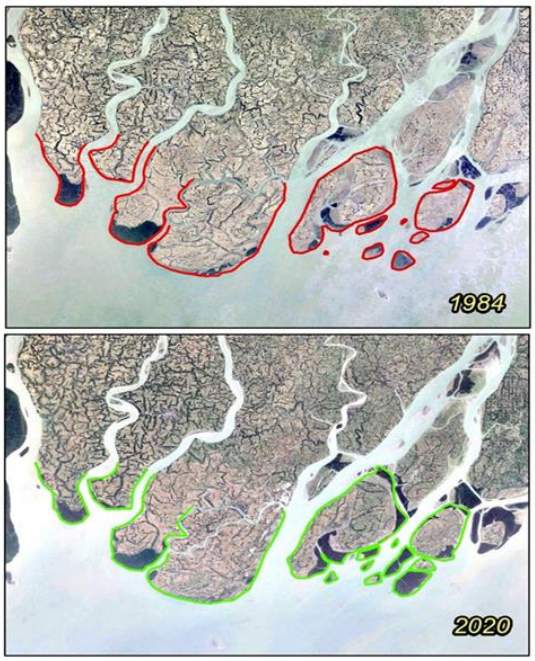


Figure 5.16: Comparison of Coastline for Study Area between 1984 and 2020

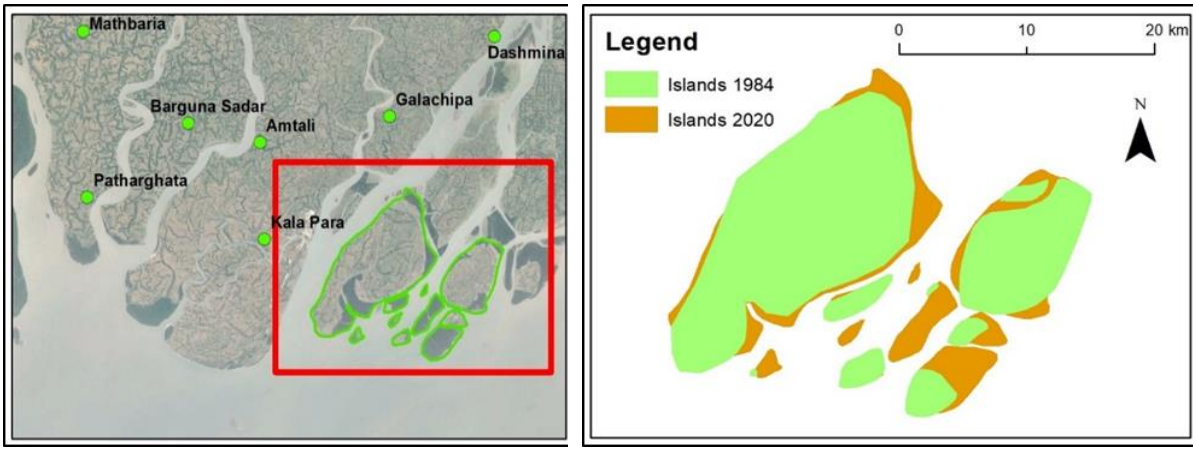


Figure 5.17: Changes of Island area at Tentulia-Rabnabad Estuary from 1984 to 2020

The extent of the Tentulia-Rabnabad estuary was 30,855 Ha in 1984. In 2020, it increased to 36,275 Ha because of an additional 17.6% of land. Artificial mangroves at this zone have accelerate the land pro-gradation process. Coastline analysis shows more sedimentation in the mouth of Tentulia channel compared to the estuaries of Baleshwar or Bishkhali-Burishwar Payra systems. This sedimentation occurs mainly due to the upstream combined flow of Ganges-Brahmaputra-Meghna Systems.

Erosion/accretion

The total amount of eroded and accreted lands is 3500 Ha and 2700 Ha respectively. Hence the erosion is about 30% higher than the accretion.

Natural Disasters

Bangladesh is situated downstream of the largest delta in the world. Thousands of rivers crisscross the whole country, resulting in flooding almost every year. In the coastal region, generally rain-fed flood, river flood and tidal floods occur. The area is frequently hit by severe cyclonic storms.

Development of Navigation and Drainage

To increase agricultural production and other economic activities, embankments were constructed in the coastal area during the 1950s and 1960s. The purpose was to prevent salt-water flooding of the floodplain areas inland and provide increased security for monsoon-season rice production. Sluices in the embankments prevented the inflow of salt-water at high tide and allowed ponded rainwater to drain away at low tide. Tide normally governs the navigation in the tidal rivers. Sediment enters the tidal system during flooding and exits during ebbing. But due to tidal asymmetry, sediments result in rivers becoming silted up. As a result, dredging the channels is difficult and expensive.

Present and Future Risks

Present challenges of the SC region include waterlogging, storm surge, salinity water intrusion, water supply and coastal morphology.

Future Risk of the SC region includes decrease in fresh water flow. The graph below illustrates the decline in the amount of discharge. This aggravates salinity intrusion with multiple impacts on the local population.

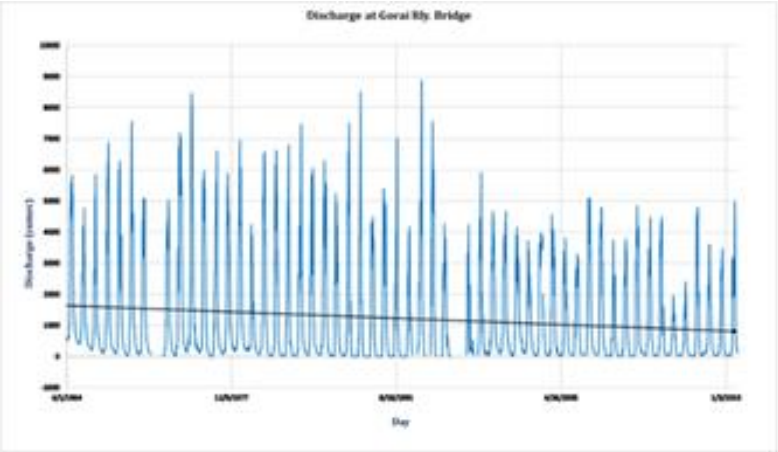


Figure 5.18: Trend of Daily Discharge in Gorai

Sea Level Rise is a threat to the coastal zone of Bangladesh, a low-lying delta that is often subjected to land subsidence. It is estimated that in 2050 and 2100 respectively, there will be inundation of 2%, 4% and 17.5% of total land mass respectively. Based on 22-year historical data, SMRC has developed a trend of sea level rise in three tidal stations in the coast of Bangladesh and the trend depicts a worrying picture where coastal areas would experience 5.9 mm sea level rise annually. Saline water intrusion inward of the coastal zone is an aftermath of sea level rise. Moreover, during the dry season freshwater inflow is reduced, thus worsening the overall situation.

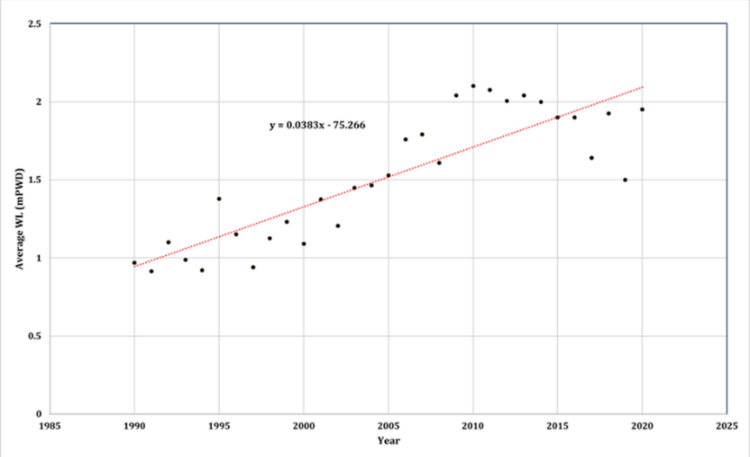


Figure 5.19: Sea Level Rise at Patharghata

5.1.3 Socio-economic Condition

Whilst there are limited data regarding the socio-economic status of the study area, this section of the SEA report provides as comprehensive an overview as could be obtained in the time available – though much of the data is national rather than local.

Bangladesh export earnings during FY 2020-21 was US$ 45367.19 million and import payment for the same year was US$ 61571.40 million which shows that export earning covered 73.68% of import bill. During 2019-20 and 2018-19 export earning covered 71.46% and 74.99% of import bill respectively. Export earnings during FY 2020-21 was US$ 38758.31 million and import payment for the same fiscal year was US$ 54344.40 million of goods sector. On the other hand, export earnings during FY 2020-21 was US$ 6608.88 million and import payment for the same year was US$ 7227.00 of service sector.

Bangladesh commonly has a trade deficit mainly due to heavy import of fuel, capital machinery, industrial raw material required for rapid industrialization.

Bangladesh is an agriculture-based nation. Agriculture is the main source of income for most people. For the fiscal year 2020–2021, agriculture's contribution to the national GDP was 11.63%, third-highest among all sectors. Through agriculture Bangladesh has made significant progress in food security in recent years compared to many of its Asian counterparts. With more than 58.5 million people facing mild chronic food insecurity (IPC Level 2), representing 36% of the total population, and 69.8 million people facing IPC Level 1, representing 43% of the total population. Nearly 35 million people, or 21% of Bangladesh's total population, face moderate and severe chronic food insecurity (IPC Levels 3 and 4), with 11.7 million of those individuals facing severe chronic food insecurity (IPC Level 4), and 23.1 million of those individuals facing moderate chronic food insecurity (IPC Level 3).

Of the eight divisions in Bangladesh, the divisions of Chattogram and Dhaka have the lowest proportion of people in Moderate or Severe Chronic Food Insecurity (18% and 16% respectively). The largest percentage of people facing moderate or severe chronic food insecurity (31%) is found in Rangpur division, followed by Barishal division (24%) and Rajshahi division (23%).

Out of all 64 districts, 19 districts have been classified in IPC Level 2. Forty-three districts have been classified in IPC Level 3. The study area Barguna and Patuakhali districts have been classified in IPC Level 3.

Comparing the upazilas overall employment rates, it is evident that a large proportion of the population is employed. However, the upazilas of Patharghata, Barguna Sadar, and Taltali have the highest rates of unemployment. The upazilas with the highest employment rates are Kalapara and Rangabali. Household work as expected is high in all upazilas. Galachipa upazila contributes the most to national employment among the seven, according to an analysis of employment data for the upazilas and a comparison with overall employment. With 25,079 TPEs, it accounts for 0.1% of all employment across the country. Taltali upazila contributes the least (0.03%) (TPE – _6,482). The towns of Galachipa, Barguna Sadar, Kalapara, Amtali, Patharghata, Rangabali, and Taltali are listed in decreasing order of total employment.

Socio-economic Issues

Population

Bangladesh is one of most densely populated countries in the world with an estimated 165.16 million people in 2022 (Preliminary Census Report, BBS 2022). However, total seven (07) upazila (administrative unit of Districts) has been taken into consideration this SEA. The population of study area (07 Upazilas) in that year (the base year) was 12.82 million. Projections data includes that there will be 14 million people in the study area and in current year there will be 14.30 millon people are living in this area. The annual average growth rate of Barisal division is 0.79%(Preliminary Census Report, BBS 2022) while annual growth rate is assumed to be 1.18% in 2025 (8th five-year plan).

Livelihood

According to BBS (2012), 39% of people are employed in three different sectors such as agriculture, industry and service. Here, agriculture is treated as the main source of livelihood in the study area, in which about 55.82% of households are dependent on agriculture, and about 16.17% are agriculture laborers. Most households (68.8%) depend on single earners (Household survey, 2019). According to the survey findings (HH survey, 2019), only 2% of households have an incidence of cross-border migration for economic reasons. According to the survey findings, most households (51%) have monthly earnings of less than or equal to BDT16,000. In contrast, only 8% of households earn more than 50,000 monthly (HH survey, 2019).

Education

In the studied Upazilas in both urban and rural areas, the literacy rate of males is higher than females except in the rural areas of Patharghata and Kalapara. The literacy rate of females is equal to or greater than male literacy in these two areas. The Existence of a large number of schools in these areas might be a reason for this.

Migration

The study area belongs to the Barisal division, due to data insufficiency divisional migration data has been taken into consideration for internal migration. It was found that 7.62% of the total population of Bangladesh born in Barisal out of which 3.24% migrated to other divisions (largest 1.62% in Dhaka and second largest 1.09% in Khulna division). Among the total population in Barisal division 75.06% people are found who live in Barisal division is native born and the remaining people migrated from other divisions (11.41% from Khulna and 7.58% from Dhaka). About 68,921 number of international migration were happened from 2005-2018 in Barguna and Patuakhali district.

Gender

In the study area which is located in the coastal region whereas women have different role in agriculture and fisheries sectors. There are also unequal power relations deeply rooted on gender roles and potentials. Women and girls are disadvantaged by multiple gender-based inequalities that include wage discrimination; limited mobility; limited decision-making authority within the household; risks of exploitation; abuse and violence; limited access to basic services and social and legal protections; and limited visibility in society. But there has been significant improvement in providing education for girls in this region.

Culture, heritage and Society

Patuakhali district has a rich cultural heritage. Folklore in this region is famous for Jari and Bhatiali. About more than 31 cultural organizations such as Patuakhali Theater, Sabuj Sangha, Shaheed Smriti Pathagar, Patua Sahitya Parishad etc. exist in this District. Patuakhali is inhabited by several tribal ethnic groups such as the Magh and Chakma. Besides, there is Rakhine village of Kalapara upazila.

Infrastructure Development

The project area is affected by various natural disasters such as cyclones, flooding and erosion. Of them, cyclones are devastating, for which a considerable number of cyclone shelters have been constructed as protective measures. According to the Regional Plan of PKCP, a total of 242 cyclone shelters have been found in the study area.

5.1.4 Land Use

The baseline information on land resources (agro-ecological characteristics, land use, major challenges, trend analyses-related land use patterns, land degradation, erosion, accretion, coastal land management, land governance) have been collected, mainly from secondary sources, but augmented by field visits. The data were screened, verified, correlated and analyzed, and presented in the baseline situation of Payra Kuakata Coastal Region. The present land resource policies/strategy documents/plans in Bangladesh have been evaluated. The land sector policies include those related to land use policy, coastal zone policy (CZPo), National agricultural policy, national water policy, environmental policy, national rural development policy and Coastal development strategy.

About 49% of land is used for agriculture and agricultural related land use like forests, mangroves, rivers, lakes, beels and haors. Aquaculture occupies 31% of total land of Payra-Kuakata Coastal Region. The remainder (21%) is non-agricultural land (rural and urban settlement, industrial zone, and accreted).

Analyses on land use pattern or trends of various land use with drivers have been incorporated in the report. Land covering maps of Payra- Kuakata region were estimated by using Landsat 5 TM for the year 2010 and Landsat 8 for the year 2020.

The findings indicated that the land use pattern is continuously changing, while the suitability of land is also changing. Mainly the agricultural land has been converted to other lands. For instance-in the last 10 years about 566 hectares (0.09%) of crop land has been lost from 146,357 hectares in 2010 to 145,791 hectares in 2020. The wetland area changed between 2010 to 2020. A total of 6,363.66 hectares (2.13%) of wetlands have been converted in past 10 years. In 2020, about 1762 hectares' area of land has been changed into settlements which is about 1.34% of the total area of PKCP region. But about 670 hectares' forest land has increased by the year of 2020.

5.1.5 Infrastructural Development

Sustainable infrastructure plays an important role regarding socio-economic development of Bangladesh as well as facilitating decision making for investment. Infrastructure development has been accelerated due to demographic and economic needs. Ministry of housing and public works, roads and highway department, Bangladesh railway, Ministry of civil and aviation, department of disaster management, Local government engineering department, Payra port authority, BIWTA, BREB, WZPDCL, BEPZA, BEZA are the major government organizations responsible for infrastructural development. Integrated Multi-Model Transport Policy 2013, national land transport policy 2004, road master plan 2009, railways master plan (2016-2045), Bangladesh delta plan 2100, Building construction act, 1952 are key PPPs relating to infrastructure which have been reviewed and described in terms of major environmental and socio-economic impacts.

According to RHD and LGED road database, total regional road, zila road of Payra-Kuakata region are 80.95 km and 81.52 km respectively. Some National and Regional Highways of Bangladesh indirectly influence the PKCP area. Regional highways (R881) and national highways (N8) relate to Asian highways (AH1 & AH41). Railway network of PKCP area is under construction which will connect this area to capital. PKCPA is a riverine region having a navigable network (river and canal combined) varying from 2,432 km round the year to 2,676 km during the monsoon. There is only one sea port which is Payra sea port.

There are 1,222 educational institutes in PKCP area. But the number of colleges, technical and vocational institutions are not adequate for the population. Health care facilities in the PKCP area are similarly insufficient.

Payra-Kuakata contains unique flora, fauna, forests, lakes and rivers, making the region ideal for ecotourism development. The main tourist attractions are Sonakata ecopark, Shuvo Shondha beach, Misripara Buddhist temple, Kuakata sea beach, Laldia forest, Haringhata forest, and Bohongo island.

Some mega infrastructure projects are planned and some are under construction in Payra-Kuakata region that will extend roads, improve energy efficiency, create rail connectivity, create employment, industry etc. This infrastructure development leads to rapid urbanization. Padma multipurpose bridge, Bhaga-Payra rail link, ship construction and improvement, Payra port development, different power plan development, costal town improvement, construction of fire service and civil defense building are examples of the major projects in the PKCP area.

5.1.6 Eco tourism

The Payra-Kuakata regions have tourism potential for both domestic and international visitors. Forests, beaches, lakes, rivers, archaeological and historical places make the region unique (**Figure 5.19**).

Kuakata sea beach popularly known as "Sagar Kannya" (Daughter of the Sea) is one of the major tourist destinations in Bangladesh. This is the second-largest sea beach after Cox's Bazar. Standing at the same

place on the beach, one can view the rising and setting of the sun in the blue water of the Bay of Bengal which makes the beach unique.

The Payra-Kuakta region's tourist attractions can be broadly categorized into three groups named natural, cultural/ historical, and religious/spiritual.

Natural attractions include Gangamotir Char, Kawar Char, Pakhir Char, Sonar Char, Lembur Char, Fatrar Char, Shuvo Shondha Beach, Tengragiri Eco-Park, Haringhata Forest from where one can observe an abundance of mangrove species including birds, red crabs, etc.

Payra-Kuakata region's Rakhain cultural heritage is one of the major tourist attractions in Kalapara and Taltoli. Tourists can experience Rakhain culture, lifestyle, artisans and tradition in this area. Additionally, this region is a hub for religious tourism having archaeologically important monasteries of the Buddhist community, including Misreepara Buddhist Temple, Srimangal Buddhist Temple, etc. Another attraction is the traditional 'Rash Mela', one of the main festivals of the Hindu community held at Kuakata in Patuakhali district.

According to the General Secretary of Kuakata Hotel and Motel Association, currently, about 15,000 to 20,000 tourists can be accommodated daily in approximately 150 residential hotels/motels/guest houses. The rent of these accommodations varies depending on the quality of the accommodations, rooms amenities, and seasons.

Road and launch are two popular transportation modes for the tourists of this region. By road, it takes only 6 hours to reach Kuakata traveling 300 kilometers from the Capital city Dhaka. While launches are also available from Dhaka to Kuakata via Patuakhali and Dhaka to Kuakata via Barisal routes and ticket fare ranges from BDT 850 to 4,000 per person depending on room quality and services. There are approximately 15 private travel agencies located in Kuakata which provide tour packages from Dhaka to Kuakata along with local tour guides. There is some local community engagement and ownership in the tourism industry of Kuakata but no foreign investment.

Figure 5.20: Map showing Major Tourist Spots of the Study Area

5.1.7 Energy & Power Sector of Bangladesh

This SEA is being undertaken partly because concerns have been raised, particularly by UNESCO, about the possible impacts on the environment (including social) from the Payra coal-fired power station and industrial development in the Payra-Kuakata area. Power generation is a major polluter (particularly airborne pollution). Energy consumption per capita is 0.28 toe, including around 489 kWh of electricity (2020). The country's overall energy consumption is increasing (4.5%/year since 2010), driven by rapid economic growth (6.9%/year). Gas is the main energy source (57%), ahead of biomass (17%), coal (13%), and oil (12%) (2020)[2].

5.1.8 Sources of Energy

Natural Gas, liquefied gas, coal, biomass & biofuel, hydro energy, wind energy, solar energy are the main available energy resources in Bangladesh. Biomass accounts for about 27% of the primary energy and the rest 73% is being met by commercial energy. Natural gas accounts for about 62% of the commercial energy (with 8% imported LNG). Imported oil accounts for most of the rest.

The use of natural gas in Bangladesh began in the 1960s, at present it is the main source of the energy. Until now, 27 gas fields have been discovered. Natural gas covers about 75% of the total fuel consumption of the country being used in electricity production, fertilizer factories, domestic and commercial cooking, CNG vehicles, tea estates and other industries.

According to the data of "Upending the Natural Gas Market in Bangladesh: Growth Prospects of LPG in Bangladesh", the local annual consumption of LPG grew to 0.95 million tons in 2019. The maximum LPG production capacity from local sources is about 22,000-25,000 tons. Bangladesh total consumption was around 400,000 tons in 2016-2017, 650,000 tons in 2017-2018, 825,000 tons in 2018-2019, and increased to 950 000 tons in 20193.

Bangladesh has reserves of 3,100 million tons of coal with 13% in the proven category[4]. The reserves include five coalfields, all of which occur in the north western area that is sandwiched between the Jamuna River and the Padma River in north western Bangladesh. Currently, Barapukuria is the only mine supplying coal to the Barapukuria Coal Based Thermal Power Plant.

Recently, Power Division suggested that coal-based power plants, which made little progress or could not secure financing, be turned into LNG based plants. These ongoing projects have a total capacity of 13,000 megawatts – which is more than the country's current power consumption. Presently, primary commercial energy resources include natural gas, oil, condensates, coal, peat and renewable energy resources. Biomass still plays an important role in the country's energy consumption in the rural areas. Government is now actively considering use of nuclear energy for electricity generation.

Net energy generation in total net energy generation in FY 2020-21 was 80,423 GWh where -60.19% derived from natural gas, 21.76% from furnace oil, 0.76% from diesel, 6.21% from coal, 0.81% from hydro and 0.20% from renewable sources and 10.08% of electricity was imported from India (BPDB, 20215). Status of the electricity production in Bangladesh has presented on the following table.

5.1.9 Status of Electricity Sector

Electricity is the major source of power for most of the country's economic activities. Bangladesh's total installed electricity generation capacity (including captive power) was 22,031 MW (BPDB Annual

2 https://www.enerdata.net/estore/energy-market/bangladesh/
3 https://databd.co/wp-content/uploads/sites/5/edd/2019/05/LPG-White-Paper-May-2019.pdf
4 Proven coal reserves: coal located in active mines, and that can be extracted under current economic and technical conditions
5 Bangladesh Power Development Board, Annual Report 2018-19; link:
https://www.bpdb.gov.bd/bpdb_new/resourcefile/annualreports/annualreport_1574325376_Annual_Report_2018-19.pdf

Report) in the year of 2020 -2021. During fiscal year 2020-21, transmission grid substation capacity also increased due to completion of new Sub-stations and augmentation of existing grid substation. At the end of fiscal year 2020-21, grid capacity increased by 13% at different voltage level.

The utility electricity sector in Bangladesh has one national grid with an installed capacity of 22,562 MW as of October 2019 (including captive and renewable energy). Annual Report 2019 of BPDB confirm that around 95% of the population had access to electricity in 2019. Electricity demand is growing day-by-day. In order to mitigate the demand-supply gap, an aggressive plan in the Seventh five-year plan 2015 has been prepared by the government for the addition of an envisaged 17,304 MW new generation capacity by 2023. The plan includes 50 power generation projects of capacity 15,151 MW which are now under construction. Distribution system losses are between 7 and 8 % (2nd Perspective Plan: 2021-2041).

5.1.10 Power generation and transmission in the Barishal Division of Bangladesh

There are Seven power stations operating in the Barishal of Bangladesh which are connected to the national grid. These power plants are fuelled by Gas, Coal, High Speed Diesel (HSD) and Heavy Fuel Oil (HFO). The present and future status of these power stations is presented in the following Tables.

The national grid, operated by the state-owned Power Grid Company of Bangladesh (PGCB), covers the whole country and operates at 132 kV, 230 kV, and 400 kV. The country's transmission system is also connected to the national grid of India through 400 kV lines at Bheramara and Comilla. The first 400 kV transmission line runs from Meghnaghat to Aminbazark. Three other 400 kV transmission lines are under construction – one these is from Mongla to Aminbazar. The utility electricity sector has one national grid with an installed capacity of 21,419 MW as of September 2019. The PGCB transferred 41,200 gigawatt-hours (GWh) in FY2015, 47,759 GWh in FY2016, and 50,846 GWh in FY2017 at the wheeling charge of Tk 0.27 per kilowatt-hour.

There are six companies involved in gas distribution in Bangladesh: Titas Gas Transmission and Distribution Company Limited (TGTDCL), Bakhrabad Gas Distribution Company Limited (BGDCL), Jalalabad Gas Transmission & Distribution System Ltd. (JGTDSL), Pashchimanchal Gas Company Limited (PGCL), Karnaphuli Gas Distribution Company Limited (KGDCL), and Sundarban Gas Company Limited (SGCL) all of them are subsidiary companies of the Petrobangla (the government-owned national oil company).

6. Policy, Legal and Institutional Environment

A review was undertaken of the main legal and regulatory instruments for each of the key line sectors as well as for cross-sector or over-arching matters.

The practice of EIA in Bangladesh started with some guidelines in 1992 for infrastructure development in the water sector through the Flood Action Plan (FAP). The process of EIA in Bangladesh includes screening, scoping, alternative analysis, identification and assessment of impacts, and preparation of an EMP. Current EIA process typically do not include Cumulative Impact Assessment (CIA) from multiple projects in the same site etc. SEA is a good tool for understanding of cumulative impacts.

The two most important documents ensuring environmental governance in Bangladesh are the 8th 5-year Plan and National Environmental Policy 2018. Vision 2021, Vision 2041, and the 8th FYP (FY2016–FY2020) all emphasized the incorporation of SEA in the ongoing national development strategies (GED/GOB, 2015). The following figure has shown the evolution of EIA to SEA in Bangladesh

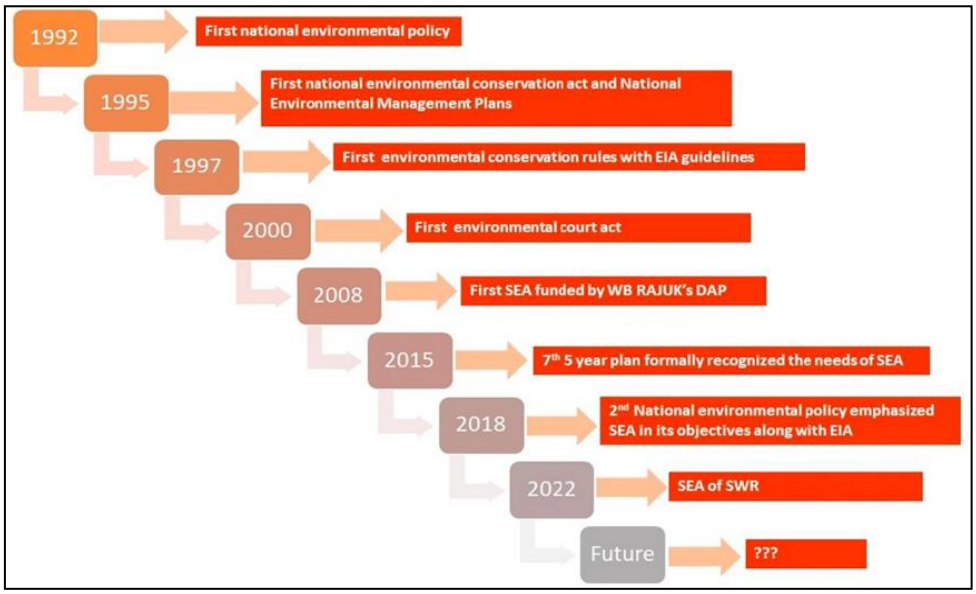


Figure 6.1: Evolution of EIA to SEA in Bangladesh (from 1992 to 2022)

The main environmental regulations in Bangladesh are the Environment Conservation Act (ECA) 1995 (amended 2000, 2002, 2007 and 2010) and Environment Conservation Rules (ECR) 2023. The ECA 1995 provides the requirements on environmental protection, improvement of environmental standards, and control and abatement of environmental pollution. Through the ECA 1995, the Department of Environment (DoE) is mandated to undertake any activity needed to conserve and enhance the quality of environment and to control, prevent and mitigate pollution.

The ECR, 2023, provide the parameters for: (a) the declaration of ecologically-critical areas and restrictions on operations and process which can or cannot be carried out/initiated in such areas, (b) securing an environmental clearance certificate, (c) environmental quality standards, (d) acceptable limits for discharges of waste, and (e) guidelines on pollution prevention. Overall, the ECA, (1995) and ECR, (2023) outline the regulatory mechanism to protect the environment in Bangladesh.

In addition, there are around 200 laws with direct relevance to environment (In most of the cases, their primary objective does not concern natural resource management or addressing environmental pollution directly. However, they can be invoked with regard to sectoral environmental issues related

to public services and practices concerning, for example, use of pesticides, land use, human health and urban facilities (Farooque and Hasan, 1996).

Laws relevant to natural resource management in Bangladesh can be broadly divided into the following categories (Farooque and Hassan 1996):

- *Non-sectoral laws*, e.g. Environmental Conservation Act (ECA), 1995; and the Environmental Conservation Rules (ECR), 2023;
- *Sectoral laws* – covering: land use, agriculture and irrigation, water resources, fisheries, forestry, wildlife, energy, health, food and consumer protection, transportation, local government, urban and rural development.

6.1 National Legislation

Appendix C provides a summary of the national environmental regulations and other relevant laws. Further details are provided in the following sections.

Environmental Conservation Act (1995 and amendments)

The Bangladesh Environment Conservation Act of 1995 (ECA, 1995) is the key legislation in relation to environment protection in Bangladesh. It covers environment conservation, standards, development, pollution control, and abatement. The Act provides for:

- Declaration of ecologically critical areas and restriction of operations and processes which can or cannot be carried/initiated in such areas;
- Regulations of vehicles emitting smoke harmful for the environment;
- Environmental clearance;
- Regulation of discharge permits for industries and other development activities;
- Promulgation of standards for quality of air, water, noise and soil for different areas for different purposes;
- Promulgation of a standard limit for discharging and emitting waste; and
- Formulation and declaration of environmental guidelines.

The Act was amended in 2000, 2002, 2007 and 2010 (**Box 6.1**).

Box 6.1: Amendments to the Environmental Conservation Act

2000: focuses on: (1) ascertaining responsibility for compensation in cases of damage to ecosystems, (2) increased provision of punitive measures both for fines and imprisonment and (3) fixing authority on cognizance of offences.

2002: elaborates: (1) restriction on polluting automobiles, (2) restriction on the sale and production of environmentally harmful items like polythene bags, (3) assistance from law enforcement agencies for environmental actions, (4) break up of punitive measures and (5) authority to try environmental cases.

2007: modified the Environmental Conservation Rules 1997 by abolishing the Orange-B category of projects.

2010: introduces new rules and restrictions on: (a) ensuring proper management of hazardous wastes to prevent environmental pollution and health risk, (b) preventing the filling/changing of any water body, except in the case of national interest with clearance by the relevant department, (c) binding emitters those responsible for any activities/incidents to control the emission of environmental pollutants that exceeds the existing emission standards, and enables the government to (d) declare any ecosystem as "ecologically critical area" if it appears to be degraded or expected to be degraded and take all precaution measures to protect that ecosystem. In addition, government shall stop any ongoing activities and will not allow any new developments in the ecosystem after declaration as an "Ecologically Critical Area".

Environment Conservation Rules (2023)

Major Features of the ECR 2023
1. Rule 3 describes the application and remedies for environmental pollution or degradation damage. 2. Rule 4 describes the notice for sampling of air, water, soil or other substances. 3. Rule 5 classifies industrial units and projects depending on environmental impact and location for issuing an Environmental Clearance Certificate (ECC). a) Four categories i.e., Green, Yellow, Orange and Red. Detailed description of these four categories of industries is given in Schedule-1 of ECR'23. 4. Rule 6 describes the obligation to obtain locational clearance and environmental clearance. 5. Rule 7 describes the application procedure for locational clearance and environmental clearance with the prescribed form together with the prescribed fees laid down in Schedule 6 and 7. 6. Rule 16 describes about the stakeholder participation in EIA. 7. Rule 20 describes the duration of locational clearance and environmental clearance. a) Five (05) years for green category from the issued date. b) Two (02) years for yellow category from the issued date. c) One (01) year for orange and red category from the issued date. 8. Rule 21 describes the procedure for renewal of locational clearance. It is a compulsory requirement for renewal of locational certificate at least 30 days before expiry of its validity.

9. Rule 31 sets the environmental standards (The quality of water shall be determined as per schedule-2 and the quality of other elements of the environment shall be determined as per the provisions of the relevant rules).
10. Rule 32 sets the liquid waste emission standards (Effluent emission standards of any industrial establishment or project shall be determined as per schedule-3, liquid waste emission standards as per schedule-4 and industrial category based liquid waste emission standards as per schedule-5).
11. Rule 33 describes about the treatment of liquid effluents from industrial establishments or projects (as per the schedule-12).
12. Rule 36 assesses the environmental damage and recovery of compensation.
13. Rule 37 describe about the enrolment of environmental consultant or expert (qualification, experience and other factors as per K of schedule 13, and, enrolment application fee, enrolment fee and renewal fee as per Kh of schedule-13). The duration of environmental consultant or expert enrolment will be three (03) years that will be renewable every three (03) years.
14. Rule 38 describe about the cancellation, renewal, etc. of enrolment of environmental consultant or expert.
15. Rule 40 describe about the cancellation and custody of the ECR'97 (the ECR'97 is cancelled by the memorandum no 22.00.0000.075.06.001.18-02 issued on January 14, 2018 by the Ministry of Environment, Forests and Climate Change).

Noise Pollution Control Rules (2006)

The Environmental Conservation Act, 1995, gives the authority to all the Union Councils, Paurasabhas, City Corporations and City Development Authorities to mark off the areas under their jurisdiction as silent, residential, mixed, commercial or industrial. They should also put signs to mark those areas. The Act describes the approved standard limits of sound in Schedules 1 and 2. In Schedule 1, silent area means an area up-to a radius of 100 metres around hospitals, educational institutions or special institutions or establishments identified/to be identified by the government. In the silent area it is prohibited to use any kind of horns of vehicles, audio signals and loudspeakers. According to this act, daytime is counted from 6am to 9pm whereas night is considered from 9.00 pm to 6.00am.

The Motor Vehicle Ordinance, 1983

The Motor Vehicle Ordinance, 1983 imposed a penalty of maximum two hundred taka for those vehicles that emit smoke that poses health hazard in public places. It also restricts passengers from smoking in public service vehicles and in any other vehicles carrying a 'no smoking' notice. This ordinance is enforced only occasionally. More regular enforcement would help to reduce air pollution in big cities. However, of the penalty is currently very low and not a deterrent.

Water Act-2013

The Bangladesh Water Act 2013 aims to ensure "integrated development, management, abstraction, distribution, use, protection and conservation of water resources". It vests all rights over surface water, ground water, sea water rain water and water in the atmosphere in the State. Notwithstanding this, "rights over the surface water on any private land shall remain with the owners of such land", and such right to use the water shall be subject to the provision of the Act". Furthermore, the "right to potable water, and to water for hygiene and sanitation shall be treated as the highest priority right".

The Act makes a provision for constituting a National Water Resources Council headed by the Prime Minister. The Council is the highest decision-making body and is empowered to make policies, give instructions to develop a National Water Resources Plan for integrated development and safe

abstraction of water and its proper use to ensure protection and conservation of water resources. The Council is also mandated to approve the National Water Resources Plan and ensure its implementation, as well as give advice to the Government to enter into agreement, through signing memorandum of understanding and/or signing conventions and treaty, with any Government and international or regional organization to undertake joint survey, exchange data/information with respect to common water resources and it abstraction and development and undertaking joint measures to prevent pollution of common water resources.

The Act also makes a provision for approving National Water Resources Plan prepared in accordance with the Water Resources Planning Act, 1992, containing, among other elements:

- Analysis of economic, natural, social, political, environmental, and ecological and institutional elements, characteristics and impact of water resources;
- Integrated use of surface and ground water emphasizing the highest possible use of rain water;
- Determination of water quality standard;
- Fixation of priority of water use;

The Act also makes further provision for:

- Declaration of a water stress area and management thereof;
- Preferential use of water in the water stress area and exemption thereof;
- Fixing the lowest safe yield level of aquifer and restrictions on abstracting groundwater; and
- Protection of flood control embankments - "to ensure the sustainability of the flood control embankment, no person shall, without the permission of the appropriate authority, be allowed to construct any house, establishment or any other structure on, or on the slope of such embankment."

Finally, if anybody deliberately violates or ignore the responsibility or protection under this Act, in that case, under the provisions of sub-section (2), she/he will have imprisoned for a maximum of 5 years or fined up to maximum Tk. 10,000, or both.

The Forest Act, 1927 (amendment up to 2000)

The Forest Act of 1927 provides for reserving forests over which the government has an acquired property right. This act has made many types of unauthorized uses or destruction of forest produce punishable. The government may assign any village community its right to, or over, any land which has constituted a reserved forest.

The government has prohibited certain activities in the reserved forest area such as any intervention that: kindles, keeps or carries any fire; trespasses or pastures cattle, or permits cattle to trespass; causes any damage by negligence in felling any tree or cutting or dragging any timber; etc.

The hunting, capturing, driving, damaging wildlife or any parts are also prohibited in all part of Bangladesh under the Wildlife (Conservation and Security) Act 2012; and hunting, shooting and poisoning water is prohibited within forests under the Forest Act 1927. The Private Forest Ordinance of 1959 provides for the conservation of private forests and for the forestation, in certain cases, of wasteland in Bangladesh.

Protected Area Rule, 2017

The Protected Area Rule, 2017 provides for establishing a system of co-management for protected areas in which the Forest Department shares management responsibilities with local stakeholders. Co-management Committees are established involving relevant government agencies, elected

members of Union Parishad, local elites and resources extractors along with members from ethnic groups. The Rule also provides for establishing a Village Conservation Forum (VCF) with local residents to function as official actors in motivating local people to better conserve resources, Community Patrol Group (CPG) members join the foresters in guarding the resources. Committees are empowered to collect revenue, 50% of which will be allotted to cover recurrent expenditure and to implement plans for landscape development and the wellbeing of the society.

Wildlife Act 2012

The Wildlife Act of 2012 enabled the government to form a "Wildlife Advisory Board" of experts. The Board will assess present conditions and give direction from time to time in relation to the development and management of biodiversity, wildlife and forest. The Act empowered the government to declare any area as a protected area and can designate these as a sanctuary, community conservation area, safari park, eco-park, botanical garden, wildlife reproduction center. The government can designate a landscape zone or corridor, buffer zone or core zone in relation to wildlife and plant preservation, protection and their smooth growth.

The Act also prohibited many activities including entrance, establishing or undertaking of any activities, disturbing or threating any wildlife, or use chemicals, explosives or any other weapon or substances which may destroy wildlife habitat. Any person performing any kind of wildlife trade without a license may be jailed for at least a year.

Biodiversity Act 2017

The Bangladesh Biological Diversity Act 2017 was enacted to enable the State to fulfil its international obligations having become a signatory to the Convention on Biological Diversity. Existing environmental laws broadly cover THE conservation of biodiversity and biosafety issues. So, the significance of this Act lies in introducing an Access and Benefit-Sharing (ABS) mechanism. The Act also promotes research on biodiversity and biological resources – leading to biotechnological inventions and their commercial utilization through preparing a nation-wide biodiversity register and documenting traditional knowledge (TK). The commercial utilisation will generate economic benefits which need to be shared in a fair and equitable manner.

Climate Change Trust Act, 2010

The Act established the Bangladesh Climate Change Trust (BCCT) under the Ministry of Environment and Forests (now MoEFCC). It has adopted various policies focusing mainly on adaptation as means of tackling the challenges of climate. Its functions include:

- The overall management of the Climate Change Trust Fund;
- Providing secretarial support to the Trustee Board on Climate Change and Technical Committee;
- Reviewing projects proposed for funding by different government ministries/divisions;
- Coordinating with different government ministries/divisions on the progress of their climate change mitigation projects;
- Liaising with beneficiaries, civil society, NGO, private sector and international organizations on climate change issues;
- Undertaking monitoring and evaluation of projects under implementation;

The Protection and Conservation of Fish Act (1950)

This Act aims to conserve and manage the country's fisheries resources in a sustainable and environmentally-responsible manner. The act and associated rules have introduced a range of measures:

- Ban on the use of certain fishing equipment and techniques (e.g. dynamite fishing), and regulation for others (e.g. mesh size restrictions for some types of nets);
- Restriction on catch size for certain species;
- Seasonal fishing closure in certain areas;
- Regulation of certain activities which may cause pollution of water bodies;
- Regulation of activities which may obstruct water courses; and
- Establishment of fish sanctuaries and provision of rules for managing these areas.

This act primarily prescribes the manner in which dredging works must be carried so as to limit potential impacts on fisheries resources and ensure that fishermen have a reasonable level of access to dredging particular areas.

The Protection and Conservation of Fish Rules, 1985

These rules in line with the overall objectives of the Fish Act. They aim to ensure that sectoral development activities are conducted in a manner that does not cause damage to fisheries in inland or coastal waters.

- Section 5 requires that "No person shall destroy or make any attempt to destroy any fish by explosives, gun, bow and arrow in inland waters or within coastal waters".
- Section 6 states that "No person shall destroy or make any attempt to destroy any fish by poisoning of water or the depletion of fisheries by pollution, by trade effluents or otherwise in inland waters".

6.1.1 Pollution Discharge Management

Some of the legal instruments concerned with pollution are described briefly in **Appendix D.** Where the government has not set standards in the ECR, International Finance Corporation (IFC) standards[6] apply. Where government standards vary from IFC standards, the more stringent values apply when implementing development projects.

6.2 Environmental and Social Safeguards Framework

6.2.1 Environmental Impact Assessment[7]

Bangladesh initiated environmental impact assessment (EIA) guidelines in 1992 for the water sector development. The country enacted Environmental Conservation Act (ECA) in 1995 (including amendments) followed by Environmental Conservation Rules (ECR) in 2023 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 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'2023) 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

[6] IFC General Environmental, Health and Safety guidelines and also IFC specific standards and guidelines for industries
[7] Based on information on https://www.eia.nl/en/countries/bangladesh/esia-profile)

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.

EIA-related guidelines are available for (a) industries (2023) 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.

EIA is required for all activities (private, public and foreign investment) that fall under the category of red projects as stipulated under Schedule One of the Environmental Protection Rules. Project proponents pay a fee to obtain an Environmental Clearance Certificate, and a fee to renew the certificate once a year for Red, Orange and Yellow, category projects and once every three years for Green category projects.

Screening

Screening of projects is undertaken by the DoE based on a list contained in Schedule I of the Environment Conservation Rules (2023). 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);
- Yellow - requires a layout plan, process flow diagram and outlines of plans for relocation and rehabilitation;
- Orange - 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 (2023), the government may declare certain areas as sensitive. Projects in such areas require a full EIA.

Scoping

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.

Assessment

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 and abatement measures;

- environmental monitoring plan (EMP);
- monitoring and follow-up program;
- special studies (for example risk assessment, rehabilitation study etc.).

EIA Review

The DoE is the responsible authority 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.

Article 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.

Compliance Monitoring

There are no clear 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.

Stakeholder Engagement

A statement is provided for conducting public consultation during the EIA process. ECR'2023 outlines various levels of stakeholder engagement based on the nature and types of the project. Based on the nature and types of the project, (i) consultation may take place between the owner and the relevant authority; (ii) national or regional level consultation; and (iii) micro level consultation. Besides, all consultation evidence should be uploaded to the relevant departments' website.

Appeal

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.

Professional Bodies

- The National EIA Association of Bangladesh (NEAB) comprises planners, practitioners and enforcement agencies. It works to create awareness of EIA in all sectors of Government planning. It has assisted in the development and extension of EIA, prescribing a code of conduct for EIA professionals, building national capability and establishing a liaison between EIA practitioners and policy-makers in Bangladesh.
- The Bangladesh Environmental Lawyers Association (BELA) has played a role in the introduction of public interest litigation cases to higher courts (the High Court and the Supreme Court). An important achievement won by BELA in response to its appeal was the Supreme Court decision in 1998 to grant citizens and NGOs the right to enforce environmental laws.
- The Forum of Environmental Journalists, Bangladesh (FEJB) has been particularly effective in creating environmental awareness, and a number of State of the Environment Reports have been produced by civil society organizations.

6.3 Strategic Environmental Assessment

A growing number of countries in the region that have introduced formal requirements for SEA, But Bangladesh currently has no legal or institutional framework for SEA. However, Some SEAs have been conducted with donor assistance and several SEA-related initiatives have been undertaken or are underway:

- Policies through Bangladesh Water Development Board (BWDB), 2017.
- In March 2019, staff of MoEFCC attended SEA training provided by SIDA/Niras, and support for SEA is being provided to MoEFCC by the Netherlands Commission for Environmental Assessment.
- The Bangladesh Water Development Board conducted a Strategic Environmental and Social Assessment (SESA) of the River Stabilization Plan under the Flood and Riverbank Erosion Risk Management Investment Program (report in 2016).
- Strategic Environmental Assessment of South West Region of Bangladesh for conserving Outstanding Universal Value of the Sundarbans, January 2020 – September 2021.
- A call for bids has been issued (February 2020) to conduct an SEA for the 'Preparation of the Payra-Kuakata' Comprehensive Development Plan Focusing on Eco-tourism'. This SEA is being conducted for the said development.
- Strategic Environmental and Social Assessment (SESA) of River Stabilization (2016) under by consultants under the Flood and Riverbank Erosion Risk Management Investment Program (FRERMIP), Project-1).
- Country Environmental Analysis (CEA) of Bangladesh - a joint project of the Ministry of Environment and Forests (MoEF) and the World Bank (World Bank, 2006, 2012).
- The World Bank (2007) conducted an SEA for the Dhaka Metropolitan Development Plan: Strategic Environmental Assessment.
- The GoB began using policy SEA as a decision-making tool in late November 2006 at the request of Rajdhani Unnayan Kartripakha (RAJUK) and the Ministry of Housing and Public Works and finalized it in 2007.
- Another policy SEA included the development and conservation of the Sundarbans, the world's largest mangrove forest (World Bank 2012).
- SEA is also reflected in the development of a cumulative environmental assessment for the planning of development in the coastal zone of Bangladesh: "The SEA for Coastal Embankment Improvement project (ongoing)" (World Bank 2012).

- Hydrobiology (an environmental consulting company) reports online (2019) that it is working with Asian Development Bank (ADB) on an SEA for a renewable energy floating solar project in Bangladesh (source: https://www.hydrobiology.biz/exciting-new-strategic-environmental-assessment-project-in-bangladesh/).

6.4 Commitments to International Conventions, Treaties and Protocols

Bangladesh has already had accessed to, ratified or signed a number of important multilateral environmental agreements (MEAs) related to environment protection and conservation of natural resources which have been already accommodated in the national policies of the country. The Environment Policy, National Conservation Strategy, National Biodiversity Strategy and Action Plan are examples of instruments that were influenced by obligations under international conventions, treaties and protocols (ICTPs).

Such ICTPs act as international guidelines that Bangladesh is obligated to comply with when implementing sectoral development activities and projects. Appendix E lists the important relevant ICTPs signed and ratified by Bangladesh**.**

7. Stakeholder Engagement

7.1 Stakeholder Mapping

SEA should be a participatory process that enables stakeholders - including organisations and individuals that have a significant interest in, or who are likely to be directly or indirectly affected by, the PPP - to raise concerns and influence strategic decision-making in a meaningful way.

One of the initial steps in the SEA process was a 'stakeholder analysis' to help understand the power relations between different actors, their influences on the PPPs and, conversely, how the PPPs influence them, and also their mutual interactions with regard to the changing circumstances.

Thereafter a Stakeholder Engagement Plan (SEP) was designed to:

- outline stakeholder consultation and communication activities throughout the SEA,
- identify the key stakeholder groups, and
- identify resources and time needed to achieve effective participation.

To assess the cumulative impacts of the SoPs in the PKCPs area of influence, the SEA needed to take into account the views of the relevant stakeholder groups. The SEP was designed as follows.

7.1.1 Determining 'Stakes' in Relation to PPPs

Stakes refer to the likely environmental, social or economic consequences of implementing PPPs, i.e. how they will likely impact on and influence physical, biological, environmental and social conditions and resources in the study area. These stakes were determined by reviewing relevant literature (such as policies, plans, programs/project documents, study reports, articles etc.), consulting with the concerned officials/representatives of targeted sectors and other relevant sectors through expert judgment and discussions among the SEA study team, etc.

7.1.2 Identifying Potential Stakeholders

An initial listing of stakeholders was made, covering all relevant sectors and levels (national to local). Additional stakeholders were included as the study proceeded. Stakeholders were categorized as primary, secondary, and tertiary; as well as internal and external. Stakeholders were classified according to a 'continuum of interacting layers':

- ***policy*** (top) layer: organizations and individuals who set visionary goals and are involved in policy-making, e. g. the legislative body of government, policy-makers, national and international NGOs, intellectuals, etc.
- ***institutional*** (mid) layer): the implementing departments of the government and non-government, especially all key sectors. Relevant officials from these sectors will be consulted throughout the study process;
- ***local*** (bottom) layer: local people, local government representatives and private sector entities.

7.2 Aim of Stakeholder Engagement

Public Consultation Meeting is an integral part of SEA process. The consultation is a mechanism for involving local communities and stakeholders in the SEA process. These meetings provide a platform for stakeholders to engage in meaningful discussions and to provide feedback on its adequacy, effectiveness, and feasibility.

