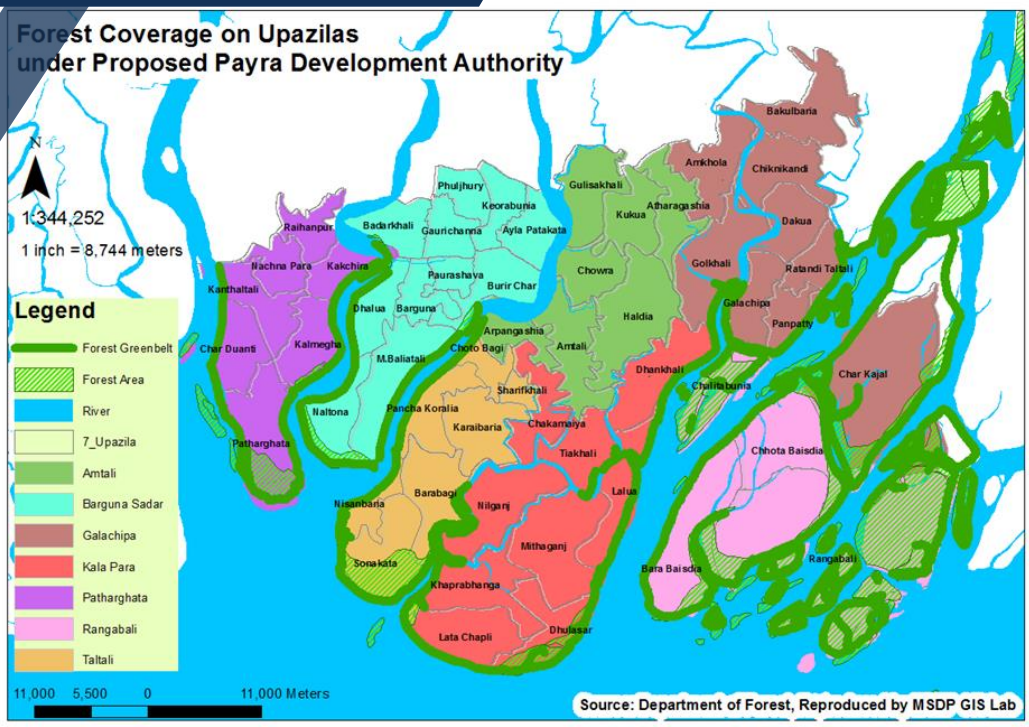
URBAN DEVELOPMENT DIRECTORATE (UDD)

Ministry of Housing and Public Works

Government of the People's Republic of Bangladesh



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Impact of Climate Change

Coastal areas and the resident population are vulnerable to recurrent natural disasters: cyclones, drainage congestion, and floods. Agriculture, irrigation systems, and livelihood activities of the local population are threatened and often disrupted by the erosion of embankments, polders, and other similar infrastructure. Table 1 presents climate change impacts on key vulnerable sectors in Bangladesh. Recurrent floods caused extensive damage to primary and secondary roads, feeder roads, rural roads, small bridges and culverts, and inland waterway's support systems, including small jetties. A significant portion of the public sector budget is allocated to meet the replacement investment required to keep the physical infrastructures in operating condition to prevent further disruption to the economic and livelihood activities of the local population.

Table 1: Climate Change Impacts on Key Vulnerable Sectors in Bangladesh.

