

LANDSCAPE NARRATIVE OF THE SUNDARBAN

A SUMMARY

A thick fog crawls slowly over the narrow channels of water that criss-cross the delta and an egret emerges from a mangrove and gently takes flight as the forest wakes up to another beautiful morning. Natives from the nearby villages take out their boats to venture into the forest in search of fish, crabs, honey and timber, fully aware that tigers lurk in its shadows.

This is the Sundarban – vibrant, mysterious, spectacular and, at times, dangerous.

Bushra Nishat
Ganesh Pangare

Photo credit: Ganesh Pangare



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Why this narrative?

Famous for being one of the last remaining natural habitats of the majestic Bengal tiger and the eponymous sundari tree (a dominant mangrove species in the region), the Sundarban spreads over an area of about 10,200 km² shared between India and Bangladesh. It is a unique ecosystem that supports a huge assortment of plant and animal species and is sustained by a complex interaction between multifarious geographical and ecological factors. Apart from its rich biodiversity, the Sundarban is significant also because it provides livelihood to some of the most economically vulnerable people in the world, constituting nearly 0.1 per cent of the global population.

The shared Sundarban region is considered to be one of the seven most globally important wetlands of the world (WWE, 2017). The Sundarban National Park in India and the Sundarban Reserve Forest in Bangladesh have been declared World Heritage Sites by UNESCO has also been listed as a Wetland of International Importance in the Ramsar Convention.

The Sundarban, geographically contiguous, but administratively split into two

regions because of the international boundary, has been seen as two separate ecosystems instead of one since 1947. However, this shared region offers India and Bangladesh a great opportunity for collaborative planning and action.

At present, there is very little attempt to understand the Sundarban in its entirety, as one landscape or one region, and available literature focuses on only one side of the Sundarban (Dipu and Ahmed, 2013; Sarker, 2010). This narrative, for the first time, tries to bridge the knowledge gap by collating data from both countries in order to facilitate the development of a collaborative action plan for the Sundarban region. This narrative defines the Sundarban region as the Sundarban Reserve Forest (SRF) and the Ecologically Critical Area (ECA) adjacent to the Sundarban in Bangladesh and Sundarban Biosphere Reserve (SBR) in West Bengal, India. Thus defined, the Sundarban represents not only the uninhabited mangrove forests but also the bordering areas that are home to people who are directly dependent on the forest for their lives and livelihood.

The objectives of this narrative are to:

- Create a multilayered and holistic understanding of the Sundarban to initiate planning activities that transcend political boundaries and multiple scales.
- Align and analyse information of ecological, socio-economic and cultural variables of the Sundarban from different sources and records to support joint understanding of the Sundarban.
- Synthesize current literature to identify effective management approaches and practices of the past.
- Identify the gaps in learning, knowledge, data and information on the Sundarban.





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The Physical Landscape

The Sundarban landscape is dominated by deltaic formations that include a network of water channels (where freshwater rivers and canals mix with tidal seawater channels), salt marshes, tidal sandbars and islands. The tides play an important role in sculpting the physical features of the land and the landscape keeps changing from high to low tide. However, the Sundarban landscape is not shaped by one factor alone but by the complex interaction of the coastal system that includes tides, currents, sediments and organic matter. The Sundarban is ever-changing and keeps evolving through the bio-tidal processes of accretion and erosion. The natural resources management of the Sundarban in both countries focuses on protection of plants and wildlife rather than conservation of the habitat and overlooks the spatial progressions and interlinkages of the entire ecosystem. These interlinkages between a wide variety of factors that affect the ecosystem and each other, some of which exist outside the physical boundary of the forest, hinder accurate analysis and as such result in slow or insignificant progress in planning and resources management. Thus, the management of the Sundarban will need to expand its spatial as well as subject-matter boundaries if it is to capture such interrelationships.

Most of the present-day Sundarban region was formed during the last 5000 years by bio-tidal processes and marine and atmospheric agencies. Erosion of estuary margins and changes in the sea face happens

simultaneously with deposition of silt and rise of riverbeds. This shapes the land masses (like beaches, dunes, swamps and so on) in the area and causes water channels to change their courses from time to time. These changes can be sped up by land-reclamation efforts and sea level rise due to climate change. Planning for this region needs to account for man-made as well as natural changes and strike a balance between conservation of nature and the needs of the people.

Around 30 percent of the Sundarban is covered by water and the unique ecosystem of this mangrove forest is shaped by rivers, canals and tidal flows. The rivers in the region are fed by the distributaries of the Ganga river system. The freshwater inflow from these rivers helps mitigate the salinity brought in by the tidal seawater of the Bay of Bengal. However, in recent decades the salinity has been rising in the area and moving further inland due to reduced flow of fresh water because of man-made diversions and dams as well as rise in sea levels.