Thus, these meetings aim to:

- Engage local communities and stakeholders in the SEA process;
- Promote transparency and accountability in the plan, policy and programme;
- Ensure that the plan reflects the needs and priorities of the community;
- Identify opportunities for mitigating or avoiding negative environmental impacts;
- Raise awareness about the importance of sustainable and environmentally responsible;

7.3 Methods and Processes of Stakeholder Engagement

7.3.1 Multi-stakeholder consultation

The consultations have been conducted at Upazila and union level. As per convention, the consultation meeting was held with multi-level stakeholders including Upazila and union level with government officials, local government representatives, local elites, teachers, representative of local association, media representatives etc. For the consultations, a checklist was followed where multi sectoral issues e.g. socio-economic, environment, fisheries, tourism, disaster, agriculture, morphology and infrastructure etc. have been raised. Participants were invited before the consultation, date and venue of consultations were informed them during communication. A five-member team comprising sectoral background led the consultation meeting. One of the team members first introduced the project to the participants though a power point presentation, and administered the issue-based checklist to get answers/responses.

7.3.2 FGDs

The Focus Group Discussions (FGDs) have been conducted with homogenous groups e.g. fisherman, farmers, Mantha community, women group and ethnic community at local level. etc. The discussions were guided by a customized checklist reflecting the type/occupation of participants. The FGD were facilitated by a five-member team from CEGIS with respective sectoral backgrounds. The team first introduced the SEA initiative prior to discussions on the questions then findings are explored through issue-based discussion.

7.3.3 KIIs

Key informant interviews were conducted with the experts of different sectors. We used a set of (pre-prepared but not rigidly applied) open and closed questions for the interview. They are a useful way of capturing softer data and of fact-checking claims or assumptions about a project/ programme. Each interview lasted between half an hour to an hour.

The details of the PCM, FGDs, and KIIs are given in **Table 7.1**. In addition, the participant lists of all sorts of consultations are presented in **Appendix B.**

Table 7.1: Status of Location, Consultation Types, Levels and number of participants in the Consultation

Date	Location	Type of Consultation	Level	No. Of Participants	Type of Participants
11.01.2023	Rangabali	PCM	Upazila	21	Multi-Stakeholder
10.01.2023	Golachipa	PCM	Upazila	21	Multi-Stakeholder
16.01.2023	Patharghata	PCM	Upazila	25	Multi-Stakeholder

Date	Location	Type of Consultation	Level	No. Of Participants	Type of Participants
30.01.2023	Taltali	PCM	Upazila	25	Multi-Stakeholder
07.02.2023	Amtali	PCM	Upazila	25	Multi-Stakeholder
10.01.2023	Char Mantaz union parishad	PCM	Union	23	Multi-Stakeholder
09.01.2023	Pantatti union parishad	PCM	Union	25	Multi-Stakeholder
16.01.2023	Charduani union parishad	PCM	Union	21	Multi-Stakeholder
16.01.2023	Patharghata sadar union parishad	PCM	Union	21	Multi-Stakeholder
31.01.2023	Nishanbaria union parishad	PCM	Union	21	Multi-Stakeholder
31.01.2023	Sonakata union parishad	PCM	Union	21	Multi-Stakeholder
06.02.2023	Arpangashia union parishad	PCM	Union	21	Multi-Stakeholder
08.02.2023	Gulishakhali union parishad	PCM	Union	21	Multi-Stakeholder
28.02.2023	Phuljhuri union parishad	PCM	Union	21	Multi-Stakeholder
01.03.2023	Phuljhuri union parishad	PCM	Union	21	Multi-Stakeholder
20.03.2023	Lalua union parishad	PCM	Union	21	Multi-Stakeholder
22.03.2023	Lata Chapli union parishad	PCM	Union	20	Multi-Stakeholder
09.01.2023	Mantha Palli, Char Mantaz	FGD	Community	10	Mantha Community
09.01.2023	Char Mantaz	FGD	Community	10	Fisherman
11.01.2023	Gramoddon, Panpotti	FGD	Community	10	Fisherman
11.01.2023	Khorida, Panpatti	FGD	Community	10	Farmer
01.02.2023	Sonakata	FGD	Community	10	Fisherman
07.02.2023	Arpangashia	FGD	Community	10	Farmer
08.02.2023	Arpangashia	FGD	Community	10	Fisherman
01.03.2023	Dhalua	FGD	Community	10	Farmer
01.03.2023	Choto Gourichonna, Phuljhuri	FGD	Community	10	Farmer
21.03.2023	Banatipara, Lalua union	FGD	Community	10	Farmer
21.03.2023	Banatipara, Lalua union	FGD	Community	11	Fisherman
21.03.2023	Misri Para, Rakhain Palli	FGD	Community	10	Ethnic Community
22.03.2023	Alipur, Lata Chapli	FGD	Community	8	Farmer
22.03.2023	Alipur, Lata Chapli	FGD	Community	11	Fisherman

Date	Location	Type of Consultation	Level	No. Of Participants	Type of Participants
20.03.2023	Department of Environmental Science, PSTU	KII	Expert	1	Academician
20.03.2023	Department of Disaster Resilience and Engineering, PSTU	KII	Expert	1	Academician

7.4 Stakeholder's Concerns and Aspirations

Upazila (sub-district) level consultation

- The PKCP area is underdeveloped because of its remoteness and poor communication system, which causes slower or no industrial initiatives. The proposed project may fulfil this need and develop the area.
- Peoples' livelihoods mostly depend on natural/land resources like crop production, fishing, collecting woods, etc. Although there are random efforts for tourism development, no organized and planned tourism development can be seen this area. Kuakata beach area is the main point of tourism but still have no effective and sustainable plan or development effort for spot. As such, local people are not attracted to be engaged in this sector. Therefore, training and other incentives are required in this context.
- Seasonal out-migration and disaster driven forced migration (internal displacement) is noteworthy in this area. In this context, disaster prevention, initiating alterative income generative activities, and motivation for local area development is needed.
- In Char area, land rights are disputed. So, in the case of land acquisition for PKCP project, this issue should be carefully taken care of.
- There is a lack of health services and facilities, especially in the remote char areas, which become problematic for pregnant women and elderly patients. Furthermore, the visit to upazila level health center requires additional expense, which is often unbearable for poor people. The PKCP project should focus on this issue.
- The female drop-out rate at the secondary level is higher. So, effective initiatives are needed to be taken.
- There are floating people called Manta. This groups belongs to the Bede (water gypsy) community, who do not have land attachment or identity. Rather, they are usually travel through river for small scale traditional trading. This group needs to be incorporated into the PKCP plan.
- Another important group is Rakhine, who live at the vicinity of Kuakata beach area. This group also needs to be included in the PKCP plan.
- Soil salinity is a growing issue in this area, which needs to be addressed immediately. Otherwise, cultivation will be hampered.
- Unregulated tourism causes ecosystem/habitat disturbances. Particularly, Kolapara upazila witnesses a gradual reduction in bird influx. There should an effective planning and regular mentoring in this context.
- Cyclone is the frequently occurred disasters in the PKCP area. Still, there is a lack of cyclone shelter and especially with facilities for women, children, physically challenged and elderly people. The plan should include this issue.

UP level consultation

- The out-migration rate for employment is higher in the PKCP area. Households need to have skill development training, credit supply and options of alternative employment.
- The PKCP plan should favour the poor and remotely living people.
- The roadway communication is not good that affects local trading, movement of students and health service receivers. These issues need to be resolved.
- Often, there is encroachment natural and mangrove forests. So, especial arrangement and control needs to be in place for reducing/discouraging encroachment.
- Strong early warning system and an effective during and post-disaster recovery program is needed against cyclone, storm surges and other natural disasters.

FGDs

- In some area, there is land to be remain fallow due to salinity intrusion. Also, internal connectivity through navigation routes is often hampered due to erosion and sedimentation. This issue needs to be addressed.
- There is a scarcity of fish landing station that causes post-harvest losses. Eventually, fishers lose their income. A PKCP plan should consider this issue.
- In post-disaster recovery, Mantha and Rakhine community should effectively be included or to be more focused.

KIIs

- The coastal area is home for various habitats and rich in biodiversity. Effective beach management plan is required for this region, since majority tourist destinations are beaches.
- River bank erosions are creating more challenges in recently. The community-based disaster management system should be increased in the area.

The photographic evidence of the consultations meetings.

Figure 7.1: Stakeholder Consultation Meeting in Rangabali Upazila

Figure 7.2: Consultation Meeting in Char Mantaz Union, Rangabali Upazila

Figure 7.3: FGD with Mantha Women Group at Char Mantaz Union, Rangabali Upazila

Figure 7.4: FGD with Fisherman Group at Char Mantaz Union, Rangabali Upazila

Figure 7.5: FGD with the Fishermen Group, Panpatti Union, Galachipa Upazila

Figure 7.6: Stakeholder Consultation Meeting at Amtali Upazila

Figure 7.7: Focus Group Discussion (FGD) with the Farmers, Fuljhuri Union, Barguna Sadar

Figure 7.8: Consultation at Arpangasia Union, Amtali Upazila

Figure 7.9: Stakeholder Consultation Meeting at Lalua Union, Kalapara Upazila

Figure 7.10: FGD with the Farmer Group at Lalua Union, Kalapara Upazila

Figure 7.11: Consultation at Taltoli Upazila

Figure 7.12: Stakeholder Consultation Meeting at Patharghata Upazila

Figure 7.13: FGD with the Rakhine Community at Latachapli Union, Kalapara, Patuakhali

Figure 7.14: KII with Environment and Disaster Management Academician, Patuakhali Science and Technology University

8. Cumulative Impact Assessment

The assessment of cumulative impacts is a key aspect of SEA. Cumulative impacts are environmental or socio-economic changes - either positive (beneficial) or negative (harmful) caused by the combined impact of past, present and future human activities and natural processes. They are the result of implementing multiple activities (e.g. individual PPPs and the projects, activities or investment initiatives that arise from their promotion/implementation).

Individual direct impacts may be relatively minor but, in combination with others, they can result in significant environmental and socio-economic effects. The multiple impacts of different activities may have an additive, synergistic or antagonistic effect on one another and with natural processes. Cumulative effects can be difficult to predict and manage where baseline data is inadequate, processes (especially ecological ones) are complex, and due to the large scale at which human developments occur (e.g., across the study region).

Positive cumulative impacts can be expected if existing environmental and social safeguard policies, regulations and guidelines are fully and effectively implemented and enforced; and if 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.

However, negative cumulative impacts will be likely to result if the opposite is the case, i.e. if existing environmental and social safeguard policies, regulations and guidelines are not fully or effectively implemented or enforced; and if no or ineffective mitigation action is taken to avoid, minimise, restore, mitigate or offset potential impacts of development, and/or the use of clean and sustainable technologies is not compulsory (i.e. if the SEMP is not effectively implemented).

The way in which critical cumulative impacts (environmental and socio-economic) would be likely to arise for principal activities in individual sectors - as a result of implementing the main proposed or envisaged development initiatives were examined using linkage diagrams. These diagrams plot how the principal activities may give rise to major impacts (positive or negative) each of which may then give rise to further impacts, which may then cascade to further tiers of impacts. The linkage diagrams indicate the pathways through which particular types of impacts will become cumulative (e.g. pollution, deforestation, deteriorating health, migration).

These diagrams provide a pictorial understanding of how such impacts might 'flow' from one to another, and their intended and unintended consequences. Understanding such linkages is fundamental to the study of the behaviour of complex, coupled social-ecological systems. Decision-makers need to be aware of the web of relationships between activities and understand the linkages between cause and effect. In all kinds of developments/projects, there are desired outcomes (which justify those developments). But there are also a series of unintended consequences which are often cumulative. The linkage diagrams help to show where "vicious circles", "downward spirals", "antagonisms" and "synergies" may occur. They also show where interventions are needed (set out in the SEMP) to ensure that negative unintended consequences are avoided, whilst the desirable outcomes are still achieved or even enhanced.

However, a good environmental and social baseline is essential as a platform for understanding cumulative impacts. The 2018 Inception Report on Socio-Economic & other related Survey under "Preparation of Payra-Kuakata Comprehensive Plan focusing on Eco-Tourism (PKCP)", provides an initial overview of existing impacts on certain components of the environment. In the absence of the PKCP and any substantial impact avoidance or mitigation interventions, it is assumed that current trends will continue or even become exacerbated (because of population growth and organic development). As noted in the ToRs, the following are key existing environmental and, to a lesser extent, social concerns:

Table 8.1: Key Environmental Concerns

Environmental Issues and Concerns	Comment /examples of Potential Impacts
1. Pollution and waste (solid and liquid): • Surface water pollution. Brackish and sea water • Groundwater pollution • Air pollution • Oil • Waste treatment & 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.
2. Water flow dynamics in rivers	Reduction of water flow in rivers of SWR may change the region's economic sustainability/integrity as well as livelihood patterns and crop production.
3. Sedimentation and siltation (fluvial and tidal) • Dredging and disposal	Sedimentation and siltation management is a challenge to maintain river flows. Disposed dredged materials can affect the regeneration of trees & survival of existing forests as well as benthic aquatic biodiversity.
4. Salinity: • Groundwater • Soil	Due to reduced flow of upstream fresh water and channel siltation, and resultant sea water intrusion/inundation, soil and groundwater salinity has increased and soil productivity has decreased as well as livelihood diversity
5. Noise - particularly due to shipping in the rivers, especially in Rabanabad Channel	Noise from the regular movement of ships (notably along major rivers of the project area) can disrupt wildlife movement, cause localisation of populations and result in inbreeding.
6. Habitat 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 behaviour (e.g. feeding, breeding) and may lead to genetic isolation and also threaten effective biodiversity conservation.
7. Loss of biodiversity	Some environmental as well as regional & local activities may affect biodiversity, with loss of keystone species and their prey base due to poaching and habitat degradation as a result anthropogenic activity. Biodiversity losses may also occur due to climate change and natural dynamic changes in the ecosystem.
8. Invasive alien species	Water hyacinth has become a major problem, clogging baors and ponds, and some water channels. Prosopis Juliflora is also spreading on embankments although it is used as a fuelwood by local people. At present, however, forest managers are concerned about their potential future spread and impacts.
9. River bank erosion – due to port expansion and boats	River bank erosion is a particular concern in the project area 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 this area.
10. Climate change • Sea level rise • Salt water intrusion	• Sea level rise is a global threat that will impact on the region. • Many factors have reduced river flow in the region, decreasing flushing time, with increased periods of saltwater exposure.

Environmental Issues and Concerns	Comment /examples of Potential Impacts
• Erratic rainfall & distribution • Increased average temperatures • Cyclones & storm surges • Greenhouse gas emissions	• Shifting of monsoon with erratic rainfall has impacted on the cropping season and pattern. • There is no evidence of significant increased temperatures yet, but climate models predict a significant increase in the future. • Cyclones making landfall impact on livelihoods (killing people and causing damage). Cyclone frequency has decreased but may rise in the future. • Rapid industrialization and urbanization 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.
11. Exceptional floods (with potentially damaging water levels): • Freshwater floods (due to rain) upstream • Tidal • Poor drainage infrastructure	Freshwater flooding may occur due to: heavy rain in the upstream/ catchment areas of this area, lack of drainage infrastructure and high tidal flow.
12. Industrialization: • Power generation – oil, gas, coal • Pipelines • Petroleum • Cement • Special economic zones	Industrialization of the inland parts of this area can create air & water pollution as well as other potential impacts on biodiversity & livelihoods of the region. Hilsa fish breeding ground is facing threats.
13. Urbanization	Rapid urbanization as well as in the environmentally critical area can affect the extent of air & water pollution and agricultural productivity etc.
14. Land use changes	Land use changes are arising due to population & economic growth of this area, e.g. shrimp cultivation, infrastructures & urbanization, etc. Impacts of this include loss of biodiversity, reduced soil productivity and loss of livelihood opportunities.
15. Livelihoods: • Conflicts between economic sectors • Access to resources (e.g. in Sundarbans) • Salinity	• 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 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. • Causes health problems (e.g. skin conditions), reduces drinking water quality – impairing people's ability to work, and affects crop production, etc.
16. Out-migration	Both involuntary and economic out-migration (mainly poor people) is common in this area. Much is driven by disasters, indebtedness, dispossession/land grabbing, lack of livelihood options, etc. Poor people move to unhealthy urban slums and become further marginalized in an uneven job market. Some educated people move to urban areas /overseas

Environmental Issues and Concerns	Comment /examples of Potential Impacts
	for employment. Migrant remittances can supplement family incomes and contribute national economy.
17. Health & sanitation: • Water-borne, respiratory & salinity-related diseases • Diet • Negative health impacts of air pollution (mainly pollution by particulate matter) • Inadequate health facilities and access • Arsenic contamination (of drinking water & irrigated rice)	• Local people, especially children and elderly people, are particularly susceptible to water-borne, respiratory and salinity- related skin diseases. • Poor diet causes malnutrition. • The dominant way of cooking causes indoor air pollution which has a serious impact on human health. • Health service providers are based in city/urban and peri-urban areas. They are not easily accessible by people and/or emergency patients living in remote areas, due to poor communication networks. • Lack of public toilets in urban and semi urban areas. As a result, local people, especially women face problems during public gatherings and at local markets. • This is a serious issue in parts of the Ganges River floodplain and the northern part of the tidal floodplain.
18. Gender-related issues	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, Women often encounter security problem while travelling alone to/from remote areas.
19. Education: • Low environmental awareness • High male dropout	• Males from poor households need to support family income, resulting in high drop out and/or lower attendance at school. • Poor communication network in the rural area often discourages school attendance.
20. Loss of traditional knowledge	Technological advancement & other development activities may be causing loss of traditional knowledge.
21. Loss of cultural heritage	Lack of proper maintenance & negligence due to low revenue return, inadequate budget allocation, etc.
22. Security – kidnapping of resource extractors	Kidnapping of forest produce extractors for ransom is an important issue for the management of the forest.
23. Seasonal tourism	Uncontrolled tourism causes loss of biodiversity, disruptive noise and water pollution etc.
24. Illegal activities: • Poaching and hunting • Illegal tree cutting • Trafficking of wildlife products • Corruption	These issues are of major concern in this area, causing loss of habitat and biodiversity (terrestrial & aquatic) & economic loss for communities.
25. Institutional issues	Lack of manpower, capacity development & logistics are major institutional issues – impeding environmental management (In general).

Each of the relevant issues and concerns were assessed (albeit at strategic level) in terms of-

- Past trend to present status;
- Impacts;
- Management framework and current practices etc.;

Both secondary information and the primary data were used and collected under this study as per the ToR. The secondary information and data were collected from:

- Relevant department, line agencies and ministries;
- Relevant formal and informal stakeholders;
- Project documents from government and non-government line agencies;
- National governmental and public-private partnership websites, database, knowledge hub etc.;
- Information from client's project document;
- CEGIS archives;
- World database and information centers;
- Research documents from universities and institutional entities;
- Access to national and international peer reviewed journals, articles and other documents.

8.1 Valued Ecosystem and Social Components (VECs)

The specialists on our team were tasked with, inter alia, identifying VECs for elaboration and inclusion in the SEA report. Also, it is acknowledged that the VECs are traditionally nature-based, with little consideration for heritage, social, gender, health, or economic considerations. Having said this, it is equally valid to note that in an area where people and national economies rely disproportionately on ecosystem services and primary production, nature-based VECs are undoubtedly important from a broader perspective. Moreover, there is no doubt that a healthy natural environment and properly functioning ecosystems are vital in the context of climate resilience. Connecting these dots and illustrating the linkages across coupled social-ecological systems is needed.

Generally, VEC refers to the fundamental elements and processes of the physical, biological, or socioeconomic environment, including the air, water, soil, terrain, vegetation, wildlife, fish, birds, and land use that may be affected by a proposed project (Pickard et al., 2019; Stelzenmüller et al., 2018). We categorized VECs into several main components respecting our project nature and proposed PKCP plan:

(i) Biodiversity – mammals (terrestrial and aquatic), avifauna (shore and wader birds), fish, and others including flora;
(ii) Land;
(iii) Habitat;
(iv) Environmental quality
(v) Socioeconomic/cultural components, and
(vi) Protected and other designated areas;

Biodiversity (flora and fauna) is the dominant VEC for forest ecosystems followed by land and habitats. Regardless, VECs related to water components have received the least attention for forest ecosystems. Socio-economic/cultural VECs are the least concern for the forest ecosystem. However, water and socio-economic/cultural factors are the prime VECs for the aquatic ecosystem including wetlands. In Bangladesh, people receive huge amounts of ecosystem services from wetlands and aquatic ecosystems. The study area is no exception as ponds, rivers, and estuaries are major aquatic

ecosystems that provide huge benefits to humans. Considering geographical settings and the coastal landscapes, this study considers both terrestrial and aquatic ecosystems for the selection of the VECs.

Coastal communities and island nations are among those facing the highest risks associated with the climate crisis due to rising sea levels. Much like the Philippines, Bangladesh has been fighting climate change for decades. This has left it number 7 on Germanwatch's Climate Risk Index (CRI) for cumulative risk between 2000 and 2019. During this time, the country experienced 185 extreme weather events that cost a combined total of $3.72 billion (€3.5bn). To make the PKCP plan more sustainable, good habitat conditions and climate resilient ecosystems must be considered as VECs.

Furthermore, coastal landscapes are dominated by mangroves, mudflats, and shorelines, which contain rich biodiversity and marine species. In this case, reserve forests and protected areas are considered VECs including major environmental components.

Table 8.2: Valued Ecosystem and Social Components

As well as assessing the current issues in the 15 different sectors (discussed in detail in the baseline report), the VESCs are identified and listed, including the expert judgment and validation of the relevant officials of the departments and lines of service. Nevertheless, an exercise in cross-checking the impact pathways of project interventions on natural resources and socio-economic conditions is also considered here.

Valued Components	Sub-components	Rationale
Faunal communities	Mammals (spotted deer, fishing cat)	
	Threatened local and migratory birds	
	Fish [particularly Ilish (*Hilsha ilisha*)]	
	Dolphins	
Floral communities	Mangrove species	
	Terrestrial species	
	Aquatic species	
Land	Land use and land cover	
	Soil quality	
	Sediment quality	
Habitat	Mangroves, mudflats and shoreline habitats	
	Fish habitat (particularly Ilish sanctuaries)	
	Inland wetlands	
Environmental quality	Surface water quality	
	Groundwater quality	
	Groundwater quantity	
	Noise quality in residential areas	
	Noise quality in forest and other habitats areas	
	Air quality	
Protected and Other Designated Areas	Ecologically Critical Areas (ECAs)	
	Reserve Forests	
	Wildlife Sanctuaries	
	Key Biodiversity Areas (KBA)	
Socio-economic conditions	Indigenous communities	
	Livelihoods	
	Migration	
	Cultural heritage	

There are around 190 species of flora including herbs, shrubs, climbers and trees, and 104 species of fauna including amphibians, reptiles, birds and mammals, within the PKCP area. These floral species occur in mangroves, homesteads, cropland, roadside, shorelines, canals, rivers and small water bodies. Among them, mangroves possess unique characteristics in the area. As a result, gewa, sundri, goran, and kewra species should be conserved either in their magnificent forests or in any patches of forests. These mangroves keep ecological balance but also protect coastal people from cyclones. Maintaining rich species diversity increases the resilience of the forest. Therefore, it is also important to increase ecosystem services for human well-being.

According to IUCN- Bangladesh (2015), Greater Flameback, Grey-headed Fisheagle, Fishing Cat, Smooth-coated Otter and Irrawaddy Dolphin are categorized as threatened species which occur in the charlands, mangrove forests, rivers and estuaries. These natural gifts must be protected and conserved in their natural environment. The saline-tolerant variant of Irrawaddy dolphins lives mainly in the PKCP region. The vast marine ecosystem falls in the PKCP area which creates the ideal habitat condition to thrive and flourish. In addition to that, there are three dolphin sanctuaries lying in the PKCP area, which exhibit their prominent presence the region. Government agencies in the area are responsible for conserving dolphin sanctuaries.

The fishing industry encompasses both marine and freshwater fisheries, categorizing capture and cultivation practices. Tidal influence makes the area unique for saline tolerant fish species. Fish diversity is also rich in tidal areas. Furthermore, this area also produces a huge amount of freshwater fish from the inland rivers, ponds and wetlands. Fishing is one of the main livelihoods here. This fishing profession has become the most challenging as cyclones and storm surges are the life threating events for this area. Vast rivers with high water discharges and turbulent waters make fishing a life-threatening activity, particularly during the cyclone prone period of Bangladesh. Tropical cyclones strike Bangladesh in two seasons, March through July and September through December. The greatest majority of storms arriving in May and October. There are six major Hilsha breeding grounds in Bangladesh, and the PKCP area contains three major Hilsha breeding grounds, which is Bangladesh's national fish. Hilsha earns $1.36 crore to India last year (2022)[8]. Furthermore, this is an area with a high number of hotspots and breeding grounds. Basically, this is the route the Hilsha fish use to migrate upstream (relatively freshwater) to spawn their eggs. Hilsha has the highest contribution in the country's fish production as the single fish species. More than 12.09% of the country's fish production comes from Hilsha. In 2017-18 Hilsha production was 5.17 lac MT, which values around 20,680 crore taka (BDT).

Among the 19 coastal districts in Bangladesh, Patuakhali and Barguna are the two located in the south central region. The PKCP is located at the coastal jurisdiction boundary of the SC region. A number of big rivers cross the landmass, including the rivers Baleswar, Bishkhali, Payra, Andharmanik, Ramnabad Channel, Galachipa, and Tentulia. Moreover, beyond the dry season (December to May) the vast landmass is submerged under water. Aman and Aus are the only major agricultural areas, including pulses in the dry season. The cultivable land is less due to the presence of salinity during the dry period in the area. Land becomes one of the most important properties here. Besides these natural barriers, land is polluted by urban waste dumping and industrial activity. This activity interferes with the availability of cultivable land, which is further squeezed by unplanned urbanization and conservation of agri-fields for use as homesteads. Liquid waste dumping from municipalities and industries also degrades river-bed/sediment quality in the PKCP area. Protecting land resources is vital for this region.

[8] https://www.thedailystar.net/business/news/bangladesh-export-hilsa-india-ahead-durga-puja-3110681

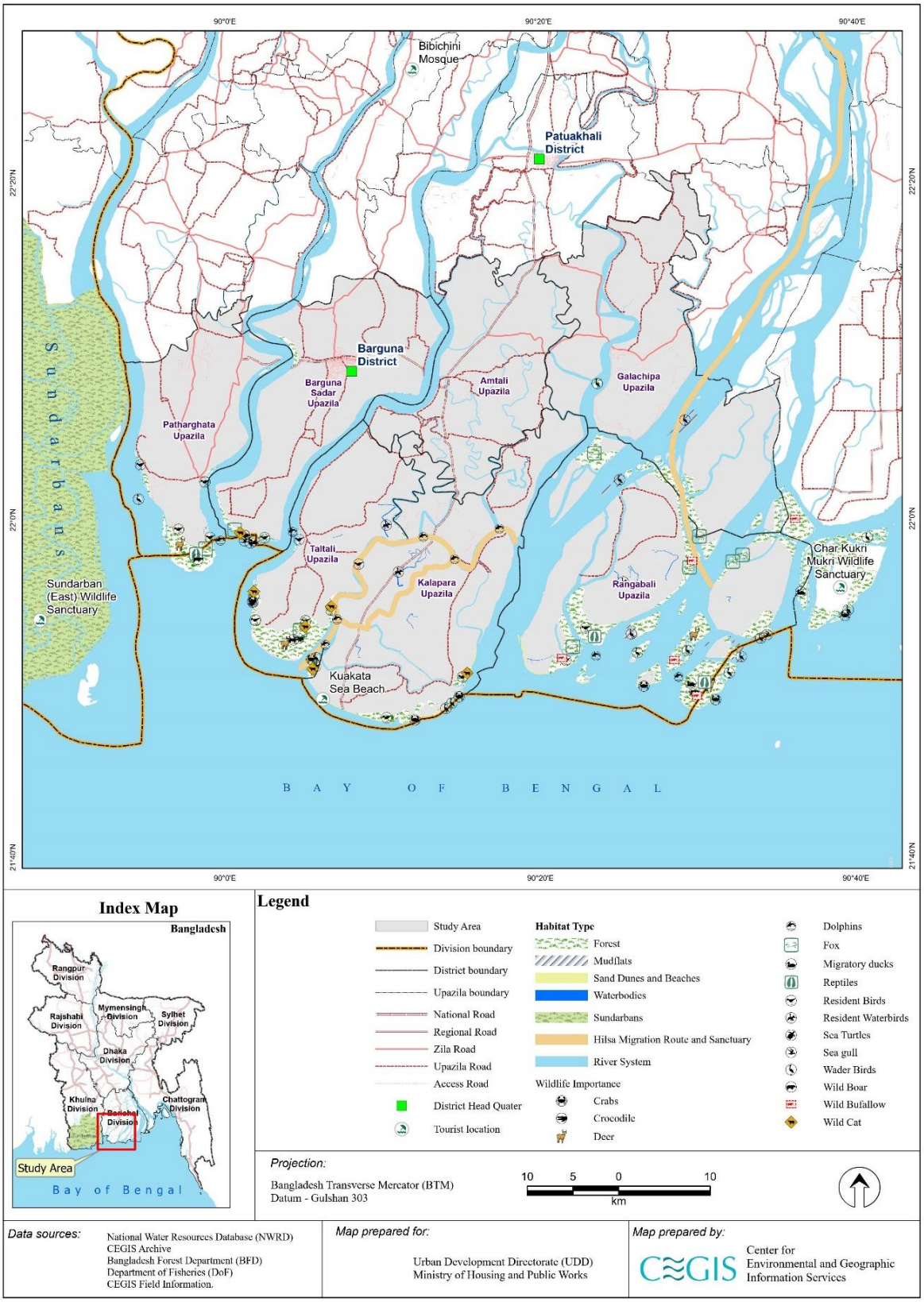


Figure 8.1: Protected and Other Designated Area

As mangroves are the prominent characteristics of this area, the beaches and shorelines are often exposed to their presence. Mangrove habitats support a wide range of coastal communities including mammals, reptiles, amphibians, shorebirds, and migratory birds. The inland rivers and wetlands also

support migratory birds and the native coastal avifauna (maps). Their presence contributes to the functioning of the ecosystem and improves habitat health. This provides a huge range of ecosystem services from provision-regulating-supporting to cultural values.

Though environmental quality gets less priority in deciding and selecting VECs, this SEA gave equal priority to conserving water, air and noise. Bangladesh's coastal area is affected by saline water. During dry season, the surface and groundwater show the issue of salinity in the SC region. This affects the aquatic ecosystems, their functions and services as well as compromises the living standard of the local community. Rivers and wetlands are affected by unplanned urbanization, markets, and growth centers. This, therefore, degrades the water quality and reduce water availability for irrigation and for the human consumption. High nutrients disrupt ecosystem functions and increase human health threats. Since urban development lacks green tags, city wastes and other construction waste increase particulate matter in the air, especially during the dry season. Therefore, dry period air quality should be conserved in accordance with Bangladesh's ECR'2023. Regarding environmental quality, noise is another environmental degradation, which disturbs the wildlife and ecosystems from all angles of day and night in the area. Tourism activities in the area include the beach, reserve forests, boating along the shoreline, and visiting the char islands. Open and traditional tourism results in chaos and waste that contributes to the degradation of the surrounding ecosystem. Tourists generate huge volumes of liquid and solid waste and they are not properly disposed of. Tourists use all sorts of plastics and generate single use plastics and micro plastics that drain to the beach area which drains to the marine environment eventually via rivers and canals. Unsustainable tourism pollutes both noise and water, thus gradually increasing in the PKCP area.

Birdlife International (2012) refer to Key Biodiversity Areas (KBAs) as globally significant sites for biodiversity conservation. They explicitly aim to conserve those species that are at greatest risk of extinction in the short and medium term, though many broader biodiversity and ecosystem service conservation goals are met through the resulting habitat conservation. KBAs focus on the systematic conservation planning principles of vulnerability and irreplaceability. Under vulnerability, the goal is to conserve those areas for which there are few options in time for the conservation of associated species. In this case, the focus is on the identifying sites based on the confirmed presence of species that are Globally Threatened according to the IUCN Red List (www.iucnredlist.org). Under irreplaceability, the goal is to conserve those areas for which there are few options in space for the conservation of associated species. Here, the focus is on geographically concentrated species, including those with a small global range, and those that congregate for some portion of their life cycle. Terrestrial and freshwater KBAs are identified based on similar (but not identical) criteria and thresholds.

KBA site boundaries are based on both the ecological needs of the target species, and on the local management context. By definition, KBAs must be ecologically sensible and currently or potentially manageable for conservation as single units. As such, sites tend not to cross national boundaries, and are often centred on existing management units such as protected areas. Where no relevant management units exist, extent of habitat cover, elevation range of target species, land use, and other factors may be used to define the KBA boundary (ibid).

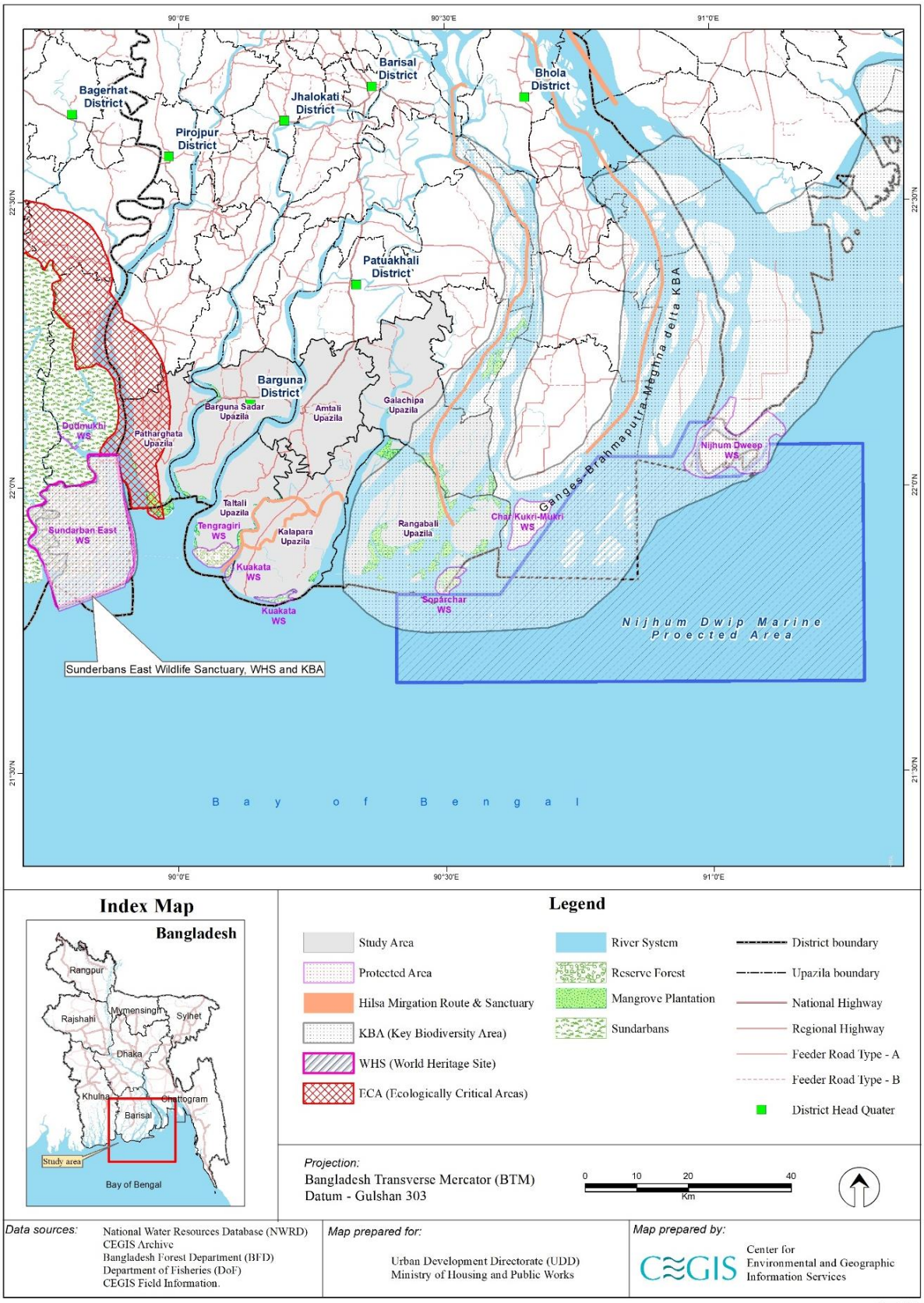


Figure 8.2: Wildlife Habitats and Fish Sanctuary including Key Biodiversity Area (KBA)

Birdlife have identified and mapped KBAs for the PKCP area (**Figure 8.2**). It is acknowledged that the VECs identified, are essentially nature-based. However, it is noteworthy that in an area where people and national economies rely disproportionately on ecosystem services and primary production,

nature-based VECs are undoubtedly important from a broader perspective. Moreover, there is no doubt that a healthy natural environment and properly functioning ecosystems are vital in the context of climate resilience.

The Rakhain, an ethnic minority group, lives near the Bay of Bengal (Kuakata). Project consequences may affect their composition, their cultural identity. Furthermore, there is also a group of bede (water gypsy) living temporarily in the absence of property rights. This group may also be affected by the project. The project will generate livelihood opportunities for many local and in-migrated people. On the other hand, the intended transformation may affect livelihoods of local, especially landless, marginal and small occupational groups (e.g. fisher, farmer, etc.). Seasonal outmigration of laborers is very common in this area. In addition, disasters also cause forced migration. The project can discourage outmigration and contrarily encourage in-migration of outside workers/professionals. Eventually, the population may be redistributed and affect and shape local culture. There are also a number of cultural heritages, which may be affected by tourism promotion.

The ToRs note that "the procedure of SEA is inextricably linked to decision making. The SEA report is a decision-support instrument aimed at providing as detailed a picture as possible of the environmental and social impacts related to the implementation of a plan, policy or programme. In the case of plans, the SEA report must contain sufficient information to assess the acceptability of the impacts, and consequently to propose suitable modifications and mitigations". In response to this, we considered Sustainability criteria in our assessment of cumulative impacts.

Though there is a diversity of meanings people attach to the concept of sustainable development (or sustainability), the United Nations (UN) Sustainable Development Goals (SDGs) provide a useful and practical framework. Since the GoB has signed up to the SDGs, there is already high-level commitment towards implementing them. Therefore, the sustainability criteria have framed our assessment of cumulative impacts.

The appraisal of the key components of the Draft PKCP against a set of sustainability assessment criteria enables the assessment of the PKCP in terms of its contribution to sustainability, where it might have an adverse effect, and where any positive effects could be enhanced. An "on balance" sustainability impression of each key component was reached.

The overall goal of the PKCP is to lead the development or redevelopment of 'Payra-Kaukata Comprehensive Development Plan focusing on Eco-tourism' in order to enhance the residents' socio-economic circumstances through the following broad objectives:

- Consideration of environmental and socio-economic consequences of the preliminary proposed 'Payra-Kuakata Comprehensive Development Plan (PKCP)' and promoting that these issues be addressed during finalizing the PKCP plan with a view to promoting sustainable development in the PKCP area;
- Assessment of the impacts of the implementation of the PKCP Plan 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 PKCP area;
- Development of alternative strategies to minimize the direct/indirect, domestic and cumulative impacts of development on the Valued Environmental Components (VECs) including other major environmental and socio-economic components more widely in the PKCP area;

- Make recommendations to improve environmental performance management in both the public and private sectors as regards PKCP activities including other future development likely to affect environment and socio-economic conditions in the area;

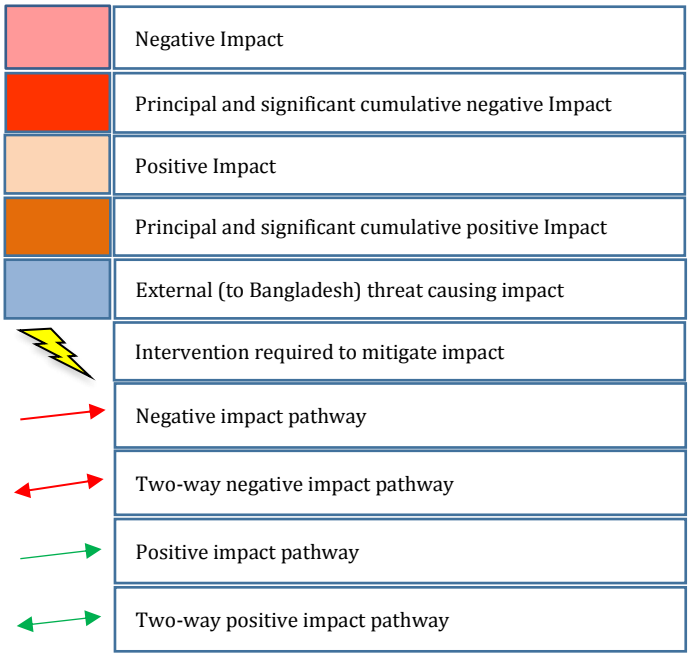
We have adopted a slight rewording of these four goals to sufficiently align them at a high philosophical level with the UN SDGs and to inform the sustainability criteria in **Table 8.3**, below.

Table 8.3: Sustainability Assessment Criteria

Objective	Criteria	Guiding Question: Will there be an Impact from the Proposed Actions on	SDG Relevance
Ecosystem health	Biodiversity protection and ecosystem resilience	Conservation and sustainable utilization of aquatic, marine and terrestrial resources?	Life below water (14), Life on land (15), Clean water & sanitation (6)
		The integrity of nature conservation sites, habitats and species?	
		Water quality?	
		Underwater noise?	
	Causes and effects of climate change	Greenhouse gas emissions?	Climate action (13)
		Resilience and/or adaptation to climate change?	
Social and economic benefits	Sustainable economic growth	Economic benefits generated by key economic sectors?	Decent work & economic growth (8), Industry, innovation & infrastructure (9), Responsible consumption & production (12)
		Ease of doing business?	
		The growth of any sector activity without detriment to another? (opportunity costs)	
		Sustainable use of living natural resources?	
	Access to decent employment opportunities	Employment creation? (and balance of full and part-time work?)	Decent work & economic growth (8)
		Attract and retain high-level skills?	
	Maintenance of human health and well-being	Human health and well-being (including any vulnerable groups)?	Good health & well-being (3)
Research and monitoring for decision making	Data collection and dissemination, and open access to information.	Research and monitoring?	Peace, justice & strong institutions (16)
		The availability of and open access to data and information?	
Good spatial governance	Inter-sectoral collaboration, planning and management	Inter-sectoral collaboration? (including across aquatic, marine and terrestrial habitats)	Partnerships for the goals (17)
		Policy development and decision-making?	
		Stakeholder engagement in marine planning?	

The preceding pages describe what cumulative impacts are defined as, and how they are assessed using linkage diagrams. The linkage diagrams below indicate the pathways along which impacts of development activities under each key "development cluster", move from one level to the next, and where they accumulate (see **Table 3.1** for elaboration of the clusters).

Box 8.1: Explanation of Linkage Diagrams



Notes:

1. The darker shaded boxes in the diagrams indicate the principal and most significant cumulative impacts (dark green for positive impacts, dark red for negative impacts) that will occur where different impact pathways result in the same final outcome, thus increasing its intensity or significance. Other cumulative impacts arise along the pathways, but to a lower intensity or significance. The justification for a darker rather than light shade is not only determined by the number of arrows leading to the box, but also by expert opinion and a judgement of significance.

2. The yellow "lightning bolts" indicate where interventions are needed to avoid or reduce unintended consequences. In some cases, even positive impacts can inadvertently lead to unintended negative impacts. For example, an increase in industrial activities will generate economic growth but can also lead to an increase in pollution during construction and operations as well as increased emissions of greenhouse gases.

3. The positive impacts of an activity can also result in mutually reinforcing positive feedback loops. For example, where economic growth leads to more money being available for investment in social and physical infrastructure, that investment then creates further economic growth which, in turn can create more money for investment.

The cumulative impacts appearing in the linkage diagrams and accompanying narrative, do not factor in impact avoidance and mitigation measures. Should these be in place, it is assumed that impacts will be less severe than anticipated. The SEMP begins the process of suggesting what is needed to address the lightning bolts shown in **Figures 8.1 – 8.7**, but it is expected that the proposed SEMP Coordinating Unit will build on these initial suggestions (see SEMP report).

8.2 Industrial Expansion and Establishment of Industrial Areas (EPZ)

As noted in **Table 3.1**, the anticipated key components of this cluster include:

Expanding industry and establishing Industrial areas (EPZ)	Location: Kalapara, Patuakhali. Work is underway to set up an EPZ in Patuakhali centering the Payra sea port. Land required is 413.03 acres. An investors' club is also being set up on 2.25 acres of land in Kuakata.

The linkage diagram below shows the likely positive (intended) consequences and possibly unintended (negative) impacts (pre-mitigation).

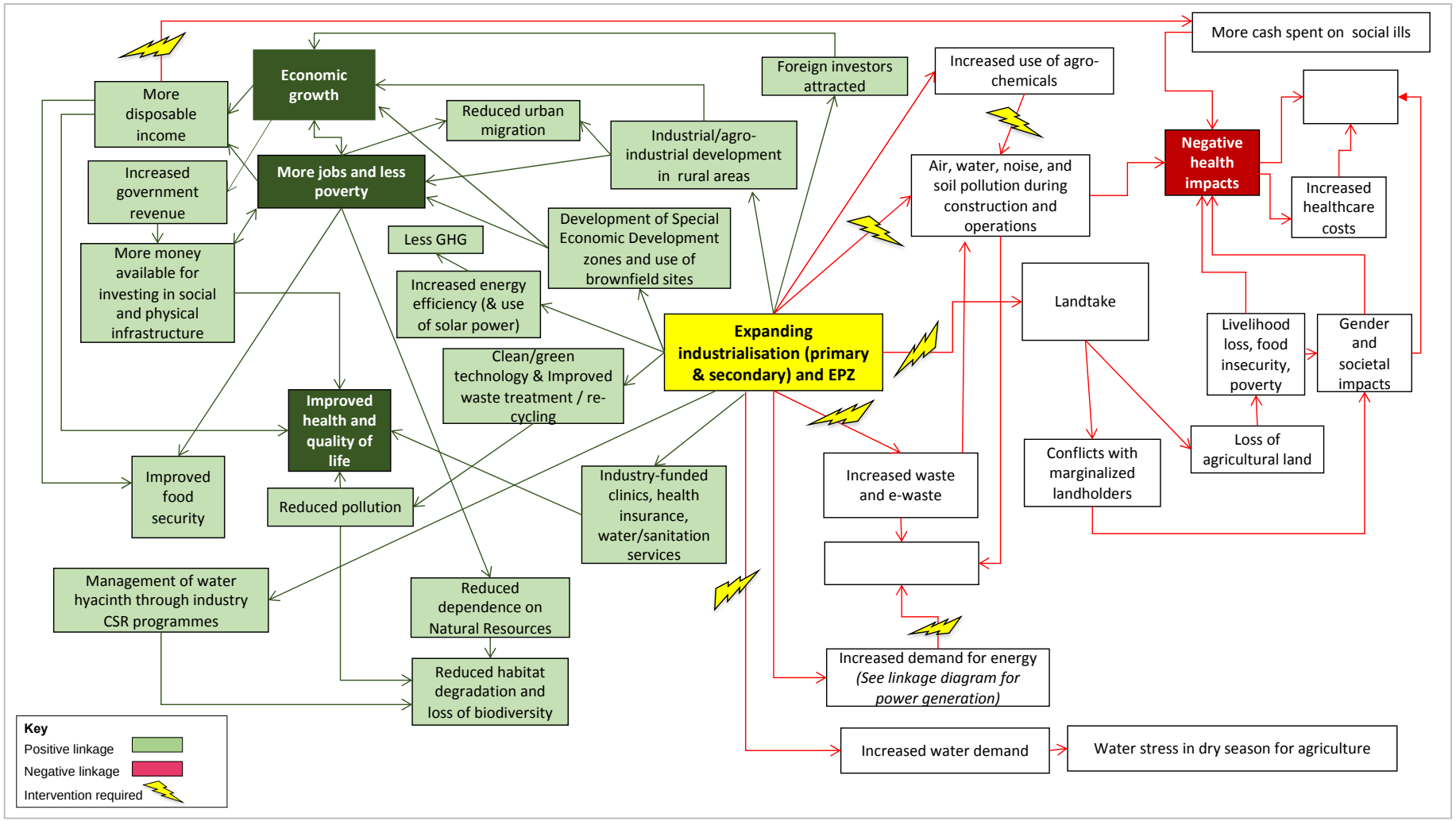


Figure 8.3: Industrial Expansion and Establishment of Industrial Areas (EPZ)

Main Cumulative Impacts

Positive: Economic growth; more jobs and less poverty; and improved health and quality of life, less reliance on primary natural resources.

Negative: Loss of biodiversity, noise and pollution (especially during construction, but also thereafter), land take (with possible social and household livelihood implications), and resultant health and economic costs.

8.2 Expansion and /or upgrading of Airport, Port, Roads, Bridges and Rail Network

As noted in **Table 3.1**, the anticipated key components of this cluster include:

Transport: Expansion and /or upgrading of airport, port, roads, bridges and rail network	• Location: Kalapara, Patuakhali Construction of 50-kilometer stretch of Marine Drive from Kuakata Zero point to Kauar Char to Alipur to Kuakata Zero Point. • Road Construction Project (Ferry Ghat) Location: Barguna, Patuakhali • Patuakhali-Amtali-Barguna Road over Paira River • Lebukhali - Dumki-Boga - Dashmina- Galachipa - Amragaci road over Galacipa River • Barguna-Patharghata Road over Biskhali River • Baliatoli Bridge over Anadarmanik River, Kalapara • Four-lane connection road of national highway with Payra port - Location: Kalapara, Patuakhali • Construction of Broad-Gauge Railway Line - Location: Amtali and Kalapara, Patuakhali

The linkage diagram below shows the likely positive (intended) consequences and possibly unintended (negative) impacts (pre-mitigation).