Sector	Likely impacts of climate change
Water	• Sea level rise • Increased flooded areas due to both sea and river flooding • Reduced water availability for purposes such as drinking water due to saline water intrusion • Increased water shortages, particularly in the northwest and southwest regions • Increased number of droughts, mostly in the western parts of the country • Displacement of coastline population
Agriculture	• Reduced main crop production by 13.9% in 2050, except for Boro rice production • Loss of productive agricultural land due to saline intrusion, coastal erosion, and inundation
Fisheries	• Reduced aquaculture production due to floods • Reduced habitat for freshwater fish due to saline water intrusion
Livestock	• Reduced milk production. • Losses in suitable land for livestock • Increased cattle mortality due to extreme climate events
Human health	• Increased water- and air-borne diseases such as malaria, cholera, and diarrhea • Changes in the spatial distribution of diseases and increased incidence zones for diseases such as malaria • Heightened risks to vulnerable groups such as women and children due to saline water
Ecosystems and forests	• Endangerment of species in the Sundarbans mangrove and wetlands due to climate change-induced natural hazards • Loss of forest species and ecosystems in coastal areas due to sea-level rise and inland due to greater moisture stress during dry periods
Infrastructure	• Damage to highways and railways due to flooding
Urban centers	• Increased urban floods and drainage congestion

	• Increased flash floods and landslides due to urban development (e.g., on hills) • Reduced water quality due to cyclones, storm surges, and floods causing saline intrusion

Adaptation to Climate Change

Salinity is a major problem in the region that has been increasing over the years due to climate change. A community-led strategy is sometimes a better option because it is local village people who are often the real experts on climate change. Rather than implementing highly technical, expensive, and outsider-led interventions that have not been tested in the field conditions, priority should be given to using and modifying traditional coping mechanisms developed in the communities in Bangladesh and around the world. In saline areas, this may involve using ancient local technologies such as the huge locally fired clay pots that harvest and store rainwater from roofs, the selection of saline-tolerant rice varieties that have traditionally been cultivated by the sea, or belts of salt-tolerant trees such as mangroves planted along coastal areas to prevent saline intrusion.

Coastal vulnerability usually differs for different communities living in different parts of the coastal belt. Payra-Kuakata region is particularly vulnerable to cyclones associated with tidal surges, mainly in the pre-monsoon months of April-May and post-monsoon months of October-November. Table 2 presents areas of focus and priorities of adaption actions needed for the study area.

Table 2: Areas of focus and priority of adaptation actions.

Area of Focus	Priority Actions
Food security, social protection and health	• Increase the resilience of most vulnerable groups through community-level adaptation, diversification of livelihoods, improved access to services and social protection schemes (e.g., insurance); • Develop climate-resilient cropping systems (including agricultural research), as well as fisheries and livestock systems to ensure local and national food security; • Implement surveillance systems for existing and new disease risks and to ensure health systems are poised to meet future demands; and • Implement drinking water and sanitation programs in areas at risk from climate change, including coastal zones and other flood and drought-prone areas
Comprehensive disaster management	• Improve the government's and civil society's ability to manage natural disasters and ensure that effective policies, laws, and regulations are in place; • Enhance community-based adaptation programs and ensure they are in place in disaster-prone parts of the country; and • Enhance cyclone, storm surge, and flood early-warning systems

Area of Focus	Priority Actions
Infrastructure	• Repair existing infrastructure – including coastal embankments, river embankments, and drainage systems – to ensure effective operation and maintenance systems; • Plan, design, and construct needed new infrastructure, including cyclone shelters, coastal and river embankments, water management systems, urban drainage systems, etc.; and • Undertake strategic planning of future infrastructure needs, and take into account (a) patterns of urbanization and socio-economic development; and (b) the changing hydrology of the country.
Research and knowledge management	• Improve climate change modeling scenarios for Bangladesh by applying methodologies at the regional and national levels; • Model the likely hydrological impacts of climate change in the Ganges -Brahmaputra-Meghna system in order to assess future system discharges and river levels to feed into flood protection embankment measures; • Monitor and research the impacts of climate change on ecosystems and biodiversity; • Analyze the impacts of climate change on Bangladesh's macro-economy as well as key sectors. • Research the linkages between climate change, poverty, health, and vulnerability in order to ascertain how the the resilience of the most vulnerable households may be improved; and • Create a Centre for Research and Knowledge Management on Climate Change to ensure that Bangladesh has access to the most current ideas and technologies available globally.
Capacity building and institutional strengthening	• Revise all government policies to ensure they consider climate change and its impacts; • Mainstream climate change considerations in national, sectoral, and spatial development planning; • Build the capacity of key government ministries and agencies to move forward on climate change adaptation; • Improve the capacity of the government to undertake international and regional negotiations on climate change; • Build the capacity of government, civil society, and the private sector on carbon financing; and • Build the capacity for education and training of environmental refugees to ease migration to other countries and integration into new societies