The fragile ecosystem of the Sundarban and the communities living in and around the Sundarban are vulnerable to tropical cyclones, storm surges, erosion, flood, drought, frequent inundation by high tide causing loss and disruption to lives and livelihood and often irreparable or long-term damage to the ecosystem. However, studies show that mangroves have the ability to cope with such hazards and, in most cases, recover from the impacts in due course (Spalding et.al. 2014).



The Biological Landscape

“The Sundarban serves as a breeding and nursing habitat for diverse marine organisms. Importantly, the Sundarban is one of the few places in the world where the Bengal tigers still live in the wild.

Mangroves thrive in tropical estuarine regions where mud-rich land meets sea. Their specialized root systems help them survive high water stress and fluctuations in temperature and salinity. The delicate balance of fresh water and seawater in the Sundarban has helped create a unique ecosystem that is suitable for mangroves. However, increasing salinity in the region is bringing about changes in vegetation –for example, trees like the tall sundari mangrove and golpata/nipa palm, which were abundant fifty years ago, are now on the decline (Islam et al., 2014). Salinity increase has affected the species combination and regular succession patterns and dwarf species are gradually replacing the taller trees. The full impact of this on wildlife has, however, not been assessed.

The Sundarban is home to a number of mangrove species like sundari (*Heritiera fomes*), gewa (*Excoecaria agallocha*), goran (*Ceriops decandra*) and keora (*Sonneratia apetala*). Sir David Prain (1903) recorded a total of 334 species of plants in the Sundarban and surrounding areas. However, recent studies have revealed a decline in diversity. In the Sundarban, three distinct vegetation types have been documented in relation to varying degrees of water salinity and freshwater flow, and the vegetation consists of recurrent patches of these vegetation types. The pattern of vegetation

succession in the Sundarban depends on the freshwater rivers that deposit silt, build land, and determine the salinity level.

The diverse array of plants, invertebrates and types of habitat in the Sundarban support an abundant wildlife, both terrestrial and aquatic. The wildlife of the Sundarban has adapted to the freshwater and saline-water environment and the ebb and flow of tides. These wetlands also sustain billions of protozoans, cnidarians, barnacles (*Amphibalanus* spp.), oysters (*Crassostrea* spp.), lichen and other invertebrates. These organisms support juvenile fish, crabs, prawns, shrimps and molluscs, which seek refuge in the shallow intertidal reaches that characterize the mangrove wetlands; these in turn are food to wading migratory and local birds, pelicans and the endangered crocodile. As many as 447 species of vertebrate wildlife (amphibians, reptiles, birds and mammals) including the Gangetic and Irrawaddy dolphins, and the olive ridley turtles have also been reported. Importantly, the Sundarban is one of the few places in the world where the Bengal tigers still live in the wild. The tigers are vulnerable to poaching and revenge killing. In the villages around the Sundarban, prevention or resolution of tiger-human conflicts is a major part of tiger - conservation efforts.



The Socio-Economic Landscape

The conservation and management efforts in the Sundarban are primarily focused on protection of biodiversity and habitat of animals and plants. Till now, planning and strategy, in both India and Bangladesh, do not reflect the economic importance of the forest for the people who live nearby. These people are amongst the poorest in the region and face similar poverty-related issues on both sides of the border. The forest is their main source of livelihood as well as fuel, food, medicine and building materials. For example, in Bangladesh, the Sundarban provides employment for over 350,000 people working as jaleys (fishermen), bawalis (woodcutters), mouals (honey gatherers) and shrimp fry, crab, nipa-leaf and thatching- grass collectors (Tamang, 1993). In India, the livelihood of nearly 2 million people is linked with the Sundarban, which mainly includes fishing, crab, collection, honey and beeswax collection and allied activities (Singh et al. 2010).

With the moratorium on harvesting of timber in both countries, agriculture and fishing and shrimp fry, crab and honey collection are the most common ways of earning a living in the Sundarban. In recent decades modern livelihood opportunities like tourism and brackish water shrimp farming have also gained popularity. The population, in the Sundarban Biosphere Reserve in India has shown a steady increase over the last decade, while it has gone down in the areas surrounding the Sundarban Reserve Forest in Bangladesh. The threat of natural hazards coupled with the unpredictability of land and water is a constant source of anxiety and vulnerability for the settlers around the Sundarban. The fragile ecology of the region, threat of natural disasters, environmental degradation, drinking water scarcity due to increased salinity and inadequate infrastructure development in the peripheral areas limiting livelihood options are the main reason for this out migration.

Management and Conservation Practices Living in close contact with raw nature, the people of



the Sundarban region have great respect for it, and their traditional practices, religious beliefs, rituals, folklore and arts and crafts promote conservation and living in harmony with nature. Scientific management of the Sundarban mangrove forest was initiated during the British era when the first call to preserve the forests was made in 1862 (Choudhury and Ahmed, 1994). Faced with dwindling forest produce, the colonial rulers declared some parts of the Sundarban as reserved forest in 1875–76 under the Forest Act (1855), and resource exploitation was brought under government control with a system of permits. Despite this, by 1930s, the standing stocks of other trees were on the decline due to unregulated felling and, thus, the Curtis plan, which was based on detailed scientific inventory, came into force in 1931. The Curtis plan remains the last coordinated assessment of the entire Sundarban as one forest. Thereafter the relevant laws, policies and management plans have been Sundarban, focused only on their side of the timber in both forest.