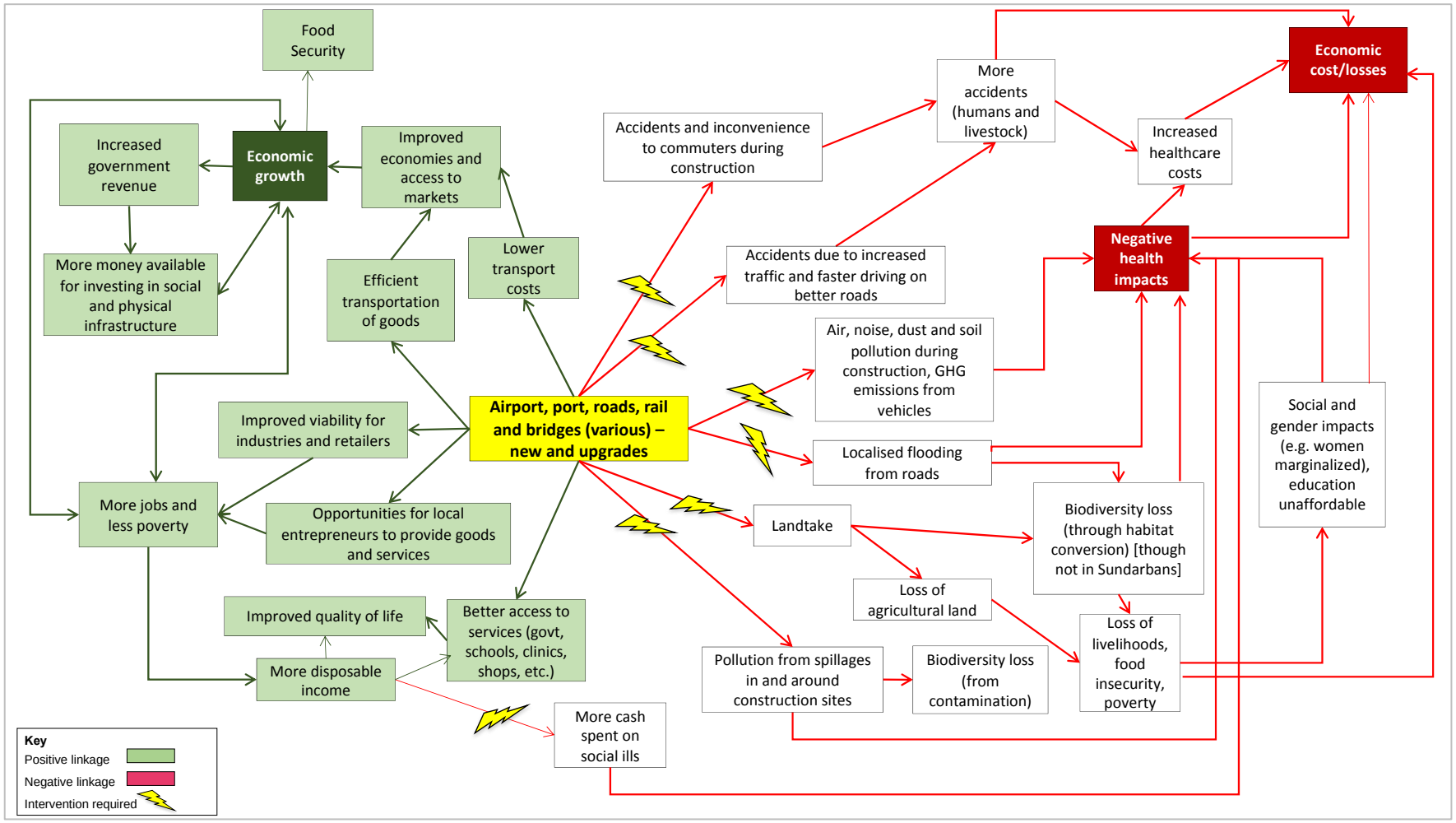


Figure 8.4: Expansion and /or Upgrading of Airport, Port, Roads, Bridges and Rail Network

Main cumulative impacts

Positive: Economic growth; economic efficiency and therefore more jobs and less poverty; improved food security and improved health and quality of life.

Negative: Loss of biodiversity, noise and pollution (especially during construction, but also thereafter), landtake (with possible social and household livelihood implications), and resultant health and economic costs.

8.3 Electricity generation and distribution

As noted in **Table 3.1**, the anticipated key components of this cluster include:

Electricity generation and distribution	Location: Barguna Sadar, Barguna. This project will improve the power supply of the PKCP project area and hence improve various power-driven tourism services and amenities.

The linkage diagram below shows the likely positive (intended) consequences and possibly unintended (negative) impacts (pre-mitigation).

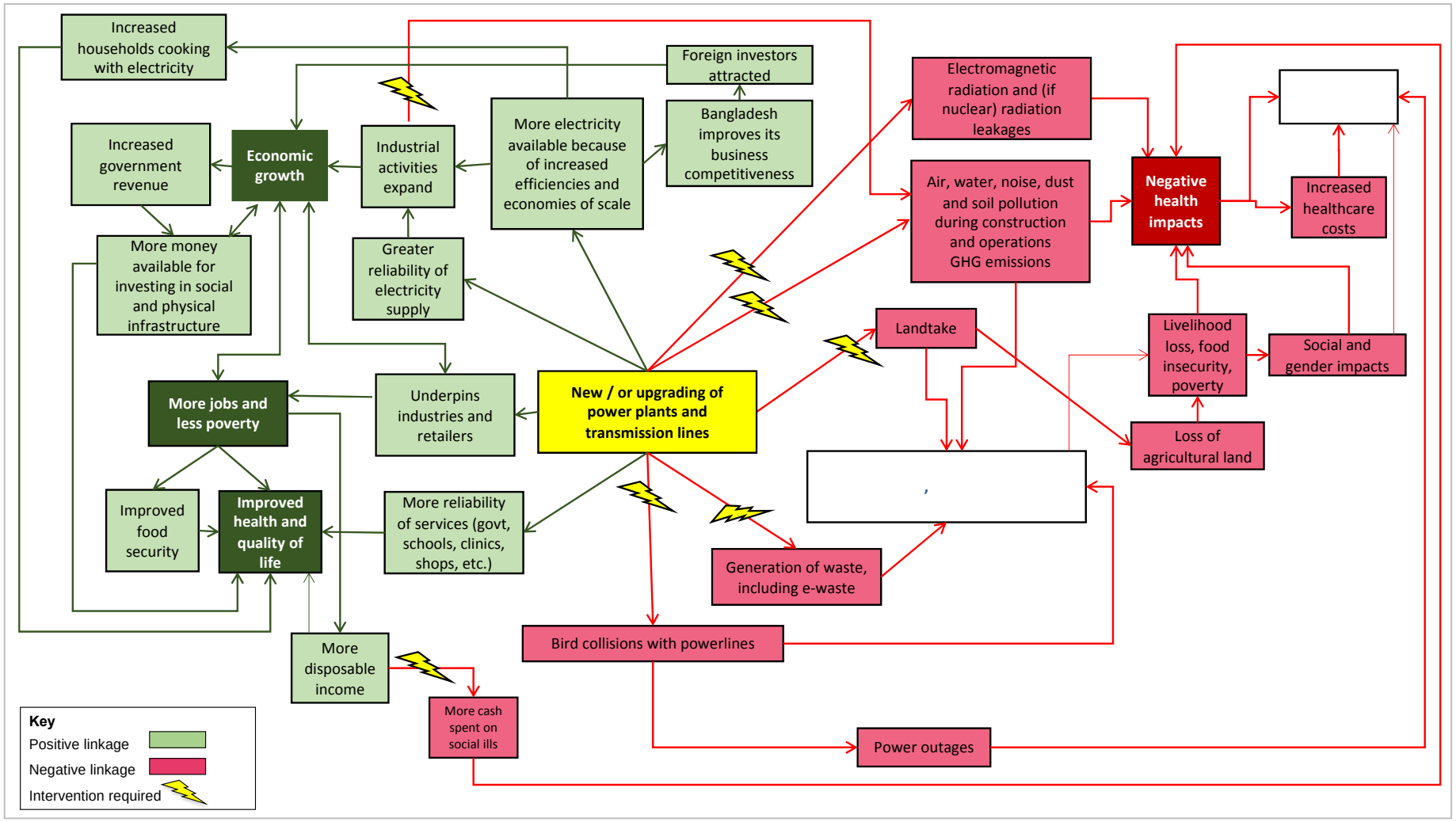


Figure 8.5: Electricity Generation and Distribution

Main cumulative impacts

Positive: Economic growth; economic efficiency and therefore more jobs and less poverty; improved food security and improved health and quality of life.

Negative: Loss of biodiversity, noise and pollution (especially during construction), landtake (with possible social and household livelihood implications), and resultant health and economic costs. Depending on type of power generation – climate change impacts?

8.4 Exclusive tourism zone with associated facilities.

As noted in **Table 3.1**, the anticipated key components of this cluster include:

Exclusive tourism zone & associated facilities, e.g. marine aquarium, museums, mosques, hotels, motels, watch towers, fire safety facilities, etc.	• ETZ - Location: Sonar Char, Rangabali, Patuakhali. Would require tourism centres, ancilliary infrastructure such as electricity, water supply, roads, gas, etc. • Marine aquarium and museum - Location: Kawar Char, Kalapara, Patuakhali • Establishment of a Parjatan Motel near the Khash Pond of Shuvo Shondha beach, Taltoli • Kuakata Dak Banglo construction - Location: Kalapara, Patuakhali – tourist accommodation • Patharghata Model Mosque - Location: Patharghata, Barguna • Barguna Sadar Model Mosque - Location: Barguna Sadar, Barguna • Barguna Circuit House - Location: Barguna Sadar, Barguna • Location: Watch tower at engragiri Eco- Park, Taltoli to observe mangrove flora and fauna. • Taltoli Fire Service Office Location: Taltoli, Patuakhali - improve fire safety (hosts and guests). • Mahipur Fish Landing Station - Location: Kalapara, Patuakhali

The linkage diagram below shows the likely positive (intended) consequences and possibly unintended (negative) impacts (pre-mitigation).

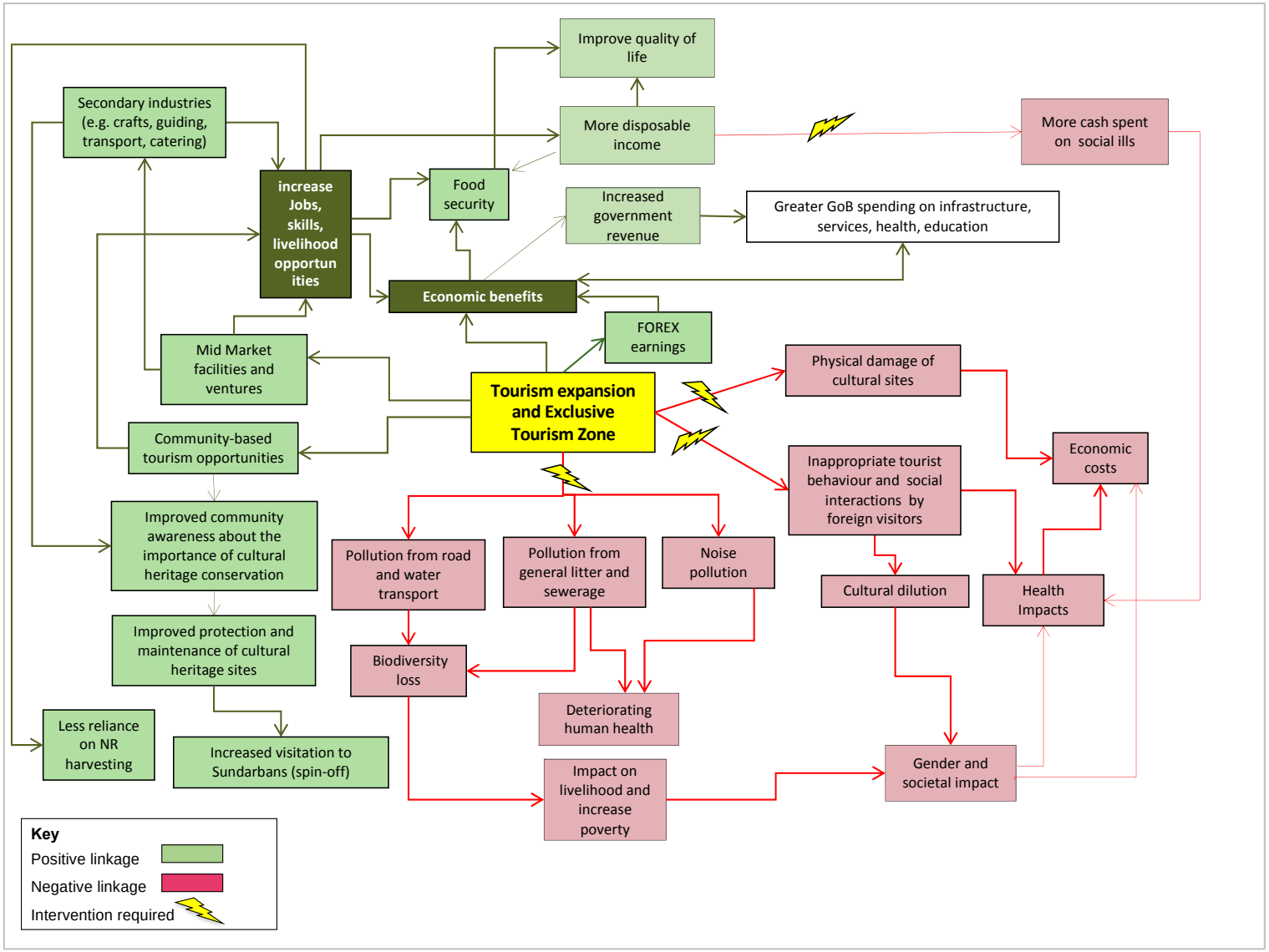


Figure 8.6: Exclusive Tourism Zone with Associated Facilities

Main cumulative impacts

Positive: Economic benefits; increased employment and livelihood opportunities.

Negative: Few are significant, but possibly pollution and social/cultural impacts.

8.5 Tourism - sea and river cruises

As noted in **Table 3.1**, the anticipated key components of this cluster include:

Tourism sea and river cruises	Location: Fakirhat, Taltoli Introduction of Sea Cruise/ River Cruise to visit Sundarbans and Swatch of No Ground (SNoG)This project will open a new door of Marine tourism in this region as Katka sea beach and Swatch of No Ground (SNoG) are only 30 kilometers and 70 kilometers away from Fakirhat, respectively.

The linkage diagram below shows the likely positive (intended) consequences and possibly unintended (negative) impacts (pre-mitigation).

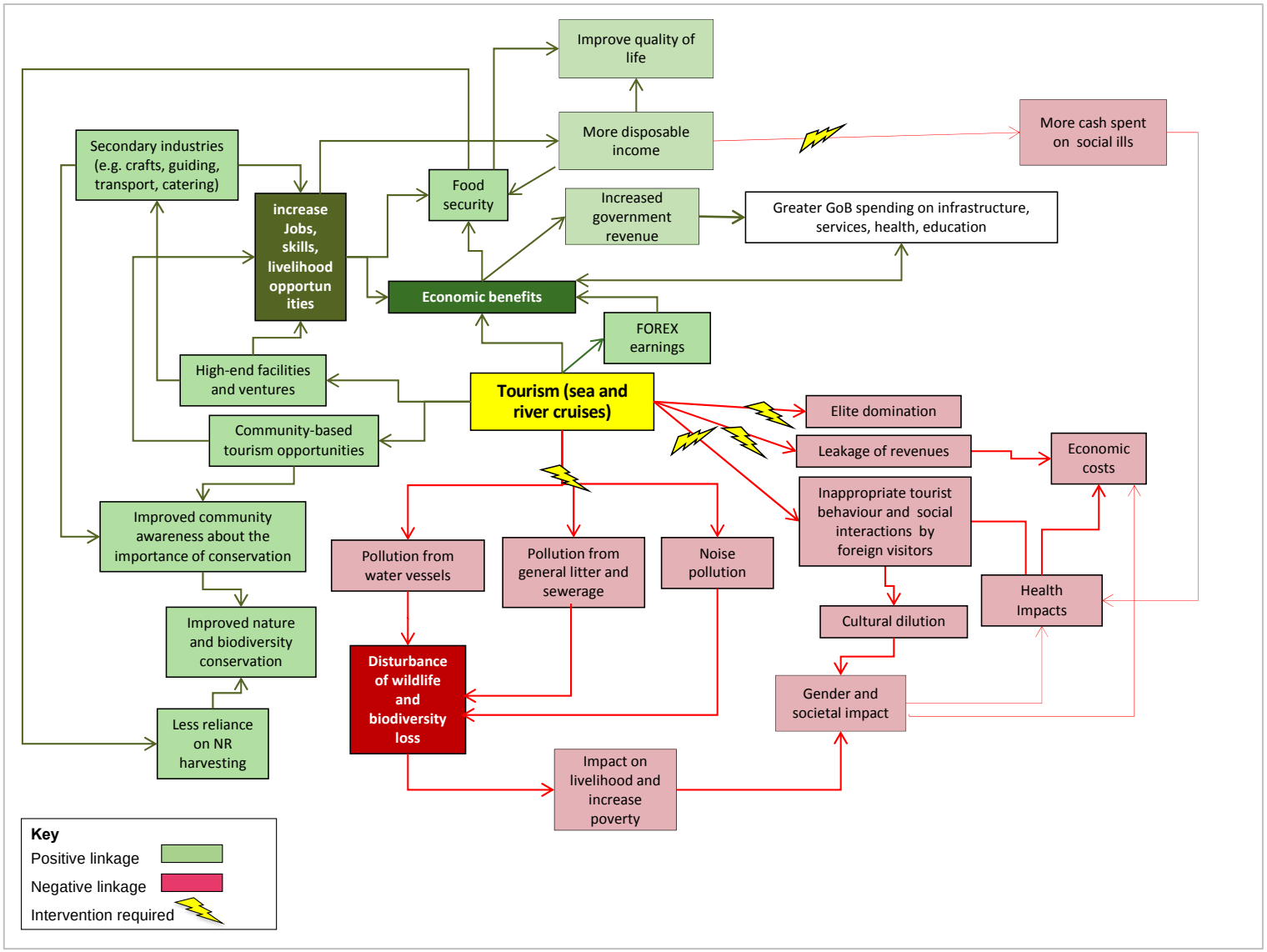


Figure 8.7: Tourism - Sea and River Cruises

Main cumulative impacts

Positive: Economic benefits; direct and indirect employment and thus livelihood improvement, improved food security and improved awareness of importance of conservation.

Negative: Wildlife disturbance and loss of biodiversity, noise and pollution (from boats and tourists), cultural and social impacts from inappropriate interactions between tourists and locals.

8.6 Improved forest protection, conservation and Coastal Embankment Improvement

As noted in **Table 3.1**, the anticipated key components of this cluster include:

Improved: forest protection, conservation and coastal embankments	Location: Overall PKCP Area

The linkage diagram below shows the likely positive (intended) consequences and possibly unintended (negative) impacts (pre-mitigation).

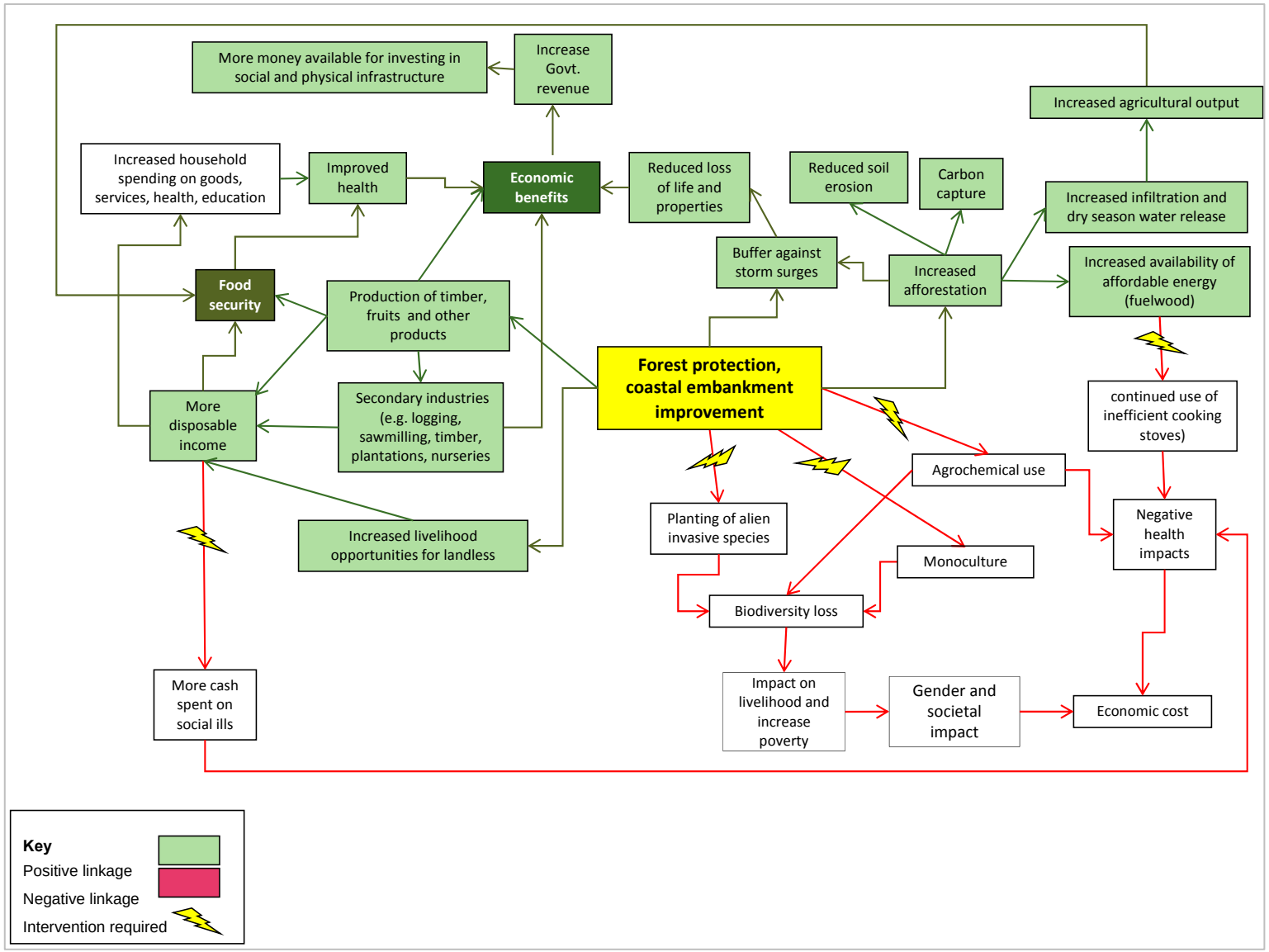


Figure 8.8: Improved Forest Protection, Conservation and Coastal Embankment Improvement

Main cumulative impacts

Positive: Increased forest and non-timber products, thus economic benefits, improved food security.

Negative: None significant.

8.7 Restoration of canals

As noted in **Table 3.1**, the anticipated key components of this cluster include:

Restoration of canals	Location: Taltali, Barguna: Restore 12 canals and 7 ponds to explore the Fatrar Char, Taltali, Barguna by Forest Department This project will create an opportunity for adventure tourism in this area.

The linkage diagram below shows the likely positive (intended) consequences and possibly unintended (negative) impacts (pre-mitigation).

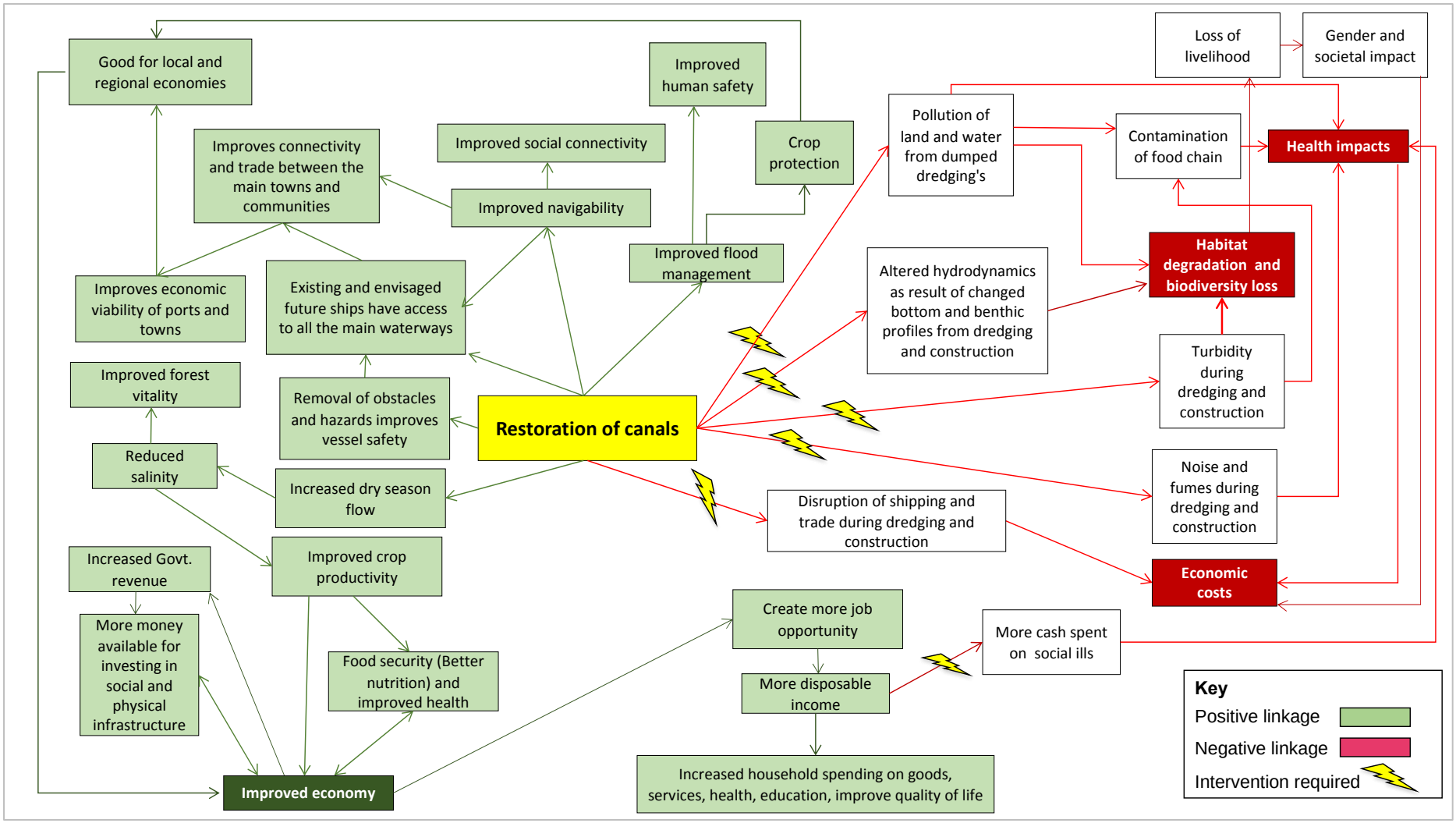


Figure 8.9: Restoration of Canals

Main cumulative impacts

Positive: Better and safer navigation, better connectivity and productivity, leading to economic growth.

Negative: Pollution (from dumped dredging), habitat degradation and traffic disruption – though primarily during the "construction" phase.

9. Conclusions

The linkage diagrams show that for each sector, the key activities result in a range of impact pathways that lead ultimately to a limited number (usually two or three per sectoral main activity) of 'end' cumulative impacts (either intended/positive or unintended/negative) (see also Table 9.1):

Principal positive cumulative impacts:

- Economic benefits;
- Increased jobs and skills;
- Food security;
- Improved health and quality of life;
- Enhance biodiversity and ecosystem services.

Principal negative cumulative impacts:

- Economic costs;
- Degradation of habitat and loss of biodiversity and ecosystem services;
- Increased diseases, sickness and health impacts.

Other important cumulative impacts arise along the pathways (e.g. increased pollution) but then cause subsequent 'end' or principal cumulative impacts (e.g. pollution leads to health impacts or loss of biodiversity).

Table 9.1: Dominant Principal Cumulative impacts of Development in the Study Area

Issue	Positive impact	Negative impact
Economy	Economic benefit	Economic cost
Habitats, biodiversity & ecosystem services	Enhance biodiversity and ecosystem services	Degradation of habitats, loss of biodiversity and/or ecosystem services
Health and quality of life	Improved health and quality of life	Increased diseases, sickness & health impacts
Food security	Improved food security	Deterioration of health and loss of livelihoods
Jobs	More jobs and improved skills	Deterioration of health and loss of livelihoods

This outcome provides a very clear signal of the logic and importance of ensuring that the Strategic Environmental Management Plan (SEMP) is pursued with determination and commitment across government; and is fully and effectively implemented – in order to avoid, minimise or mitigate these impacts arising. 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. Resilience of the environment to current and future impacts

10. Impact Avoidance and Mitigation

10.1 Consideration of Alternatives

As noted earlier, a key principle in SEA is that the impacts of alternatives to the PPP in focus (or alternatives to elements of the PPP) should ideally also be addressed. However, in this case, there are a large number of PPPs covering multiple sectors across a broad landscape. It was not feasible to assess every PPP or alternatives to them.

For the purposes of this SEA, we have assumed that the key aspects of the PKCP, and other projects and initiatives listed in **table 3.1**, will be implemented over the next 10 years. We have also assumed, based on the analysis provided in the ToRs, that the existing development trajectory in the study area is undesirable and the environmental and social impacts evident are equally undesirable.

Therefore, there is a self-evident conclusion that the interventions envisaged through the PKCP (and activities beyond the PKCP) are desirable from a sustainable growth perspective, and that adverse impacts can be mitigated providing the SEMP is implemented. The SEA has therefore not expended any further effort in comparing the impacts of the "no-go" alternative to the pursuit of the PKCP.

10.2 Impact Avoidance and Mitigation

This SEA recommends that the authorities in the study area implement the Mitigation Hierarchy in order to limit negative impacts to within acceptable levels, whilst also enhancing synergies. The mitigation hierarchy is a step-by-step tool used to limit the negative impacts of development projects. It can be used for many disciplines; including to manage risks and impacts to coupled social-ecological systems. The SEMP provides more details.

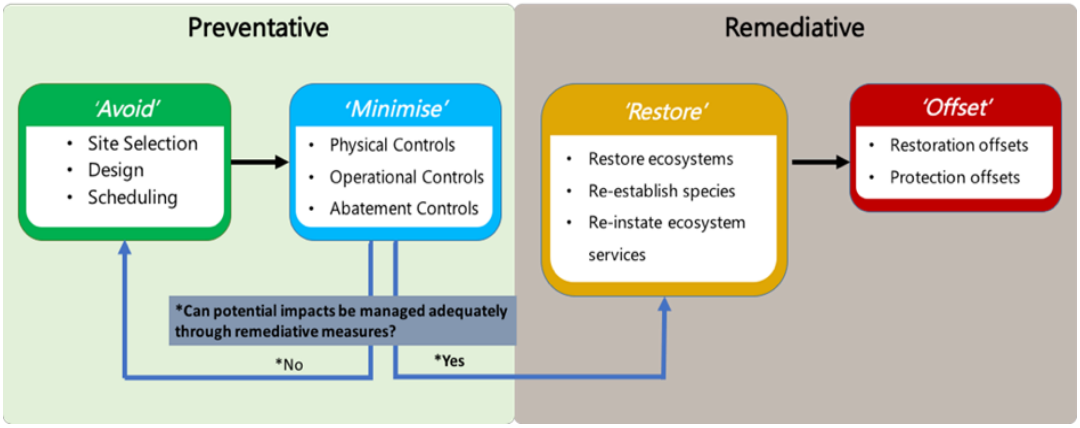


Figure 10.1: A Framework for Implementing the Mitigation Hierarchy [9]

10.3 Strengthening of Institutional Arrangements

The accompanying SEMP is the instrument that sets out measures to implement a response to the findings of the SEA, addressing the management of both environmental and socio-economic issues. It recommends how to enhance positive impacts and how to avoid or mitigate negative impacts, and

[9] A Cross-Sector guide for Implementing the Mitigation Hierarchy provides a practical approach and guidance. The Cross-Sector Biodiversity Initiative (CSBI).

how to build synergies and avoid antagonisms between developments arising from implementing policies, plans and programmes.

The SEMP will require institutional, political and public understanding and support if it is to be acceptable and effective. Therefore, the SEMP will need further discussion by senior level representatives of the key government institutions likely to be responsible for its implementation (e.g. monitoring indicators, enforcing regulations, managing resources, etc.). Likely changes to the environment in the absence of the PKCP.

Bibliography

Ayodele Omoniyi Olagunju & Jill A.E. Gunn (2015). Selection of valued ecosystem components in cumulative effects assessment: lessons from Canadian road construction projects, Impact Assessment and Project Appraisal, 33:3, 207-219, DOI: 10.1080/14615517.2015.1039382.

Ball MA, Noble BF, Dube´ MG. (2013). Valued ecosystem components for watershed cumulative effects: an analysis of environmental impact assessments in the South Saskatchewan River watershed, Canada. Integr Environ.

Betchtel, J.D (2010). Gender, Poverty and the Conservation of Biodiversity. A Review of Issues and Opportunities. McArthur Foundation

Fonseca, G.A.B. da. (2004). Hotspots: Revisited. Mexico: CEMEX. http://www.cepf.net/Documents/Eastern_Afromontane_Ecosystem_Profile_FINAL.pdf

Kennedy A, Ross W. (1992). An approach to integrate impact scoping with environmental impact assessment. J Environ Manage. 16:475–484.

McCarty L, Power M. (2000). Approaches to developing risk management objectives: an analysis of international strategies. Environ Sci Policy. 3(6):311–319. doi:10.1016/S1462-9011(00)00103-9.

Mittermeier, RA, Mittermeier, CG, Robles Gil, P, Pilgrim, J, (2003). *Wilderness: Earth's Last Wild Places*. Mexico City, Mexico: CEMEX.

Mittermeier, RA, Robles Gil, P, Hoffmann, M, Pilgrim, J, Brooks, T, Mittermeier, CG, Lamoreux, J and Fonseca, GAB. (2004): *Hotspots Revisited*. Mexico City, Mexico: CEMEX.NC), Vol 2, pp 1–132.

Myers N, Mittermeier RA, Mittermeier CG, da Fonseca GA, Kent J. (2000). Biodiversity hotspots for conservation priorities. Nature. Feb 24;403(6772):853-8.

OECD (2008). *Gender and Sustainable Development. Maximizing the economic, social and environmental role of women*.

Saatchi SS, Harris NL, Brown S, Lefsky M, Mitchard ET, Salas W, Zutta BR, Buermann W, Lewis SL, Hagen S, Petrova S, White L, Silman M, and Morel A., (2011). Benchmark map of forest carbon stocks in tropical regions across three continents. *Proceedings of the National Academy of Sciences of the United States of America*, 108: 9899-9904.

Stiassny, M.L.J. (1999). The medium is the message: freshwater biodiversity in peril. In J. Cracraft and F.T. Grifo (eds.), The Living Planet in Crisis: Biodiversity Science and Policy pp.53–71. Columbia University Press, New York.

Stiassny, M.L.J., Revenga, C. & Comer, P., (2010). Aquatic ecosystems: diversity and dynamism. In*: Fresh water: the essence of life* (Mittermeier, R.A., Farrell, T.A., Harrison, I.J., Upgren, A.J., and Brooks, T.M., editors), pp. 93-116. CEMEX & ILCP, Arlington, Virginia, USA.

Treweek J. (1999). Ecological impact assessment. London:Blackwell.

Van der Knaap, M., Katonda, K. I., & De Graaf, G. J. (2014). Lake Tanganyika fisheries frame survey analysis: Assessment of the options for management of the fisheries of Lake Tanganyika. Aquatic ecosystem health & management, 17(1), 4-13.

Vanmaercke, M., Poesen, J., Van Mele, B., Demuzere, M., Bruynseels, A., Golosov, V., Fuseina, Y. (2016). How fast do gully headcuts retreat? Earth-Science Reviews, 154, 336-355.

Verburg P., Hecky R.E. and H. Kling, (2003). Ecological consequences of a century of warming in Lake Tanganyika. Science, 301, 505-507.

Weeratunge, N. and Snyder, K.A. (2010). Gleaner, fisher, trader, processor: understanding gendered employment in fisheries and aquaculture. Fish and Fisheries.

Weeratunge, N., Snyder, K. A., & Sze, C. P. (2010). Gleaner, fisher, trader, processor: understanding gendered employment in fisheries and aquaculture. Fish and Fisheries, 11(4), 405-420.

West, K., Michel, E., Todd, J., Brown, D., & Clabaugh, J. (2003). The gastropods of Lake Tanganyika: Diagnostic key, classification and notes on the fauna. Centre for African Wetlands Ghana, on behalf of International Association of Theoretical and Applied Limnology.

Pickard, D., de la Cueva Bueno, P., Olson, E., Semmens, C., 2019. Evaluation of Cumulative Effects Assessment Methodologies for Marine Shipping. www.essa.com.

Stelzenmüller, V., Coll, M., Mazaris, A.D., Giakoumi, S., Katsanevakis, S., Portman, M.E., Degen, R., Mackelworth, P., Gimpel, A., Albano, P.G., Almpanidou, V., Claudet, J., Essl, F., Evagelopoulos, T., Heymans, J.J., Genov, T., Kark, S., Micheli, F., Pennino, M.G., Ojaveer, H., 2018. A risk-based approach to cumulative effect assessments for marine management. Sci. Total Environ. 612, 1132–1140. https:// doi.org/10.1016/j.scitotenv.2017.08.289.

Appendices

Appendix A: Terms of Reference

Section 6. Terms of Reference (TOR)

Kuakata a scenic sea beach on the south of Bangladesh. The most important attraction of the beach is that one can see both sunrise and sunset from some of its locations. Situated 320 km from DHAKA and 70 km from the PATUAKHALI district headquarters, *Kuakata* is part of the *Latachapli* union of KALAPARA upazila. The best way to reach *Kuakata* from Dhaka is to first travel to BARISAL by road, water, or air, and then to take the bus or boat/launch for the destination. The Bangladesh Road Transport Corporation introduced a direct bus service from Dhaka to *Kuakata* via Barisal.

The name *Kuakata* originated from the word *Kua*, which means a well dug for drinking water. It is believed that the early *RAKHAIN* settlers found it difficult to get fresh drinking water in the place and they had to dig *(kata)* wells *(kuas)* to solve the problem. The beach at *Kuakata* is 18 km long and 3 km wide. This sandy beach slopes into the BAY OF BENGAL. Other attractions at *Kuakata* include blue sky, huge expanse of water, the evergreen forest in surrounding areas, rows of coconut trees, boats of many different kinds and their colourful sails, and surfing waves. *Kuakata* is also a sanctuary for migratory winter birds.

Many people visiting *Kuakata* find interest in the Buddhist temples located at nearby places such as *Keranipara, Misripara* and *Amkholapara*, while many others find the place interesting because of the unique customs and traditions of the *Rakhain* community. *Kuakata* is also a place of pilgrimage of Hindus and Buddhists. Devotees arrive here during the festivals of *Rash Purnima* and *Maghi Purnima*. A major ritual on these occasions is dipping in the holy waters of *Kuakata*. Visitors also enjoy the traditional fairs organised to mark these celebrations.

Historical events The *Rakhain* tribe of Bangladesh first settled in this upazila. A section of the people belonging to the Buddhist *Rakhain* tribe of Arakan came to this *Upazila* in quest of better living and first settled at *Khepupara* and *Kuakata*. Tradition goes that the *Rakhain*s on excavating wells traced fresh water in the area and thereby settled there. The *Rakhain* word 'kansai' means beach of fate. The place was named as Kansai after this. The place was subsequently renamed as *Kuakata* (digging of well) after the wells dug out by the *Rakhans*. The *Upazila* though named as Kalapara, the *Upazila* sadar is known as *Khepupara*. It is said that two influential *Rakhain* chiefs used to reside on either side of a canal running northsouth through the upazila, *Kala Magh* on the eastern bank and *Khepu Magh* on the western side. The habitation on eastern bank of the canal was named as *Kalapara* after the name of *Kalau Magh* and that on the western bank as *Khepupara* after *Khepu Mag.*

Squalls and cyclonic storms sometimes pass over the area in the months of May-June and September-October and the worst of the type is accompanied by the tidal bore. In recent years low atmospheric pressure in the Bay of Bengal led to frequent storms causing large scale damage all over the district.

On the 12th November, 1970 the district was swept away by an unprecedented cyclone and tidal bore. It took a heavy toll on human life and property and made a tragic record in the history of the district. Previous to the onslaught of the cyclone gusty wind blew from the 10th to the 11th November. On the 12th November at about 8 P.M. stormy wind started to blow from the north eastern side. From 9 P.M. it changed its course and the storm came from the south-eastern side at a speed of 70 to 80 miles per hour and the tidal bore at a height of 15 to 18 feet swept over the district. At about 10 P.M. the storm raged at a lower speed but by about 11 P.M. stormy wind blew at a speed of 100 to 120 miles per hour from the west and north-western side. The terrifying speed of the storm and the tidal bore destroyed many human lives; trees were uprooted, houses were damaged making an unprecedented record in the district. The loss of human life by this calamity in Kalapara thana is 4,609. The worst hit area of the district was Golachipa Police-station where 28,718 persons were killed by the cyclone and tidal bore. Under the same Police-station the situation in Bara-baishdia, Chhotobaishdia, Charkazal and Rangabali was beyond description. In Char Momtaz under Rangabali union council only six persons remained alive.

Inundations from the Bay during the passage of cyclones are not infrequent in the southern part of the district and do great damage. They usually occur in June before the breaking of the

69

monsoon or in October or November after the monsoon is over. Smaller inundations affect the coast for serveral miles inland and deposit a layer of sand, which not only destroy the crops of that season but reduce the fertility of the soil for some seasons afterwards. Incidental effects felt in that portion where the wave is at its height are the destruction of lives and the impregnation of all tanks which supply drinking water with salt. At infrequent intervals storms and waves of great magnitude occur which are liable to cover the entire district or the greater portion of it with salt water and therefore affect the fertility and throw temporarily a great deal of the land out of cultivation. There is a brief reference to the storm wave of 1964 in the works of Abul Fazal. There were also storm waves in 1584. In British period we get records of several other storms and tidal bore incidents, namely those of 1787, 1822, 1825, 1832, 1855, 1867, 1869, 1870 and 1876. In 1940 cyclone and high floods caused considerable damage to lives and property. In October 1960 and in May, 1961 sever cyclones hit the coastal areas of the district. The waves were reported to have-reached a height of 10-12 feet particularly in the Galachipa Archipelago and Char Kukri Mukri of the district. Recently there had been frequent floods and tidal bores in 1954, 1955, 1964, 1965 and 1970. Of these, the floods and tidal bore of 1965 and 1970 caused great havoc.

The great flood and storm surge of 1970 was the worst of its kind in the district. It is speculated that people died in thousands in the coastal belts and islands in the south. The loss of lives in the country as a whole was more than 5 lakhs. The damage to crops and property was tremendous. The tidal bore was reported to have reached a height of 20-22 feet in some places of Char Bastin, Char Nalua, Char Kukri Mukri, Char Kajal, etc. and the coastal belts and other islands of Kalapara and Galachipa of the district. The loss of lives in the district alone was more than 25,000. The deterioration of soil was intense due to intrusion of saline water into the land.

The soil is formed of alluvium carried down and deposited by river creeks and channels. It is composed of silt and clay. The beach of *Kuakata* is, however, sandy. Deposit of sand is also found in a few *chars* such as *Char Tufania, Char Hare* and *Sonarchar*.

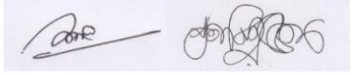
Bangladesh can earn money in local and also in foreign exchange by opening a tourist resort at *Kuakata*. This is an island village situated in the southern-most part of Patua-khali. It is in the Teakhali Union under *Khepupara* or Kalapara thana. This island is separated from the main land by *Kuakata khal*. The spot, if properly developed will become an excellent holiday resort and tourist centre. Rowing facility can be arranged easily; fishing and hunting facilities are already there. *Kuakata* abounds with birds and other animals. The success of developing *Kuakata* as a tourist centre depends much on good communication facilities and availability of modern amenities.

Kalapara was originally convered by the Sunderban. This forest area included the present Kalapara thana and its southern part, that is the Barabagi and Karaibaria unions. There is a Beat Office at *Kuakata* for reserved forest under Mohipur Range which was formerly under Sundarban Forest Division. With the creation of Afforestation Division, Barisal it was transferred to this division. This reserve forest comprises 15000 acres land in area. Subsequently 5,000 acres more have been added to it. In the reserve forest areas fishes are available abundantly and formal permits are granted for catching fishes there.

Khepupara is an inland nver port situated on the northern bank of the Nilganj river. It is under Teakhali union and Kalapara police station. The place is easily accessible from all parts of the Sundarbans. It is an important place and has a steamer station.

Kuakata is a sea beach and a village of almost of exotic scenic beauty. This is in the southernmost area of Patuakhali district situated on the fringe, of the Bay of Bengal. If properly developed it can be made an attractive holiday resort for local as well as foreign visitors and a tourist centre. According to the 1961 census, population of the village was 401 persons. Most of them are *Maghs* (Buddhists) and Muslims. Some persons have recently started coconut plantation m an area of 200 acres. They are also experimenting with growing potato and ground-nut. The local people grow all kinds of vegetables, paddy and wheat. The Maghs, particularly their womenfolk, are well-known for their dexterity in weaving and wood-work. There is a small Rest House at *Kuakata* belonging to the State Acquisition Department. Even without good provision of amenities and other facilities tourists visit this area to enjoy its natural beauty which is indeed worth a look.

As a matter of fact, from the approach to *Khepupara* down to *Kuakata*, a visitor will find on both sides of the river and the canal excellent natural scenery and hutment of the Buddhist Maghs. Their forefathers settled there many generations' back and they still retain their tribal customs,



costumes, traditions and culture. Their pagoda-shaped house, their dialect and mode of living and social institutions, temples, etc., are a source of fascinating study to the tourists and anthropologists.

During World War II an Army outpost was located at *Kuakata* and aeroplanes used to land on its beach. The Army constructed a small jeep able road which has, however, fallen into disrepair. A landing strip may now be developed at *Kuakata* which can give better communication and facilities for tourist travel by air. A forest office was situated at *Mohipur*, the jurisdictiqn of which extended over *Kuakata* and its neighbouring areas.

1.2 The proposed project would be prepared on a regional development perspective considering the Payra-Kuakata costal region as a part of whole of Kalapara, Galachipa, Rangabali, Amtali, Taltali, Bargua Sadar and Patharghata upazila. Amtali upazila has been included in the development planning package, since its location is strategically important from the regional context Because Amtali upazila is situated on the way to Barisal-Kuakata highway as the highway runs through Amtali upazila.

Taltali and Pathargata upazila is situated within the same ecological region with that of Kalapara and Amtali upazila. Besides Sonar Char is located within Rangabali upazila, which was further a part of erstwhile Galachipa upazila. Hence, Galachipa and Rangabali upazila are also included within the project area, to prepare the Payra-Kuakata Comprehensive Master Plan Focusing on Eco-Tourism in an integrated and Comprehensive development planning context.

Furthermore, the third seaport has been established at Kalapara upazila. This huge establishment would change existing land use pattern of the region abruptly. To forecast such probable changes in existing land use pattern, and to accommodate such massive establishment and its related changes in existing land use pattern of the region, this development planning package is essential. The proposed project would also attempt to address the issue of impact of climate and would make recommendation on the possible adaptation strategies.

Table 1: Area, Population and Population Density of the Project Area

District Name	Upazila Name	Area		Population	Population Density	
		Acre	Sq.km		Sq.km	Acre
Barguna	Amtali Upazila (Including Taltoli Upazila)	178103	720.76	270802	375.72	1.52
	Barguna Sadar Upazila	112282	454.39	261343	575.15	2.33
	Pathargata Upazila	95719	387.36	163927	423.19	1.71
Patuakhali	Galachipa Upazila (Including Rangabali Upzila)	313421	1268.37	361518	285.03	1.15
	Kala Para Upazala	121549	491.89	237831	483.50	1.96
Total		821074	3322.77	1295421	389.86	1.58

Source: BBS, 2011

2.1 Spatial Decision Support for Strategic Environmental Assessment of Land Use Plan

The procedure of Strategic Environmental Assessment (SEA) is inextricably linked to decision making. The SEA report is a decision-support instrument aimed at providing as detailed a picture as possible of the environmental impacts related to the implementation of a plan, policy or programme. In the case of plans, the SEA report must contain sufficient information to assess the acceptability of the impacts, and consequently to propose suitable modifications and mitigations. It can be argued that most of this information has a spatial component because geographical distribution of impacts plays a relevant role in determining how they are perceived by decision-makers, as well as by the affected stakeholders and the general public. Although this applies to all kinds of plans, it is particularly evident for land use plans, whose implications have an explicit spatial nature.

"SEA is a systematic process for evaluating the environmental consequences of proposed policy, plan or programme initiatives in order to ensure they are fully included and

appropriately addressed at the earliest appropriate stage of decision-making on par with economic and social considerations".

2.2 Scope of strategic environmental assessment: Most practitioners view SEA as a decision-aiding rather than a decision making process (like EIA) - a tool for forward planning to be flexibly applied at various stages of the policy-making cycle. Under this broad perspective, SEA encompasses assessments of both broad policy initiatives and more concrete programmes and plans that have physical and spatial references (e.g. town and regional plans, regional development programmes). With this scope of coverage one problem becomes readily apparent. The methodologies to be applied at the opposite ends of the decision-making spectrum differ markedly. However, the principles of EIA apply at all levels. Table 2 compares EIA and the evolving process (es) of SEA.