The projected climate change and variability are likely to have a significant impact on the water supply and sanitation sector in the region. The water supply and sanitation systems, particularly in the coastal region of the country, are vulnerable to such factors as cyclonic and storm surges and flooding. To improve the situation, it is important to:

- Conserve water effectively

- Recycle and reuse water
- Raise tube wells on concrete platforms in order that a clean source of water is available above floodwaters.

Other measures that may significantly improve the adaptive capacity of the coastal communities may include the following:

- Development of coastal green belts as a measure against storm surge (Figure 1).
- Analysis of meteorological data to improve prediction of changes in the pattern of cyclonic events
- Ensuring safety by introducing hazard-resistant housing (improved material, alternative design, etc.)

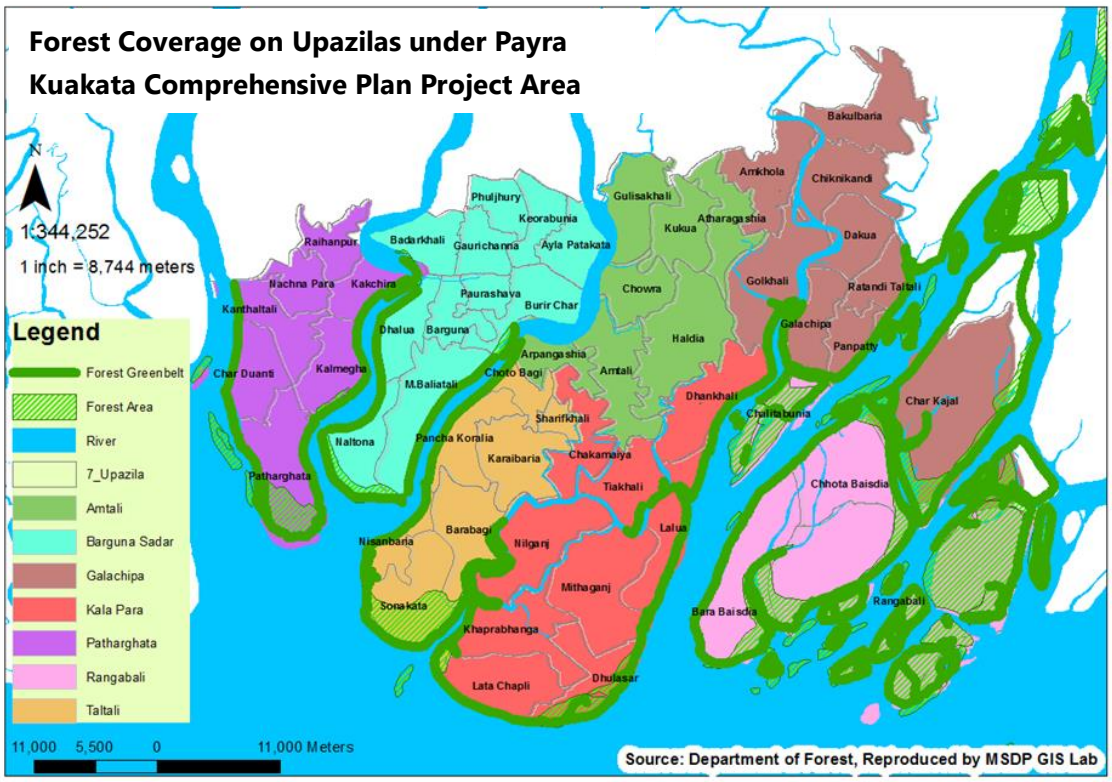

Figure 1: Forest Coverage and Proposed Green Belt in the Region