Table 2: Main Differences between SEA and EIA

Sl No.		SEA	EIA
1	Nature of action	Strategy, visions, concepts	Construction/operation actions
2	Focus	Critical decision moments along decision processes	Products of decision processes (final outcomes)
3	Level of decision	Policy, planning	Project
4	Alternatives	Spatial balance of location, technologies, fiscal measures, economic, social or physical strategies	Specific alternative locations, design, construction, operation
5	Scale of impacts	Macroscopic (mainly global, national, regional)	Microscopic (mainly local)
6	Scope of impacts	Sustainability issues, economic and social issues may be more tangible than physical or ecological issues	Environmental with a sustainability focus, physical or ecological issues, and also social and economic
7	Time scale	Long to medium-term	Medium to short-term
8	Types of data sources	State of the environment reports, statistical data, policy and planning instruments	Field work, sample analysis, statistical data
9	Assessment benchmarks	Sustainability benchmarks (criteria and objectives)	Legal restrictions and best practice
10	Outputs	Broad	Detailed
11	Post-evaluation	Other strategic actions or project planning	Objective evidence/construction and operation

Source: Rosário Partidário, M. (2003)

The inter-relationship between policies, plans and programmes is frequently idealized as a hierarchical or tiered process of decision making, as illustrated by Figure 1 using energy development as an example. In reality, however, policy-making does not necessarily follow a logical sequence of discrete, technical steps. Rather it is a more complex, iterative process in which the range of choice is gradually narrowed and most options are foreclosed by the project phase. This fact has a critical bearing on practical applications of SEA.

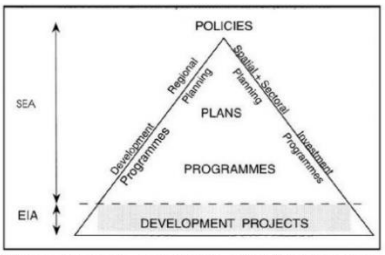


Figure 1:Expected amplitude of SEA intervention

In addition, terms such as *policies, plans and programmes* (PPP or 3 P's) mean different things in different countries and their use is dependent on the political and institutional context. But

in general, policies are taken to be broad statements of intent that reflect and focus the political agenda of a government and initiate a decision cycle. They are given substance and effect in plans and programmes - which involve identifying options to achieve policy objectives and setting out how, when and where specific actions will be carried out (Sadler and Verheem, 1996).

Table 3: Emerging Process of Tiered and Integrated Environmental Assessment

	JUSTIFICATION	ALTERNATIVES		MITIGATION
		Technological	Locational	
POLICIES	Macro-economic policy / Environ -mental policy	Sectoral development strategies e. g. transport and energy	Regional development plans	Mega-projects e.g. Channel tunnel (UK) and hydro-development (Quebec)
PROGRAMS	Conservation strategies	Energy supply e.g. oil and gas, nuclear and hydro		
PLANS	Integrated river basin management		Hydro facility plans e.g. reservoir transmission corridors	
PROJECTS	Environmental standards e.g. water quality and fisheries production			Site specific impact assessment

Source: Sadler and Verheem, 1996

However defined, policies and programmes encompass a range of strategic decisions, many of which are likely to have environmental, social or economic consequences. Table 4 outlines a simple "pre-screening" check for SEA to establish the proposals that are of concern. It can be adapted to different decision-making contexts and is undertaken by reference to:

- *the policy area or sector covered.* In general, all policy areas which concern or lead to changes in the use of land and natural resources, the production of raw materials, chemicals and other hazardous products and/or the generation of pollutants, wastes and residuals, are potential candidates for SEA.
- *the type of environmental effects that can be anticipated.* When moving from the policy to the project stage of the decision cycle, environmental considerations correspondingly shift from indirect to direct effects.

Table 4: Pre-Screening Procedure for Determining SEA Requirements

Sl No.	Questions can be used to make a quick judgment about SEA requirements
1	What is the actual content of the proposal? - is it concerned only or primarily with broad general direction(s) ?; or - does it address or specifically include operational measures (projects, activities, etc.)?
2	What policy area or sector is targeted in the proposal? - is it one known to have or likely to cause environmental effects (e.g. energy, transportation, housing, agriculture)?; and/or - are there components which are likely to have cumulative or long-term consequences for the environment (e.g. trade, industrial diversification, technology development)?
3	What environmental considerations are raised by the proposal? Does it appear likely to: - initiate actions that will have direct or evident environmental impacts?; - raise broad environmental implications and/or issues that should be addressed ?; or - have marginal or no environmental consequences?

Source: Sadler & Verheem (1996)

Logically, the scope and form of SEA should correspond broadly with the level of generality of decision-making and the type of environmental effects that are identified. Direct effects, typically, can be correlated with projects and with plans and programmes that initiate and locate specific activities; indirect effects are associated more with policies and with certain types of plans and programmes, such as legislative and fiscal initiatives. Many of these are not easily separable into discrete actions but that may have an environmental dimension; for example, by influencing attitudes and consumer behavior toward transport or waste recycling. These categories apply equally to

73

developing as well as industrial countries, although obviously the circumstances and considerations will differ.

2.3 Rationale for strategic environmental assessment

The benefits of introducing SEA and some constraints are identified in Table 5. In broad terms, the rationale for SEA of policies, plans and programmes falls into three main categories: strengthening project EIA; advancing the sustainability agenda; and addressing cumulative and large-scale effects:

Strengthening project EIA and advancing sustainability: EIA practice is constrained by certain limitations and weaknesses. These include structural weaknesses centred on the relatively late stage at which EIA is usually applied in decision making. By this point, high-order questions of whether, where and what type of development should take place have been decided, often with little or no environmental analysis. Project-by project EIA is also an ineffective means of examining these issues. SEA or an equivalent approach can be used as a complement to project-level EIA to incorporate environmental considerations and alternatives directly into policy, plan and programme design. Thus, when applied systematically in the "upstream" part of the decision cycle and to the economic, fiscal and trade policies that guide the overall course of development, SEA can be a vector for a sustainability approach to planning and decision-making - as called for by the Brundt land Commission (WCED 1987) and by Agenda 21 (UNCED 1992). This "upstream" approach can also help to focus and streamline project EIAs, making them more consequential and reducing the time and effort involved in their preparation. SEA may yield significant other benefits; for example, by ruling out certain kinds of development at the policy level, reducing the need for many project-level EIAs and thus relieving pressure where institutional and/or skills capacity is limited.

Addressing Cumulative and Large Scale Effects: Arguably, SEA offers a better opportunity than project-level impact assessment to address cumulative effects. Recently, considerable efforts have been made to extend EIA-based frameworks to encompass certain types of cumulative effects. These deal reasonably well with the ancillary impacts of large-scale projects (e.g. dams, transport infrastructure) and the incremental effects of numerous, small-scale actions of a similar type (e.g. road realignment and improvement). However, more pervasive cumulative effects and large-scale environmental change (which are the end result of multiple actions and stresses that cut across policy and ecological boundaries) are difficult to address. In principle, these can be addressed best by SEA of policies, plans and programmes; in practice, this has not proven to be the case.

Table 5: Benefits and Constraints for SEA

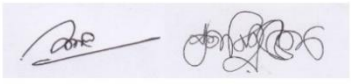
Benefits: SEA can and should:	**Constraints**: For SEA to function effectively:	**Other factors**:
• promote integrated environment and development decision-making; • facilitate the design of environmentally-sustainable policies and plans; • provide for consideration of a larger range of alternatives than is normally possible in project EA; • take account, where possible, of cumulative effects (particularly by focusing on the consequences of sectoral or regional-level developments) and global change; • enhance institutional efficiency [particularly where EIA related skills, operational funds and institutional capacities are limited] by obviating the need for un-necessary project-level EIAs; • strengthen and streamline project EA by: - the incorporation of environmental goals and principles into policies, plans and programmes that shape individual projects; - prior identification of impacts and information requirements; - clearance of strategic issues and information requirements; and - reducing time and effort taken to conduct reviews; and • provide a mechanism for public engagement in discussions relevant to sustainability at a strategic level.	• a level of institutional maturity is necessary which allows for effective inter-sectoral dialogue, for environmental considerations to be taken into account in formulating, revising and implementing policies, plans and programmes effectively, and to influence decision-making; • appropriate skills are needed, within government departments and agencies, in the private sector (e.g. industry, environmental consulting companies) and amongst academics and NGOs; and • there is a need for adequate capacity in these sectors (both human and financial resources).	In practice, the extent to which the benefits of SEA are achieved will also depend on a number of other important factors: • the provisions made for SEA, e.g. legal versus administrative; • the prior record of implementation and acceptance by decision-makers; • the degree to which overall strategies of sustainable development are in place; • the scope and level(s) of process application; with the broadest range of benefits being gained from SEA systems that include review of policies as well as plans and programmes.

74

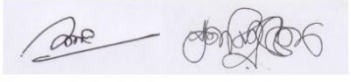
Sources: Dalal-Clayton & Sadler (1995) and Sadler and Baxter (1997)

List of priority environment, social and economic issues and concerns

Environmental issues and concerns	Comment / examples of potential impacts
Pollution and waste (solid and liquid): • Surface water pollution. Brackish and sea water • Groundwater pollution • Air 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 differentdevelopmental initiatives.
Water flow dynamics in rivers	Reduction of water flow in rivers of SWR may change the region's 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. Disposed dredged materials can affect the regeneration of trees & survival of existing forests as well as benthic aquatic biodiversity.
Salinity: • Groundwater • Soil	Due to reduced flow of upstream fresh water and channel siltation, and resultant sea water intrusion/inundation, soil and groundwater salinity has increased and soil productivity has decreased as well as livelihood diversity
Noise - particularly due to shipping in the rivers, specially in Rabanabad Channel	Noise from the regular movement of ships (notably along major riversof the project area) can disrupt wildlife movement, cause localisation of populations and result in inbreeding.
Habitat 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 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, with loss of keystone species and their prey base due to poaching and habitat degradation as a result anthropogenic activities. Biodiversity losses may also occur dueto climate change and natural dynamic changes in the ecosystem
Invasive alien species	Water hyacinth has become a major problem, clogging baors and ponds, and some water channels. *Prosopis juliflora* is also spreading onembankments although it is used as a fuelwood by local people. At



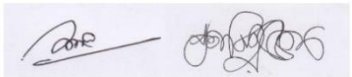
Environmental issues and concerns	Comment / examples of potential impacts
	Present. However, forest managers are concerned about their potential future spread and impacts,
River bank erosion – due to port expansion and boats	River bank erosion is a particular concern in the project area due to bow-waves 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 this area.
Climate change	
• Sea level rise	• Sea level rise is a global threat that will impact on the region.
• Salt water intrusion	• Many factors have reduced river flow in the region, decreasing flushing time, with increased periods of saltwater exposure.
• Erratic rainfall & distribution	• Shifting of monsoon with erratic rainfall has impacted on the cropping season and pattern
• Increased average temperatures	• There is no evidence of significant increased temperatures yet, but climate models predict a significant increase in the future.
• Cyclones & storm surges	• Cyclones making landfall impact on livelihoods (killing people and causing damage). Cyclone frequency has decreased but may rise in the future.
• Greenhouse gas emissions	• 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.
Exceptional floods (with potentially damaging water levels): • Freshwater floods (due to rain) upstream • Tidal • Poor drainage infrastructure	Freshwater flooding may occur due to: heavy rain in the upstream/catchment areas of this area, lack of drainage infrastructure and high tidal flow.
Industrialisation: • Power generation – oil, gas, coal • Pipelines • Petroleum • Cement • Special economic zones	Industrialization of the inland parts of this area can create air & water pollution as well as other potential impacts on biodiversity &livelihoods of the region. Hilsa fish breeding ground is facing threats.
Urbanisation	Rapid urbanization as well as in the environmentally critical area can affect the extent of air & water pollution and agricultural productivity etc.



Land use changes	Land use changes are arising due to population & economic growth of this area, e.g. shrimp cultivation, infrastructures & urbanization, etc. Impacts of this include loss of biodiversity, reduced soil productivity and loss of livelihood opportunities

Environmental issues and concerns	**Comment / examples of potential impacts**
Socio-economic issue	**Comment**
Livelihoods: • Conflicts between economic sectors • Access to resources (e.g.in Sundarbans) • Salinity	 • 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 by forest-dependent people to forest resources (to supporttheir livelihood options) is limited so as to prevent exploitation and to maintain a sustainable flow of resources. • Causes health problems (e.g. skin conditions), reduces drinking water quality – impairing people's ability to work, and affects crop production, etc.
Out-migration	Both involuntary and economic out-migration (mainly poor people) is common in this area. 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 national economy.
Health & sanitation: • Water-borne, respiratory & salinity-related diseases • Diet • Negative health impactsof air pollution (mainly pollution by particulate matter)	 • Local people, especially children and elderly people, are particularly susceptible to water-borne, respiratory and salinity- related skin diseases • Poor diet causes malnutrition. • The dominant way of cooking causes indoor air pollution which has a serious impact on human health.
• Inadequate health facilities and access	• Health service providers are based in city/urban and peri-urban areas. They are not easily accessible by people and/or emergency patients living in remote areas, due to poor communication networks. • Lack of public toilets in urban and semi urban areas. As a result,local people, especially women face problems during public gatherings and at local markets.

77



Environmental issues and concerns	Comment / examples of potential impacts
• Arsenic contamination (of drinking water & irrigated rice)	• This is a serious issue in parts of the Ganges River floodplain andthe northern part of the tidal floodplain.
Gender-related issues	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, Women often encounter security problem while travelling alone to/from remote areas.
Education: • Low environmental awareness • High male dropout	• Males from poor households need to support family income,resulting in high drop out and/or lower attendance at school. • Poor communication network in the rural area often discourages school attendance.
Loss of traditional knowledge	Technological advancement & other development activities may be causing loss of traditional knowledge.
Loss of cultural heritage	Lack of proper maintenance & negligence due to low revenue return, inadequate budget allocation, etc.
Security – kidnapping of resource extractors	Kidnapping of forest produce extractors for ransom is an importantissue for the management of the forest.
Seasonal tourism	Uncontrolled tourism causes loss of biodiversity, disruptive noise andwater pollution etc.
Illegal activities: • Poaching and hunting • Poison fishing • Illegal tree cutting • Trafficking of wildlife products • Corruption	These issue are of major concern in this area, causing loss of habitat and biodiversity (terrestrial & aquatic) & economic loss for communities.
Institutional issues	Lack of manpower, capacity development & logistics are major institutional issues – impeding environmental management (In general).

2.4 The Main Steps of Strategic Environmental Analysis:

The strategic environmental analysis approach aims to be systematic, analytical and practical. 10 methodological steps create a logical structure and provide guidance to participants in clarifying the complex issues involved.

Steps 1-4: Society-environment context analysis and impact assessment:

- identification of the main environmental functions (production and regulation);
- defining stakeholders dependent upon these functions;
- assessment of current trends within the functions revealed by environmental indicators;
- assessment of consequences (impacts) of trends on stakeholders; future generations and natural values, using environmental impact chains and a trend-impact matrix;

78

- defining the norms, standards and thresholds involved.

Steps 5-6: Environmental problem analysis:

- definition of the main environmental problems, based on the impacts of trends and a risk analysis;
- identification of the key factors and related actors causing the problem using the action-in-context approach (underlying factors will be mainly socio-cultural, economic and/or institutional).

Steps 7-8: Environmental opportunity analysis:

- definition of the main environmental opportunities;
- identification of the main underlying factors and the actors to realise and benefit from these opportunities.

Steps 9-10: Formulation of a sustainable development policy plan with action fields and follow-up strategy:

- synthesis of the key factors and actors related to the environmental problems and opportunities;
- definition of environmental action fields;
- definition of sustainable development action fields by integrating priority issues from social and economic dimensions;
- formulation of a policy and coherent action plan for sustainable development based on the strengths and weaknesses of the relevant institutions and existing development policies;
- formulation of a follow-up strategy, including definition of coordination responsibilities, establishment of a monitoring system with relevant indicators, procedures for regular adjustments to policy using relevant strategic environmental analysis steps, institutional strengthening and capacity-building.

Source: AID Environment (1997); Kessler (1997a)

2.5 Trends and Experiences

Current SEA processes vary considerably. They may be formal or informal, comprehensive or more limited in scope, and closely linked with or unrelated to either policy or planning instruments. In general, three broad approaches to SEA have been adopted to date:

- it has been introduced as a relatively separate, distinct process - typically as an extension of EIA (e.g. in Canada);
- it has been established as a two tier system (e.g. in the Netherlands) with formal SEAs required for specific sectoral plans and programmes and an environmental "test" applied to strategic policies; or
- it has been incorporated into policy appraisal (e.g. in the UK) and regional and land use planning (e.g. in Sweden). Recently, there has been growing recognition of the importance of integrating EA with other policy and planning instruments.

Few developing countries have these enabling conditions in place. However, there are a number of supportive trends and developments. Notably various international organizations have taken steps to promote the transition.

2.6 Principles

Clearly the application of SEA approaches is increasing and with it comes the first crop of generalizations about best practice. Based on experience to date with SEA, and with proximate approaches, a number of broad principles are suggested that can guide policymakers, planners and SEA practitioners. These provide a first approximation rather than a last word, and undoubtedly will undergo review and revision. Above all, the need is to test and develop these against practice - learning by doing. We accept that conceptual development can be valuable. But for more than most subjects, SEA theory could do with a prolonged spell of general re-thinking.

79

3.0 Objective of Strategic Environmental Assessment

The method adopted to develop the spatial decision-support tool consisted of three main stages:

1) Identifying the main environmental concerns and indicators;
2) Spatially resolving the main effects of the Plan;
3) Assessing the effects using suitable environmental indicators.

Identification of concerns and indicators: A strategic assessment makes sense only after having defined a strategy by means of a holistic and long-term vision. In operational terms, this typically consists in setting performance targets for a set of relevant environmental parameters. The plan is then appraised against the compliance with such targets. This work aimed at building a decision support tool, in a stage in which a formal SEA procedure was not yet undertaken, and targets and objectives were not yet set. Therefore, first it was required to identify the main environmental areas of concern. This is normally done by fostering political debate, public participation and stakeholder consultation, as well as by referring to the existing legal framework (directives, protocols, conventions, etc.).

Spatial effects of the Plan: SEA is affected by a greater level of uncertainty than project EIA. Even though a spatial plan sometimes provides indications whose effects are unequivocal (e.g., sitting of main infrastructures), most issues are addressed in more general terms (e.g., policies to control soil erosion). In order to set the basis for an effective SEA procedure, it is crucial to try to identify, and spatially resolve, the outcomes of implementing the plan proposal. The second stage of the method consisted in predicting the expected changes caused by the implementation of the spatial strategy devised by the Plan. The analysis focused on the changes that are most instrumental in causing environmental impacts, and that have a spatial representation, given that some SEA impacts are by nature not spatially fixed. To test the approach, three main effects were addressed: urban expansion, land use changes, and passengers and freight flows.

Environmental impacts of the Plan: This stage aimed at providing a framework for the assessment of the changes likely to be brought about by the Plan's proposals. Impacts should be assessed against explicit environmental criteria, and with respect to a baseline environment. Characterizing impacts of planning tools requires a substantially different approach with respect to the impacts of projects. A plan can be regarded as a project at the landscape scale, whose features, and hence predictable impacts, are defined to an extent that does not allow anything more than identifying opportunities and threats, to be associated to possible implementation scenarios.

Opportunities and threats can be evaluated with reference to the strength and weakness factors of the region under consideration. All these elements should be specifically assessed in relation to previously set values, and associated criteria.

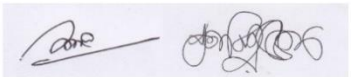
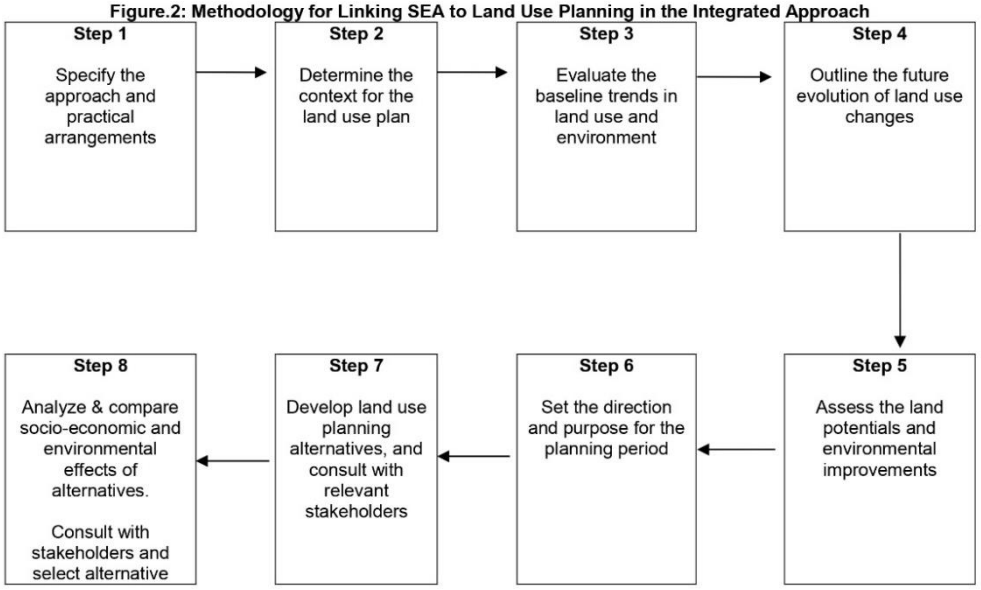


Figure.2: Methodology for Linking SEA to Land Use Planning in the Integrated Approach



Source: IUCN (2014)

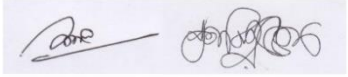
4.1 Land Use Planning Guidelines for Optimal Coastal Environmental Management

The objective of this study is to weigh and recommend environmentally-optimal regional land-use planning guidelines for coastal regions. The present malaise is assessed, as regards inefficiencies, non-suitability, non-sustainability, enhancing factors of environmental degradation, and potentially destructive consequences of current land-use alteration. *The Desired Situation:* A set of key environmental and socio-economic concerns must be addressed in the course of land-use planning decision-making. When addressing these concerns, realistic targets should be set.

Satisfactory Levels of Air Quality: A wide suite of pollutants result from Industrial sources, vehicular traffic, and agriculture. Significant reduction of particulate emissions, smog-inducing aerosols, and such gases as CO_2, N_2O, and CH_4 into the atmosphere could mitigate ambient climate change, consequent global warming, steric effects, and sea level rise. Minimizing air pollution could reduce harmful impact upon global flora and fauna, lower medical costs to the world's human population, and raise the ambient quality of life. Such reduction could result once economically feasible alternative energy sources replace the burning of fossil fuels for power sources and vehicles.

Satisfactory Levels of Water Quantity and Quality: Water quality can be defined as the set of values of physical, chemical, and/or biological parameters of water as related to accepted, desired standards for any given category of use. Quality of water suitable for human needs can vary widely; what is satisfactory for one purpose may not be for another. Usage-value of a given water quality for a particular category of use is the worth of a unit volume of water of that quality to a user in that category. Thus, differing water quality standards must be strictly tailored to the requirements of domestic drinking, industrial, and agricultural usages.

Sustainable development must ideally maintain the equilibrium of the natural ecosystem. Minimal use of non-renewable sources could mitigate ambient environ- mental loss. "Mining" of such resources needs to be replaced by recycling. Altered usage patterns and input of new non-



conventional water sources could be employed, as long as these do not themselves reduce the resulting usage-value of the ambient resources. Improved irrigation methods should be encouraged, decreasing net water loss by employing drip rather than sprinkler or canal irrigation. Maximally treated effluents applied as primary sources for agricultural irrigation could ensuring minimal negative impact to groundwater quality and integrity of soils, especially where significant perco- lation through shallow surface soil and unsaturated zone layers to unconfined phreatic aquifers can be expected.

Satisfactory Groundwater Storage: Water supply management planning should ideally take drought periods into account, during which rainfall depths are smaller than the minimal amount required for re charge of a groundwater basin. A desired level of efficient capture of natural rainfall drainage, tied to sustainable usage, would enable proper levels of recharge. Efficiently capturing natural coastal rainfall drainage by integrating storm-drainage with current sewage water treatment systems would quickly repay start-up preparation costs by reducing costs for drinking water. By tying water tariff to water quality, groundwater reservoirs could then prove adequate for long-term utilization solely for drinking purposes.

Establishment and Enforcement of Pollution Parameter Standards: Efficient and properly planned water resources management requires effective monitoring. Appropriate standards regarding potential pollution parameters form the basis for cost-effective monitoring networks that could satisfactorily protect surface and groundwater resources. Where such monitoring would indicate the need, water remediation and conservation measures could then be taken. Not all pollutant impact is readily reversible within a human time frame. Decision-making should then be based upon accurate registers of potential pollution sites, anticipating types and quantities of pollutants likely to impact the regional environment.

Satisfactory Desalinization and Effluent Treatment: Desalinization and effluent treatment can provide desirable operational means for water resource remediation. Desalinization of seawater and saline, brackish ground- water, import of fresh water from other sources, and use of properly treated effluents could prove ecologically effective measures for maintaining sustainable water resources, especially during times of drought in arid regions. A key challenge to cost-effective desalinization is, of course, energy efficiency.

Irrigation of agricultural crops, especially those having lower sensitivity to salinity, with satisfactorily treated effluents could enable use of higher quality fresh water for drinking. Efficient irrigation methods, such as drip irrigation on arid and semiarid land, would need to be employed.

Mitigation of Aquifer Salinization by Preventing Sea Level Rise: On-going sea level rise can salinate coastal aquifers. To minimize climate change that could lead to glacial melting and consequent SLR, appropriate measures would need to be adopted by all nations.

Planting and Maintaining Vegetation and Tree Cover: Vegetation enhances soil fertility by retaining soil aeration and often returning needed nitrogen by means of rhizobic nitrogen-fixing bacteria symbiotically tied to the roots of legumes. Tree-cover and other vegetation filter the air, cleansing it of excess CO_2 in return for added O_2. Root systems protect soil from erosion. Especially along coastlines, vegetative cover should be enhanced.

Three approaches could encourage sound soil conservation and healthy vegetative land cover. Firstly, to retain long-term fertility of otherwise low-fertility soils, a Native American technique could be employed, plowing in charcoal, food refuse, and other solid waste to produce black, well-aerated, highly fertile, carbon-enriched soils that retain their fertility over extended periods of time. Secondly, tree-cover and deeply-rooted soil- and sand-fixing plants and groundcover adapted to local environments, such as fescue, could serve as efficient anchors in areas where physiographic vulnerability of steep- sloping sea-side cliffs and valley walls are prone to erosion. And finally,

82

conservation advisors could encourage no-till farming, proper crop rotation, and use of humus and detritus for soil fertilization and aeration to protect and enhance fragile soil.

Integrating Urban/Rural Land-Use: A proper blend of urban and rural land-use could provide adequate rural amenities to urban areas and adequate urban amenities to rural areas. Urban areas could enjoy clean air and water, maintenance of maximal tree and ground vegetative cover, as well as maximal public access to natural amenities. Rural areas could enjoy efficient and rapid public transportation access to such urban amenities as employment and education complexes, cultural centers, and sports facilities.

In urban areas, local gardens and growth of vegetation on flat roof-tops should be encouraged. These could lower urban temperatures, maximize rainfall utilization, and provide a soothing natural visual environment for the inhabitants.

Guarding of Flood plains: Building in floodplains entails danger of significant potential loss to residents. Proper flood plain management could preclude such loss. Stream or river flood-plains are best employed for agriculture, wetlands, recreational parkland, etc. Land-use alteration in floodplains for the purposes of residential or commercial purposes should be discouraged. Proactive development of wet-lands, especially mangroves could be critical for protecting the physical, chemical, and biological integrity of coastal regions, as well as serving as vital feeding and nesting areas for birds, fish, and amphibious fauna.

4.2 Integration of Strategic Environmental Assessment into Regional Planning

The integration of environmental concerns within regional planning aims to reduce the possibility of any dislocation between environmental, economic and spatial processes. Regional planning deals with the efficient placement of land use activities, infrastructure, and settlement growth across a larger area of land than an individual city or town. Integrated regional economic environmental development plans are not simply a compilation of separate economic and environmental plans. They should show the linkages between the economic development, resource use and the production of residuals and impacts on environmental quality and communities.

Any regional environmental development plan should give attention to regional economic considerations so that all proposed environmental projects will be economically sound. Regional Planning potentially allows linkages between sectoral national planning and project planning and between physical and socio-economic and spatial linkages through which project impacts are expressed.

Regional Planning also allows the identification of the institutional arrangements necessary to ensure beneficial integration of projects into the economy of a sub-national area. An understanding of Regional Planning is essential for defining the role that Environmental Land Use Planning can play in the regional development. Therefore, Regional Strategic Environmental Assessment (RSEA) is a process designed to systematically assess the potential environmental effects, including cumulative effects, of alternative strategic initiatives, plans, or programmes for a region. In doing so, RSEA can support the preparation of a preferred regional development strategy and environmental management framework, and inform subsequent project based environmental assessment and decision processes.

Criteria to Apply Regional Strategic Environmental Assessment: There is set of screening criteria at Regional Strategic Environmental Assessment (RSEA) should be triggered. The followings are circumstances under which RSEA can be applied:

1) A strategic decision is to be made in order to establish a framework and conditions for future development, land and resource use, or management actions in a region;
2) There is a proposal to develop a regional plan or strategy concerning resource use, resource allocation, conservation or development;
3) There is an application for development in a previously undeveloped region and for which no current regional plan or strategy exists;

83

4) There is an application for development in an already developed region, for which no current regional plan or strategy exists, and that development has the potential to instigate or significantly influence regional cumulative effects processes;
5) There is a noticed decline in the key natural resources or ecological integrity of a region;
6) There is a need to coordinate disparate regional resources, programmes, data, management objectives, strategic initiatives in relation to a common regional issue;
7) Regional decisions are to be made concerning resource use, development, or land access that is multijurisdictional or multi-sectoral in nature; and
8) The Public demands that RSEA should be carried out.

Based on the above criteria, examples of the types of initiatives to which RSEA might apply include the development of PPPs, and associated strategic initiatives. These are marine and coastal zone planning, integrated land use planning, urban planning, conservation and protected areas planning, watershed management, and regional energy strategies and initiatives.

Process to Conduct a Regional Strategic Environmental Assessment: As an assessment process, RSEA adopts task such as scoping; identification and evaluation of alternatives; identification of a preferred option; mitigation; reporting; and monitoring, all in a consistent and systematic form, ensuring open and accountable decision making, and contributing to the improved quality of subsequent decisions. The output of R-SEA does not represent the decision, but rather the results of a systematic evaluation of options in such a manner that a strategic direction can be identified, and informed regional PPPs and project development decisions can be made. The process to conduct RSEA consists of three interrelated components. These components are summarized as follows:

1) a pre-assessment phase, focused on developing a reference framework for the assessment, scoping the environmental baseline, identifying cumulative baseline change, and delineating key trends and cumulative effects stressors of concern;
2) an impact assessment phase, often technical in nature, that serves to identify and assess the cumulative environmental effects and associated impacts of alternative options and leads to identification and selection of a preferred option; and
3) a post-assessment phase, focused on moving RSEA output forward to PPP implementation and following-up on the results.

4.3 Guidelines for Strategic Environmental Assessment of Spatial Planning

The Guidelines presented here are meant for use by proponents of land use plans. These will variously be city authorities, district planning agencies, or Planning and Development Departments at the Provincial level. It needs to be stressed that the Guidelines are directed primarily to public sector proponents … rather than private sector project developers, because it is government agencies that are responsible for overall spatial planning.

(1) Specifying the Approach: Proponent of an integrated land use plan should outline:

- The purpose and the scope of the plan - what do we want to achieve with the plan?, is it a revision or completely new plan?, what other land use plans need to be referenced?;
- Detailed methodology to be followed, along with timeline and budget;
- Arrangements for consulting relevant government departments;
- Broad arrangements for consulting directly affected land-users and other interested stakeholders;
- Specific roles and responsibilities for the land use planning representatives and SEA representatives; and,
- Management arrangements.

(2) Determining the Context for the Land Use Plan: The purpose of this step is to determine the key socio-economic and environmental issues that should be addressed in the land use plan. It consists of five sub-tasks:

- Outline the relevant socio-economic targets for the land use plan;

84

- Outline key land management issues resulting from the existing local land use patterns;
- Outline key environmental problems; and,
- Determine the most important socio-economic, land management and environmental issues for the land use plan.

(3) Evaluating Baselines Trends in Land Use and Environment: The purpose of this step should be to outline key trends for all land-management and environmental/natural resource management issues occurring in the concerned region. These trends will provide the framework to evaluate the proposed alternatives developed in a later step. Every endeavor would be made to prepare a land use plan which positively influences these trends.

a) *Evaluate the local land-use changes/trends in the last 10 years and implementation of any previous land use plans*

Proponents may outline the key trends in the local land-use changes in the last 10 years and implementation of any previous land use plans.

The proponent may also wish to illustrate these trends by overlaying the current land use plan map for the concerned territory and with the status of land use 10 years ago. Participatory methods can be used to involve community groups in analysing the current situation, reasons and causes of problems and in proposing solutions and mitigation measures. Participatory methods take time and require additional resources but the results can greatly contribute to the overall findings and report. A genuinely participatory process can increase the feeling of responsibility for the environment among the concerned population and also bring along higher acceptance of the final decision. Some training on facilitating participatory analysis would probably need to be done at the local level. Examples of such techniques include:

Mapping: community groups participate in mapping of resources, living areas, agricultural areas of importance, cultural or religious sites etc.

Ranking: simple techniques to determine the perceived importance of problems, agricultural issues, environmental concerns etc.

Walks: organizing walks with community representatives through sites of special interest can be a good way for planners to collect local knowledge.

Focus groups: organized discussions in small groups to collect in-depth information about specific issues.

Survey: Surveys (using interviews or questionnaires) can be used to collect information on current practice and land use, future plans, priorities, environmental concerns etc among different population groups.

b) *Evaluate environmental changes/trends during the last 10 years – analyze influence of land-use patterns on these trends*

Proponents may outline the key local environmental changes/trends in the last 10 years and analyze effects of implementation of the previous land use plans on these environmental trends. When doing so, they should focus on key environmental issues that are relevant for the land use plan (these were identified during Step 2).

The proponent may also wish to illustrate these trends on a map that features the most important environmental features for the concerned territory and also shows their status 10 years ago.

(4) Outlining Future Evolution of Land Use Changes

a) *Outline future evolution of land-use changes/trends if no land use plan intervention is taken*

The purpose of this step is to outline the likely trends for all land management and environmental/natural resource management issues if no land use planning intervention is undertaken. Using the analysis of the local land-use changes in the past 10 years and the effects of implementation of previous land use plans (see step 3A), proponents should outline the likely future evolution of these land-use trends for the next 5-10 years if no new plan intervention is taken.

b) *Evaluate environmental changes/trends during the last 10 years – analyse influence of land-use patterns on these trends*

Proponents may outline the key local environmental changes/trends in the last 10 years and analyze effects of implementation of the previous land use plans on these environmental trends by e.g. using a simple framework outlined in. When doing so, they should focus on key environmental issues that are relevant for the land use plan

c) *Outline future evolution of environmental changes/trends if no land use plan intervention is taken*

Extending the analysis of the local environmental changes in the past 10 years, proponents may outline the likely future evolution of these environmental trends for the next 5-10 years if no new land use plan intervention is taken. They can do this using a simple framework. When doing so, they should highlight key uncertainties in these projections.

(5) Assessing Land Potentials and Environmental Improvements

The purpose of this step is to assess the future land potential by analyzing current land use, constraints on conversion of land use, and the likely availability of suitable infrastructure.

a) *Assess land potentials – in relation to the expected land-use trends*

Using the analysis of the likely future land-use trends for the next 5-10 years if no new land use plan intervention is taken, the proponent can determine the specific land-use/land-management interventions that are likely to maximize the land use potential. They will need to assess the areas that are currently being underutilized; the plans for enhancement of basic infrastructure such as roads and drainage; any constraints on further development, such as existing residential areas; the costs of relocation of industry; and evaluate the suitability of the natural environment for particular types of development.

b) *Analyze potential for environmental improvement through land-use changes*

Extending the analysis of the likely future environmental use trends for the next 5-10 years if no new land use plan intervention is taken, the proponent can determine the specific land-use/land-management interventions that would favorably influence these future environmental trends.

(6) Setting the Direction and Purpose for the Land Use Planning Period

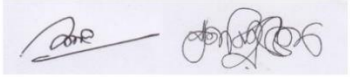
The purpose of this step is to set the overall framework for developing land use plan alternatives/scenarios for the next planning period. This step is intended to bring together all of the previous information that has been gathered to enable it to be evaluated as the various alternatives are being developed.

(7) Develop Land Use Planning Alternatives, and Consult with Relevant Stakeholders

The purpose of this step is to develop alternatives, or scenarios, that will satisfy the land use targets established under the previous step. The development of alternatives is an analytical and creative process that requires the proponent to analyze all of the available information. Development of alternatives should be based upon the land-use targets determined during the preceding Step 6. Each alternative (scenario) needs to be designed to support the achievement of as many of the targets as possible. Various alternatives should consider potential changes to land use to meet the identified targets whilst attempting to positively influence the land management and environmental trends.

The current land use map should be the foundation upon which all analysis will be performed. Based on this map, a new version indicating locations of the proposed land-use changes under each alternative should be produced.

This is an important step, where there is still a real possibility for the public to participate in the development of the land use plan. Simple maps and easy-to-understand presentation material should be used to explain the different alternatives and their pros and cons so that people in general can understand and compare the alternatives. The alternatives should be presented in local media



and exhibited in relevant public offices. Consultation meetings should be organized to allow for members of the public to study the alternatives.

(8) Analyze and Compare Socio-economic and Environmental Effects of Alternatives

a) Analyze alternatives

The purpose of this task is to analyze each of the land use plan alternatives in a systematic way in order to evaluate the influence/impact each alternative will have on the targets, land management trends, and environmental trends. The proponent needs to assess each of the alternatives in order to determine which is the option that maximizes land use potential, and meets the forecasted demands in a sustainable manner. For each alternative it is proposed to assess its influence/impact and the socio-economic, land-management and environmental context for the land use plan as identified in step 2.

This would be done in the form of descriptive text which could be colored according to likely influence. The colours will vary from dark green for a very positive impact/influence to a dark red for a very negative influence/impact. This will enable decision makers to obtain a quick visual assessment of each option whilst still providing a text description if more information is required. It is also possible for the proponent to use a numerical scoring system (including a weighting system for each factor) if this is seen as an effective assessment method.

b) Consult with stakeholders and select plan

The proponent needs to ensure that the proposed plan alternatives are being evaluated by the people who will be directly influenced by the land use plan. Simple maps and easy-to-understand presentation material should be used to explain the main changes and new features of the land use plan and its environmental considerations. A meeting should be held with local leaders to explain all aspects of the land use plan. The local leaders will then be responsible for informing the population they represent and for collecting comments.

In some cases it might be appropriate to organize meetings for major stakeholders that are particularly affected by the plan. This might, for example, be communities affected by important investments (industries, infrastructure development) and reallocation, or private sector investors. Using the analysis of alternatives prepared under Step 8a, and the feedback from key stakeholders in Step 8b, the final preferred alternative can be determined.

5.0 Scope of Work Strategic Environmental Assessment

5.1 Scope of Work for Environmental Survey

Pollution database: Study of noise and waste (solid/liquid including household and industry; night soil) pollution, ambient air quality during peak hour, quality assessment of drinking and surface water, quality assessment of top soils. The firm shall prepare report on the basis of output of the obtained surveyed and studied data showing a possible quality of existing and possible future pollution in the project area with tentative remedial measures and adaptation for Project area. All the collected environmental pollution and disaster related attribute and spatial data shall be linked with other spatial database.

Table 6: Environmental Tests

Sl. No	Components	Parameters	Frequency	Nos. of Sample
1	Ambient Air	PM10, PM2.5, SO2, NOx, VOCs	12 Locations X Twice in 2 seasons	24
2	Ambient Noise	Noise Level Mapping	12 Locations X Once in 2 seasons	24
3	Ground Water(2)/ Surface Water (3)/ Sea Water (1)	pH , Temperature, Turbidity, Total Suspended solids, Total Dissolved Solids, Total alkalinity ,Total Hardness, chloride, Sulphate, Sodium, Potassium, Nitrate-Nitrozen, Total phosphate, phosphorous, nickel, cadmium, chromium, copper, lead, iron, manganese, zinc, DO, COD, BOD5, Total coliforms, salinity, conductivity, Iron, oil & grease, phenol, E.coli	12 locations X Onece in 2 season	24
5	Soil	pH , Porosity, Soil Texture, Electrical Conductivity	12 locations X once in 2 season	24
7	Meteorological Monitoring	Wind Speed, Wind Direction, Temperature, Relative Humidity, Rainfall	for 90 days	90

5.2 Scope of Work for Ecological Survey

The team shall conduct historical study to on the spatial distribution of habitats or species and compile habitat or species inventories on various scales, and also recognize the pattern of rarity. The team needs to know if the habitats actually rare have been in this state for a long time or if they were still frequent some decades ago.

Information on the underlying process of decline or increase can be achieved by an historical landscape analysis. Time series of old topographic maps or aerial photos, written historical texts or oral information are all valuable sources to outline a picture of the landscape at times when land use was less intensive than today. Maps with the historical distribution of habitats from these sources should be drawn in the same resolution as the actual distribution. By overlaying both maps the team shall compute exact balances of losses for all habitat types in the project area.

The communities, which have been rare for a longer time (mainly because of special landscape conditions) and which communities have just recently declined in spatial extent shall be identified through the historical analysis. The historical analysis shall depict wet meadows some decades ago and, within land reclamation schemes, the recent drainage of the valley bottom. Subsequently, the drained meadows were turned into crop fields. Drainage is a major factor for the loss of species that are adapted to wet habitat conditions

5.1.1 Inventory of Existing Flora and Fauna:

- Identify existing flora and fauna
- Stating which species are rare and which species are endangered
- Identify the habitats of the flora and fauna
- Identify the characteristics of the flora and fauna

5.1.2 Spatial Distribution of Habitat: Spatial Distribution of Habitat (along with GIS Shape file and thematic maps):

- Spatial Distribution of flora and fauna
- Location map of flora and fauna
- Location and Spatial Distribution of rare and endangered Species

88

5.1.3 Interactive Digital Model on Bio-Diversity and Human Intervention (along with GIS Shape file and thematic maps):

- Description of baseline and trends of existing flora and fauna, if the project were not to go ahead;
- Explanation of the criteria used to evaluate existing flora and fauna; and assess the significance of impacts of the project
- Statement of methodology used
- Presentation of analytical techniques used and the analysis itself; and interpretation from the analysis

5.1.4 Interactive Digital Model on Bio-Diversity and Human Intervention (along with GIS Shape file and thematic maps; and Recommendation on Eco-Sensitive Land use Planning)

- An interactive digital model of existing habitat, decline of habitat and possible areas of conservation
- Identification of likely impacts on existing flora and fauna; and an explanation of their significance and the level of certainty with which this can be stated
- GIS database of the existing flora and fauna
- Description of legal and policy consequences
- Thematic map for providing planning guidelines

89

5.3 Survey and Data of Payra Kuakata Project

- Digital Imagery: 50 cm multispectral (RGB, NIR) Satellite Imagery with raw stereo model, Aerial Image orthophoto, high resolution UAV Orthophoto of Urban/Pourashava area.
- Transport Survey: Passenger Transport, Traffic Volume Count, Origin Destination, Household, Travel Time, Transportation Route and Zonal trip survey.
- Hydrogeology Study: Arsenic Map, Electric Conductivity Map (Salinity), Aquifer depth, Sand and Clay Thickness, Soil component
- Engineering Geology Study: Borehole, PS Logging, Microtremor test, MASW, AVS 30 Map, Foundation depth Map, Surface Lithological 3D Model, Soil Type Map, Soil Liquefaction Map.
- Base Map and Physical Feature Survey: Administrative Boundary, Mouza Boundary, 3D GIS Vector data (shapefile) of Building, Road and Waterbody with attribute, location data of different services and facilities, Landuseinformartion
- Digital Elevation Model and Contour: 10-meter Digital Elevation Model and Contour
- Socio Economic Survey: Socio economic information of Households in Urban and Rural area
- Economic Base Analysis: Shift share analysis, Economic base multiplier, Union Ranking analysis
- Hazard Mapping: Risk mapping of hazard

5.4 Scope of Study for Strategic Environmental Assessment

The Guidelines here are meant for use of land use plans. These would variously be urban area plan, or Planning Departments at regional level. It needs to be stressed that the Guidelines are directed primarily to public sector proponents … rather than private sector project developers, because it is government agencies that are responsible for overall spatial planning. Giudelines presented in the document are listed below:

- Methodology for Linking SEA to Land Use Planning in the Integrated Approach (Figure.2)
- Land Use Planning Guidelines for Optimal Coastal Environmental Management (Section 4.1)
- Integration of Strategic Environmental Assessment into Regional Planning (Section 4.2)
- Guidelines for Strategic Environmental Assessment of Spatial Planning (Section 4.3)

6.1 Deliverables: Baseline theme papers

Preparation of a suite of 13 baseline theme papers to be initiated. The papers are rolling documents that will be further elaborated and updated throughout the SEA process as more information is accessed.

All papers cover a similar format with some common sections:

- Introductory section;
- Administration/competent authorities – key agencies (government, private sector, NGOs) responsible for managing resources/issues covered by the paper, and their roles, mandates and performance;
- Relevant legislation and regulations;
- Brief description of main relevant PPPs and discussion of consequent environmental,social or economic impacts and why they arise, and mega projects;

90

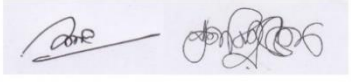
- Drivers of change;
- Main issues concerned with the theme;
- References;
- Annexes

The theme papers present information and trends at a national and SW Region scale.

Table: Scope of baseline theme papers:

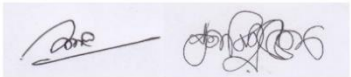
SL	Topics of thematic baseline papers	Scope of paper (beyond the common sections mentioned above)
1.	Climate and climate change	• Baseline climate of project area and related issues; • Review of evidence for climate change, trends and projections; • Climate change scenarios; • Potential climate change impacts; • Adaptation and mitigation measures.
2.	Pollution and waste	• GHG emissions; • Pollution: air, water, soil, noise – impacts and futures scenarios; • Waste and waste management – municipal, rural, industrial, agricultural, e-waste, wrecked, cars, waste oil, plastics, hazardous waste (e.g. obsolete pesticides) and recycling.
3.	Delta morphology, river dynamics, floods and water management	• Hydrological setting: river system, freshwater, water levels, tidal and drainage characteristics, future projections; • Morphological setting: river planform analysis, coast line changes, sedimentation, projections for erosion/accretion; • Natural disaster: floods, cyclones, tidal surges; • Development of water infrastructure;

SL	Topics of thematic baseline papers	Scope of paper (beyond the common sections mentioned above)
		• Present and future risks; • Future plans to mitigate potential risks.
4.	Land resources	• Physical conditions: geography, physiography, land types, geology, hydro-meteorology; • Agro- and bio-ecological regions and land cover; • Soils; • Land resources management practices: agriculture, fisheries, forestry; • Major challenges and issues; • Coastal polders.
5.	Ecosystem and wildlife conservation	• Landscapes; • Protected areas and sanctuaries; • Flora and fauna; • Management of the existing ecosystems; • Extraction of resources; • Challenges and issues.
6.	Tourism in the project area	• Status of tourism industry: major attractions and spots; facilities; limitations of sector development; visitor numbers and capacity; community involvement, culture tourism; • Development potential/future prospects for tourism: ecotourism, cultural tourism, archaeological & historical tourism, riverine & ruraltourism; • Impacts of COVID-19 on tourism.
7.	Fisheries, agriculture and other land uses	• Land use data; • Determinants of land use; • Land use policy; • Agriculture; • Forestry; • Fisheries; • Cities, towns and settlements; • Land use change and its impacts.
8.	Infrastructure	• History & background information on infrastructure and communications; • Current infrastructure estate and trends (2011-2020); • Road transport; • Water transport: inland water ways, navigation and shipping; • Communications; • Other infrastructure; • Summary of five-year and two-year plans; • Projections for transport sub-sectors; • Mega projects.



92

SL	Topics of thematic baseline papers	Scope of paper (beyond the common sections mentioned above)
9.	Power and energy	• Basic information: energy sources, consumption, production, infrastructure (power plants and networks), indicators, impacts, accidents, etc; • Outlook: projections of energy production and consumption; intended new power plants, networks, pipelines etc; • Air pollution (current status and outlook); • GHG emissions (current status and outlook).
10.	Urbanization	• Background; • Cities and towns, functions and services: locations; land uses; • Trends and challenges: area & population; urbanization and land use changes; urbanization trends; key issues; waste management; air quality; transport; • Impact of urbanization; • Ongoing and proposed projects related to urbanization.
11.	Economic and industrial development in the project area	• State of the economy: employment; food security; exports/imports; prices; incentives; • Taxation and subsidy policies; • Economic activities: industries, SMEs; transport; agriculture; forestry; fishing; services; tourism; mining; shipping; etc. – and impacts; marketing • Development of Special Economic Zones; • Labour and employment opportunities and co-operatives; • Challenges in economic and industrial development;
12.	Social issues and challenges	• Population; • Education; • Livelihoods; • Health; • Gender perspectives and children; • Culture, heritage and traditional knowledge; • Conflict, contestations, power structure; • Security, law and order situation;
13.	Institutional governance	• Background to institutional governance; • Central, regional and local government institutional hierarchy; • Governance of environmental assessment; • Major governance issues; • Relations between government and other organisations; • Institutional capacities

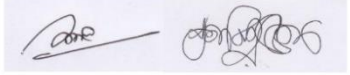


The papers will provide the substrate material for the preparation of a baseline chapter for the main SEA Report. The following sections are derived from these papers.

6.2 Deliverables and Timeframe

Table 7: List of deliverables with their tentative outlines

Sl No.	Deliverables	Outline of Deliverables	Period of Submission	Mode of Payment
1.	Inception Report	□ Description of objectives and scope of sub-activities □ Team formation and structure of survey team □ Actual work schedule for the work □ Immediate action taken after signing agreement □ Introduction □ Description of sub-activities □ Method and materials for each activity □ Required resources allocation □ List of Working papers	End 1st month	20%
2	Database Report	□ Inventory of related Spatial and attribute database of the project (not only SEA component) and check consistency; □ Integrate SEA database with the GIS database; Perform □ Spatial and environmental analysis for strategic planning;	End of 3th month	20%
3.	Interim Report	□ Formulate working papers for SEA □ Formulation of Strategic options for spatial planning □ Selection of strategic options □ Preparation of Interim report	End of 6th month	20%
4	Draft Report	Interactive GIS database on Environment, Bio-Diversity and Human Intervention (along with GIS Shape file and thematic maps; and Recommendation on Environment Eco-Sensitive Land use Planning) □ An interactive digital model of existing Environmental, habitat, habitat and conservation □ Identification of likely impacts on existing environment, ecology, land use □ GIS data base existing environment, ecology, land use □ Description of legal and policy consequences □ Thematic map for providing planning guidelines	End of 9th month	20%
5	Final Report	Strategic Environmental Assessment for Spatial Plan: □ Specifying the Approach: Proponent of an integrated land use plan □ Determining the Context for the Land Use Plan: The purpose of this step is to determine the key socio-economic and environmental issues □ Evaluating Baselines Trends in Land Use and Environment	End of 12th month	20%



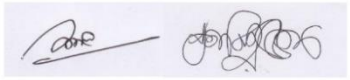
Sl No.	Deliverables	Outline of Deliverables	Period of Submission	Mode of Payment
		□ Outlining Future Evolution of Land Use Changes □ Assessing Land Potentials and Environmental Improvements □ Setting the Direction and Purpose for the Land Use Planning Period □ Develop Land Use Planning Alternatives, and Consult with Relevant Stakeholders □ Analyze and Compare Socio-economic and Environmental Effects of Alternatives □ Plan Book preparation		

7.0 Qualification, Experience and Responsibility

(1) Strategic Environmental Assessment (SEA) Expert (12 mm) Full-time
Qualification: Ph.d/M.Sc in Environmental Sciences, Environmental Management, Environmental Engineering, Forestry or closely related discipline
Experience: At least 15 years' experience in related field. Proven technical knowledge of conducting Strategic Environmental Assessment, Analytical, Research, Presentation and Report Writing Skills.
Responsibility: (i) To conduct the SEA of Project areas ((ii) Identify the SEA Procedure of the project (iii) Screening of Policies, Programs, Plans (PPPs) that have significant socio-economic and environmental impacts to be included in SEA in the field of urbanization. (iv) Review of PPPs with baseline socio-economic and environmental data of various sectors identified through screening, stakeholder analysis, legal and regulatory framework, environmental and socio-economic objectives, For SEA, Scenario Development issues including setting environmental and socio-economic objectives of the concerned sector, identifying institutional capacity, level of environmental pollution. (v) Deeper Assessment of Preferred Alternative based on Initial Impact (Positive and Negative) Assessment (High, Medium, Low) and Initial Impact Assessment of different sectoral PPPs for SEA. (vi) Preparation of Strategic Environmental Management Plan (SEMP) based on SEA, including Critical Issues, Role and Responsibilities of Concerned Institutions / Agencies, Mitigate to Negative Impact of PPPs and Coordination for Implementation of SEMP for Positive Impact and Monitoring Mechanism.

(2) Environmental Analyst (12 mm) Full-time
Qualification: Master's Degree in Environmental Science or related discipline
Experience: At least 15 years' experience in environmental management in coastal region.
Responsibility: (i) Evaluate environmental changes/trends during the last 10 years – analyze influence of land-use patterns on this trend; (ii) Outline future evolution of environmental changes/trends if no land use plan intervention is taken; (iii) Assessing Land Potentials and Environmental Improvements; (iv) To delineate spaces in terms environmental parameter; (v) Analyze and Compare Socio-economic and Environmental Effects of Alternatives; (vi) Develop Land Use Planning Alternatives, and Consult with Relevant Stakeholders; (vii) Formulate EMP.

(3) Ecologist (12 mm) Full-time
Qualification: Master's Degree in Environmental Science or related discipline
Experience: At least 15 years' experience in the study of flora and fauna in the coastal region.



95

Responsibility: (i) To make an inventory of all types existing flora and fauna; (ii) to identify the potentiality of the natural resources (flora and fauna); (iii) To identify hazards that might de imparted on the flora and fauna due to proposed development; (iv) To prepare a map of habitat for existing flora and fauna; (v) To earmark the conservation areas, which would not be disturbed by any kind of development (vi) Identify threats for wildlife assessing impacts of existing and future development impact on wildlife resources; (vii) Developing and preparing Management plan of wildlife resources.

(4) Hazard Management Expert (6 mm) Part-time

Qualification: Master's in Water resource development or related discipline

Experience: At least 15 years' experience in the study of flora and fauna in the coastal region.

Responsibility: (i) Shortlist national level policies for coastal region regarding hazard management and formulate strategies for spatial plan of Payra-Kuakata; (ii) Prepare composite hazard map (flood and cyclone) and guidelines for hazard mitigation including climate change; (iii) To integrate the engineering geological and DRR data with urban and regional planning database to prepare risk sensitive spatial.

(5) Climate change adoption expert (6 mm) Part-time

Qualification: Master's in Water resource development or related discipline

Experience: At least 15 years' experience in the study of flora and fauna in the coastal region.

Responsibility: (i) Shortlist national level policies for coastal region and formulate strategies for the spatial plan; (ii) Projection of water requirement with seasonal variation; (iii) Asses coastal hazards and prepare hazard map, guidelines for hazard mitigation including climate change; (iv) Generate erosion and accretion model; (v) Identify, evaluate and quantify climate change impacts on the region; (vi) Coordinate the climate change related activities and data collection; (vii) Analyze and interpret the historical climate data; (viii) Project next 20 years climate change scenario.

(6) Economist (Blue economy) (6 mm) Part-time

Qualification: Master's in Economics or related discipline

Experience: At least 10 years' experience in relevant field.

Responsibility: (i) Assessment of coastal and marine resource of the region; (ii) Assess scope further expansion of port related facilities; (iii) Assess scope for further scope for fishing in the coast; (iv) Assess the scope for eco-tourism in the region; (v) Assessment of Pollution from ports and other coastal activities and propose measures to limit pollution.

(7) Institutional Management Expert (6 mm) Part-time

Qualification: Master's in Public administration or related discipline

Experience: At least 15 years' experience in relevant field.

Responsibility: (1) Propose Organizational setup for Payra-Kuakata Development Authority; (ii) Charter of duties for the professionals; (iii) Procedure of coordination among the agencies; (iv) Role of UDD after the completion of current development plan.

(8) Land Use Planner (12 mm) 1 person Full-time

Qualification: BURP/ MURP or related discipline

Experience: At least 15 years' experience in Land use planning.

Responsibility: (i) Formulate structure plan policies from strategic environmental assessment; (ii) Formulate Structure plan considering sectoral policies; (iii) Formulate Growth centre plan for the region; (iv) Formulate Urban Area Plan

policies; (v) Prepare Urban Area plans; (vi) Analysis of Environmental Legislative Requirement in land use plan.

(9) Navigation expert (6 mm) Part-time
Qualification: Master's/ B. Sc. in Marine Engineering/ Navigation/ Water Resources Engineering or related discipline
Experience: At least 15 years' experience in relevant field.
Responsibility: (i) Assessment of River navigation baseline condition of the in the region; (ii) Impact assessment of existing and future vessel movements in region; (iii) Identify impacts of water navigability and Prepare carrying capacity of rivers and canals in the region; (vi) Suggest facilities for improvement for inland port related facilities; (v) Assess facilities and connectivity on inland ports due to Payra port.

(10) Tourism development Expert (6 mm) Part-time
Qualification: Master's in related discipline
Experience: At least 15 years' experience in relevant field.
Responsibility: (i) Assessment of Baseline Condition of the Tourism sector in the region; (ii) Assessment of Impacts on Tourism sector; (iii) Identify impacts due to development of Tourism sector in the region; (vi) Preparing relevant environmental management plan

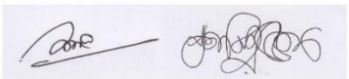
(11) Agronomist (6 mm) Part-time
Qualification: Master's in Agriculture or related discipline
Experience: At least 10 (Ten) years' experience in relevant field: agriculture planning, crop modeling, crop water demand assessment, irrigation water management.
Responsibility: (i) Identify problems (including climate change) of recent practice in agriculture with spatial pattern; (ii) Strategy for distribution of agriculture infrastructures in different settlement heirarchy; (iii) Integrate rural settlement with agricultural activities; (iv) Integrate agriculture activities in urban areas; (v) Assessing the impacts of the proposed interventions agricultural practices; (vi) Policy measures to conserve agricultural land and integrate it with land use plan.

(12) Forest Resource Management Expert (6 mm) Part-time
Qualification: Master's in Forestry or related discipline
Experience: At least 10 years' experience in relevant field.
Responsibility: (i) Preparing baseline of the forest, flora and fauna in the region; (ii) Compare all existing and previous management plans and suggest guideline to prepare future management plan; (iii) Assessment of impact on forest due to development and human intervention; (iv) policy measures to integrate forest resource management with spatial plan.

(13) GIS database manager (12 mm)
Qualification: Master's / GIS / BURP/ MURP or related discipline.
Experience: 10 years experience in database management and analysis
Responsibility: (i) Manage all related Spatial and attribute database of the project (not only SEA component) and check consistency; (ii) Integrate SEA database with the GIS database; (iii) Perform Spatial and environmental analysis for strategic planning;(iv) Prepare Regional, Structure, Urban Area Planning database; (v) Prepare map layout for Regional, Structure, Urban Area Plan.

(14) Ecology /Environmental Associate – (12 mm) 3 persons Full-time
Qualification: Master's in Environmental Sciences /Forestry / Ecology related discipline

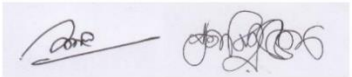
97



Experience: At least 5 years' experience in the study of flora and fauna in the coastal region.
Responsibility: (i) Conduct field survey to make an inventory of all types existing flora and fauna; (ii) Field study to identify the potentiality of the natural resources (flora and fauna); (iii) Conduct field trip to identify hazards that might de imparted on the flora and fauna due to proposed development; (iv) Collection of field data to prepare a map of habitat for existing flora and fauna; (v) Field verification of the conservation areas, which would not be disturbed by any kind of development (vi) Field study to Identify threats for wildlife assessing impacts of existing and future development impact on wildlife resources.

(15) GIS Associate (12 mm) - 2 person's full time
Qualification: B.Sc. in GIS / BURP/ MURP or related discipline.
Experience: 5 years' experience in database management and analysis
Responsibility: (i) Manage all related Spatial and attribute database of the project (not only SEA component) and check consistency; (ii) Integrate SEA database with the GIS database; (iii) Perform Spatial and environmental analysis for strategic planning;(iv) Prepare Regional, Structure, Urban Area Planning database; (v) Prepare map layout for Regional, Structure, Urban Area

98



Appendix B: Record of Stakeholder Inputs

Galachipa Upazila Consultation Meeting

Public Consultation Meeting
for
Stakeholder Engagement of Strategic Environmental Assessment under Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism

Participants List

Venue: Galachipa Upazila Auditorium

Date: 10.01.23

SL	Name	Address	Mobile/ E-Mail	Signature
1	Md. Mohiuddin Al Helal	UNO Galachipa	01733334153	
2	MD. Nizamuddin	Vice chairman	01715188805	
3	Anjin Akter	UAO Galachipa	01728368011	Anjin Akter
4	Uday Sankar Dey	UDD	01716007110	
5	Dr. Kazi Abdul Momin	UHC, Galachipa.	01815482142	
6	Md. Zahangir Alam	UE, Galachipa	01712681180	
7	[illegible]	[illegible]	[illegible]	
8	মো: [illegible]	SUFO, Galachipa	01769-459619	
9	মাহবুব হাসান [illegible]	URDO, BRDB Galachipa	01712722217	
10	মু: [illegible] ইসলাম	USSO Galachipa	01723582827	
11	[illegible]	Ex. Vice-Chair	01761361183	
12	মো: [illegible]	[illegible]	01718094152	
13	[illegible]	S.A.E (DPHE, Galachipa)	01745-321808	
14	মো: কামরুল আহসান মিয়া	উপজেলা সমবায় অফিসার	01712158791	
15	মেহেদী হাসান	[illegible]	01769400736	
16	মোসা: ইসমত আরা	[illegible] গলাচিপা, পটুয়াখালী	01313704328	Ismat
17	মো: জিয়াউর রহমান	সহকারী উপজেলা শিক্ষা অফিসার	0171244607[illegible]	
18	কামাল হোসেন [illegible]	[illegible]	01722223816	
19	মো: সুমন হাওলাদার	[illegible] কর্মকর্তা [illegible]	01798557001	10.01.2023
20	মো: [illegible]	[illegible]	01305062570	

Public Consultation Meeting
for
Stakeholder Engagement of Strategic Environmental Assessment under Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism

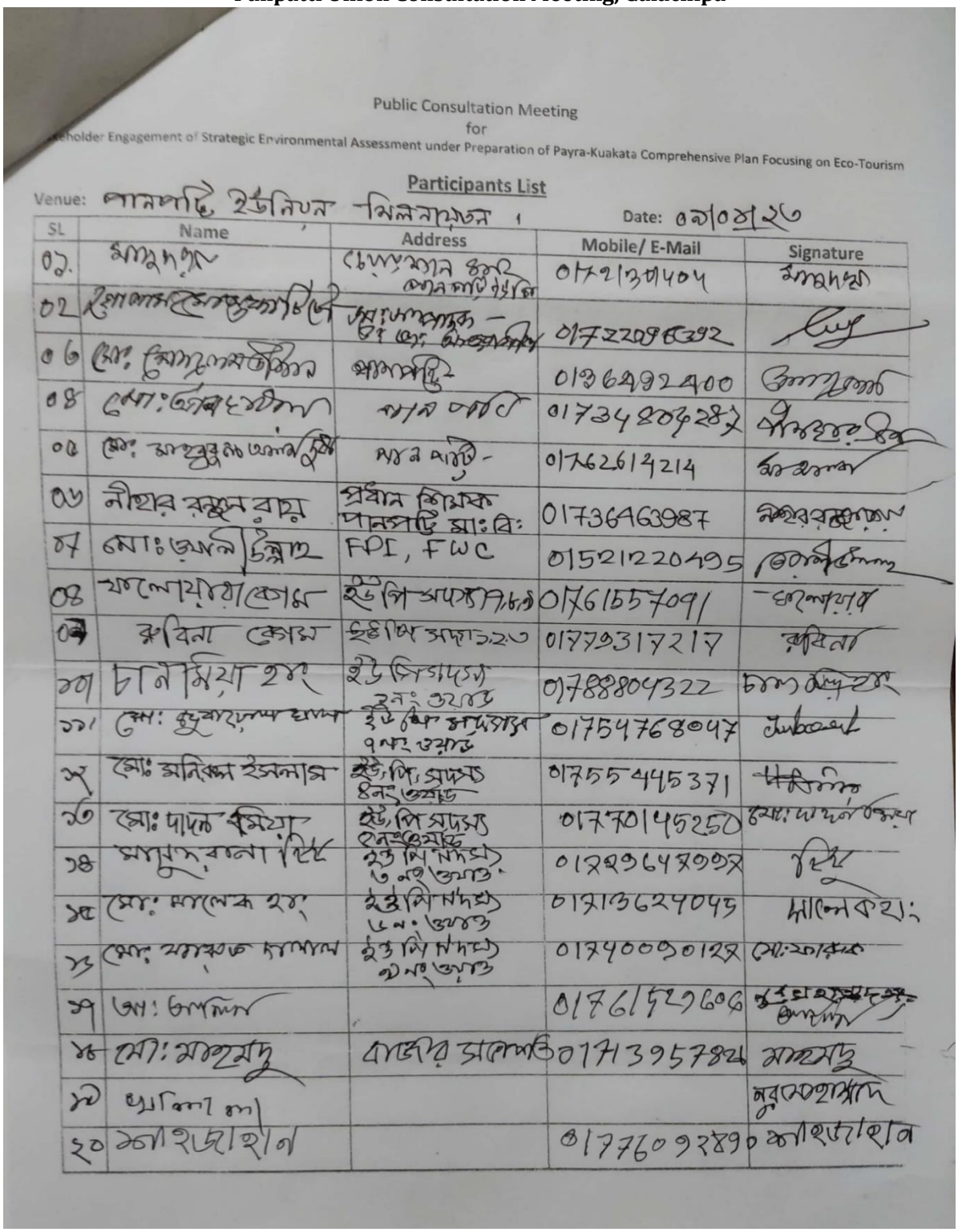
Participants List

Venue: Galachipa Upazila Auditorium

Date: 10.01.23

SL	Name	Address	Mobile/ E-Mail	Signature
21	Md. Ramiz Uddin	SM(HR & Admin) CDHC	01716950209	
22	MD. ABDUL ALIM			
23	Harosit Barai	U.DD	01917316475	
24	MD. Jilla Rahaman	U.D.D	01645197190	
25	Md. Khalid Hossain-milton	Press	01304363019	
26	Md. Mazharul Islam	President, Pressclub	01718484492	
27	Md. Abdul Hakim	Press	01712670062	
28	Md. Kamruzzaman	UDD	01722575910	Ahakim
29	Shayed Hasan	CEGIS	01786628834	
30	SAMIT KUMAR DATTA	Press MyTV President Television Prom	01792053970	
31	[illegible]	press	01716301528	
32	বীর মুক্তিযোদ্ধা আবুল কালাম আজাদ [illegible]	[illegible]	01721301404	
33	Zakia Sultana Planner	মুক্তিযোদ্ধা	01716315731	
34	Mohammad Nurul Islam AE	UDD	01713399797	20/02/2020
35	[illegible]	UDD	01818726026	20/2/20
36	মো: [illegible]	[illegible]	01712299733	
37	মো: [illegible]	[illegible]	01716037554	
		[illegible]	01712566862	

Panpatti Union Consultation Meeting, Galachipa



Public Consultation Meeting
for
Stakeholder Engagement of Strategic Environmental Assessment under Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism

Participants List

Venue: পানপট্টি ইউনিয়ন মিলনায়তন Date: ০৯/০৪/২৩

SL	Name	Address	Mobile/ E-Mail	Signature
০১.	মামুনুর	চেয়ারম্যান গলাচিপা পৌরসভা	01721301404	মামুনুর
০২	মোঃ [illegible]	[illegible]	01722096392	[illegible]
০৩	মোঃ [illegible]	পানপট্টি	01364924400	[illegible]
০৪	মোঃ [illegible]	[illegible]	01734806281	[illegible]
০৫	মোঃ [illegible]	[illegible]	01762614214	[illegible]
০৬	নীহার রঞ্জন রায়	প্রধান শিক্ষক পানপট্টি মাঃ বিঃ	01736463987	নীহার রঞ্জন রায়
০৭	মোঃ জামিল হোসেন	FDI, FWC	01521220495	[illegible]
০৮	[illegible]	ইউপি সদস্য, ৬	01761557091	[illegible]
০৯	রুবিনা বেগম	ইউপি সদস্য ১২	01729317217	রুবিনা
১০	চানমিয়া হাং	ইউপি সদস্য ৯নং ওয়ার্ড	01788804322	চানমিয়া হাং
১১	মোঃ [illegible]	ইউপি সদস্য ৭নং ওয়ার্ড	01754768047	[illegible]
১২	মোঃ মনিরুল ইসলাম	ইউপি সদস্য ৪নং ওয়ার্ড	01755445371	[illegible]
১৩	মোঃ দাদন মিয়া	ইউপি সদস্য ৩নং ওয়ার্ড	01770145250	মোঃ দাদন মিয়া
১৪	[illegible]	ইউপি সদস্য ৩ নং ওয়ার্ড	01729647005	[illegible]
১৫	মোঃ [illegible]	ইউপি সদস্য ৫ নং ওয়ার্ড	01713624045	[illegible]
১৬	মোঃ [illegible]	ইউপি সদস্য ৩ নং ওয়ার্ড	01740009012	মোঃ [illegible]
১৭	[illegible]		01761529606	[illegible]
১৮	মোঃ মাহমুদু	বাজার ব্যবসায়ী	01713957824	মাহমুদু
১৯	[illegible]			[illegible]
২০	[illegible]		01776092890	[illegible]

Public Consultation Meeting
for
Stakeholder Engagement of Strategic Environmental Assessment under Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism

Participants List

Venue: ধানখালি ইউনিয়ন মিলনায়তন। Date: ০৯/৩/২৩

SL	Name	Address	Mobile/ E-Mail	Signature
২১	মো: লতিফ হাওলাদার	০৭ নং [illegible]	01755952288	লতিফ
২২	মোতালেব হং	[illegible]	01323641848	মোতালেব হং
২৩	আব্দুল গনী	৯ নং ওয়ার্ড		[illegible]
২৪	আল্লামা মঞ্জু সুর	ইউপি সচিব	01793568002	Sd/-
২৫	রফিক	২ নং ওয়ার্ড	01708492293	রফিক

Focus Group Discussions, Galachipa

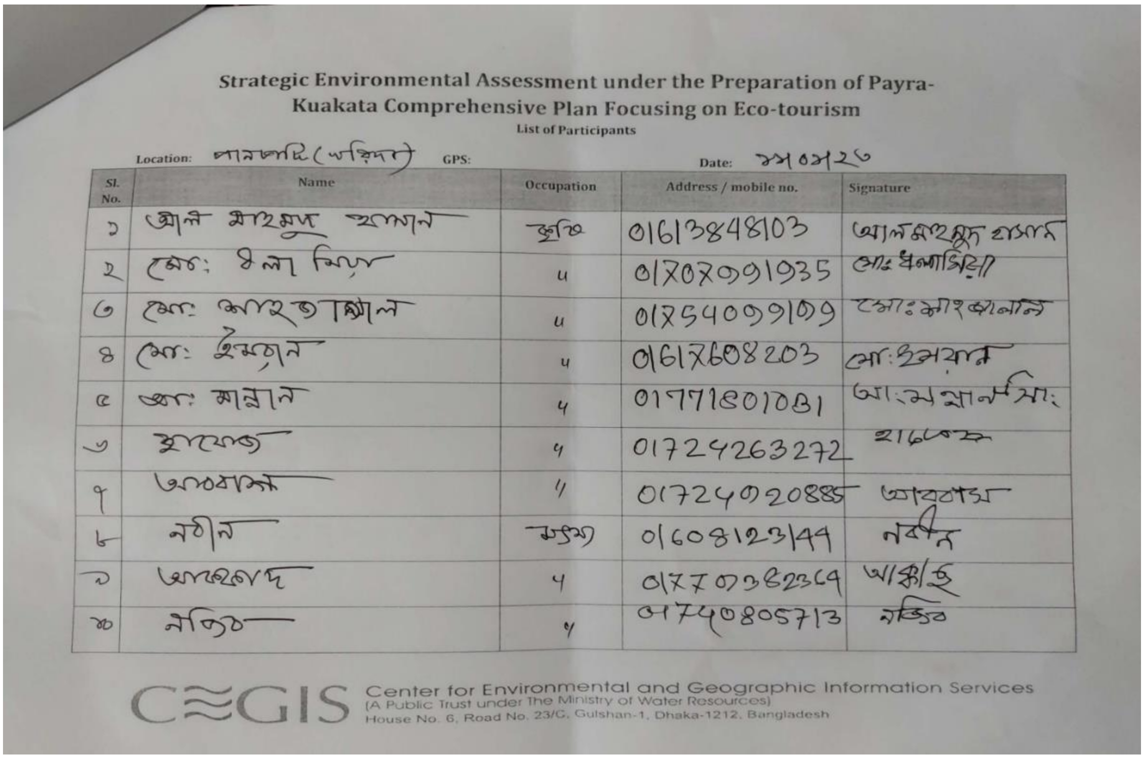
Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: [illegible] - ৫ নং ওয়ার্ড GPS: 22.06, 37.0, 9027, 3 Date: ১১/০৩/২৩

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১	মো: আনোয়ার [illegible]	[illegible]	01734807287	[illegible]
২	মো: কবির মিয়া	[illegible]	01789723083	মো: কবির মিয়া
৩	মো: মামুন [illegible]	[illegible]	01752805950	[illegible]
৪	খালেক হাওলাদার	[illegible]		খালেক [illegible]
৫	মো: হাসান	"		মো: হাসান
৬	মো: নাজমুল হাওলাদার	"	01610799175	মো: নাজমুল হক
৭	মো: আলম মোল্লা	"	01646336086	মো: আলম মোল্লা
৮	মো: আনোয়ার	"	01793223971	মো: আনোয়ার
৯	মো: মাহাবুব [illegible]	[illegible]	01731133901	মো: মাহাবুব [illegible]
১০	আবু বকর	"		[illegible]

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh



Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: পানপট্টি (খলিফার) GPS:

Date: ২২০২২৩

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১	আল মাহমুদ হাসান	কৃষি	01613848103	আল মাহমুদ হাসান
২	মোঃ ইলা মিয়া	"	01707091935	মোঃ ইলা মিয়া
৩	মো: আহতাশাম	"	01754099109	মো: আহতাশাম
৪	মো: ইমরান	"	0617608203	মো: ইমরান
৫	মো: মান্নান	"	01771801081	মো: মান্নান সিঃ
৬	হাফেজ	"	01724263272	হাফেজ
৭	আফতাব	"	01724920885	আফতাব
৮	নবীন	মৎস্য	01608123144	নবীন
৯	আহমেদ	"	01770382364	আক্কাছ
১০	নজির	"	01740805713	নজির

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Rangabali Upazila Consultation Meeting

“পায়রা ও কুয়াকাটা পরিবেশ পর্যটন ভিত্তিক সমন্বিত পরিকল্পনা প্রনয়ন” শীর্ষক প্রকল্পের অনুষ্ঠিত আলোচনা সভার উপস্থিতির তালিকা:

উপজেলার নাম : রাঙ্গাবালি উপজেলা, পটুয়াখালী।
স্থান : উপজেলা নির্বাহী অফিসারের কার্যালয়
তারিখ : ১১/০১/২০২৩ ইং
সময় : ১১.০০ টা

ক্রমিক নং	নাম ও পদবী	ঠিকানা	ফোন ও ইমেইল	স্বাক্ষর ও তারিখ
১.	মোঃ জহির উদ্দিন আহমেদ উপজেলা চেয়ারম্যান	রাঙ্গাবালি উপজেলা পটুয়াখালী	01799959192	[signature]
২.	মোহাম্মদ সালেক মুহিদ UNO (রাঙ্গাবালি)	"	01729569514 shalekmuhid@gmail.com	[signature]
৩.	ইকবাল আহমেদ উপজেলা কৃষি অফিসার	"	01712-839388 iahmed.np@gmail.com	[signature] ১১/০৭/২০২৩
৪.		"		
৫.	মোহাম্মদ মাহমুদ হাসান সহকারী প্রোগ্রামার	"	01714131729 mhasan.aozshal@yahoo.com	[signature]
৬.	মু: তরিকুল ইসলাম অধ্যক্ষ রাঙ্গাবালী সরকারি কলেজ	"	01712601191 rangabali College@gmail.com	[signature]
৭.	এম. এম. সাহাদাত হোসেন মেরিন ফিশারিজ অফিসার উপজেলা মৎস্য দপ্তর	"	01961-866960 sahadathossainraju48@gmail.com	[signature]
৮.	মো: হুমায়ুন কবির উপজেলা প্রকল্প বাস্তবায়ন কর্মকর্তা রাঙ্গাবালী, পটুয়াখালী।	"	01700-717094 pio.humayun@gmail	[signature]
৯.	মোঃ বিপ্লব হাসান উপজেলা জনস্বাস্থ্য প্রকৌশল অধিদপ্তর রাঙ্গাবালি পটুয়াখালি।	"	01719090920 biplobav1996@gmail	[signature]

ক্রমিক নং	নাম ও পদবী	ঠিকানা	ফোন ও ইমেইল	স্বাক্ষর ও তারিখ
১০.	সিকদার [illegible] সভাপতি রাঙ্গাবালী প্রেস ক্লাব	রাঙ্গাবালি উপজেলা পটুয়াখালী	01722507898	
১১.	সিকদার আবির হোসেন জেলা রিপোর্টার, সময় টিভি	"	01743738107	
১২.	মো: [illegible] [illegible] রাঙ্গাবালী	"	0172881599	
১৩	মো: আবুল হোসেন [illegible]	"	01712-492870	
১৪.	মো: আব্দুল [illegible] আহমেদ সহ-সম্পাদক	"	01714648038	
১৫	মো: মোস্তফা [illegible] [illegible]	"	01768970783	
১৬.	মো: কামরুল হাসান সভাপতি রাঙ্গাবালী প্রেসক্লাব যুগান্তর ও ৭১ টিভি	"	01711634933	
১৭.	এম সোহেল আবির সম্পাদক রাঙ্গাবালী প্রেসক্লাব দৈনিক কালেরকণ্ঠ	"	01729786390	
১৮.	মাহমুদ হাসান রাকিব দৈনিক মানবজমিন প্রতিনিধি	"	01717685593	
১৯.	মো: জাকির হোসেন ইউপি সচিব	"	01715847958	
২০.	মো: মোস্তাফিজুর রহমান SAE LGED	"	01712762303	
২১.	মো: আতিকুল ইসলাম [illegible]	"	01715223117	

Char Montaz Consultation Meeting, Rangabali

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: Char Montaz UP GPS: Date: 10.01.2023

Sl. No.	Name	Occupation	Address / mobile no.	Signature
1	এ কে শামসুদ্দিন	চেয়ারম্যান চরমোন্তাজ	0171531[illegible]	[illegible]
2	মো: মোক্তারেজ হোসাইন	৭নং ওয়ার্ড ইউপি সদস্য	01735727636	[illegible]
3	মু: ফরিদ উদ্দিন	শিক্ষক	01761893278	[illegible]
4	মোসা: হেলেন বেগম	৪,৫,৬ ইউপি সদস্য	01798796290	হেলেন বেগম
5	মো: রফিক হোসেন	ইউপি সচিব	01715847358	[illegible]
6	মো: জালাল উদ্দিন	ইউ.পি., ০১ ওয়ার্ড	01722696208	[illegible]
7	মো: বেল্লাল খাঁন	ইউপি ০৬ ওয়ার্ড	01713965026	[illegible]
8	মো: মোশারেফ হোসেন	ইউপি সদস্য [illegible]	01715714926	[illegible]
9	মোসা: মোমেনা	১,২,৩ নং ওয়ার্ড	01772048626	[illegible]
10	মো: [illegible]	[illegible]	01712432140	[illegible]

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: Char Montaj Union P. GPS: Date: 10.01.2023

Sl. No.	Name	Occupation	Address / mobile no.	Signature
11	মো: মাহবুব ইসলাম	ইউপি সদস্য ৪নং ওয়ার্ড	01749551409	[illegible]
12	মনিরুজ্জামান [illegible] SACMO	[illegible]	01760520428	[illegible]
13	মো: বেল্লাল হোসেন	ইমাম	01734688620	[illegible]
14	মো: ওয়াহেদ [illegible]	সমাজ সেবক	01708797200	[illegible]
15	মো: আল-মামুন	উদ্যোক্তা [illegible]	01712-479987	[illegible] 10.01.23
16	মো: মিজানুর রহমান	ইউ. পি. সদস্য ২নং ওয়ার্ড	01710023376	[illegible]
17	মো: মাহিদুজ্জামান (মামুন)	[illegible]	01718228522	[illegible]
18	মো: [illegible]	[illegible] ৪নং ওয়ার্ড	01798793765	[illegible]
19	মো: [illegible]	[illegible]	01710189178	[illegible]
20	মো: শফিকুল আলম মামুন	সমাজ সেবা	01716299480	[illegible]

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: Char Montaj Union P. GPS: Date:

Sl. No.	Name	Occupation	Address / mobile no.	Signature
21	SAJAL KANTI DAS	Police	IC, CHARMONTAJ 01320-458497	
22	[illegible]	[illegible]	01740804623	
23	মো: আইয়ুব আলী	সাংবাদিক	01819-368178	Ayub.

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Focus Group Discussions, Rangabali

Public Consultation Meeting
for
Stakeholder Engagement of Strategic Environmental Assessment under Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism

Participants List

Venue: চর মন্তাজ, (আবাসন/ আমার পল্লী) মহিলা Date: 09.01.2023

Sl.	Name	Address	Mobile/ E-Mail	Signature
01.	Kohinur	Char Montaj		
02.	Momota2	Char Montaj		[illegible]
03.	Kohinur	Char Montaj	01790693345	[illegible]
04.	Hasina Begum	Char Montaj		[illegible]
05.	Siniara Begum	Char Montaj		[illegible]
06.	Renu Begum	Char Montaj	01737226739	[illegible]
07.	Hasina Begum	Char Montaj		[illegible]
08	Kodvanu Bibi	Char Montaj	01709265342	
09.	Shahinur Bibi	Char Montaj		[illegible]
10.	Hafeza Begum	Char Montaj		
11.	Hanera Bibi	Char Montaj	01763819985	[illegible]
12.	Jarina Begum	Char Montaj	01741459807	-

Public Consultation Meeting
for
Stakeholder Engagement of Strategic Environmental Assessment under Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism

Participants List

Venue: Char Montaj (Abashik/ Manta Palli) Date: 09.01.2023

SL	Name	Address	Mobile/ E-Mail	Signature
01.	Md. Sajahan	Fisherman		
02.	Mizanur Hawladar	Fisherman	01744680751	
03.	Kanchan Sharder	Fisherman	-	
04.	Rustom Sarder	Fisherman		
05.	Rezaul Karim	Fisherman	01781460114	
06.	Rasul Bayati	Fisherman	01778503944	
07.	Md. Harun	Fisherman	01715592383	
08.	Md. Milon	Fisherman	01703681107	
09.	Md. Ismail	Fisherman	01311948973	
10.	Motaleb Majhi	Fisherman	01714739501	
11.	Zahangir	Fisherman	01703688672	
12.	Bashsha	Fisherman		

Dhalua Union Consultation Meeting, Barguna Sadar

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: ঢলুয়া ইউনিয়ন পরিষদ   Date: 01.03.2023

SL No	Name	Designation/ Occupation	Address	Mobile No	Signature
১।	আজিজুল হক স্বপন	ইউপি চেয়ারম্যান	ঢলুয়া ইউনিয়ন পরিষদ	01715705169	[signature] 01-3-23
২।	মো: আনোয়ার হোসেন	ইউপি সচিব	৭নং ঢলুয়া	01717086635	[signature]
৩।	মো: আল আমিন হোসাইন	U.P. সদস্য ৮নং	ঢলুয়া ইউনিয়ন	01724296590	[signature] 01-3-23
৪।	[illegible]	ইউপি সদস্য, ০৪-০৬ ওয়ার্ড	ঢলুয়া ইউনিয়ন	01726049947	[signature]
৫।	মো: মশিউর রহমান	ইউপি সদস্য ০৭-৯ ওয়ার্ড	ঢলুয়া ইউনিয়ন	01712964874	[signature] 01-3-23
৬।	মো: জাহিদুল ইসলাম	ইউপি সদস্য ১নং ওয়ার্ড	নলটোনা	01772674460	Zhidul
৭।	[illegible]	কৃষক	ঢলুয়া ইউনিয়ন	01777058596	[signature]
৮।	খালিদুর রহমান রিয়াদ	ছাত্র	পাতাকাটা	01710718882	[signature]
৯।	মো: রহমান	ব্যবসায়ী	ঢলুয়া ইউনিয়ন	01777309277	রহমান
১০।	গোলবানু		ঢলুয়া ইউনিয়ন	01773102030	গোলবানু

CEGIS Center for Environmental and geographic Information Services
(A Public Trust Under the Ministry of Water Resources)
House No. 6, Road No. 23/C. Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: ঢলুয়া ইউনিয়ন পরিষদ   Date: 01.03.2023

SL No	Name	Designation/ Occupation	Address	Mobile No	Signature
১১।	মো: রিপন মিয়া	[illegible]	ঢলুয়া ইউনিয়ন	01774817447	[signature]
১২।	মো: রিয়াজুল ইসলাম	চাকরি	ঢলুয়া ইউনিয়ন	01727824171	[signature]
১৩।	[illegible]	ইউপি সদস্য	৭,৮,৯	01738500323	[signature]
১৪।	মরিয়ম	ইউপি সদস্য ৪,৫,৬ নং ওয়ার্ড	ঢলুয়া ইউনিয়ন	01734866156	মরিয়ম
১৫।	মিনারা	ইউপি সদস্য ১,২,৩ নং	"	01325051332	মিনারা
১৬।	জাহাঙ্গীর	জেলে	"	01849224806	জাহাঙ্গীর
১৭।	মো: নান্নু সাকী	জেলে	"	01641305233	[signature]
১৮।	জাকির হো	কৃষক	"	01861680470	মো: জাকির
১৯।	মজনু	কৃষক	"	01729696190	[signature]
২০।	মো: আবু জাফর	ইমাম	"	01724591845	[signature]

CEGIS Center for Environmental and geographic Information Services
(A Public Trust Under the Ministry of Water Resources)
House No. 6, Road No. 23/C. Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: ডালুয়া ইউনিয়ন পরিষদ   Date: ০২/০৬/২০১৬

SL No	Name	Designation/ Occupation	Address	Mobile No	Signature
২১।	সুব্রত সমদ্দার শুভ	হিসাব সহকারী	৭নং ডালুয়া ইউপি	01681332126	[signature]
22।	মিরাজ হোসেন	কামলা	ডালুয়া	01726782659	[signature]
২৩।	টিপু মোল্লা	কৃষক	"	01791961820	মো: টিপু
২৪।	মো: হেলাল উদ্দীন	কৃষক	"	01745358456	মোঃ হেলাল

Center for Environmental and geographic Information Services
(A Public Trust Under the Ministry of Water Resources)
House No. 6, Road No. 23/C. Gulshan-1, Dhaka-1212, Bangladesh

Focus Group Discussions, Barguna Sadar

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: নলী চর কমিউনিটি , GPS: ঢলুয়া ইউনিয়ন Date: 01/03/2023

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১.	মোঃ জাহাঙ্গীর মৃধা	কৃষক	01736112724	জাহাঙ্গীর
২.	মোঃ মোহাম্মদ হোসেন	"	01776524672	মোহাম্মদ
৩.	মোঃ মোতালেব মল্লিক	"	01754622337	মোতালেব
৪.	মোঃ মজিদ হোসেন	"	01724815781	মজিদ
৫।	মোঃ মালেক	"	–	মালেক
৬।	মোঃ আল-আমিন	"	01724296590	A
৭।	মোঃ বাদল	"	01791424259	বাদল
৮।	মোঃ [illegible]	কৃষক	–	মোঃ হামিদ

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Consultation Meeting, Fuljhuri Union, Barguna Sadar

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: ফুলঝুড়ি ইউনিয়ন পরিষদ GPS: Date: 28.02.2023

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১।	গোলাম সারোয়ার কবির	ইউপি চেয়ারম্যান	01770-344212.	[illegible] 28.2.23
2	মাও: মো: ইব্রাহীম খলিল	ইউপি সদস্য ৯ নং ওয়ার্ড	01713962167	[illegible] 28/2/2023
৩	মোঃ আলমগীর হোসেন.	ইউপি সদস্য ০৬ নং ওয়ার্ড	01720622144.	Allossain 28.02.23.
৪	আব্দুল্লাহ আল মামুন	ইউপি সদস্য ০৩ নং ওয়ার্ড	01725650850	[illegible] 28-02-23
৫	মোঃ [illegible] খাঁ	ইউপি সদস্য ১ নং ওয়ার্ড	01919875460	Acy
৬	শামিমা নাসরিন	U.P. মহিলা সদস্য ৭,৮,৯	01705986866	শামিমা
৭	মোসা: শাহনাজ	" ৪,৫,৬	01707649193	[illegible]
৮	মোঃ মজিবুর রহমান	U.P. সদস্য 07 ওয়ার্ড	01728942342	[illegible]
৯	মোঃ মানসুরুল্লাহ মামুন	ইউ, পি সদস্য ২ নং ওয়ার্ড	01716332591	[illegible]
১০	মোঃ রিয়াজুল	ব্যবসায়ী	01906256652	Reazul

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: phuljury Union GPS: Date: 28.02.2023

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১১	মো: মনির	ব্যবসায়ী	01719732997	মনির
১২	আ: সালাম	গণ্যমান্য ব্যক্তি	01644224200	[illegible]
১৩	মো: রহমান	দিনমজুর	01943726231	রহমান
১৪	মো: মেহরাব	কৃষক	01929527781	মেহরাব
১৫	মো: ওমর ফারুক	পরিবেশক উদ্যোক্তা	0175-7536098	[illegible]
১৬	মো: রেজাউল করিম	[illegible]	01723471105	[illegible]
১৭	মো: আবুল ইসলাম	ইমাম	01716247800	[illegible]
১৮	মো: গোলাম রাব্বি	সমাজ সেবক	01756830961	[illegible]
১৯	মো: জাহিদুল ইসলাম	সমাজসেবক	0172969256X	[illegible]
২০	মো: অলিদ	কৃষি	01703677519	[illegible]

সমাজ সেবক

CEGIS Center for Environmental and Geographic Information Services (A Public Trust under The Ministry of Water Resources) House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: phuljury Union GPS: Date: 28.02.2023

Sl. No.	Name	Occupation	Address / mobile no.	Signature
২১	মো: আবু তালেব	শিক্ষক	[illegible] 0172[illegible]	[illegible]
২২	মো: জাকির মৃধা	সমাজসেবক কৃষক	01723642567	মো: জাকির
২৩	সাহাবউদ্দিন	মুক্তিযোদ্ধা	01716860579	[illegible]
২৪	মো: ইব্রাহিম	কৃষক	01961817550	ইব্রাহিম
২৫	মো: মজিবুল হক	কৃষক	01736907410	[illegible]
	[struck out]	[struck out]		
২৬	মো: আ: রব খান	কৃষক	01775592114	[illegible]
২৭	মো: মাকসুদুর রহমান	কৃষক	01948683782	[illegible]
২৮	মো: মিলন	কৃষক	01714533656	MD. MELON
২৯	মো: মাহফুজ	ইমাম	01739416097	[illegible]

CEGIS Center for Environmental and Geographic Information Services (A Public Trust under The Ministry of Water Resources) House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: [illegible] Date: ২৪/০২/২০২৬

Sl. No.	Name	Occupation	Address / mobile no.	Signature
০০১	আবুবক্কর সিদ্দিক বাবু	ইঞ্জিনিয়ার	০১৭১৫৯৪০১১৪	

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Focus Group Discussion, Barguna Sadar

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: ফুলঝুড়ি ইউনিয়ন GPS: ছোট গৌরীচন্না Date: 01.03.2023

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১।	মো: মনিরুজ্জামান মামুন	UP সদস্য	01716332591	[illegible]
২।	মো: গোলাম মোস্তফা মাতুব্বর		01737468639 01737468639	মোস্তফা
৩।	মো: শহিদুল ইসলাম		01407809081	[illegible]
৪।	[illegible]		01961961714	[illegible]
৫।	আমিনুল ইসলাম মামুন		01721-632231.	[illegible]
৬।	মিজানুর রহমান মাতুব্বর		017[illegible]281319	[illegible]
৭।	জাহাঙ্গীর		01793322053	
৮।	মো: দুলাল হাং		01783542202	দুলাল
৯।	মো: রুবেল হাং			রুবেল
১০।	সুলতান			

Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

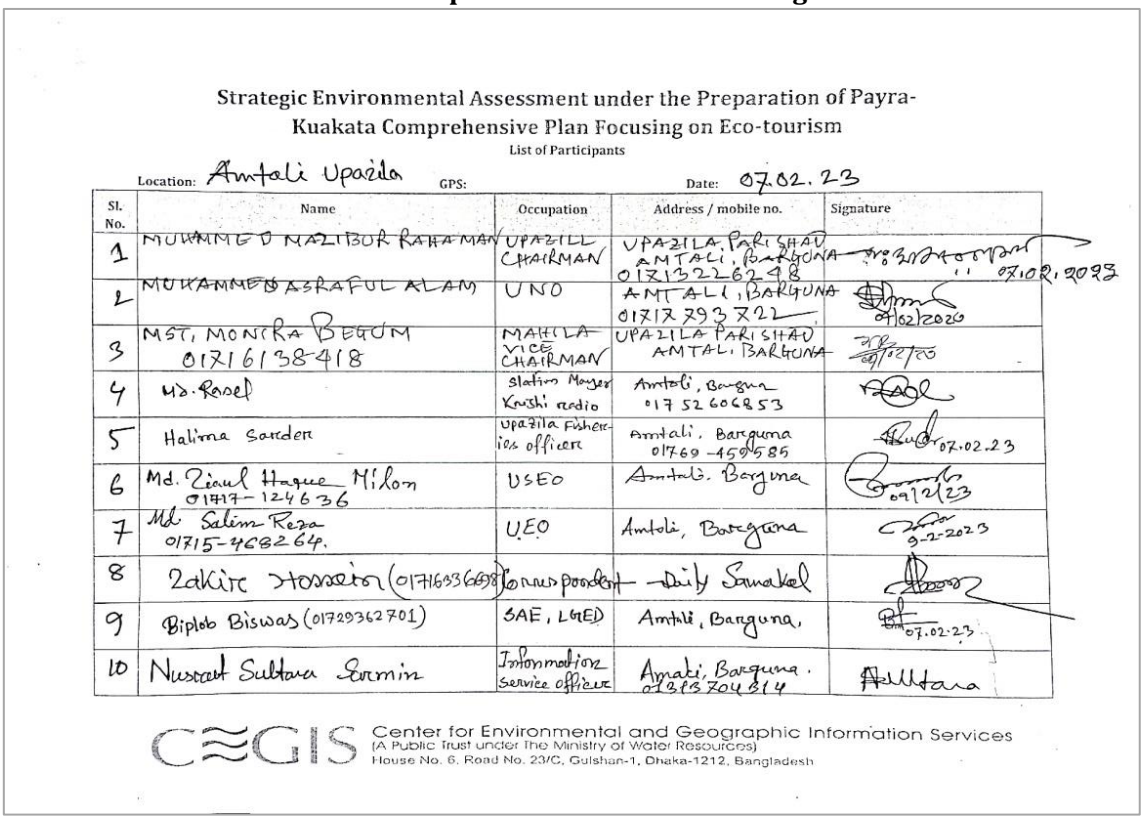
List of Participants

Location: ফুলঝুড়ি ইউনিয়ন (ছোট GPS: গৌরীচন্না) Date: 01.03.2023

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১১।	মো: আব্দুর রহিম মাতুব্বর		0171849302	[illegible]
১২।	মো: জাহাঙ্গীর		01721627047	জাহাঙ্গীর
১৩।	মো: আবুল কালাম		0	মো: আবুল কালাম
১৪।	মো: মিরাজ		01793494155	[illegible]
১৫।	মো: আ: রশিদ		01725355035	[illegible]

Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Amtoli Upazila Consultation Meeting



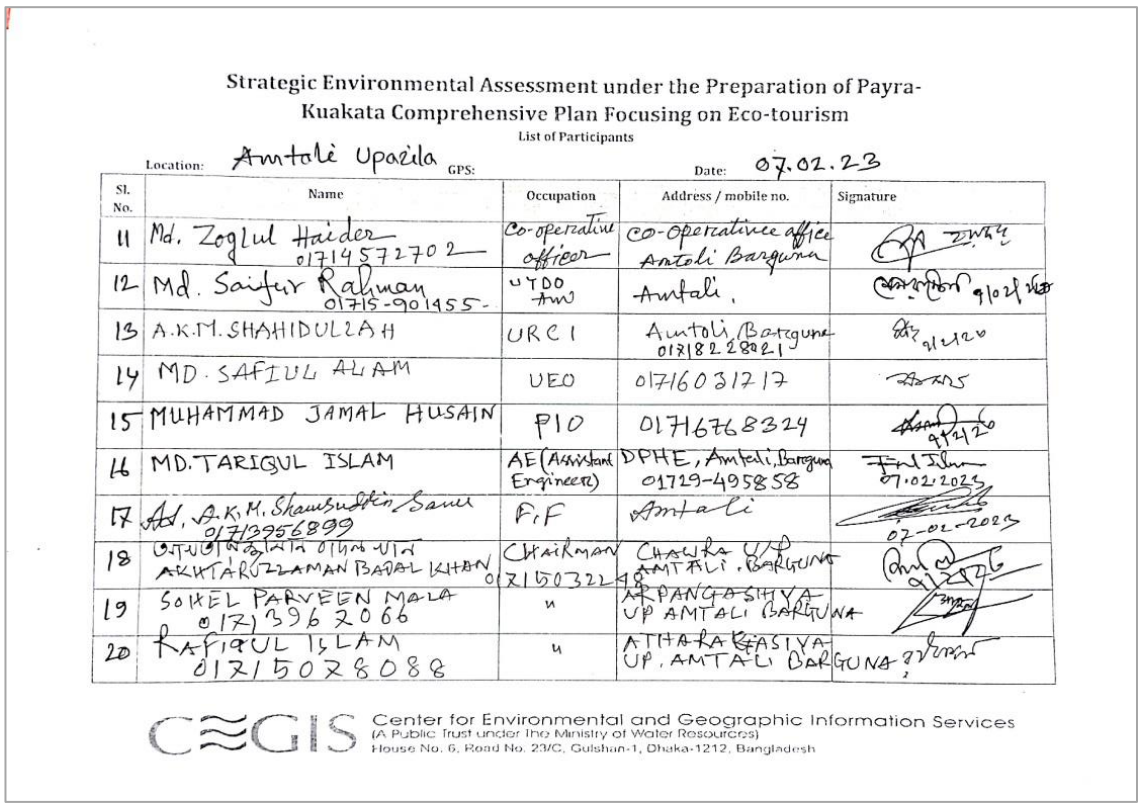
Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: Amtoli Upazila GPS: Date: 07.02.23

Sl. No.	Name	Occupation	Address / mobile no.	Signature
1	MUHAMMED NAZIBUR RAHAMAN	UPAZILL CHAIRMAN	UPAZILA PARISHAD AMTALI, BARGUNA 01713226298	07.02.2023
2	MUHAMMED ASRAFUL ALAM	UNO	AMTALI, BARGUNA 01717293722	07/02/2023
3	MST. MONIRA BEGUM 01716138418	MAHILA VICE CHAIRMAN	UPAZILA PARISHAD AMTALI, BARGUNA	
4	Md. Rasel	Station Mayer Krishi radio	Amtoli, Barguna 01752606853	
5	Halima Sarder	Upazila Fisheries officer	Amtali, Barguna 01769-459585	07.02.23
6	Md. Ziaul Haque Milon 01717-124636	UEO	Amtali, Barguna	09/2/23
7	Md Salim Reza 01715-468264.	UEO	Amtoli, Baregrna	9-2-2023
8	Zakir Hossain (01716936698)	Correspondent	Daily Samakal	
9	Biplob Biswas (01729362701)	SAE, LGED	Amtali, Barguna,	07.02.23
10	Nusrat Sultana Sarmin	Information Service officer	Amaki, Barguna. 01913704314	Nusrat

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh



Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: Amtoli Upazila GPS: Date: 07.02.23

Sl. No.	Name	Occupation	Address / mobile no.	Signature
11	Md. Zoglul Haider 01714572702	Co-operative officer	co-operatiwee office Amtoli Barguna	
12	Md. Saifur Rahman 01715-901455-	UYDO	Amtali,	9/02/23
13	A.K.M. SHAHIDULLAH	URC I	Amtoli, Barguna 01718228821	9/2/23
14	MD. SAFIUL ALAM	UEO	01716031717	
15	MUHAMMAD JAMAL HUSAIN	PIO	01716768324	9/2/23
16	MD. TARIQUL ISLAM	AE (Assistant Engineer)	DPHE, Amtali, Barguna 01729-495858	07.02.2023
17	Adv. A.K.M. Shamsuddin Sami 01713956899	F.F	Amtali	07-02-2023
18	AKHTARUZZAMAN BABAL KHAN	Chairman	CHAURA U/P AMTALI, BARGUNA 01715032248	9/2/23
19	SOKEL PARVEEN MALA 01713962066	"	ARPANGASHIYA UP AMTALI BARGUNA	
20	RAFIQUL ISLAM 01715028088	"	ATHARAKHASIYA UP. AMTALI BARGUNA	

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: Amtali Upazila GPS: Date: 07.02.23

Sl. No.	Name	Occupation	Address / mobile no.	Signature
21	BORHAN UDDIN AHAMED 01716089229	CHAIRMAN	KUKUA U/P AMTALI, BARGUNA	B.U. Ahm..
22	মো: মোস্তাফিজুর রহমান [illegible]	চেয়ারম্যান প্রতিনিধি	[illegible] আমতলী, বরগুনা 01718859989	[illegible] 7.2.23
23	মো: মতিউর রহমান	[illegible]	[illegible] 01309100011	[illegible] 7/2/23
24	কামরুল হাসান (মেম্বার [illegible])	[illegible]	8নং [illegible] 01712188646	[illegible] 07.02.23
25	মো: আনোয়ার হোসেন	কৃষক	01718623417	[illegible]
26	জাহাঙ্গীর হোসেন	ইউপি সচিব	আঠারোগাছিয়া ইউপি 01727170082	[illegible]
27	মো: [illegible]	শিক্ষক	[illegible] 01774949228	[illegible]
28	মো: [illegible]	ইউপি সচিব	[illegible] ইউপি 01713963293	[illegible]
29	মো: রেজাউল করিম	সাংবাদিক [illegible]	আমতলী 01717185223	[illegible]
30	সি. এম. রেজাউল করিম	উপজেলা কৃষি অফিসার	আমতলী, বরগুনা 01712646274	[illegible]

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: Amtali Upazila GPS: Date: 07.02.23

Sl. No.	Name	Occupation	Address / mobile no.	Signature
31	মোজাম্মেল মোল্লা	সমাজসেবী	[illegible], আমতলী, বরগুনা 01783960312	[illegible]
32	মো: মোস্তাফিজুর	সমাজসেবী	[illegible] আমতলী, বরগুনা	[illegible] 01725592539
33	মো: [illegible] 01717862908	[illegible]	আমতলী [illegible]	[illegible]

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Consultation Meeting at Arpangasia, Amtali

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: আড়পাঙ্গাশিয়া ইউনিয়ন পরিষদ, আমতলী Date: ০৬/০২/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১	সোহেলী পারভীন	ইউপি চেয়ারম্যান	01713067066	[illegible]
২	আঃ লতিফ	ইউপি সেক্রেটারি	01722236605	[illegible]
৩	নুর জাহান	UP-১,২,৩	01708700089	নুর জাহান
৪	রুবিনা	U P, ৪,৫,৬	01778518991	রুবিনা
৫	মোঃ [illegible]	"	01731937891	[illegible]
৬	মোঃ আবুল হোসেন	সহঃ শিক্ষক	01735165102	[illegible]
৭	মোঃ নজরুল ইসলাম	[illegible]	01725440426	[illegible]
৮	মো: মাসুদ	[illegible]	01751676121	মাসুদ
৯	মো: মামুন	গণমাধ্যম	01745891257	মোঃ মামুন
১০	মো: আ: রব [illegible]	জেলে	01736868042	মোঃ আঃ রব

Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

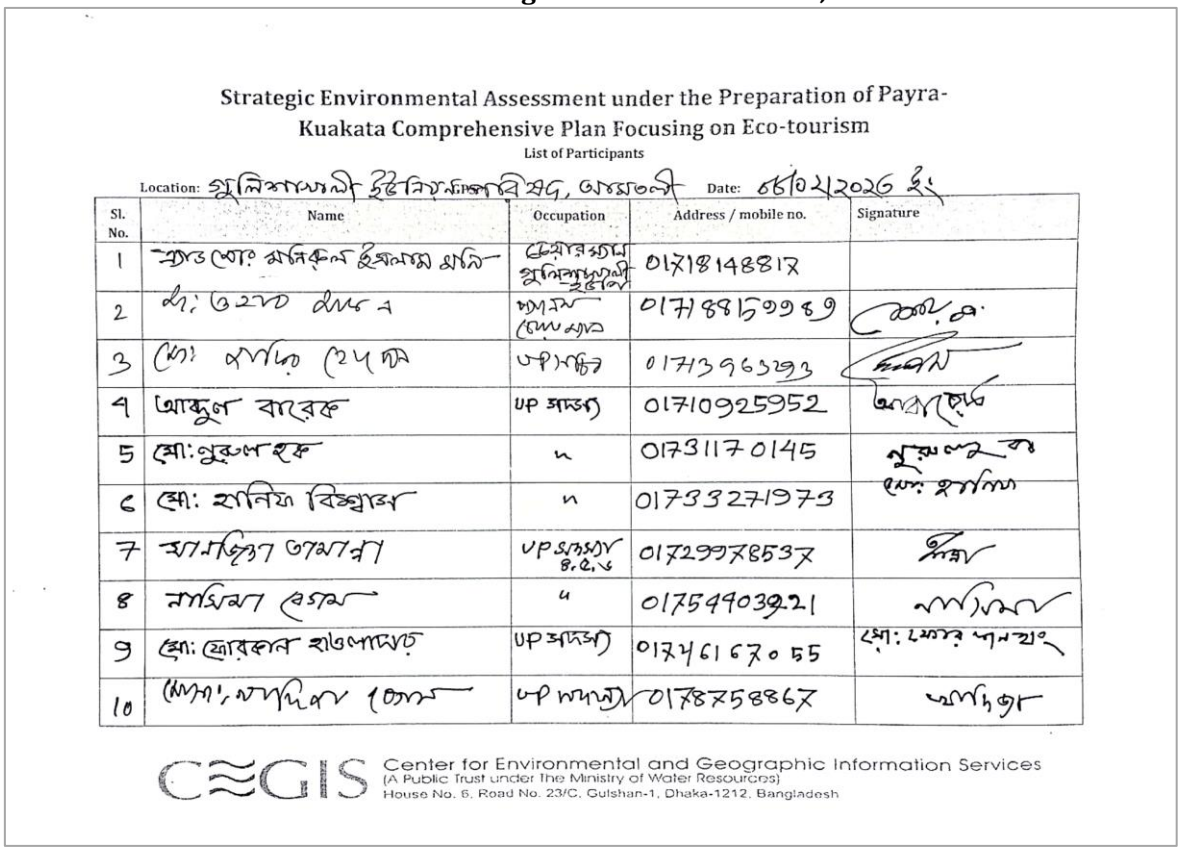
List of Participants

Location: আড়পাঙ্গাশিয়া ইউনিয়ন পরিষদ Date: ০৬/০২/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১১	মো: মোবারক	কৃষক	01747497248	মো: মোবারক [illegible]
১২	মো: আবুল হোসেন	জেলে	01729412058	[illegible]
১৩	[illegible] হোসেন	[illegible]	01727170082	[illegible]
১৪	কামরুজ্জামান রুবেল	উদ্যোক্তা U.D.C	01710224617	[illegible]
১৫	[illegible]	SMSS, ২নং ওয়ার্ড	01716973994	[illegible]
১৬	মো: আবু [illegible]	BUP	01736546760	[illegible]
১৭	মো: ছালাম	জেলে	01710765723	ছালাম
১৮	করিম হাওলাদার	কৃষক	–	করিম
১৯	আবুল মিয়া	গণমাধ্যম	01738648785	আবুল মিয়া

Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Consultation Meeting at Gulishakhali Union, Amtali



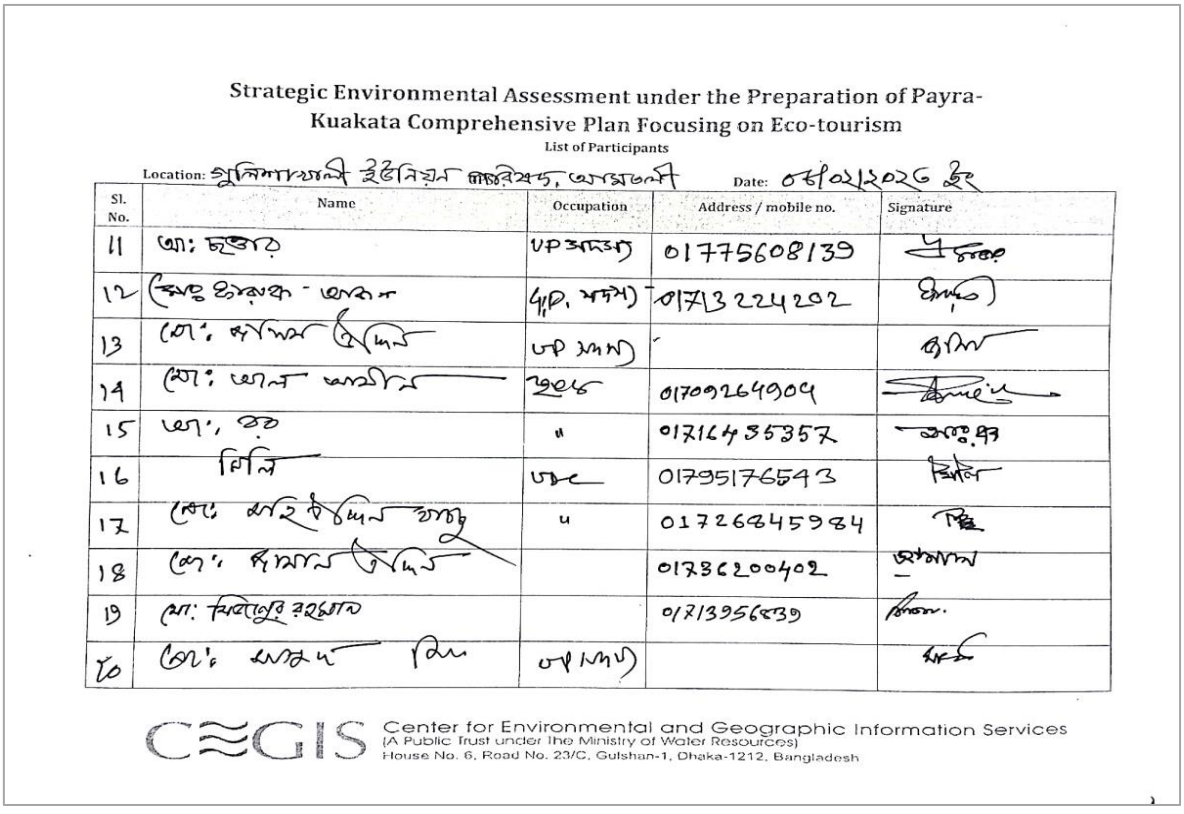
Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: গুলিশাখালী ইউনিয়ন পরিষদ, আমতলী Date: ০৪/০২/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
1	[illegible]	[illegible]	01718148817	
2	[illegible]	[illegible]	01788159969	
3	[illegible]	[illegible]	01713963293	
4	আব্দুল বারেক	UP সদস্য	01710925952	
5	মো: নুরুল হক	"	01731170145	
6	মো: হানিফ বিশ্বাস	"	01733271973	
7	[illegible]	UP Secretary	01729978537	
8	[illegible]	"	01754903921	
9	মো: জোবকান হাওলাদার	UP সদস্য	01746167055	
10	[illegible]	UP সদস্য	01787558867	

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh



Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: গুলিশাখালী ইউনিয়ন পরিষদ, আমতলী Date: ০৪/০২/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
11	[illegible]	UP সদস্য	01775608139	
12	[illegible]	[illegible]	01713224202	
13	[illegible]	UP সদস্য		
14	[illegible]	[illegible]	01709264904	
15	[illegible]	"	01716435357	
16	[illegible]	[illegible]	01795176543	
17	[illegible]	"	01726845984	
18	[illegible]		01736200402	
19	[illegible]		01713956839	
20	[illegible]	[illegible]		

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Consultation Meeting at Lalua Union, Kalapara

Public Consultation Meeting

on

Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism (PKCP)

Venue: Lalua Union parishad, Kalapara, Patuakhali

Date: 20, 03, 2023

SL. No	Name	Organization / Designation	Mobile no.	Signature
১.	প্যানেল মো: শওকত হোসেন বিশ্বাস	চেয়ারম্যান ৩নং লালুয়া ইউ/পি	01733-283764	[illegible]
২.	মো: আশিকুজ্জামান	মৎস্যজীবি	01743062916	[illegible]
৩.	মো: সাহিদ আলম	সহকারী শিক্ষক	01719817027	[illegible]
৪.	মো: করিম সরদার	কৃষি	01710781243	[illegible]
৫.	আলাল মাতব্বর	"	[illegible]	আলাল মাতব্বর
৬.	মো: মাইনউদ্দিন	"	01740928143	মো: মাইনউদ্দিন
৭.	মো: মাহফুজুর রহমান	ইউপি সচিব	01712964350	[illegible]
৮.	গোলেনুর বেগম	ইউপি সদস্যা	01734807394	গোলেনুর
৯.	মো: কাওসার হাবিব	ইউপি সদস্য	01727464936	[illegible]
১০.	মো: রফিকুল ইসলাম	কৃষি	01735900955	[illegible]
১১.	মো: আ: রব মৃধা	কৃষি	01737673848	মো: আ: রব মৃধা
১২.	আবদুল লতিফ হাং	[illegible]	01730165545	[illegible]
১৩	মো: আমীর হোসেন	ইউ.পি. সদস্য	01718924687	[illegible]

SL. No	Name	Organization / Designation	Mobile no.	Signature
১৪.	মো: রাকিব	গাড়ি চালক	01719664565	[illegible]
১৫.	মো: রাকিব খাঁ	কৃষক	01710405553	[illegible]
১৬	মো: মিলন	"	01311645300	[illegible]
১৭	মো: নুরুজ্জামান মৃধা	"	01716186115	[illegible]
১৮	মো: বশার ফকির	"	01720352731	[illegible]
১৯	মো: মতিউর রহমান	"	01736164999	[illegible]
20.	রহিমা বেগম	গৃহিনী	01712964350	রহিমা
২১	মো: সোহরাব মিয়া	কৃষক	01754618530	[illegible]

Focus Group Discussion, Kalapara

Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism (PKCP)

FGD Attendance

Venue : Banati Bazar, Lalua Union
Upazila : Kalapara
Date : 21-03-2023
District : Patuakhali
Time : 12.00 Pm

SL. No	Name	Organization / Designation	Mobile no.	Signature
১	মো: মোজিবর সিকদার	সহসভাপতি	[illegible]	[signature]
২	মো: [illegible]	"	01740951680	[signature]
৩	মো: [illegible]	"	01745519739	[signature]
৪	মো: আবদুল হক মুন্সী	সহসভাপতি	01712092234	[signature]
৫	মো: [illegible] হা:	"	01739858185	[signature]
৬	মোঃ নজমুল আহসান	"	01771467993	[signature]
৭	মো: [illegible]	"	01722285517	[signature]
৮	মোঃ [illegible]	"	01778939900	[signature]
৯	মো: রিপন	"	[illegible]	[signature]
১০	মো: রিয়াদ	"	01710405564	[signature]
১১	[illegible]		01724918379	[signature]

Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism (PKCP)

FGD Attendance

Venue : Banati Bazar, Lalua Union
Upazila : Kalapara
Date : 21-03-2023
District : Patuakhali
Time : 10.00 Am

SL. No	Name	Organization / Designation	Mobile no.	Signature
১	[illegible]	কৃষি	01894-016282	[signature]
২	মোঃ [illegible] ইসলাম	কৃষক	01734910835	[signature]
৩	মো: সাহাবুদ্দিন [illegible]	কৃষক	01737087089	[signature]
৪	মো: [illegible]	"	01306015119	[signature]
৫	মো: রিমন হা:	"	01782193968	[signature]
৬	মো: ফিরোজ খা:	"	01715713725	[signature]
৭	মো: [illegible] মুন্সী	"	0179650635	[signature]
৮	মো: [illegible]	"	01718857519	[signature]
৯	[illegible]	"	[illegible]	[signature]
১০	মোঃ [illegible]	"	01721376882	[signature]

Consultation Meeting at Latachapli Union, Kalapara

Public Consultation Meeting

on

Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism (PKCP)

Venue: Latachapli Union Parishad, Kalapara, Patuakhali

Date: 22-03-2023

SL. No	Name	Organization / Designation	Mobile no.	Signature
১	মোঃ আনছার উদ্দিন মোল্লা	চেয়ারম্যান, লতা চাপলী ইউনিয়ন পরিষদ	01718815601	[illegible]
২	মোঃ [illegible] নিজাম	সচিব, লতাচাপলী ইউপি	01716558658	[illegible]
৩	মোঃ [illegible] মুন্সী	মুক্তিযোদ্ধা প্রতিনিধি	01713951979	[illegible]
৪	মোঃ হানিফ ফকির	মৎস্যজীবি	01740984496	[illegible]
৫	মো: আ: জব্বার আকন	কৃষক	01751609754	[illegible]
৬	[illegible]	সমাজ সেবক	01735952757	[illegible]
৭	মোঃ মনজুরুল আলম	শিক্ষক প্রতিনিধি	01739930969	[illegible]
৮	মোঃ মিজানুর রহমান	ইউ পি সদস্য	01715242135	[illegible]
৯	মো: [illegible] রহমান	কৃষক	01913888510	[illegible]
১০	মোসাঃ নুরুন্নাহার	ইউ. পি সদস্য	01260673948	[illegible]
১১	মোসা: [illegible] বেগম	ইউ পি. সদস্যা	01717988208	[illegible]
১২	মোঃ তুহিন খান	ইউ. পি. সদস্য	01728367463	[illegible]
১৩	মো: মোকলেচ চৌকিদার	গ্রাম পুলিশ (অব:)	01783517887	[illegible]

SL. No	Name	Organization / Designation	Mobile no.	Signature
১৪	রাহিমা আক্তার (লিপি)	U.P. সদস্য লতাচাপলী ইউনিয়ন	01795779538	[illegible]
১৫	মো: মিজানুর রহমান	U.P. সদস্য লতাচাপলী	01713952115	MRAHMAN.
১৬	মো: জামাল হোসেন	ব্যবসা	01792-039765	[illegible]
১৭	মোঃ মেহেদী	ব্যবসা	01733172318	[illegible]
১৮	কালাম	চাকুরী	01783420882	[illegible]
১৯	মো: [illegible]	দোকানদার লতাচাপলী	01714729087	[illegible]
২০	মাসুদ	কৃষক		[illegible]
২১				
২২				
২৩				
২৪				
২৫				
২৬				
২৭				
২৮				
২৯				

Focus Group Discussion, Kalapara

Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism (PKCP)

FGD Attendance

Venue : Mistipara, Rakhain Palli, Lata chapli Union
Upazila : Kalapara
Date : 22-03-2023
District : Patuakhali
Time : 10.00 Am

SL. No	Name	Organization / Designation	Mobile no.	Signature
১	[illegible]	[illegible]	01710578433	[illegible]
২	[illegible]	[illegible]	01728874199	[illegible]
৩	[illegible]	[illegible]	01713822163	[illegible]
৪	[illegible]	[illegible]	01729364163	[illegible]
৫	[illegible]	[illegible]	01729786808	[illegible]
৬	[illegible]	[illegible]	01752056509	[illegible]
৭	[illegible]	[illegible]	01719665649	[illegible]
৮	[illegible]	[illegible]	-	[illegible]
৯	[illegible]	[illegible]	-	[illegible]
১০	[illegible]	[illegible]	01714814208	[illegible]

Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism (PKCP)

FGD Attendance

Venue : Alipur, Lata chapli Union
Upazila : Kalapara
Date : 22-03-2023
District : Patuakhali
Time : 5.30 Pm

SL. No	Name	Organization / Designation	Mobile no.	Signature
১	[illegible]	[illegible]	01[illegible]	[illegible]
২	[illegible]	"	01790857425	[illegible]
৩	[illegible]	"	01[illegible]	[illegible]
৪	[illegible]	"	01[illegible]	[illegible]
৫	[illegible]	"	01[illegible]	[illegible]
৬	[illegible]	"	01[illegible]	[illegible]
৭	[illegible]	"	01[illegible]	[illegible]
৮	[illegible]	"	01740984496	[illegible]

Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism (PKCP)

FGD Attendance

Venue : Alipur, Lata Chapli Union

Upazila : Kalapara District : Patuakhali

Date : 22-03-2023 Time : 4.00 PM

SL. No	Name	Organization / Designation	Mobile no.	Signature
১	মোঃ [illegible]	মৎস্যজীবি	০১৭১৮৬৯৯১০৬	[illegible]
২	হারুন আকন	মৎস্যজীবি	01772684013	হারুন আকন
৩	মো: বাচ্চু	"	01728196715	বাচ্চু
৪	মোঃ আবু হানিফ মাঝি	মৎস্য জীবি	01740984496	মোঃ আবু হানিফ
৫	মোঃ মোঃ রহিম মাঝি	"	01743413315	মোঃ রহিম
৬	মো: আ: মনির মাঝি	"	01748711835	মো: মনির
৭	মো: ইউসুফ	"	01712927047	মো: ইউসুফ
৮	মোঃ জাকির	"	01728218526	মোঃ জাকির
৯	মো: রুহুল আমিন মাঝি	মৎস্য	01715072890	রুহুল আমিন [illegible]
১০	মোঃ [illegible]		01621608487	[illegible]
১১	মোঃ [illegible]		01710022666	[illegible]

Consultation Meeting at Taltoli Upazila

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: তালতলী উপজেলা পরিষদ, GPS: Date: ০৫/০২/২০২৩

Sl. No.	Name	Occupation	Address / mobile no.	Signature
1	SM Sadik Tanvear	UNO Taltoli Upazila	01733348027	০৫/০২/২৩
2	Md. Razib ul kabir	UP Chairman Taltoli Upazila	01711979095	০৫/০২/২০২৩
3	LUTFUL KABIR MD. KAMRUL HASSAN	Asst. Employ USEO	Upazilla Parisad, Taltoli	
4	MD. FIROJ ALAM	URDO	TALTALI, BARGUNA	
5	DIPU SARKAR	AP	TALTALI BARGUNA	
6	MD. ABDUR RAHMAN	Assistant prof.	Taltali Govt college	
7	MD. SHAFIQUL ISLAM.	Assistant Teacher	Taltali Govt School	
8	MD. ABDAR MOLLAH	UAVDO	Ansar & VDP, Taltali 01745230053	30.01.23
9	MD. AKHTERUZZAMAN	UPAZILA MANAGER (UM) (SEDF)	upazila office, Taltali 01769-504388	30.01.23
10	Md. Moniruzzaman.	Forest, Ranger officer.	Forest office, Taltali 01999001552	০৩/০২/২০২৩

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: তালতলী উপজেলা পরিষদ, GPS: Date: ০৫/০২/২০২৩

Sl. No.	Name	Occupation	Address / mobile no.	Signature
11	MD. SUMON HOWLADER	Upazila Agri. Officer,	Upazila Agriculture office. Taltoli 01744989355	
12	Monika nasrin moni	vice chairman Taltola	01757143586	

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: তালতলী উপজেলা পরিষদ GPS: Date: ৩০/০১/২০২৩

Sl. No.	Name	Occupation	Address / mobile no.	Signature
13	Md-Jalaluddin Ahmed	Youth development officer	Upozila taltoli	
14	Runu Begum	P.I.O	Taltali, Barguna	৩০/০১/২০২৩
15	Md. Nazmul Hasan Shahin	SAE, DPHE	DPHE, Taltali	30.01.2023
16	Md. Fazlul Karim	USO	Taltali 01712483872	30.01.2023
17	Dr. Md. Sadequr Rahman, VS	ULO	01770229988	30.01.2023
18	Md. Mahabubul Alam	UFO	01713-644230	30.01.2023
19	MD. Kamruzzaman Bachchu Mia	Chairman	01711195436	30.01.2023
20	Farage M.D. Younus	chairman	01724063182	30/01/2023
21	MD. Ibrahim Sikder (Roal)	Chairman	01799994656	30/01/2023
22	MD. Nur Alam Howlader	ASSO সমাজসেবা কার্যালয়	01835-605242	30/01/2023

Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: তালতলী উপজেলা পরিষদ GPS: Date: ৩০/০১/২০২৩

Sl. No.	Name	Occupation	Address / mobile no.	Signature
23	MD. ALAMGIR MIA	CHAIRMAN	BAROBOGI UP 01740803802	৩০/০১/২৩
24	KAMAL HALDER	ARDO	01721-991912	30/01/23
25	মো: [illegible]	[illegible]	01761880218	

Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Consultation Meeting at Nishanbaria Union, Taltoli

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: নিশানবাড়ীয়া ইউনিয়ন GPS: Date: ৩১/০১/২০২৩ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
1	MD. Kamruzzaman Badshu mia	Chairman	Nishanbaria, Sobahanpara 01711195436	[illegible] 31.01.2023
২	ফুলমতি বেগম	সদস্যা ৭,৮,৯	01308305200	ফুলমতি
3	আসমা আক্তার	সদস্যা ৪,৫,৬	01758738466	আসমা 31.01.2023
4	ফাতেমা বেগম	সদস্যা ১,২,৩	01779260406	[illegible]
5	জামাল খান	সদস্য ৩ নং ওয়ার্ড	01740553239	[illegible]
6	সাহিদ খান	সদস্য ২নং ওয়ার্ড	01738810740	[illegible]
7	মো: আ: লতিফ নান্টু	সচিব ইউপি	01721366548	[illegible]
8	মো: নুরনবী আলম বাবুল	সদস্য	01721275257	[illegible]
9	মো: [illegible]	সদস্য	01778377768	[illegible] 31-1-23
10	মো: [illegible] তালুকদার	সদস্য	01712975129	[illegible]

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: নিশানবাড়ীয়া ইউনিয়ন GPS: Date: ৩১/০১/২০২৩ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
11	নজরুল সিকদার	জেলে	01715195307	[illegible]
12	মো: শাহিন	শিক্ষক	01736100113	Shaheen
13	মো: আবু বকর সিদ্দিক	উদ্যোক্তা	01775608797	[illegible]
14	জাহাঙ্গীর	কৃষক	01765577482	জাহাঙ্গীর
15	মো: জামাল মৃধা	কৃষক	01735951836	জামাল
16	বাদল মন্ডল	কৃষক		
17	মো: [illegible]	উদ্যোক্তা	01727986485	[illegible]
18	মো: হাসান	ব্যবসায়ী	01719577169	মো: হাসান
19	মো: জয়নাল	কৃষক	01300256754	[illegible]
20	মো: আমির হোসেন	কৃষক	01712577936	মো: আমির হোসেন

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Consultation Meeting at Sonakata Union, Taltoli

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: সোনাকাটা ইউনিয়ন পরিষদ GPS: Date: ০১/০২/২০২৩ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১	[illegible] মো: ইউনুচ	ইউপি চেয়ারম্যান সোনাকাটা ইউনিয়ন	01740631871	[illegible]
২	মোসা: শাহিদা	U.P সদস্যা ১,২,৩		শাহিদা
৩	মোঃ [illegible]	[illegible]	01740974186	[illegible]
৪	SAHID	UP. MEMBER 02. WARD	01511-715077 01712-385416	Sahid
৫	মোঃ ইব্রাহিম তালুকদার	U.P. MEMBER 04. WARD	01740916090	[illegible]
৬	মোঃ [illegible]	[illegible]	01713962889	[illegible]
৭	মোসা: [illegible]	U.P সদস্যা	01732097702	[illegible]
৮	মো: [illegible]	U.P. সদস্য	01733190775	[illegible]
৯	আবুল [illegible]	U.P. Member	01713932480	[illegible]
১০	নুরজাহান বেগম	U.P. সদস্যা	01721809592	নুরজাহান

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: সোনাকাটা ইউনিয়ন পরিষদ GPS: Date: ০১/০২/২০২৩ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১১	মো: মজিবর রহমান [illegible]	[illegible]	01740840586	[illegible]
১২	[illegible] রহমান	সচিব, ১নং সোনাকাটা ইউনিয়ন পরিষদ	01711327543	[illegible]
১৩	মোঃ বেল্লাল হোসেন	সহকারী শিক্ষক [illegible]	01761529841	[illegible]
১৪	মো: [illegible]	সাবেক ইউপি সদস্য	01740975209	[illegible]
১৫	মোঃ নুরু [illegible]	ইউপি সদস্য ৪নং ওয়ার্ড	01767406178	[illegible]
১৬	মো: [illegible]		0176304[illegible]	[illegible]

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Focus Group Discussion, Taltoli

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: লাঠিপাড়া মাথাইন GPS: Date: 01/02/2023

Sl. No.	Name	Occupation	Address / mobile no.	Signature
	[illegible]	কৃষি	01746843628	[illegible]
	[illegible]	ইঞ্জি	01779925292	[illegible]
	মো: আমুন	ড্রাইভার	01713867223	আমুন
	আজান	গৃহিনী	01771540398	আজান
	নুরুন	কৃষি	01744532854	নুরুন
	[illegible]	কৃষি/ড্রাইভার	01779077548	[illegible]
	নিনি	গৃহিনী	01771015484	নিনি
	[illegible]	গৃহিনী	01751899187	[illegible]
	[illegible]	ড্রাইভার	01735160192	[illegible]
	আইরিনা	গৃহিনী	01771540398	আইরিনা

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: ফকিরহাট, তালতলী বরগুনা GPS: Date: ০১/০২/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১।	[illegible]	[illegible]	01712486693	[illegible]
২।	মো: বারেক	ছেলে	01765317173	মো: [illegible]
৩।	মো: জাফর	ছেলে	01761701341	মো: [illegible]
৪।	মো: ইব্রাহিম	ছেলে	01303850764	ইব্রাহিম
৫।	মো: সিদ্দিক	ছেলে	01712501150	মো: [illegible]
৬।	মো: জুয়েল	ছেলে	01601717922	মো: জুয়েল
৭।	মো: হেলাল	ছেলে	01608122066	[illegible]
৮।	মো: সাকোয়ার হোসেন	ছেলে	01775007688	[illegible]
৯।	[illegible]	ছেলে	01780502644 / 01772518461	[illegible]

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

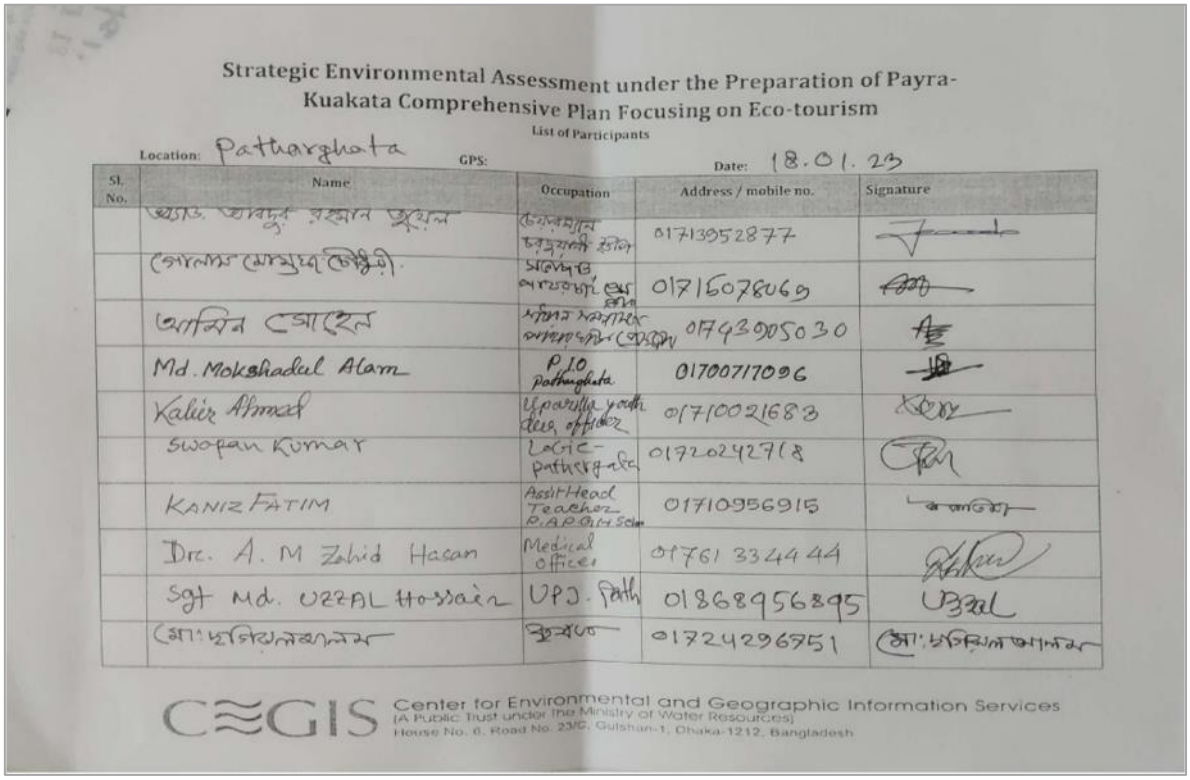
List of Participants

Location: পশ্চিম আমুজান পাড়া, GPS: নিশানবাড়িয়া ইউনিয়ন Date: ০২/০২/২০২৬

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১।	উক্যেনসিং		01731843573	[illegible]
২।	উচ্যাং		01755768116	উচ্যাচি
৩।	উয়েমেন			উয়েমেন
৪	নাচান		01753638055	নাচান
৫।	চ্যচমেচান		01732097637	চ্যচমেচান
	সিংচেউয়েন			

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Consultation Meeting at Patharghata Upazila



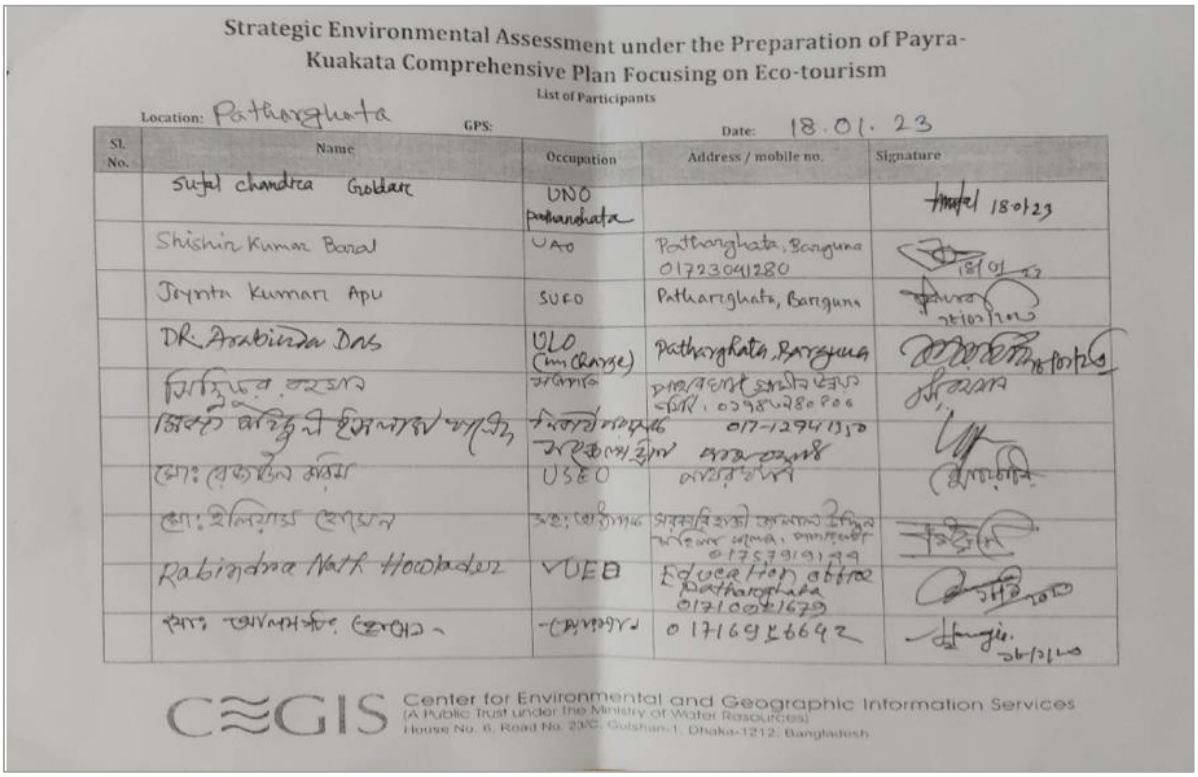
Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: Patharghata GPS: Date: 18.01.23

Sl. No.	Name	Occupation	Address / mobile no.	Signature
	[illegible]	[illegible]	01713952877	
	[illegible]	[illegible]	01716078069	
	[illegible]	[illegible]	01743005030	
	Md. Mokshadul Alam	PIO Patharghata	01700717096	
	Kalir Ahmed	Upazila youth dev. officer	01710021683	
	Swapan Kumar	LOIC - patharghata	01720242718	
	KANIZ FATIM	Asst Head Teacher R.A.P.G.H.S.Sch	01710956915	
	Dr. A. M Zahid Hasan	Medical Officer	01761 334444	
	Sgt Md. UZZAL Hossain	UPJ. Path	01868956895	
	[illegible]	[illegible]	01724296751	

C≋GIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh



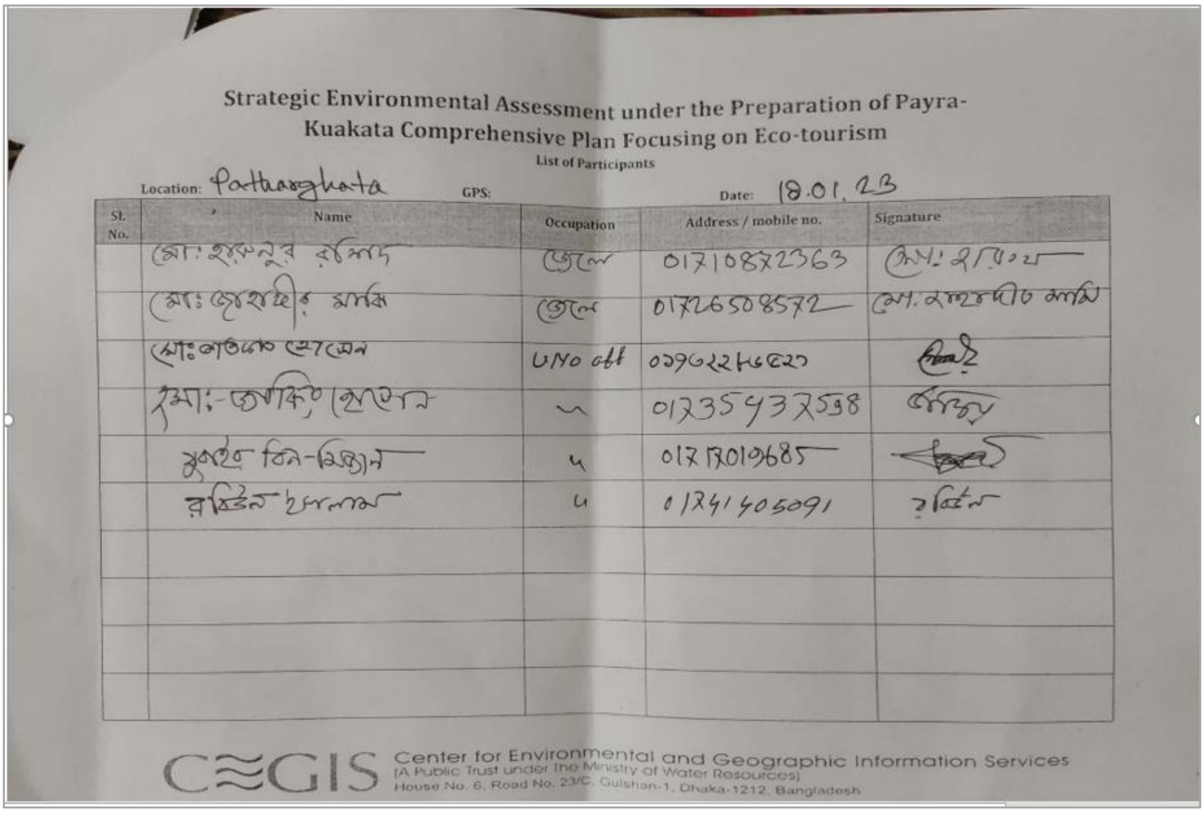
Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: Patharghata GPS: Date: 18.01.23

Sl. No.	Name	Occupation	Address / mobile no.	Signature
	Sujal chandra Goldar	UNO Patharghata		18.01.23
	Shishir Kumar Baral	UAO	Patharghata, Barguna 01723041280	18/01/23
	Joynta Kumari Apu	SUFO	Patharghata, Barguna	18/01/2023
	DR. Arabinda Das	ULO (in charge)	Patharghata, Barguna	
	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	017-12941350	
	[illegible]	USEO	[illegible]	
	[illegible]	[illegible]	[illegible] 01753791949	
	Rabindra Nath Hoodadar	VUEO	Education officer Patharghata 01710021679	18/01/2023
	[illegible]	[illegible]	01716956692	18/1/23

C≋GIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh



Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

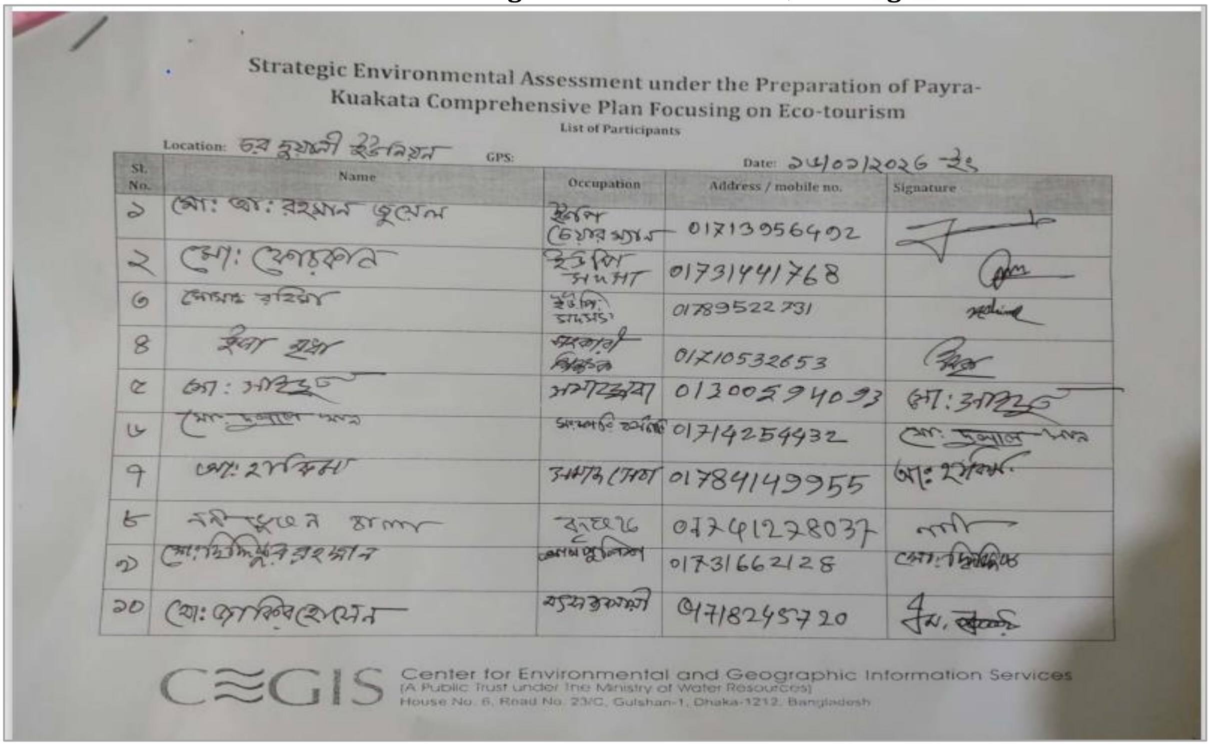
List of Participants

Location: Patharghata GPS: Date: 18.01.23

Sl. No.	Name	Occupation	Address / mobile no.	Signature
	মো: হাসানুর রশিদ	জেলে	01710872363	[illegible]
	মোঃ জাহাঙ্গীর মাঝি	জেলে	01726508572	মো. জাহাঙ্গীর মাঝি
	মোঃ [illegible] হোসেন	UNO off	[illegible]	[illegible]
	মো:- তৌফিক হোসেন	"	01735937598	[illegible]
	মুহিব বিন-মিজান	"	01717019685	[illegible]
	রবিউল ইসলাম	"	01741405091	রবিউল

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Consultation Meeting at Char Duani Union, Patharghata



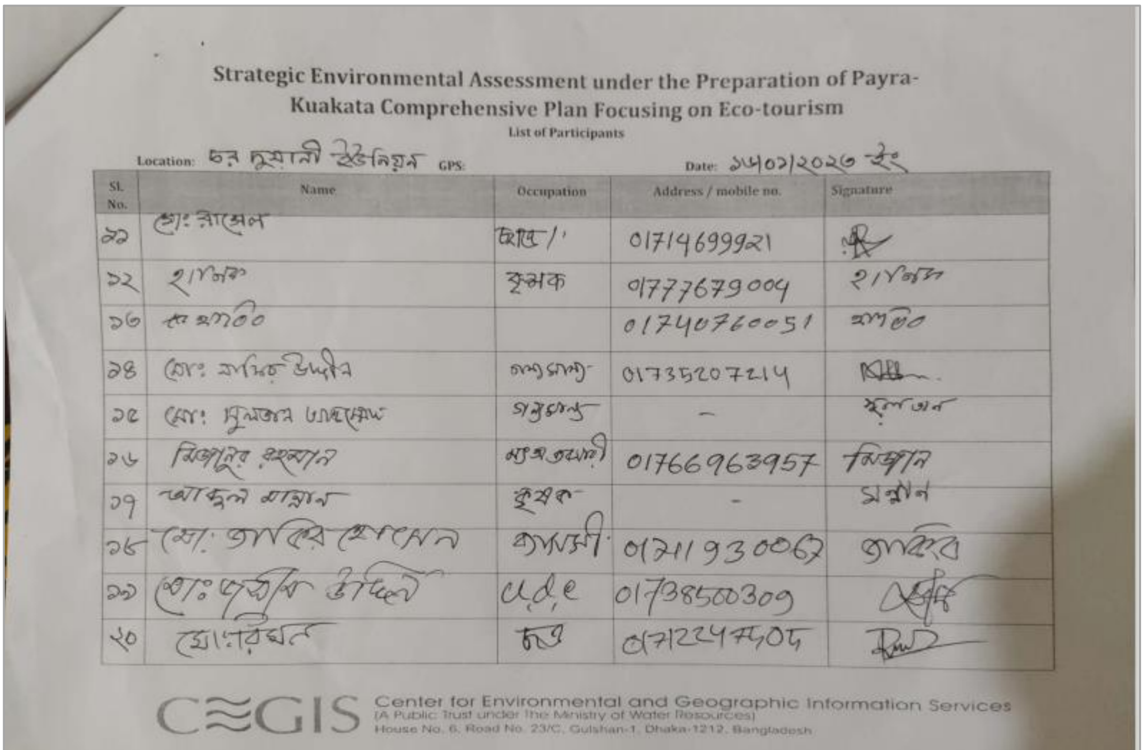
Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: চর দুয়ানী ইউনিয়ন GPS: Date: ২৬/০১/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১	মো: আ: রহমান জুয়েল	ইউপি চেয়ারম্যান	01713956492	[illegible]
২	মো: মোশারফ	ইউপি সদস্য	01731441768	[illegible]
৩	মোসাঃ রহিমা	ইউপি সদস্যা	01789522731	[illegible]
৪	ইভা রাণী	সহকারী শিক্ষক	01710532653	[illegible]
৫	মো: সাইদুল	সমাজকর্মী	01300594093	মো: সাইদুল
৬	মো: দুলাল সরদার	সংগঠন কর্মী	01714254432	মো: দুলাল সরদার
৭	মো: হাফিজ	সমাজসেবা	01784149955	মো: হাফিজ
৮	নবী হোসেন হাওলাদার	ব্যবসায়ী	01741278037	[illegible]
৯	মো: মিজানুর রহমান	গ্রাম পুলিশ	01731662128	মো: মিজানুর
১০	মো: আনোয়ার হোসেন	ব্যবসায়ী	01718245720	[illegible]

C≋GIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh



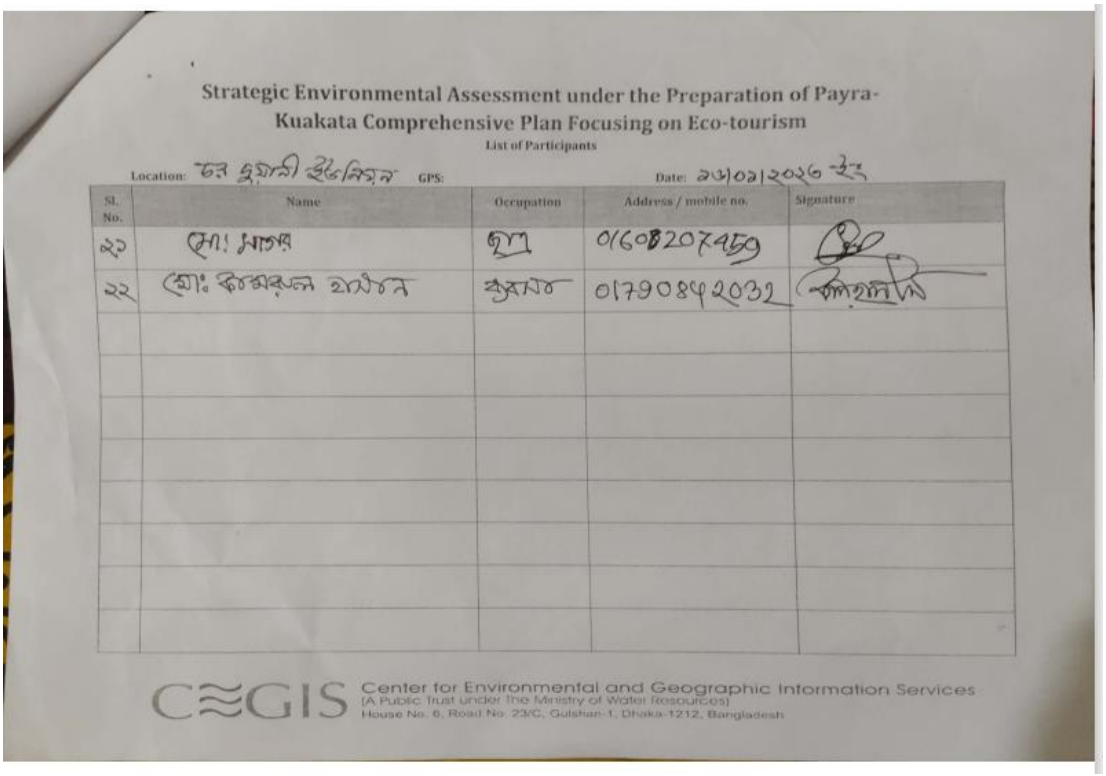
Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: চর দুয়ানী ইউনিয়ন GPS: Date: ২৬/০১/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১১	মো: রাসেল	ছাত্র	01714699921	[illegible]
১২	হাফিজ	কৃষক	01777679004	হাফিজ
১৩	মো: হাসান		01740760051	হাসান
১৪	মো: সাইদ উদ্দিন		01735207214	[illegible]
১৫	মো: সুলতান আহমেদ		–	সুলতান
১৬	মিজানুর রহমান	ব্যবসায়ী	01766963957	মিজান
১৭	আব্দুল মান্নান	কৃষক	–	মান্নান
১৮	মো: জাকির হোসেন	ব্যবসায়ী	01711930067	জাকির
১৯	মো: ফরিদ উদ্দিন	u.d.e	01738500309	[illegible]
২০	মো: রবিউল		01712247505	[illegible]

C≋GIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh



Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: তর কুয়াকাটা ইকোপার্ক GPS: Date: ২৬/০২/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
২১	মো: সাগর	ব্যবসা	01608207459	
২২	মোঃ ফারহান হাওলাদার	ব্যবসা	01790842032	

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Consultation Meeting at Patharghata Sadar Union, Patharghata

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: পাথরঘাটা সদর ইউনিয়ন

Date: ২৬/০১/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১	মোঃ আলমগীর হোসেন	চেয়ারম্যান	৪নং পাথরঘাটা	[signature]
২	মোঃ আব্দুল মান্নান হাওলাদার	সচিব	01719847542	[signature]
৩	মোসাঃ ফাতেমা বেগম UP সদস্য ৭, ৮, ৯	UP ৭,৮,৯	01727491306	[signature]
৪	আবুবক্কর সিদ্দিক	up mem 06	01714593711	[signature]
৫	মোঃ আবুল কালাম খান	U.P. সদস্য ১নং ওয়ার্ড	01712009122	[signature]
৬	মোঃ হেলাল	কাঠ ব্যবসায়ী	01718031496	[signature]
৭	মোঃ কাদের	ব্যবসা	01714487516	[signature]
৮	রাজিয়া সুলতানা	U.P সদস্য ১,২,৩	01716848832	[signature]
৯	মোঃ নুরুল আলম (দুলাল)	U.P.4	01792911246	[signature]
১০	আকলিমা বেগম	প্রাঃ শিঃ	01728368895	[signature]

CEGIS Center for Environmental and Geographic Information Services (A Public Trust under The Ministry of Water Resources) House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

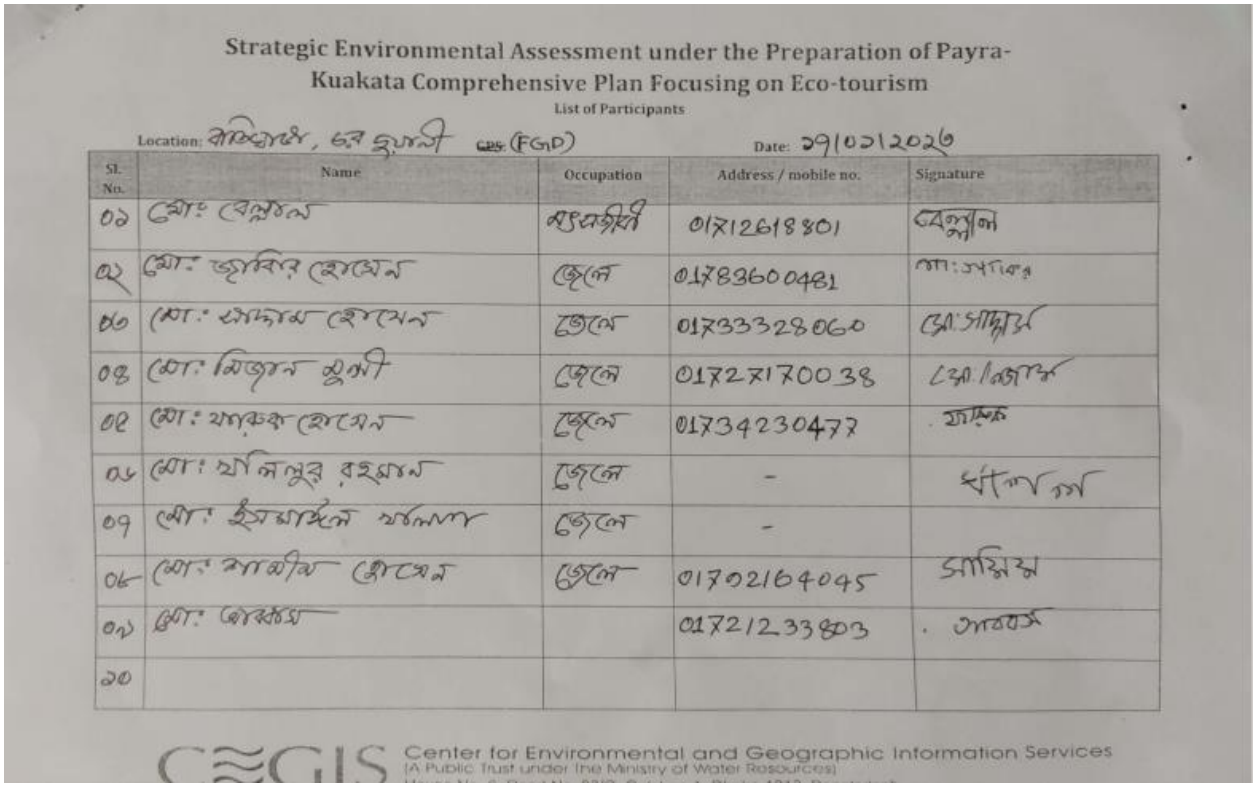
Location: পাথরঘাটা সদর ইউনিয়ন

Date: ২৬/০১/২০২৬ ইং

Sl. No.	Name	Occupation	Address / mobile no.	Signature
১১	মোঃ জাকির হোসেন	মৎস্যজীবি নেতা	পাথরঘাটা 01742420800	[signature]
১২	মোঃ সেরাজ মুন্সী	সাংবাদিক	01735336016	[signature]
১৩	মোঃ মাহিদুর রহমান	ইউপি সদস্য	01714511506	[signature]
১৪	মোঃ জালাল মিয়া	কৃষক	01740004871	[signature]
১৫	মোঃ আলম আমিন	UP.6	01718718304	[signature]
১৬	মোঃ জাহির আলম	ইউপি সদস্য ২নং ওয়ার্ড	01716190395	[signature]
১৭	মোঃ ইকবাল	ইউপি সদস্য ৫নং ওয়ার্ড	01724-002753	[signature]
১৮	মোঃ [illegible]	ব্যবসা	01738137477	[signature]
১৯	মোঃ ইউসুফ আলী	—	01721936680	[signature]
২০	আবুল কালাম	ব্যবসায়ী	01608487854	[signature]

CEGIS Center for Environmental and Geographic Information Services (A Public Trust under The Ministry of Water Resources) House No. 6, Road No. 23/C, Gulshan-1, Dhaka-1212, Bangladesh

Focus Group Discussion, Patharghata



Strategic Environmental Assessment under the Preparation of Payra-Kuakata Comprehensive Plan Focusing on Eco-tourism

List of Participants

Location: পাথরঘাটা, ৬নং ইউনিয়ন GPS: (FGD) Date: 29/01/2026

Sl. No.	Name	Occupation	Address / mobile no.	Signature
০১	মোঃ বেলায়েত	ব্যবসায়ী	01712618801	বেলায়েত
০২	মোঃ জহির হোসেন	ছেলে	01783600481	মোঃ জহির
০৩	মোঃ সাদ্দাম হোসেন	ছেলে	01733328060	মোঃ সাদ্দাম
০৪	মোঃ নিজাম খুলী	ছেলে	01727170038	মোঃ নিজাম
০৫	মোঃ খাকক হোসেন	ছেলে	01734230477	খাকক
০৬	মোঃ খলিলুর রহমান	ছেলে	-	খলিলুর
০৭	মোঃ ইসমাইল খলিফা	ছেলে	-	
০৮	মোঃ শাকিল হোসেন	ছেলে	01702164045	শাকিল
০৯	মোঃ জোবায়ের		01721233803	জোবায়ের
১০				

CEGIS Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)

Appendix C – National Legislation Relevant to Sectoral Development Activities

Issue	Legislation or Regulation	Brief description of the legislation
Protection of Environment including protected areas and pollution management	Environment Conservation Act-1995 (with amendments till 2010)	The ECA 1995, amended in 2010, covers environment conservation, standards development, pollution control and abatement, declaration of ecologically critical areas (ECAs) and imposing of restriction for operations within the jurisdiction of such areas, defining and conserving wetlands, hill cutting, ship breaking, and hazardous waste disposal. The 2010 amendment empowered the government to enforce more penalties than before. Moreover, affected persons were given provision for make objections or take legal actions against polluters or any entity creating a nuisance.
	Environment Conservation Rules- 2023 (including all amendments)	These rules, promulgated under the ECA 95, categories industries and projects and identify the types of environmental assessments needed for the categories, and established national environmental quality standards.
	Environment Court Act 2010)	The objective of this act is to expedite trials concerning environmental crimes. Previously, environmental crimes were not usually considered as serious offences. The act allows government to take necessary legal action against any parties who create environmental hazards/ damage to environmentally sensitive areas as well as human society. According to this act, government can take legal actions if any environmental problem occurs due to interventions of the River Management Improvement Programme.
	The Forest Act, 1927 (amended in 1982, 1989 and 2000)	This Act aims to protect forest resources and provides for reserving forests over which the Government has an acquired property right. It enables the restriction of many activities that may cause damage to forests and wildlife resources within forest areas and the imposition of punishment for violation. Relevant people are bound to inform and assist Forest or Police Officers to prevent crime in the forests.
	The Protected Area Rule 2017	This rule provides for the formation of Co-Management Committees for the management of Protected Areas. The Committees involve stakeholders including the resources users and especially ethnic people. It empowers the Committee to act as official actor for the protection of forests and collect revenue, and also provides for sharing of revenue to cover the recurrent costs of co-management. Recently introduced in Sundarbans.
	The Social Forestry Rule 2004	Provides regulation for plantation on marginal lands besides roads, canals, embankments and railways with the involvement of local residence as beneficiaries. The latter are given the majority of the harvested crops in return for their contribution to protect the seedlings planted. The rule allows tree firming funds from the sale proceeds of harvested plantation for replanting.
	Wildlife (Conservation and Security) Act-2012-	Provides for the conservation and safety of biodiversity, forest and wildlife of the country by repealing the Bangladesh Wildlife (Preservation) Order 1973 relating to conservation and management of wildlife of Bangladesh. Under this Act, hunting, trapping, killing, driving or damaging of wildlife are strictly prohibited.

Issue	Legislation or Regulation	Brief description of the legislation
	Bangladesh Biodiversity Act 2017	As a dualist country, Bangladesh requires implementing domestic legislation to give legal effect to the provisions of international treaties. The act was introduced 25 years after Bangladesh signed the Convention on Biodiversity in order to fulfil the State's international obligations. The law introduces an access and benefit-sharing (ABS) mechanism and also promotes research related to biotechnology and documentation of traditional knowledge.
	Noise Pollution Control Rules-2006	This Rules give a right to the respective authority to mark off the areas under their jurisdiction as silent, residential, mixed, commercial or industrial. Also describes the approved standard limit of sound for each area.
	Bangladesh Water Act- 2013	Makes provisions for integrated development, management, abstraction, distribution, use, protection and conservation of water resources.
	National River Protection Commission Act-2013	This act created the National River Protection Commission. It establishes composition, duties and responsibilities of the Commission to manage and control pollution of rivers caused by industries and construction of illegal structures, to prevent irregularities and restore the normal flow of rivers, to control floods and drainage, and monitor hydrology and use of surface and ground water; and examine equipment.
	The National River Conservation Commission Act, 2013	Established the Commission to prevent illegal occupation of rivers, pollution of water and environment, pollution of rivers caused by industrial factories, illegal constructions and various irregularities and ensuring multidimensional use of rivers for socio-economic development including restoration of the normal flow of rivers, proper maintenance thereof and making them navigable.
	Natural Water Bodies Protection Act 2000	According to this Act, the character of water bodies, i.e. rivers, canals, tanks, or floodplains identified as water bodies in the master plans or in the master plans formulated under the laws establishing the municipalities in division and district towns, shall not be changed without approval of concerned ministry.
	The Ground Water Management Ordinance (1985)	Describes the management of ground water resources and licensing of tube wells.
	The Water Supply and Sanitation Act (1996)	Regulates the management and control of water supply and sanitation in urban areas.
	Bangladesh Climate Change Trust Act 2010	An Act to establish a trust to be called the Climate Change Trust to redress the adverse impact of climate change on Bangladesh and to take measures on other matters relating thereto. The objective of the Trust is to use funds beyond the revenue and development budget to address vulnerability to climate change issues.
	The Ship Breaking and Recycling Rules-2011	The Rules promulgated under the ECA of 1995 (amended) defines and classifies hazardous materials (hazmats) (including hazardous wastes) and provides for safe and environmentally sound ship recycling in Bangladesh.
	Embankment and Drainage Act 1952	An Act to consolidate the laws relating to embankment and drainage and to make better provision for the construction, maintenance, management, removal and control of embankments and water courses for the better drainage of

Issue	Legislation or Regulation	Brief description of the legislation
		lands and for their protection from floods, erosion or other damage by water.
Agriculture and Fisheries	The Protection and Conservation of Fish Act 1950 (amended 1973, 1982, 1995, 2002)	The act sets requirements to protect and conserve fish. Defines fish as "all cartilaginous, bony fishes, prawn, shrimp, amphibians, tortoise, turtles, crustacean animals, molluscs, echinoderms and frogs at all stages in their life history."
	The Protection and Conservation of Fish Rules- 1985	The Rules focus on the protection of fisheries/fishes and aim to prevent the destruction of fish in the natural waters and killing of fish by poisoning.
	Private Fisheries Protection Act 1889	Provides for the protection of private fishing rights.
	Irrigation Act 1876	Makes provision for the construction, maintenance and regulation of canals, for the supply of water therefrom, and for the levy of rates for water so supplied, in Bangladesh.
	Marine Fisheries ordinance 1983 and Marine Fisheries Rules-1983	Covers fisheries conservation and management.
	Biosafety Rules-2012	Provide regulations on the approval process for biotech products developed domestically or by a third country. Requires all GE products to be approved before they can be imported or sold domestically within Bangladesh.
Toxic and hazardous substances	Agricultural Pest Ordinance 1962	An Ordinance to provide for the prevention of the spread of agricultural pests in Bangladesh.
	Agriculture and Sanitary Improvement Act 1920	Act to consolidate and amend the law relating to the construction of drainage and other works for the improvement of the agricultural and sanitary conditions.
	Drug Act 1940	An Act to regulate the import, export, manufacture, distribution and sale of drugs.
	Drug Control Order 1982	An Ordinance to control manufacture, import, distribution and sale of drugs.
	Poison Act 1919	An Act to consolidate and amend the law regulating the importation, possession and sale of poisons.
	Agricultural Pest Ordinance 1962	An Ordinance to provide for the prevention of the spread of agricultural pests in Bangladesh
	Pesticide Act-2018 and Pesticide Rules, 1985 (Amendment) in 2010	Bans harmful toxic substance which were earlier imported and used for pest control.
Land, land use and cultural heritage	Antiquities Act 1968	The Act focuses on protection and preservation of archaeological and historical artefacts.
	Acquisition and Requisition of Immovable Property Act, 2017	Repealed the Acquisition and Requisition of Immovable Property Ordinance 1982 and provides certain safeguards for the owners and has provision for payment of "fair value" for the

Issue	Legislation or Regulation	Brief description of the legislation
		property acquired. Also gives the right to the land owner to appeal against land acquisition.
	Balumahal and Soil Management Act 2010	This Act has the provision for protection of uncontrolled mining of sand from water ways and prohibits sand quarrying within a kilometer of bridges, culverts, dams, barrages, embankments, highways, rail tracks, residential areas and other important structures, as well as sand lifting without permission.
	Non-Agricultural Tenancy Act 1949- for land use	Makes provisions relating to the certain non-agricultural tenancies in Bangladesh.
	State Acquisition and Tenancy Act 1950-land use	Introduced to eradicate flaws and gaps in the provisions for collection and receiving of rents for land. It also declares forests and waterbodies as non-retainable properties.
	Acquisition of Waste Land Act 1950	This Act authorizes the government to acquire private lands that have not been cultivated during last five years, for any public purposes including afforestation.
	Land Reforms Ordinance 1984 Land use	Reformed the law relating to land tenure, land holding and land transfer with a view to maximizing production and ensuring a better relationship between land owners and bargadars (people who cultivate the land for others).
Water Transportation, handling and storage, pollution and coastal resources management,	Territorial Water and Marine Zone Act 1974 & Maritime Rules- 1977	Provide guidelines for transportation through marine and inland water ways and control of pollution in the surrounding waterways, and for the conservation, management and development of marine fisheries.
	Ports Act- 1908	The Act has guidelines for controlling pollutant discharges (oil, grease, oily water, bilge and ballast water, rubbish etc.), creation of fires, creation of obstacles for navigation and spread of infectious diseases in the surrounding environment or damage of shore/bank.
	Hazardous Wastes and Ship Breaking Waste Management Rules, 2011 (22 December, 2011; MoEF)	The legislation is premised on the Basel Convention. It bars the import of wastes if ships are not certified by authorized agents of exporting countries as not containing hazardous wastes; provides regulations for safe disposal of hazardous waste. Implementation through an emergency response plan Implementation is the responsibility of a National Technical Committee under MoEF.
	The removal of wrecks and obstructions in inland navigable water-ways Rules, 1973	The Rules has provision to take action against any obstruction created in the water ways. The wreck or obstruction can be required to be raised, removed or destroyed.
	Bangladesh Merchant Shipping Ordinance- 1983	The Act provides for the engagement of seaman during project activities.
	The inland shipping Ordinance-1976	The law makes provision for BIWTA to issue a permit for navigation.
	Coast Guard Act 2016	The Act makes provisions to control pollution discharges and protect the surrounding environment.
	Rules for Removal of Wrecks and Obstructions in	The Rules apply to inland navigable waterways, including all rivers, canals, lakes, shores, inland river ports, piers and terminals (as per Section 2, clause I) and deal with any kind of

Issue	Legislation or Regulation	Brief description of the legislation
	inland Navigable Water Ways (1973)	obstruction and all wrecks (as per Section 2, clause IV) impeding navigation. The appointed Authority may dispose, remove or destroy obstructing items or even take possession of them and issue a public notice in this regard.
	Canals Act 1864	This old law in need of amendment and consolidation. It covers the collection of tolls on canals and lines of navigation.
	Inland shipping Ordinance 1976	An Ordinance to provide for the survey, registration and control of navigation of vessels plying on inland waters.
	Mongla Port Authority Ordinance- 1976	The legislation enables the controlling, anchorage and sailing of ships and provides guidelines for environmental pollution control in the surrounding sea and land environment.
Road transportation	The Vehicle Act (1927) and the Motor Vehicles Ordinance (1983)	This Act provided for the better control of horse-drawn vehicles in certain areas in Bangladesh. The Ordinance consolidated and amended the law relating to motor vehicles in Bangladesh. These laws regulate vehicular exhaust emissions, air and noise pollution including road safety.
Power generation, energy, mining, industry and utilities	Electricity Act, 2018	The Act repealed a 2010 law relating to the supply and use of electrical energy. The 2018 Act specifies conditions of distribution, sale and use of electricity, including related generation and transmission infrastructure, and obligations regarding the need for preservation of the environment, and associated protection and safety clauses.
	Bangladesh Energy Regulatory Commission Act- 2003	Makes provisions for the establishment of an independent and impartial regulatory commission for the energy sector.
	The Telegraph Act (Act XIII of 1885)- 1885	Sections 10-19 specify parameters and obligations for government-built transmission lines throughout the country.
	NG Safety Rules 1991 (amended 2003)	Provides guidelines on the materials, design and construction of gas transmission and pipeline industry. This Safety Rules were based on the American National Standard Codes for Gas Transmission and Piping System.
	Bangladesh Petroleum Act 1974	Provides for the exploration, development, exploitation, production, processing, refining, and marketing of petroleum.
	Petroleum Act 2016	An Act to consolidate and amend the law relating to the import, transport, storage, production, refining, blending, or reclaiming by recycling of petroleum and other inflammable substances. This Act, consisting of six Chapters, regulates petroleum import, transport, storage, distribution, refining, blending, testing, licensing and all aspects related to petroleum exploitation.
	Bangladesh Gas Act 2010	Regulates the transmission, distribution, marketing, supply and storage of natural gas and liquid hydrocarbon.
	NG Safety Rules 1991 (amended 2003)	Provides guidelines on the materials, design and construction of gas transmission and pipeline industry. This Safety Rules were based on the American National Standard Codes for Gas Transmission and Piping System.
	Brick Manufacturing and Brick Kiln Establishment (Amendment) Bill 2019	The proposed law (passed by parliament in February 2019) is a modified version of the 2013 Act and will prohibit conventional technologies in the brick-making industry.

Issue	Legislation or Regulation	Brief description of the legislation
	Speedy Increase of Electricity & Fuel (Special Provision) 2010	An Act to make special provisions for facilitating effective and urgent measures to enhance the generation, transmission, transportation and marketing of electricity and energy with a view to ensuring uninterrupted supply of electricity and energy keeping pace with the demands of agricultural, industrial, commercial and domestic activities, and for quick implementation of the plan to import electricity and energy from abroad, if necessary, and for implementation of the decisions on urgent extraction and utilization of minerals related to energy.
	SREDA Act 2012, Renewable energy Act-2012	Sustainable and Renewable Energy Development Authority (SREDA) has been formed under Sustainable and Renewable Energy Development Authority Act, 2012 as a nodal agency to promote, facilitate and disseminate sustainable energy (SE), i.e. covering both the areas of Renewable Energy (RE) and Energy Efficiency (EE) to ensure the energy security of the country.
	BEZA Act 2010	An act to make provisions for the establishment of economic zones in all potential areas including backward and underdeveloped regions and development, operation, management and control thereof including the matters ancillary thereto with a view to encouraging rapid economic development through increase and diversification of industry, employment, production and export.
	Bangladesh Electricity & Energy Research Council Act 2015	This Act created the Bangladesh Energy and Power Research Council. It prescribed the composition, duties and responsibilities of the Council regarding research and development of the country's power and energy sector. It specifies the authorized use of electricity and fuel diversification for the identification, conservation and conversion of energy to ensure the safety of the power and energy sector in the country with a view to long-term planning study of the sector.
	Mines Act 1927	The Act focuses on mineral resources development and management. It requires amending and consolidation regarding the regulation and inspection of mines.
Procurement in Bangladesh	The Public Procurement Regulations- 2003 (and all amendments)	The regulation focuses on each of the project services and equipment which will be procured following the government rules.
	Import and Export Control Act-1950	The Act outlined guidelines on the export and import of goods. The Government may prohibit, restrict or otherwise control the import or export of goods of any specified description, or regulate generally all practices (including trade practices) and procedures connected with the import or export of such goods.
Health and Safety and labor management	The Penal Code 1860	The Code contains still valid provisions relating to pollution management, environment protection, and protection of health and safety.
	Dangerous Cargoes Act 1953	The Act provides for guidelines for cargos to avoid any discharges of hazardous materials in the surrounding water ways and adjacent land.
	Explosives Act 1884, Explosive Rules-2008.	An Act to regulate the manufacture, possession, use, sale, transport and importation of Explosives.

Issue	Legislation or Regulation	Brief description of the legislation
	Pressure Vessel Rules 1995 (amended 2004)	The Rules provide the safety requirements for units handling divergent types of hazardous materials.
	Explosive Substances Act 1908 and Explosive Substances (Amendment) Act, 1987.	This amendment act imposed a penalty for causing an explosion with intent to commit an offense, and punishment for exploding, making or possessing explosives under suspicious circumstances.
	Fire Prevention and Extinguish Act, 2003	The Act has provisions for controlling and prevention of fire and accidental events.
	Bangladesh Labour Act 2006 and Bangladesh Labour (Amendment) Act, 2013.	The 2013 amendment makes a large number of changes to the 2006 Act. It provides regulations that aim to protect the interests and rights of the workers, provision for a comfortable working environment, reasonable working conditions, and to ensure workers' safety and wellbeing during project life cycles. In addition, it stipulates that children under 18 years are not allowed to be employed during project life cycle.
	Bangladesh Labour Rules 2015	The Rules require that any establishments which want to employ labor must have service rules and must get permission from the Chief Inspector of Labour. The Manpower Supply Agency is registered under the Labour Act. The Rules prescribed the process for investigating misconduct. They also cover festival bonuses, provident fund, holidays, health and fire safety, calculating wages, a form for use in labour court cases, and approval of factory plans and extensions.

Appendix D - Legal Instruments Concerned with Pollution

Environmental pollution issues	Legal instruments	Remarks
Gaseous emissions; Noise; Liquid and solid wastes discharges to the surrounding environment may ultimately impact natural resources. Accidental events or unplanned events which may create catastrophic conditions and cause damage/degradation of the natural environment.	ECA (1995) and ECR (2023) including related all amendments Noise Pollution Control Rules (2006) Forest Act (1927) and all amendments Wildlife Act (2012) Relevant WB guidelines.	Schedules 1-14 of the ECR (2023) have been established to regulate uncontrolled emissions and discharges Schedule of Noise Pollution Control Rules (2006). Where there are no GOB regulations, WB guidelines apply.

Appendix E - International Conventions, Treaties and Protocols

Sector	International convention, treaty or protocol	Description	Date Ratified	Date Entered into Force
Environment and biodiversity, environmental pollution	Convention on Biological Diversity (1992)	Requires signatories to develop national strategies (National Biodiversity Strategy and Action Plan) for the conservation and sustainable use of biological diversity.	03-05-1994	29-12-1993
	Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington 1973) – also known as CITES	Addresses the exploitation patterns and overharvesting that threaten species of flora and fauna. Under this Convention, the governments agree to restrict or regulate trade in species that are threatened by unsustainable patterns and to protect certain endangered species from overexploitation by means of a system of import/export permits.	20-11-1981	01-07-1975
	The International Plant Protection Convention (IPPC), 1951	Aims to secure coordinated, effective action to prevent and to control the introduction and spread of pests of plants and plant products.	01-09-1978	-
	Kyoto Protocol (1997)	Commits its Parties to set internationally- binding emission reduction targets. This agreement is linked to the UNFCCC.	22-10-2001	16-02-2005
	United Nations Framework Convention on Climate Change (UNFCCC), 1992	Aims to achieve stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level low enough to prevent dangerous anthropogenic interference with the climate system.	Adopted in 1992 and enforced from 15-04-1994	15-04-1994
	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)	Aims to reduce the amount of waste produced by signatories and regulate the international traffic in hazardous wastes.	01-04-1993	05-05-1992
	Convention on Wetlands of International Importance (Ramsar, 1971).	Provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.	21-09-1992 (ratified)	1971
	Convention on the Conservation of Migratory species of	Aims to conserve migratory species within their migratory ranges.	01-12-2005 (ratified)-	1979 and enforced in 1983

Sector	International convention, treaty or protocol	Description	Date Ratified	Date Entered into Force
	wild Animals (Bonn 1979)			
	Vienna Convention for the Protection of the Ozone Layer (Vienna, 1985)	A framework for efforts to protect the globe's ozone layer by means of systematic observations, research and information exchange on the effects of human activities on the ozone layer and to adopt legislative or administrative measures against activities likely to have adverse effects on the ozone layer.	02-08-90 (ratified).	1985
	Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal, 1987).	Designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion.	02-08-1990	1987
	London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (London, 1990. Copenhagen Amendment).	-	18-03-1994	1990
	International Convention on Oil Pollution Preparedness, Response and Cooperation (London, 1990.)	Parties are required to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries.		Signed 30-11-1990 and enforced from 13-05-1995
	Convention on persistent Organic Pollutants, Stockholm-2001	Aims to eliminate or restrict the production and use of persistent organic pollutants (POPs).	12-03-2007	2001 and effective 2004
Nuclear pollution	The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency is a 1986 treaty of the International Atomic Energy Agency (IAEA)	Parties agreed to provide notification to the IAEA of any assistance that they can provide in the case of a nuclear accident that occurs in another state that has ratified the treaty.	1988	1986
Aquaculture and Fisheries	Agreement on the Network of Aquaculture Centres in Asia and the Pacific (Bangkok, 1988.)	Recognizes the importance of fisheries in the Asia Pacific region, that aquaculture plays a vital role in the promotion and better use of fishery resources and that the	15-05-90	1988

Sector	International convention, treaty or protocol	Description	Date Ratified	Date Entered into Force
		maintenance of a network of aquaculture centres in the region can make a significant contribution to the development of aquaculture.		
Land degradation	UN Convention to Combat Desertification (UNCCD) 1994	A legally binding international agreement linked to sustainable development. It addresses most vulnerable ecosystems and peoples living in the dryland area.	1995	1994
Cultural and natural heritage	Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972)	Defines and provides for the conservation of world`s heritage by listing the natural and cultural sites whose value should be preserved.	03-11-1983	23-11-1972
Sea, maritime safety and marine pollution	International Convention for the Safety of Life at Sea (SOLAS), 1974 (amended)	Specifies minimum standards for the construction, equipment and operation of ships, compatible with their safety.	04-11-2002	25-05-980
	United Nations Convention on the Law of the Sea (Montego Bay, 1982.)	Provides guidance on ship-based pollution control and management	1982	1982
	The International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78, The current convention is a combination of 1973 Convention and the 1978 Protocol, which entered into force on 2 October 1983.	Includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations	04-11-2002	02-10-1983
	International Convention on Standards of Training, Certification and Watch keeping for Seafarers (STCW), 1978	Prescribes minimum standards relating to training, certification and watch keeping for seafarers which countries are obliged to meet or exceed.	1984	Entered into force in 1978
	International Convention for the Prevention of Pollution of the Sea by Oil (London, 1954 (as amended on I I	Applies to all ships, except tankers of under 150 tons' gross tonnage and other ships of under 500 tons' gross tonnage, registered in the territory of, or having the nationality of, a Party. Naval ships and ships engaged in	28-12-1981	Entered in 1954 and amended in 1962 and in 1969

Sector	International convention, treaty or protocol	Description	Date Ratified	Date Entered into Force
	April 1962 and 21 October 1969.)	whaling are excepted (art. 2). Discharges are prohibited, except when a ship is proceeding enroots or when the instantaneous rate of discharge does not exceed 60 litres per mile.		
Women affairs	Convention on the Elimination of Discrimination against Women (CEDAW), 1984	-	2000	1984

Appendix F - Outline of the Thematic Baseline Papers

SL	Topics of Thematic Baseline Papers	Scope of Paper (Beyond the common sections)
1	Climate and climate change	• Baseline climate of project area and related issues; • Review of evidence for climate change, trends, projections; • Climate change scenarios; • Potential climate change impacts; • Adaptation and mitigation measures.
2	Pollution and waste	• GHG emissions; • Pollution: air, water, soil, noise – impacts and futures scenarios; • Waste and waste management – municipal, rural, industrial, agricultural, e-waste, wrecked, cars, waste oil, plastics, hazardous waste (e.g. obsolete pesticides) and recycling.
3	Delta morphology, river dynamics, floods and water management	• Hydrological setting: river system, freshwater, water levels, tidal and drainage characteristics, future projections; • Morphological setting: river planform analysis, coast line changes, sedimentation, projections for erosion/accretion; • Natural disaster: floods, cyclones, tidal surges; • Development of water infrastructure; • Present and future risks; • Future plans to mitigate potential risks.
4	Land resources	• Physical conditions: geography, physiography, land types, geology, hydro-meteorology; • Agro- and bio-ecological regions and land cover; • Soils; • Land resources management practices: agriculture, fisheries, forestry; • Major challenges;
5	Ecosystem and wildlife conservation	• Landscapes; • Protected areas and sanctuaries; • Flora and fauna; • Management of the existing ecosystems; • Extraction of resources; • Challenges and issues.
6	Tourism	• Status of tourism industry: major attractions and spots; facilities; limitations of sector development; visitor numbers and capacity; community involvement, culture tourism; • Development potential/future prospects for tourism: ecotourism, cultural tourism, archaeological & historical tourism, riverine & rural tourism; • Impacts of COVID-19 on tourism.
7	Fisheries, agriculture and other land uses	• Land use data; • Determinants of land use; • Land use policy; • Agriculture; • Forestry; • Fisheries;

SL	Topics of Thematic Baseline Papers	Scope of Paper (Beyond the common sections)
		• Cities, towns and settlements; • Land use change and its impacts.
8	Infrastructure	• History & background information on infrastructure and communications; • Current infrastructure estate and trends (2011-2020); • Road transport; • Water transport: inland water ways, navigation and shipping; • Communications; • Other infrastructure; • Summary of five-year and two-year plans; • Projections for transport sub-sectors; • Mega projects.
9	Power and energy	• Basic information: energy sources, consumption, production, infrastructure (power plants and networks), indicators, impacts, accidents, etc.; • Outlook: projections of energy production and consumption; intended new power plants, networks, pipelines etc.; • Air pollution (current status and outlook); • GHG emissions (current status and outlook).
10	Urbanization	• Background; • Cities and towns, functions and services: locations; land uses; • Trends and challenges: area & population; urbanization and land use changes; urbanization trends; key issues; waste management; air quality; transport; • Impact of urbanization; • Ongoing and proposed projects related to urbanization.
11	Economic and industrial development in the project area	• State of the economy: employment; food security; exports/imports; prices; incentives; • Taxation and subsidy policies; • Economic activities: industries, SMEs; transport; agriculture; forestry; fishing; services; tourism; mining; shipping; etc. – and impacts; marketing; • Development of Special Economic Zones; • Labour and employment opportunities and co-operatives; • Challenges in economic and industrial development.
12	Social issues and challenges	• Population; • Education; • Livelihoods; • Health; • Gender perspectives and children; • Culture, heritage and traditional knowledge; • Conflict, contestations, power structure; • Security, law and order situation.
13	Institutional governance	• Background to institutional governance; • Central, regional and local government institutional hierarchy; • Governance of environmental assessment; • Major governance issues; • Relations between government and other organizations; • Institutional capacities.

Appendix G - Field Trip Observations

G-1 Landform, Soil, and Agriculture:

The planning area mainly falls under the Ganges Tidal floodplain which is at risk of being affected by sea level rise due to climate change. Forests in the planning area are mostly are reserved areas.

G-2 Hydrology and Environmental Characteristics

Diverse flora and fauna occur in the area but are being affected by over exploitation, deforestation, inefficient forest management, agriculture and industrial pollution. Main crops of the area are rice, wheat, jute, pulses etc. The Upazilas are also crisscrossed by numerous rivers and contains large number of pond areas.

G-3 Basic Services

There is a disparity between urban and rural areas of Patuakhali and Barguna district. Most households have kutcha houses and water sources are tap, tube-well and others. According to census data of 2011, the Upazilas are mainly served by Tube-Well for the purpose of drinking water in both urban and rural areas. Both these areas suffer from inadequate toilet and health facilities.

G-4 Vulnerabilities and Challenges

People in the Payra-Kuakata region live in an extremely dynamic estuarine environment facing such threats as: cyclone and storm surge, land erosion, flood, drainage congestion, salinity intrusion, drought, tectonic process and deteriorating coastal ecosystems. Besides, there are threats of climate change and upstream effects, and water uses. These threats affect almost every aspect of life and limit people's livelihood choices.

These vulnerabilities create a context of insecurity, which in turn, discourage investments, limit economic activities and squeeze employment opportunities. An effective disaster warning system is being developed and comprehensive disaster management program (CDMP) is being implemented. Agricultural activities suffer greatly by different degree of water and soil salinity as well as lack of safe drinking water. The water supply sector has achieved commendable success over the last few decades; overall about 95 percent of the population now has access to water from tube-wells, taps or ring-wells.

The coastal zone of Bangladesh experiences extensive ecosystem degradation. Some of the interventions to cause degradation are drainage for agriculture; dredging and canalization for navigation; conversion of land for aquaculture, commercial, industrial or residential purposes; construction of dykes for flood control and irrigation and other structures; discharge of pesticides and herbicides; disposal of solid waste, domestic and industrial waste; agricultural runoff and sedimentation ; hydrological alternation by canals; building of roads and other structures; and subsidence due to extraction of groundwater.

G-5 Socio-Economic Facilities

A key problem is the disparity among the Upazilas in terms of service facilities. In this study the need for a facility has been determined based on population threshold for that facility. The facilities have been broadly categorized into four groups:

- Educational: Primary schools, high schools, and Madrashas.
- Commercial: Growth Centres and Rural Markets.
- Health: Upazila Health Complexes/Hospitals, Family Welfare Centres, Community Clinics.
- Disaster management: Cyclone Shelters.

G-6 Land Use Suitability Analysis for Urban and Infrastructure Development

In the present study, several suitability analyses have been done considering different impacts and every suitability analysis has been sub categorized into logical sub parameters observing its extent. The major suitability analyses are outlined below:

- Agricultural Suitability;
- Hydro-Geological Suitability;
- Flood Depth Analysis;
- Urban Land Use Suitability;

Urban Suitability analysis was done after taking into consideration the suitability analysis mentioned above, and a composite land use/infrastructure suitability map was being prepared based on various types of suitability analysis. According to the map, most of the area is moderately suitable (approx. 33.31%) to poorly suitable (approx. 35.35%) for infrastructure development.

G-7 Development Potentials of the Upazilas

A union level multi-criteria analysis shows the potential areas for development and the criteria are: road length in the union, structure frequency in the union, number of various socio-economic facilities available in the union, and population size of the union. By combining these criteria, an index value was developed and based on the index values, 14 unions or pourashavas were found to be of high development potential. 18 pourashavas or unions were found to have moderate potential for development. A further analysis was performed to identify the potential location for eco-town development. All eco-towns should comply with planning policy statements including those relating to sustainable development such as: climate change adaptation, pollution control, open space, biodiversity, transport, and flooding, housing and economic development. Excluding Payra Port area and 10-minute walking distance buffer area, the following suitable areas have been identified for various sectors.

G-8 Tourism Development

Payra-Kuakata region has substantial tourism potential, due to unique flora and fauna and panoramic views. Forests, beaches, lakes and rivers make the region suitable for ecotourism development. Based on various locations that could be attractive for tourists, a composite tourist zoning map has been prepared that identifies 13 zones which have important characteristics that may attract tourists both domestic and international. Three of these locations are attractive because of high quality beaches, five have a combination of forest and char (small island) and another five have both beach and mangrove forest. For proper development of these zones

recommendations have been made for provision of adequate and proper Tourist Service Infrastructure for attracting local and international tourists.

G-9 Transportation System Development

Promoting tourism and enhancing socio-economic and infrastructural development, requires a transportation network and regional connectivity. The transportation model suggests that the proposed land use change will significantly increase vehicular movement in the future scenario. Expansion of the road network is needed to handle the future traffic demand and thus reduce congestion whilst also enabling reasonable operating speeds. Recommendations have also been made for improving the water transportation system by addressing the problems related to (i) siltation, (ii) day & night navigational problems, (iii) shortage of passenger & cargo handling facilities including transit shed at river ports, (iv) Presence of manual loading/unloading of cargo at river ports, (v) underdeveloped rural launch landing stations, inadequate number of watercrafts etc.

G-10 Payra Port Development and its Impacts in the Region

The Payra Port Authority and the port were established on 19 November 2013 through the Payra Sea Port Act 2013, started commercial operations from August 2016 under the port authority. Payra deep seaport is still under construction. It is situated in the Southern part of Bangladesh, in Patuakhali District's Kalapara Upazila. The port and related facilities (airport, free trade zone etc.) would employ about 13,000 people in different sectors. Total employment (direct and indirect) in the new township adjacent to the port may be 43,550 with a total population of about 1,26,000.

G-11 Economic Growth Potential of Upazilas

Taltali Upazila has grown substantially since 2003 with the second highest percentage increase in employment (116%) - faster than other Upazilas. The Education sector has the greatest number of employees indicating this sector serves people coming from outside the region. From the shift-share analysis, it was found that only Amtali upazila can be considered fast-growing in terms of regional growth. Other Upazilas are lagging the national growth. All the Upazilas are found to be slow-growing in terms of industry Mix (IM).

G-12 Strategies for Regional Development

Mitigating Natural Disasters

In order to address the increasing risks pertaining extreme events due to climate change such as cyclone, storm surge, coastal flood, windstorm etc., a substantial public investment program is required. The purpose is to create resilient infrastructure, including drainage and flood control, water supply, sanitation, cyclone shelters, emergency access roads and bridges, slum improvements, bus terminals, boat landings, and markets. All the projects selected for such programme should be assessed considering effects of climate change based on agreed technical criteria and climate projections for 2040. Institutional capacity to integrate climate and disaster risks into urban and regional planning and infrastructure management also need to be addressed. The priority investment program for mitigating natural disasters and ensuring safety and protection of the coastal population should focus on the following: Coastal embankment construction and rehabilitation, flood control and drainage, and infrastructure and urban services.

Integrated Development of the Region

The Payra-Kuakata region includes environmentally sensitive areas which need protection from harmful human intervention. At the same time, development activities are also needed for poverty reduction and livelihood improvements - which requires formulation and enforcement of an integrated development plan. The focus areas are: Management of the coastal environment including its protection and regeneration, management of the water resources, facilitating sustainable economic development of coastal communities, development of productive economic activities, development of infrastructure, and development of social facilities including education, health, water and sanitation, mitigation of natural disasters.

Investment and Implementation

For the development of the coastal zone, two sectors – tourism and fisheries, are identified where investments in projects can be done. For investment, among others mitigation measures, environment management and water resource management, should be prioritized. Implementation of these strategies require the support of national and local government budgets, private investment (including foreign investment), NGO program resources, and multilateral and bilateral donors.

The tabulated summary of field findings is presented in **Table G-1**

Table G-1: Field Findings of Ecology and Ecosystems

<table>
<tr><th>Plans</th><th>Facilities Development (Plans and programmes)</th><th>Major concern on Ecological Resources</th><th>Triggered Policies</th></tr>
<tr><td rowspan="4">Socio-economic conditions development</td><td>Educational institution</td><td rowspan="4">• Wetland filling and squeezing due to land development for educational institution, health centers, growth centers and markets;
• Habitat encroachment for wildlife;
• Aquatic habitat degradation due to spillage of solid and liquid waste from growth centers and markets;
• Disturbance to wildlife due to noise from growth centers and markets;
• Lighting effects to nocturnal animals;</td><td>Wetland Policy 1998</td></tr>
<tr><td>Health centers</td><td>National Water Policy 1999</td></tr>
<tr><td>Growth centers and markets</td><td>Bangladesh Water Act, 2018</td></tr>
<tr><td>Cyclone shelters</td><td>Wildlife (Conservation and Security) Act, 2012</td></tr>
<tr><td rowspan="6">Regional landuse development</td><td>Commercial area development</td><td rowspan="6">• Mangrove forest degradation for construction of parks and recreation sites;
• Inland vegetation damage and habitat conversion for commercial and residential area development;
• Wetland reshaping, filling and squeezing for commercial or residential area development, parks and recreation sites construction;
• Encroachment of wildlife habitat for land development;</td><td>National Environment Management Action Plan (NEMAP, 1995)</td></tr>
<tr><td>Residential area development</td><td>National Environment Policy, 1992</td></tr>
<tr><td>Agricultural zone</td><td>National Agri-policy-1999</td></tr>
<tr><td>Park and recreation</td><td>National Environmental Policy (2018)</td></tr>
<tr><td>Wetlands</td><td>National Forest Policy-1994</td></tr>
</table>

Plans	Facilities Development (Plans and programmes)	Major concern on Ecological Resources	Triggered Policies
	Rural settlement	• Aquatic habitat degradation due to spillage of solid and liquid waste from residential, commercial and park areas; • Disturbance to wildlife due to noise and lighting commercial areas, parks and recreation sites;	• Wetland policy - 1998 • National Land-use Policy 2001 • Wildlife (Conservation and Security) Act, 2012
Tourism development	Transportation	• Mangrove vegetation damage due to tourist facilities establishment; • Disturbance to wildlife due to noise and lighting from tourist spots; • Disturbance to nocturnal birds for excess lighting from security post and hotels; • Aquatic habitat degradation due to spillage of solid and liquid waste from tourist spots; • Management of waste and environmental degradations for ensure environmental safeguards;	Wildlife (Conservation and Security) Act, 2012
	Utilities		Noise Pollution (Control) Rules, 2006
	Accommodation		National Environmental Policy (2018)
	Marketing and management		-
	Safety and security of tourists		-
	Environmental safeguards		-
Transportation	Road network development	• Habitat conversion for land development of roads; • Wetland encroachment and squeezing for road construction; • Disturbance to dolphins due to underwater noise during dredging of navigation route; • Risk of collision of dolphins with water vessels • Aquatic habitat degradation due to spillage of oil and grease from the water vessels;	Wildlife (Conservation and Security) Act, 2012
	Navigation route development		• The Inland Water Transport Authority Ordinance, 1958 • Bangladesh Water Act, 2018
Payra port development	Port navigation development	• Temporary disturbance to dolphins while dredging of the channel; • Terrestrial habitat conversion for connecting road and railway construction, warehouse and terminal development; • Degradation of mudflats for construction of jetty, terminals and shipyard; • Wetland encroachment and squeezing for airport, railway and connecting road construction and development;	Wildlife (Conservation and Security) Act, 2012
	Warehouse development		National Environmental Policy (2018)
	Terminals development		Bangladesh Water Act, 2018
	Jetty development		-
	Four lane connecting roads		-
	Airport development		-
	Railway network		-
	Exclusive economic zone		-

Plans	Facilities Development (Plans and programmes)	Major concern on Ecological Resources	Triggered Policies
	Power plant development	• Aquatic habitat degradation due to spillage of solid and liquid waste from maritime vessels; • Aquatic habitat degradation due to spillage of warm water from power plant and ballast water from maritime vessels;	-
	LNG terminals		-
	Shipyards		-
Payra Development Authority and integrated Development	Beach conservation	• Habitat conservation for shorebirds and red crabs due to beach conservation; • Ensure habitats for water dependent birds and amphibians due to conservation of depressions and mangroves; • Risk of encroachment of mangrove forest for tourism center development or expansion of forest-based tourism; • Degradations of mudflats and shorebird habitat for tourist movements along the island peripheries;	National Environment Policy - 2018
	Depression area conservation		Wildlife (Conservation and Security) Act, 2012
	Mangroves conservation		Bangladesh Water Act, 2018
	Existing urban area		-
	Urban Promotional area		-
	Port centric urban zone		-
	Eco town		-
	Rural growth center		-
	Tourism center development		-
	Island based tourism		-
	Forest based tourism		-
	Agricultural zone development		-

Agriculture

The detailed field findings on agriculture are presented in **Table G-2.**

Table G-2: Field Findings of Agriculture

Plans	Facilities development (Plans and programs)	Major concern on Agricultural Resources	Triggered policies
Socio-economic conditions development	Educational institution	• Crop damage due to development work; • Agricultural production loss due to Agricultural land acquisition for development work; • People are concern about crop marketing (farmers and DAE officials are mainly concern about middle-man) but have no idea about food processing	• National Agriculture Policy, 2018 • Agricultural Extension Policy, 2015 (draft) • Integrated Minor Irrigation Policy, 2017 • Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 • National Seed Policy, 1993 [EXCLUDED]
	Health centers		
	Growth centers and markets		
	Cyclone shelters		

Plans	Facilities development (Plans and programs)	Major concern on Agricultural Resources	Triggered policies
		(juice from water melon and Mung bean processing for ready to cook); • Development of Irrigation facilities at community level with proper drainage system;	
Regional land use development	Commercial area development Residential area development Agricultural zone Park and recreation Wetlands Rural settlement	• Existing cropping pattern and distribution of single, double and triple crop land; • Land types with crop suitability; • Soil quality and water quality (irrigation purpose); • Existing agro-farming system (if present); • Existing Irrigation facilities and drainage system;	• National Agriculture Policy, 2018 • Agricultural Extension Policy, 2015 (draft) • National Land Use Policy, 2001 • National Integrated Pest Management Policy, 2002 • Integrated Minor Irrigation Policy, 2017 • Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 • National Seed Policy, 1993 [EXCLUDED]
Tourism development	Transportation Utilities Accommodation Marketing and management Safety and security of tourists Environmental safeguards	• Agricultural production loss due to Agricultural land acquisition for tourism development work; • Flower or ornamental crops cultivation may increase;	• National Agriculture Policy, 2018 • Agricultural Extension Policy, 2015 (draft) • Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 • National Seed Policy, 1993 [EXCLUDED] • Bangladesh Second Country Investment Plan Nutrition-sensitive food system, 2016-2020
Transportation	Road network development Navigation route development	• Lack of Modern agro-transportation system (considering perishability of crops); • Need development of water transportation system for agro-products like fertilizer, pesticides, insecticides, seeds etc.;	• National Agriculture Policy, 2018 • Agricultural Extension Policy, 2015 (draft) • Integrated Minor Irrigation Policy, 2017 • Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 •
Payra port development	Port navigation development Warehouse development	• Crop damage due to development work; • Agricultural production loss due to Agricultural land	• National Organic Agriculture Policy, 2016 • National Agriculture Policy, 2018

Plans	Facilities development (Plans and programs)	Major concern on Agricultural Resources	Triggered policies
	Terminals development Jetty development Four lane connecting roads Airport development Railway network Exclusive economic zone Power plant development LNG terminals Shipyards	acquisition for development work; • Export quality crop production may increase like Organic crop production, Safe vegetable production etc.; • Agro-food processing industry may stablish like water melon juice processing industry, pulse (Mung bean) processing industry etc.; • High value crop production may take place;	• Agricultural Extension Policy, 2015 (draft) • Integrated Minor Irrigation Policy, 2017 • National Integrated Pest Management Policy, 2002 • Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 • National Seed Policy, 1993 [EXCLUDED]
Payra Development Authority and integrated Development	Beach conservation Depression area conservation Mangroves conservation Existing urban area Urban Promotional area Port centric urban zone Eco town Rural growth center Tourism center development Island based tourism Forest based tourism Agricultural zone development	• Existing cropping pattern and distribution of single, double and triple crop land; • Land types with crop suitability; • Soil quality and water quality (irrigation purpose); • Existing Irrigation facilities and drainage system; • High value crop production may take place; • People are concern about crop marketing (farmers and DAE officials are mainly concern about middle-man) but have no idea about food processing (juice from water melon and Mung bean processing for ready to cook); • Agro-food processing industry may stablish like water melon juice processing industry, pulse (Mung bean) processing industry etc.;	• National Agriculture Policy, 2018 • National Organic Agriculture Policy, 2016 • Agricultural Extension Policy, 2015 (draft) • National Integrated Pest Management Policy, 2002 • Integrated Minor Irrigation Policy, 2017 • Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012 • National Seed Policy, 1993 [EXCLUDED] • Bangladesh Second Country Investment Plan Nutrition-sensitive food system, 2016-2020 • National Land Use Policy, 2001

Water Resources

The detailed field findings on water resources are presented in **Table G-3.**

Table G-3: Field Findings of Water Resources

Plans	Facilities development	Water resources	Related Policy
Socio-economic conditions development	Educational institution	• Land reclamation, if required for this development, can lead to canal filling which play a vital role in agricultural sector; • Socio-economic development will attract people to migrate and thus the navigation routes of the surrounding rivers are likely to be damaged due to frequent use and may need dredging or other sorts of rehabilitation; • The developments can be located on the floodplains, if so; it is likely to cause lowering the conveyance capacity of the rivers just by occupying the floodplain area. After all, making room for the river is essential; • The reduction of the conveyance capacity can result in lesser discharge into the river, which will eventually cause salinity intrusion into the water resources; • During monsoon, water level is likely to increase if the cross-sectional area of the river or canal is incapable to withstand the additional amount of flow; • Indiscriminate use of the limited existing water resources;	National Water Policy (1999)
	Health centers		Coastal Zone Policy (2005)
	Growth centers and markets		Bangladesh Water Act (2013)
	Cyclone shelters		-
Regional landuse development	Commercial area development	• Groundwater table depletion may occur if it is used by both the commercial or residential area without any management plan for adequate distribution; • Keeping balance in water supply is likely to be difficult if both commercial and residential developments are located close to each other; • Agricultural zoning may cause some of the existing Water Control Structures ineffective and obsolete; • Occasional heavy precipitation can make the draining mechanism more difficult in commercial zone and thus can cause urban flood for days; • Water based recreational facilities can make more eddies in rivers and then wave propagation breaking at the banks lead to bank erosion; • Wetland reshaping can cause hindrance in groundwater recharge process. Wetland can also attenuate flood. Therefore, reshaping the wetlands for rural settlement can lead to floods with increased duration;	National Water Policy (1999)
	Residential area development		Coastal Zone Policy (2005)
	Agricultural zone		Bangladesh Water Act (2013)
	Park and recreation		-
	Wetlands		-
	Rural settlement		-

Plans	Facilities development	Water resources	Related Policy
Tourism development	Transportation	• Tourism development can hamper the ongoing projects of coastal revetment construction; • Beach erosion can occur and can result in the need for beach nourishment; • Disturbed wave action can cause adverse effect on the beach morphology by causing net movement of the sediment up the beach, steeping the beach profile; • Planform of the shoreline can change unfavorably with such developments; • Deposited sediment pattern of the beaches can be altered; • If beach morphology gets disturbed, dissipation of wave energy along the coast will be disturbed too and thus, it can devour coastal settlements or protective works;	Coastal Zone Policy (2005)
	Utilities		-
	Accommodation		-
	Marketing and management		-
	Safety and security of tourists		-
	Environmental safeguards		-
Transportation	Road network development	• Dredging at certain channels may be required for navigation route development. In that case, the dredged material, if deposited near other resources, they can fall into the water causing increase in the quantity of suspended sediment. Sometimes, mismanagement of the dredged material may cause riverbed siltation and river encroachment; • The process to make one channel navigable can impart negative impact on the existing navigation routes by raising the riverbed and water level of other resources; • Unplanned dredging alignment can create scour holes in riverbed and thus increased discharge will likely cause bank erosion at those locations;	National Water Policy (1999)
	Navigation route development		-
Payra port development	Port navigation development	• Payra Port development requires flat land to build the infrastructures. Therefore, to reclaim the necessary amount of flat land, they are filling up the low-lying terrains and cutting high ground to provide sufficient space for the proposed facilities construction. This can result in sewage congestion, poor local drainage and water logging; • The developed facilities can have an adverse effect on the surrounding canal systems via emitted pollutants; • Vessels visiting the port may discharge their garbage into the river; • Construction of terminals and airport may involve land reclamation and dredging work. During the construction phase, if not properly planned, may cause erosion and accretion in the southern part of Bangladesh, which can result in coastline change;	Coastal Zone Policy (2005)
	Warehouse development		National Water Policy (1999)
	Terminals development		Bangladesh Water Act (2013)
	Jetty development		-
	Four lane connecting roads		-
	Airport development		-
	Railway network		-
	Exclusive economic zone		-
	Power plant development		-
	LNG terminals		-

Plans	Facilities development	Water resources	Related Policy
	Shipyards	• Terminal construction can cause water stagnation; • Construction of breakwater can alter the flow direction resulting in erosion and sediment deposition at port or location of other facilities. • Small vessels may face trouble maneuvering near the facilities if the flow pattern becomes unfavorable to them;	-
Payra Development Authority and integrated Development	Beach conservation	• Depression area conservation may benefit accumulating rainwater or floodwater, on the contrary, it can cause accelerated seepage into the unsaturated zone of the soil resulting in elevated groundwater table that can be harmful towards growth of agricultural crops and natural percolation of rainwater; • Urban zone development can increase the probability of urban flood occurrence; • Island based tourism may cause island instability; • Improper resource management may lead to drainage congestion and insufficient water supply for both household and drinking purposes;	National Water Policy (1999)
	Depression area conservation		Coastal Zone Policy (1999)
	Mangroves conservation		Bangladesh Water Act (2013)
	Existing urban area		-
	Urban Promotional area		-
	Port centric urban zone		-
	Eco town		-
	Rural growth center		-
	Tourism center development		-
	Island based tourism		-
	Forest based tourism		-
	Agricultural zone development		-

Land Use

The detailed field findings on land use changes are presented in **Table G-4.**

Table G-4: Field Findings of Land Use

SL No.	Issue/Sector	Check If Present	Observed impacts, magnitude/ severity, area if quantifiable
1.	Land use		
	• Aquaculture • Cropland • Grassland • Forest land • Settlements • Wetlands		• Less aquaculture, more open water. • Cropping intensity more than 200%. • Grass land: Few • Forest land: Mangrove forest and Social forest • Wetland: Khal, Canal
2.	Transportation		
	• Road network • Rail network • Waterways • Navigation • Network • Ferries • Ports	✓	• The road network from district to district is well developed, but road network is not good at Upazila level. The road network comprising of road category of Zila road and regional roads exhibit high operating speed and the local road networks are operating at lower speed. Also, bottle necks in the study area can only be seen at points where there is a ferry, i.e., construction of bridges will alleviate that congestion. • There is no rail network yet. However, a rail network is proposed from Payra to Dhaka. • Water navigation network is good. • There are at least 2 ferry ghats in all the Upazila. However, the number of ferries must be increased. • There is a River port in Patuakhali. A deep-sea port in Payra is under construction.
3.	Facilities and Utilities (Water, Electricity, etc.)		
	• Facilities • Utilities	✓	• There are educational institutions, growth centers, markets, hotels, resorts, stationary, cyclone centers etc. Since this is a cyclone-prone area, more cyclone centers are needed. • Industries are not developed; • Electricity is available everywhere, but water facilities are not available everywhere except in the municipality. Feasibility of undertaking a project should be explored to supply electricity produced in non-grid Bhola Island to Rangabali by setting up a gridline from Bhola.
4.	Social Structure		
	• Livelihood pattern • Religion • Ethnic group • Economic status of inhabitants	✓	• Their main occupations are: agriculture, fishing, grocery shop, selling vegetables in the market, selling tea/coffee, hotel business. • Community includes people of different religions such as Buddha, Muslim, Hindu etc. • Rakhine and Mog ethnic community are living in Kuakata. • Economically the people are of mixed classes varying from poor to solvent.

SL No.	Issue/Sector	Check If Present	Observed impacts, magnitude/ severity, area if quantifiable
	• Social Security system		• There are Police, Ansar, Administration, village police, Mayor, Chairman, Commissioner etc. Social security needs to be increased. Already the government of 'Bangladesh has formulated "Tourist Police". But their capacity in terms of human resources and infrastructure need to be strengthened.
5.	Tourism Demand		
	• People's opinion on tourism as livelihood • Impact of tourism on environment and ecosystem • Tourism based knowledge • Security system	✓	• People want mangrove based eco-tourism if communication can be improved. • If tourism develops, pressure may increase on the eco-system. Environmental pollution may increase. There is no solid waste, liquid waste management scheme. • Tourism based knowledge is very low. There is no programme to make tourists aware. There is no institutional training. Training can be arranged with the help of Jubo Unnayan Proshikhyon Kendra i.e. Youth Development Training Centre. • The security system is not well developed. • Lack of adequate police, watch tower.
6.	Environmental and Ecosystem		
	• Agriculture • Fisheries • Flora • Fauna	✓	• Agricultural production is good. Apart from rice, fruits and vegetables such as Watermelon, sunflower, Mugdal (Lentil) are also grown. • Cold storage needs to be increased for agriculture and fisheries. • Capture and culture fisheries are practiced which are both economically beneficial. • Ecosystem comprises river ecosystem, lowland ecosystem, mudflow/charland and mangrove ecosystem. • Flora includes Shundari, Golpata etc. • Fauna includes Deer, Buffaloes etc.
7.	On site-Off site projects		
	Payra Port		• Payra Port Authority requires land to build infrastructures. It may cause loss of natural and recreational areas. • Infrastructure development of Payra port may be reduced access to culturally important areas and landscapes, reduced viability of commercial fishing land, reduced road and marine safety. • Physical displacement of people and their settlements may occur. • Economic displacements of agricultural and fisheries livelihoods. • It can create primary employment, business opportunities, property values and marketability, demand for housing which can contribute to the economy.

Hazard and Disaster Risks Reduction

The detailed field findings on hazard and disaster risks reduction are presented in **Table G-5.**

Table G-5: Field Findings of Hazard and Disaster Risks Reduction

Plans	Facilities development	Hazard and Disaster Risks Reduction
Socio-economic conditions development	Educational institution	• Establishment of institutions and other socio-economic development at the Upazila level will be effective but its effectiveness needs to be conditioned by the existence of effective government institutions, cyclone shelters, endured building structures and embankments protection; • Education and other well-being facilities improvement will lead to enhance the ultimate awareness of DRR concept among the community and will reduce its comprehensive damage; • Improved livelihoods opportunities can reduce vulnerability but agro-based livelihoods in disaster-prone contexts can be unproductive unless a resilience approach is used. • Land acquisition for the development may cause the canal blockage and drainage congestion which will in turn increase the likelihood of the flash flood, seasonal flood and water logging; • Though inadequate, there are cyclone shelter and school buildings that are being used as alternative shelter during cyclone and other natural disaster in each surveyed Upazila. • Behavioral changes to the community people are important, as many do not even attempt to seek refuge in a shelter as they know the shelter is there is inadequate space available, unhygienic, unsecured for the women and also do not want to abandon their assets in their homesteads; • Extensive Training and awareness program within the community may reduce the consequences of the fatality and loss of other household assets;
	Health centers	
	Growth centers and markets	
	Cyclone shelters	
Regional land use development	Commercial area development	• Land Use plan (LUP) and zoning is essential tool for a sustainable and disaster resistant urbanization for these proposed Upazilas; • As the whole study area (7 Upazilas) is more or less disaster influenced area, the most hazardous and risk prone areas should be identified to avoid the construction and if plan to establish any infrastructures, proper protective or mitigation measures should be designed to reduce the risk accordingly; • DRR into land use planning can be a way to achieve safer and more sustainable development by protecting communities, houses, livelihoods, schools and hospitals and other components of development from disaster; • Land acquisition might be required by the bank of the river and other floodplain area for commercial and industrial zoning which will be at high risk of flooding and
	Residential area development	
	Agricultural zone	
	Park and recreation	
	Wetlands	
	Rural settlement	

Plans	Facilities development	Hazard and Disaster Risks Reduction
		other hydrological disaster. Riverbank protection by revetment and other structural measures, Land elevation, Room for river concept, flood-wall etc. can be possible options to reduce the risk; • Being a disaster-prone area, most of the residents at Barguna and Patuakhali district are living in Impoverished situation who can be dislocated due to Urbanization and other facilities development. Proper and safer resettlement must be ensured to protect them from the natural and other associated disasters; • Nature Based Solution (NBS) concept can be initiated to reduce the disaster risks. To do so Afforestation zone should be incorporated while prepare the regional land-use development plan;
Tourism development	Transportation Utilities Accommodation Marketing and management Safety and security of tourists Environmental safeguards	• Imperative attempts need to be taken to incorporate a rigorous geological and geotechnical site characterization, including a potential risk analysis in preparing comprehensive plan focusing on Eco-Tourism within the project influenced area in Barguna and Patuakhali District; • Safe and setback distances should be strictly followed while constructing tourism facilities and other infrastructures; • Possibilities of construction the tourism development at the vicinity in the coastal area must be assessed properly; • River bank protection, nearby cyclone shelter and Emergency Reponses Plan (ERP) should be ensured before the project implementation;
Transportation	Road network development Navigation route development	• Transportation networks development need to be carried out in such a way that the existing drainage system and other water-ways remains unblock and clean. The blockage of the drainage system inside the Upazila and distributary mouths of the main rivers may cause and persist the seasonal and flash flood miseries; • Drainage and dredging works may reduce the disaster risks • Emergency access road to and from the evacuation and cyclone shelter should be improved to decrease the fatality;
Payra port development	Port navigation development Warehouse development Terminals development Jetty development Four lane connecting roads Airport development Railway network Exclusive economic zone	• Construction of breakwaters and terminals involves huge reclamation and dredging works. These reclamations and dredging works may cause erosion or accretion in the southern part of Bangladesh resulting in coastline change; • Burning of fossil fuel will cause ozone depletion and global warming which will lead the natural disaster; • Destroying mangrove may limit the global capacity of carbon and may cause climate change impact including temperature rise and ocean acidification; • Riverbank erosion, storm, tidal surge are the notable natural disasters occurring in this area. River embankment protection work, land elevation, floodwall

Plans	Facilities development	Hazard and Disaster Risks Reduction
	Power plant development	etc. may be introduced to reduce the risks of these disaster; • Hazard and Risk Assessment Safety Training is essential for workers in order to reduce the risks associated with accidents, internal and external threats, and natural disaster; • An Emergency Response Plan (ERP) is mandatory to provide a systematic approach for the protection of employees, assets and the environment from impact of serious incidents. An ideal ERP will be designed by fire exit and evacuation plan about fire and explosion related disasters; immediate medical emergency due to injuries; leakage of hazardous materials; natural disasters (floods, cyclones etc.);
	LNG terminals	
	Shipyards	
Payra Development Authority and integrated Development	Beach conservation	• Port Authority should design the land use development keeping consider Patuakhali is a most disaster prone area; • Beach protection is mandatory to protect the bank from erosion; • Shared cyclone center can be constructed for both port workers and the local community; • NBS concept can be initiated by the port authority to reduce the risk of the natural disaster in this area;
	Depression area conservation	
	Mangroves conservation	
	Existing urban area	
	Urban Promotional area	
	Port centric urban zone	
	Eco town	
	Rural growth center	
	Tourism center development	
	Island based tourism	
	Forest based tourism	
	Agricultural zone development	

Socio-economic Aspects

The detailed field findings on socio-economic aspects are presented in **Table G-6** below:

Table G-6: Field Findings of Socio-economic Aspects

Plans	Facilities development	Socio-economic issues
Socio-economic conditions development	Educational institution	• The number of educational institutes should be increased according to the local growth rate of the population; • The literacy rate is moderate at present; • Overall dropout rate at the high school level is also noticeable, triggered by the early marriage of females and livelihood support for households by male members; • The ratio of teacher and student is less, so, more teachers are required at the high school level; • Infrastructure of many schools is very poor, which often hinders enabling environment;
	Health centers	
	Growth centers and markets	
	Cyclone shelters	

Plans	Facilities development	Socio-economic issues
		• Health centers are needed for quality health services and facilities • There are a number of important high-value crops, which can also be exported. Eventually, the development of market and growth centers is appreciated; • To protect people and their assets from coastal cyclones and flooding, cyclone shelters in the coastal areas are needed. However, these shelters must be friendly for women, elderly people, physically challenged and children;
Regional land use development	Commercial area development	• Local and regional commerce, especially for agro-based production, involves a great potential. The regional development needs to be focus-oriented; • Since agriculture is the mainstay of local livelihood and commerce, the preservation of agricultural zone, particularly in productive areas, is highly required; • The proposed plan shall urbanize the entire project area, which needs zone-wise planning; • For development work, land acquisition will be required, for which the land losers need to be paid properly and hassle-free;
	Residential area development	
	Agricultural zone	
	Park and recreation	
	Wetlands	
	Rural settlement	
Tourism development	Transportation	• The study area, especially the coastal bank and chars have a great potential for tourism. These areas can be promoted but must be focused on environmental friendliness; • Some areas need to have their own branding and tourism promotion strategy, which will guide the local natural resource-based tourism; • Tourist facilities are very poor at this moment. Only the Kuakata has some infrastructures, therefore, facilities need to be enhanced; • If large private entrepreneurs do not invest, local level small scale promoters need to be promoted;
	Utilities	
	Accommodation	
	Marketing and management	
	Safety and security of tourists	
	Environmental safeguards	
Transportation	Road network development	• The transportation system in the entire project area is very poor. Therefore, this system need to be improved; • The roadway network needs to be improved;
	Navigation route development	
Payra port development	Port navigation development	• At present, the Payra port is underused. The port can be extended following the plan, but it must be based on future needs and demands; • The land acquisition process should be in a proper way and hassle-free;
	Warehouse development	
	Terminals development	
	Jetty development	
	Four lane connecting roads	
	Airport development	
	Railway network	
	Exclusive economic zone	
	Power plant development	

Plans	Facilities development	Socio-economic issues
	LNG terminals	
	Shipyards	
Payra Development Authority and integrated Development	Beach conservation	• The entire development plan should be in an integrated way based on the macro and micro needs; • The proposed plan needs to be consulted widely with respective stakeholders; • The overall plan should be shared with concerned department, local people and civil society people; • Emphasis should be given to sustainable planning;
	Depression area conservation	
	Mangroves conservation	
	Existing urban area	
	Urban Promotional area	
	Port centric urban zone	
	Eco town	
	Rural growth center	
	Tourism center development	
	Island-based tourism	
	Forest based tourism	
	Agricultural zone development	

Appendix H: Policy, Pan, Programs (PPPs)

Sector	Name of PPP / Mega project
Nine Key Sectors Identified in ToR	
Forestry	Forestry Policy 1994
	National Forest Policy 2016 (draft)
	Forestry Master Plan, 1995-2015 (being updated)
Fisheries	National Fisheries Policy 1998
	National Shrimp Policy, 2014
	The Shrimp Mohal Management Policy, 1992
	The National Fisheries Strategy (2006)
	New Fisheries Management Policy (NFMP), 1986
Water	National Water Policy 1997, 1999
	National Water Management Plan 2001, 2004
	National Strategy for Water Supply and Sanitation (2014)
	Public Water Body (Jalmahal) Management Policy (PWBMP), 2009
Power and energy	Power and Energy Sector Strategy Paper (SSP), September 2018 Programming
	Power & Energy System Master Plan 2016
	Intended Nationally Determined Contributions (INDC), September, 2015
	The Power and Energy Sector of Bangladesh: Challenges of Moving beyond the Transition Stage, 2019
	The Alternative Power and Energy Plan for Bangladesh, 2017
	Energy Efficiency and Conservation Master Plan up to 2030, (2015)
	Gas Sector Master Plan 2018
Tourism	National Tourism Policy 2010
	Tourism Master Plan 1988 (being updated)
	Bangladesh Tourism Vision 2020
Urbanisation	National Urban policy 2011 (draft)
	Integrated Development Plan of Payra Development Authority
Industry	National Industrial Policy 2016
	National Policy for the Management of Radioactive Waste and Spent Nuclear Fuel-2019
	National Textile Policy 2017
	Leather and Leather Products Development Policy, 2019
	Development Plan of Payra Energy Hub
Transport/communication	Integrated Multi-Modal Transport Policy 2013
	National Land Transport policy 2004
	Road Master Plan 2009
	Railway Master Plan (2010-2030)
	Concept Paper for Dredging and Re-excavation of River, Canal and Pond in Bangladesh, 2017
Shipping	National Shipping Policy 2000
	Payra Port Development Plan of Payra Port Authority
Other sectors	
Environment	Protected Area Management Rule, 2017

Sector	Name of PPP / Mega project
	National Biodiversity Strategy and Action Plan for Bangladesh (NBSAP),B), 2004 (under updating)
	Country Investment Plan (CIP) for Environment Forestry and Climate Change (2016-21)
	National Adaptation Plan of Action (NAPA) – for climate change, 2005, updated 2009
	Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009
	Bangladesh Climate Change and Gender Action Plan (ccGAP) 2013
	National Adaptation Plan (Draft), 2022
	National Environment Policy, 2013
	e-waste Policy, 2017 (Draft)
	National Environment Management Action Plan (NEMAP) 1995
	Environment Forestry and climate Change National Action Plan, 2017 (2016-2021)
	National Policy for Arsenic Mitigation 2004
Agriculture	National Agriculture Policy, 2018
	National Organic Agriculture Policy, 2016
	Master Plan for Agricultural Development in the Southern Region of Bangladesh 2012
	New Agricultural Extension Policy, 1996 (proposed upgradation, 2015)
	National Agricultural Extension Policy (NAEP) 2012
	National Livestock Extension Policy, 2013 (Final Draft)
	National Livestock Development Policy, 2007
	National Integrated Livestock Manure management Policy, 2015 (Draft)
	National Milk Development Policy, 2016
	National Poultry development policy, 2008
	National Integrated Pest Management Policy, 2002
	Pesticide Rules, 1985
	National Seed policy, 1993 (proposed upgradation, 2018)
	Agricultural Ground Water Management policy, 2019
	Seed Rules, 1997
	Integrated Minor Irrigation Policy, 2017
Cultural affairs	National Cultural Policy 2006
Defence	National Defence Policy (draft) 2018
Disaster management & relief	National Plan for Disaster Management 2010-2015
Economy	Export Policy, 1997-2002
	Sector Development Framework -2004
Education	National Education Policy 2010
Food	National Food Policy, 2006
	The National Food Policy Plan of Action (2008 - 2015)
	National food and nutrition safeguard policy, 2020 (Proposed)
	Bangladesh Second Country Investment Plan Nutrition-sensitive food system (2016-2020)
Health & family welfare	National Health Policy (2011)
Housing & public works	Regional Plan of Payra-Kuakata Comprehensive Plan Focusing on Eco-Tourism

Sector	Name of PPP / Mega project
Land	National Land Use Policy, 2001
Local government, rural development and cooperatives	National Rural Development Policy -2001
Population	Bangladesh Population Policy, 2012
Posts, telecommunications & information	Right to Information Policy 2009
	Right to Information Strategic Plan (2015-2021)
	National ICT Policy 2009
Poverty	Pro-Poor Strategy-2005
	Poverty Reduction Strategy of 2005
Science & technology	National Science and Technology Policy 2011
Waste management	The National Sanitation Strategy 2005
	National Water Policy 1999
Women and children affairs	National Women Development Policy 2011
	National Children Policy 2011
	National Action Plan on Women, Peace and Security- 2019-2022
National and cross-sector plans	
	Eighth Five Year Plan, FY 2020-2025
	National Sustainable Development Strategy (2010-21), 2013
	Sustainable Development Goals, (SDGs)
	National Land Use Policy, 2001
	Bangladesh Delta Plan 2100
	Investment Program, Bangladesh Delta Plan 2100
	Perspective Plan for Bangladesh: 2010-2021
	Second Perspective Plan of Bangladesh (2021-2041)
	Mujib Climate Prosperity Plan (for 2030), 2021
	Integrated Resources Management Plan for the Sundarbans (2010-2020)
	Coastal Zone Policy 2005
	National Adaptation Plan (2023-2050)
Projects and mega projects	
Infrastructural Development Projects	1. Payra Power Hub 2. Payra Port 3. Padma Bridge 4. A total of 48 Infrastructural Development Project in the Patuakhali-Kuakata region listed in the Regional Plan (Figure 2.2)

Appendix I: Report Compilers

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
Dr. Peter Tarr	CEGIS	Ph.D. in Environmental Management and Planning from University of Aberdeen, Scotland, 1995-1999. M.Sc. in Environmental Management and Planning from University of Aberdeen, Scotland, 1994-1995. National Diploma Nature Conservation from Pretoria Technikon, South Africa, 1980-1982. More than 40 years of experienced in: • Strategic Environmental Assessments, Environmental Impact Assessments, Integrated Environmental Assessments, and Environmental Sustainability Appraisals; • Policy formulation, strategy, programme, project appraisal and review; • Land use and environmental planning, and land evaluation for sustainable natural resource management • Protected area management; • Community-based natural resource management.	Strategic Environmental Assessment (SEA) Expert/Team Leader	He will be responsible: • To conduct the SEA of Project areas and prepare all aspects of planning, liaison and reporting; • Identify the SEA Procedure of the project • Screening of Policies, Programs, Plans (PPPs) that have significant socio-economic and environmental impacts to be included in SEA in the field of urbanization; • Review of PPPs with baseline socio-economic and environmental data of various sectors identified through screening, stakeholder analysis, legal and regulatory framework, environmental and socio-economic objectives, For SEA, Scenario Development issues including setting environmental and socio-economic objectives of the concerned sector, identifying institutional capacity, level of environmental pollution; • Deeper Assessment of Preferred Alternative based on Initial Impact (Positive and Negative) Assessment (High, Medium, Low) and Initial Impact Assessment of different sectoral PPPs for SEA; • Preparation of Strategic Environmental Management Plan (SEMP) based on SEA, including Critical Issues, Role and Responsibilities of Concerned

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
				Institutions/Agencies, Mitigate to Negative Impact of PPPs and Coordination for Implementation of SEMP for Positive Impact and Monitoring Mechanism;
Kazi Kamrull Hassan	CEGIS	Doctor of Philosophy (Sustainable Resource Management with particular focus on Environmental Policy and Legislations) Master of Environmental Management and Development Graduate Diploma in Environmental Management and Development. 25 years of experience • Worked as Environmental and Ecological Specialist to carry out IEE, EIA, CEIA, ESIA and ESHIA studies; • Experience in SEA; • prepared and implemented Environmental Management Plan (EMP) including Environmental Monitoring Plan; • Thorough knowledge and experiences on Ecosystem, Biodiversity including forest, wetlands and Natural Resources management;	Environmental Analyst	He will be responsible for • Evaluating environmental changes/trends during the last 10 years – analyze influence of land-use patterns on this trend; • Outline future evolution of environmental changes/trends if no land use plan intervention is taken; • Assessing Land Potentials and Environmental Improvements; • To delineate spaces in terms environmental parameter; • Analyze and Compare Socio-economic and Environmental Effects of Alternatives; • Develop Land Use Planning Alternatives, and Consult with Relevant Stakeholders; • Formulate EMP;
Dr Kazi Md. Noor Newaz	CEGIS	Ph.D. in Biological Science/ particularly Ecology (Adaptation and distribution of species in natural environment). M.Sc. in Environmental Science. M.Sc. Part-I (research) in Env. Microbiology 37 years of experience including • Research and conducting environmental ecological studies; • Ecological reports (inventory of flora, fauna and their habitats, ecological habitat restoration and enhancement of ecosystem services), ESIA, CEIA, DIA and ESHIA; • Involved as ecologist, biodiversity management and compliance specialist in SEA study of SW region of Bangladesh;	Ecologist	He will be responsible • To make an inventory of all types existing flora and fauna; • To identify the potentiality of the natural resources (flora and fauna); • To identify hazards that might be imparted on the flora and fauna due to proposed development; • To prepare a map of habitat for existing flora and fauna;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
				• To earmark the conservation areas, which would not be disturbed by any kind of development; • To identify threats for wildlife assessing impacts of existing and future development impact on wildlife resources; • Developing and preparing Management plan of wildlife resources;
Dr. Md. Shibly Sadik	CEGIS	Ph.D. in Civil and Earth Resources Engineering from Kyoto University in 2019. Research on Post-Disaster Recovery after Cyclone Aila M.Sc. in Technology for Integrated Water Management from University of Gent, Belgium in 2013. M.Sc. in Water Resources Development from Bangladesh University of Engineering and Technology in July 2009. B.Sc. in Environmental Science from Khulna University in 2006. More than 15 years of experience in • Conducting environmental assessment including SEA, IEE, EIA, ESIA, and environmental monitoring; • Preparation of hazard map, hazard assessment and hazard mitigation guideline preparation, noise modeling, air quality modeling, preparation of ESMP for noise reduction, and environmental pollution;	Hazard Management Expert	He will be responsible for • Shortlisting national level policies for coastal region regarding hazard management and formulate strategies for spatial plan of Payra-Kuakata; • Prepare composite hazard map (flood and cyclone) and guidelines for hazard mitigation including climate change; • Integrate the engineering geological and DRR data with urban and regional planning database to prepare risk sensitive spatial;
Malik Fida A Khan	CEGIS	M.Sc. in Hydro informatics B.Sc. in Civil Engineering 30 years of working experience in: • Climate Change and vulnerability assessment, analysis and mitigation measures; • Coastal and river system management; • water resources and, integrated and strategic planning;	Climate Change Adaptation Expert	He will be responsible for: • Shortlisting national level policies for coastal region and formulate strategies for the spatial plan; • Projection of water requirement with seasonal variation; • Assess coastal hazards and prepare hazard map, guidelines for hazard mitigation including climate change;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
				• Generate erosion and accretion model; • Identify, evaluate and quantify climate change impacts on the region; • Coordinate the climate change related activities and data collection; • Analyze and interpret the historical climate data; (viii) Project next 20 years climate change scenario;
Mohammad Nur Nobi	CEGIS	M.Sc. in Environmental Economics and Management from Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden, 2013. M.S.S. in Economics from University of Chittagong, Chittagong, Bangladesh, 2000. B.S.S. (Hons) in Economics from University of Chittagong, Chittagong, Bangladesh, 1999. More than 15 years of working experience in: • Natural Resource and Environmental Economics; • Assessment and valuation of ecosystem services, blue economy, tourism, and sustainable development;	Economist (Blue Economy)	He will be responsible for • Assessment of coastal and marine resource of the region; • Assess scope further expansion of port related facilities; • Assess scope for further scope for fishing in the coast; • Assess the scope for eco-tourism in the region; • Assessment of Pollution from ports and other coastal activities and propose measures to limit pollution;
Dr. M A Quassem	CEGIS	PhD in Participatory Management, Barrington University, USA, 1998. Post-Graduate Diploma in Rural Policy and Planning, (specialization in monitoring and evaluation) Institute of Social Studies, The Hague, 1988. Post-Graduate Diploma in Hydraulic Engineering, International Institute of Hydraulic Engineering, Delft, 1979. B.Sc. Engineering (Civil) from Bangladesh University of Engineering and Technology (BUET), 1966. More than 40 years of working experience in: • Planning and research, construction, operation & management;	Institutional Management Expert	He will be responsible • To propose organizational setup for Payra-Kuakata Development Authority; • Charter of duties for the professionals; • Procedure of coordination among the agencies; • Role of UDD after the completion of current development plan;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		• Working with government at different levels and delivering high quality outputs; • Public and private sector organizations in a management capacity and advising to institutional reform and on improving organizational performance and business development;		
Dr. Farhana Ahmed	CEGIS	Ph.D. on Resilient Adaptation to Flood Risks under Urban Growth and Climate Change Dynamics from Vrije University of Amsterdam, the Netherlands, July 2019. M.Sc. in Environmental Science (Specialization in Environmental Planning and Management), UNESCO-IHE, The Netherlands, April 2008. Masters of Urban and Regional Planning (M.U.R.P), BUET, Dhaka, December 2008. Bachelor of Urban and Regional Planning (B.U.R.P), BUET, Dhaka, April, 2002. More than 15 years of working experience in: • Urban planning, regional planning, landscape planning and design; • Conducting various environmental and socio-economic studies focusing on planning at local and regional level, strategy formulation, vulnerability assessment and adaptation to climate change; • Formulation of Urban Sector Policy to support Urban Governance Reform of Bangladesh; • Preparing adaptive flood management for urban areas in the delta regions in light of the changing urban and climatic environment;	Land Use Planner	She will be responsible • To formulate structure plan policies from strategic environmental assessment; • To formulate Structure plan considering sectoral policies; • To formulate Growth centre plan for the region; (iv) Formulate Urban Area Plan;
Syed Monowar Hussain	CEGIS	Masters in Port Management and Harbor Administration, University of Antwerp (Belgium), 1994-95 Post Graduate Diploma in Personnel Management, Bangladesh Institute of Management, 1985-86	Navigation Expert	He will be responsible for • Assessment of River navigation baseline condition of the in the region;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		M.A. Dhaka University, Bangladesh, 1976. B.A. (Hons), Dhaka University, Bangladesh, 1974 More than 35 years of working experience in: • Management and operation of all inland ports and landing stations; • Outsourcing the actual operation of the ports and stations including the employment of labor in the ports; • Traffic analysis Intermodal connectivity. Regulatory and infrastructure requirement for handling of both international and domestic goods, development planning according to traffic demand, bilateral and regional transport connectivity, inland container handling, private sector participation, regulatory provisions in respect of transport and handling of goods;		• Impact assessment of existing and future vessel movements in region; • Identify impacts of water navigability and Prepare carrying capacity of rivers and canals in the region; • Suggest facilities for improvement for inland port related facilities; • Assess facilities and connectivity on inland ports due to Payra Port;
Dr. Md. Wasiul Islam	CEGIS	Ph.D. in School of Business (Tourism Discipline), The University of Queensland (under G8), St. Lucia Campus, Brisbane, QLD 4072, Australia, January 2014 to March 2018. Master of Science in Forest and Nature Conservation, Faculty of Environment Science, Wageningen University and Research Center, the Netherlands, September 2007 to August 2009. Master of Science in Forestry, Forestry and Wood Technology Discipline, Khulna University, Bangladesh, June 2000 to November 2002. B.Sc. (Hon's) in Forestry, Forestry and Wood Technology Discipline, Khulna University, Bangladesh, June 1995 to December 1999. More than 15 years of working experience in: • Tourism management, planning and development; • Tourist carrying capacity analysis and community-based tourism; • Preparing adaptive co-management plans in tourism destinations;	Tourism Development Expert	He will be responsible for • Assessment of Baseline Condition of the Tourism sector in the region; • Assessment of Impacts on Tourism sector; • Identify impacts due to development of Tourism sector in the region; • Preparing relevant environmental management plan;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		• Formulating EMP for tourism sector;		
Mohammad Abdur Rashid	CEGIS	M.S in Agricultural Engineering (FPM), Bangladesh Agricultural University, Mymensingh, 2005. B.Sc. Agricultural Engineering, Bangladesh Agricultural University, Mymensingh, 2000. More than 15 years of experience in • IEE, EIA and SIA studies of Water Resources, Communication, Power, Gas and Planning sector projects. • Agriculture planning, crop modeling, crop water demand assessment, irrigation water management, and climate change and disaster management.	Agronomist	He will be responsible for • Identifying problems (including climate change) of recent practice in agriculture with spatial pattern; • Strategy for distribution of agriculture infrastructures in different settlement hierarchy; • Integrate rural settlement with agricultural activities; • Integrate agriculture activities in urban areas; • Assessing the impacts of the proposed interventions agricultural practices; • Policy measures to conserve agricultural land and integrate it with land use plan;
Zahir Uddin Ahmed	CEGIS	M.Sc. Forestry, University of Chittagong, 1988. M.Sc. Chemistry, Dhaka University, 1981. B.Sc. (Hons.) Chemistry, Dhaka University, 1980. More than 15 years of working experience in: • Forest resources assessment particularly health assessment, forest service assessment; • Plantation program in Coastal regions; • Sustainable management of forest resources; • Supervising forest plantation programs (coastal mangrove forest high forest); • Developing forest management plan; • Analysis of the paradigm shifting of forest management in Bangladesh; • Impact assessment on forest resources due to natural and anthropogenic causes;	Forest Resource Management Expert	He will be responsible for • Preparing baseline of the forest, flora and fauna in the region; • Compare all existing and previous management plans and suggest guideline to prepare future management plan; • Assessment of impact on forest due to development and human intervention; • Policy measures to integrate forest resource management with spatial plan;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		• Policy formulation on forest resources management; • ESIA and SEA experiences in Bangladesh;		
Mir Fahim Shaunak	CEGIS	MURP (Masters of Urban and Regional Planning), Department of Urban and Regional Planning, Jahangirnagar University. BURP (Bachelor of Urban and Regional Planning), Department of Urban and Regional Planning, Jahangirnagar University. More than 13 years of working experience in: • Executing Remote Sensing/GIS and Urban Planning based activities such as DTM Generation, City Clutter Mapping with geodatabase, Extracting Features from images, Image Processing (Image referencing, Image mosaic, Image interpretation, Image Classification, Ground Truthing, Accuracy Assessment, Mosaic and Subset Images, Enhancement of Images), 3D City Modelling, 3D Vector Mapping from Aerial Photograph, GPS and DGPS Field Survey, Socioeconomic Survey, Landscape Design, etc.	GIS Database Manager	He will be responsible for • Manage all related Spatial and attribute database of the project (not only SEA component) and check consistency; • Integrate SEA database with the GIS database; • Perform Spatial and environmental analysis for strategic planning; • Prepare Regional, Structure, Urban Area Planning database; • Prepare map layout for Regional, Structure, Urban Area Plan;
Md. Amanat Ullah	CEGIS	M.Sc. in Botany from National University, 2001 B.Sc. (Hons.) in Botany from National University, 2000 More than 10 years of working experience in: • Floral inventory survey in the coastal areas; • Identification of flora habitat; • Threats assessment for the floral vegetation in respect to land use changes and climate change; • Spatial mapping and habitat suitability assessment of the vegetation in coastal areas; • Conducting feasibility, IEE, EIA and Environmental Monitoring studies of water resources, power, forestry, climate change, communication and various planning sector projects; • Natural resources management and ecological impact assessment, biodiversity assessment, preparation of	Ecology Associate (Ecology)	He will be responsible for • Conduct field survey to make an inventory of all types existing flora; • Field study to identify the potentiality of the natural resources (flora); • Conduct field trip to identify hazards that might de imparted on the flora due to proposed development; • Collection of field data to prepare a map of habitat for existing flora; • Field verification of the conservation areas, which would not be disturbed by any kind of development; • Data analysis and report writing;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		ecological management plans, plantation design, evaluation of ecosystem services and biodiversity conservation;		
H M Nurul Islam	CEGIS	Master in Limnology and Wetland Management; M.Sc. (2017) and B.Sc. (2008) in Environmental Science. More than 10 years' experience in • Assessment of floral and faunal biodiversity; • Identification of environmental problems and issues in rivers, wetlands, terrestrial ecosystem, and in generally to natural resources; • Tourist carrying capacity assessment of any tourism center or island or any region; • Conservation management zones assessment for the coastal forests, and other landscapes; • Environmental monitoring of the resources; • Ecosystem service capacity assessment; • Wetland management and habitat suitability assessment of flora and fauna;	Environmental Associate (Environment)	He will be responsible for • Conduct field survey to identify the environmental issues related to flora and fauna and lastly the ecosystem; • Tourism impact assessment on natural vegetation, fauna, the terrestrial and aquatic ecosystems; • Water quality assessment, monitoring assessment of seasonal variation; • Conduction of survey for air quality, noise quality assessment in the study area; • Meteorological information measuring and collection of secondary information form the BMD; • Waste characteristics analysis and waste dumping and recycling mapping development; • Carrying capacity assessment of the tourism center or areas; • Data analysis and report writing;
Mohammad Kamruzzaman	CEGIS	M.Sc. (Wildlife Ecology, Management and Conservation Biology) in 2000 University of Chittagong, B.Sc. (Honors) Zoology in 1999 University of Chittagong. More than 10 years of working experience in: • Inventory of fauna scientifically; • Habitat mapping of faunal biodiversity;	Ecology Associate (Wildlife)	He will be responsible for • Conducting field survey to make an inventory of all types existing fauna; • Field study to identify the potentiality of the natural resources (fauna); • Conduct field trip to identify hazards that might de imparted on the fauna due to proposed development; • Collection of field data to prepare a map of habitat for existing fauna;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
				• Field verification of the conservation areas, which would not be disturbed by any kind of development; • Field study to Identify threats for wildlife assessing impacts of existing and future development impact on wildlife resources; • Data analysis and report writing;
Md. Habibur Rahman	CEGIS	M.Sc. in GIS for Environment and Development B.Sc. in Civil Engineering Diploma Engineering in Civil More than 18 years of working experience in: • GIS data development, system analysis and development, designing survey form and database structure, organizing data entry and data cleaning job; • Data collection with Differential GPS, Spatial analysis of different aspects, generating contours from water level data, Transferring data in between different systems, Geo-referencing and geographic databases; • preparing spatial database to use GIS as planning tool in both Vector GIS and Raster GIS, making data usable, structuring databases, analyzing database, aerial photo interpretation, graphics design, cartographic design for display presentation and hard copy map production; • Designing and developing methodology for capturing spatial and tabular data to create GIS database and to produce thematic information for various fields; • Topographic survey with Total Station to generate contours and DEM (Digital Elevation Model);	GIS Associate	He will be responsible for- • To manage all related Spatial and attribute database of the project (not only SEA component) and check consistency; • To integrate SEA database with the GIS database; • To perform Spatial and environmental analysis for strategic planning; • To prepare Regional, Structure, Urban Area Planning database; (v) Prepare map layout for Regional, Structure, Urban Area;
Md. Firoz Alam	CEGIS	Masters in Information Technology (GIS-RS), IIT, Jahangirnagar University, 2017; B.Sc. in Civil Engineering, World University of Bangladesh, 2012;	GIS Associate	He will be responsible for • To manage all related Spatial and attribute database of the project (not only SEA component) and check consistency;

Name of Staff	Firm/ Organization	Qualification and Area of Expertise	Proposed Position	Task Assigned
		Diploma in Civil Engineering, Dhaka Polytechnic Institute, 1991 More than 25 years of working experience in: • GIS data development, system analysis and development, designing survey form and database structure, organizing data entry and data cleaning job; • Data collection with Differential GPS, Spatial analysis of different aspects, generating contours from water level data, Transferring data in between different systems, Geo-referencing and geographic databases; • Preparing spatial database to use GIS as planning tool in both Vector GIS and Raster GIS, making data usable, structuring databases, analyzing database, aerial photo interpretation, graphics design, cartographic design for display presentation and hard copy map production; • Designing and developing methodology for capturing spatial and tabular data to create GIS database and to produce thematic information for various fields; • Topographic survey with Total Station to generate contours and DEM (Digital Elevation Model);		• To integrate SEA database with the GIS database; • To perform Spatial and environmental analysis for strategic planning; • To prepare Regional, Structure, Urban Area Planning database; (v) Prepare map layout for Regional, Structure, Urban Area;

Additional Team Members Worked in this SEA

Name	Designation and Organization	Email ID
Mir Sazzad Hossain	Advisor, Water Resources, CEGIS	mhossain@cegisbd.com
Dr. Md. Zahidul Haque	Agricultural Specialist, CEGIS	zahidul@cegisbd.com
Muhammad Shifuddin Mahmud	Socio-Economic Specialist, CEGIS	smahmud@cegisbd.com
Md. Alamgir Hossain	Stakeholder Engagement Specialist, CEGIS	mhalamgir@cegisbd.com
Md. Monowar-ul-Haq	Water Resource Specialist, CEGIS	monowar@cegisbd.com
Mohammed Mukteruzzaman	Fisheries Expert, CEGIS	mdzaman@cegisbd.com
Sudipta Kumar Hore	Morphologist, CEGIS	skhore@cegisbd.com
Mushfiq Ahmed	Wildlife Specialist, CEGIS	mahmed@cegisbd.com
Md. Ashraful Alom	Fisheries Specialist, CEGIS	aalom@cegisbd.com
Laila Sanjida	Tourism Specialist, CEGIS	lsanjida@cegisbd.com
Bhuyia Md. Tamim Al Hossain	Climate Change Specialist, CEGIS	thossain@cegisbd.com
Uzzal Kumar Saha	Junior Biodiversity Specialist, CEGIS	suzzal@cegisbd.com
Sharif Tanvir Ahammad	Junor Forest Specialist, CEGIS	stahammad@cegisbd.com
Md. Wahiduzzaman Kallol	Institutional Specialist, CEGIS	wahidzamankallokl@gmail.com
Emdadul Haque	Power and Energy Specialist	ehaque@cegisbd.com
Md. Rayhan Ahmad	Junior Disaster Management Specialist, CEGIS	ahmedrayhandm@gmail.com
Md. Billal Hossain Majumder	GIS Analyst, CEGIS	bmajumdr@cegisbd.com
Md. Ashish Mawla	Sociologist, CEGIS	amawla@cegisbd.com
Tanvir Ahmed Rifat	Sociologist, CEGIS	tarifat@cegisbd.com
Mahdi Mahmud	Junior Economist, CEGIS	mmahmud@cegisbd.com
Abhijit Das	Junior Morphologist, CEGIS	abhijit@cegisbd.com
Chayon Biswas	Junior Environmental Specialist, CEGIS	cbiswas@cegisbd.com
Md. Bariul Musabbir	Junior Environmental Specialist, CEGIS	bmusabbir@cegisbd.com
Satyendro Nath Barman	Junior Environmental Specialist, CEGIS	snbarman@cegisbd.com
Md. Masuk Rahman	Junior Agriculturist, CEGIS	rmasuk@cegisbd.com
Md. Tazbiul Islam	Junior Agriculturist, CEGIS	tazbiul@cegisbd.com
Md. Hasan Sabit	Junior Agriculturist, CEGIS	mhsabit@cegisbd.com

Center for Environmental and Geographic Information Services
http://www.cegisbd.com