Issues and Shared Challenges The Sundarban symbolizes a world of human earning a living in the poverty and vulnerability surrounded by natural

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richness. In Bangladesh and India – despite national and international concern, political support and significant resource flows – a combination of exposure to disasters and natural stresses, increasing population pressure, unregulated drives towards commercialization of natural products and insufficient institutional coordination and capacity has led to inadequate management of the Sundarban and continuous degradation of forest resources. While both countries face similar challenges with regard to sustainable resource management in the shared region, political and administrative boundaries have impacted their effectiveness in dealing with these issues.

Around 7.5 million¹ people are directly dependent on the Sundarban and suffer from several and similar dimensions of poverty in the two countries. The average per capita income in the Indian part is about USD 0.5 per day while the corresponding figure for the Bangladesh part is about USD 0.9 per day. Common factors highlighting this extreme poverty include poor health conditions, relatively low education levels, limited employment opportunities, inadequate infrastructure and very high risk of persistent cyclones, floods and embankment failures.

The Sundarban is an active delta region and the numerous islands are still being formed and reformed by natural processes. While mangroves help in soil conservation, sea level rise and tidal hydraulics have caused erosion in many of the islands. Hence, it needs to be included in planning and

management of the region. Both countries are also vulnerable to the effects of climate change like cyclones, fluctuations in water salinity and flooding. Climate change and sea level rise also affect agriculture and can be devastating for the fragile Sundarban ecosystem.

The management policies in both the countries reflect their individual priorities, and the political borders create the perception that the two sides of the Sundarban are two separate regions. In Bangladesh, the Sundarban Reserve Forest (SRF) is managed by the Forest Department. Their primary focus is conservation of biodiversity. As per the provisions of Environmental Conservation Act, 1995, the 10-km wide band surrounding the northern and eastern boundaries of the SRF, was declared ecologically critical area (ECA) with the main objective of providing protection to the SRF and conservation of its biodiversity. However, other than a few uncoordinated activities by government and non-government agencies, no real initiative has been taken to manage and develop the ECA area so far. In India, the degree of protection across the Sundarban Biosphere Reserve varies greatly. While the Project Tiger is federally managed, the national park and the wildlife sanctuaries are under the forest department of the state of West Bengal, who have varying degrees of control in different parts. The presence of numerous governmental organizations with overlapping authorities and responsibilities gives rise to duplication of efforts, especially in terms of socioeconomic development, and monitoring of outcomes is limited.

As regards data collection, three types of data are crucially required – forest inventory, wildlife census and survey, and hydro-meteorological data. While the government agencies in India and Bangladesh periodically collect these and other data, they lack a coordinated approach that can lead to a holistic understanding for better management of the Sundarban. Non-governmental actors, like researchers, scientists and journalists, add to the information database through their studies but their efforts are temporary and limited. After 1930 there has been no attempt to scientifically assess the Sundarban as a whole.

This joint landscape narrative attempts to address these issues by combining data from a wide range of sources in order to support the development of a coordinated action plan.



1. Nearly 5 million in West Bengal, India, live in the buffer zone of Sundarban Biosphere Reserve and analyses from different studies (Hussain, 2014), show that the population, which according to BBS (2010) is 2.5 million, residing in a 20 km wide radius surrounding the periphery is directly dependent on the Sundarban in Bangladesh.

Emerging Opportunities for Coordinated and Concurrent Activities



In 2011, India and Bangladesh signed a memorandum of understanding for bilateral cooperation on conservation of the Sundarban and a protocol on the protection of tigers. Under these two mutual agreements a number of strategic actions have been proposed to be undertaken in collaboration, such as joint research and monitoring, sharing of relevant information and technical knowledge (e.g., on tiger-human conflict) between the concerned officials of the two countries and execution of patrolling along the borders to prevent poaching and illegal trade. However, there is scope for more collaborative activities that the two countries can focus on and many areas in which the two countries can cooperate. By recognizing common grounds and differences, specific needs and priorities can be identified.

India and Bangladesh can work together on natural resources management to improve biodiversity conservation outcomes. Restoration and recovery programmes and better recognition of the full value of forests can help increase profitability, which could become an incentive for investment in the forests. Preventing or resolving human-wildlife conflicts and providing incentives to forest officials and communities can help in protecting wildlife. Both countries can start community forestry that seeks to ensure both social interests and sustainable management of the forests and offers an integrated package of benefits. Sharing relevant data on plant and animal life and enhancing current knowledge base will also be helpful. In this, developments in technology can play a significant role. Cultural and media exchanges are also important for improving bilateral relations as well as attracting new ideas and perspectives.

India and Bangladesh can also work together to improve disaster management through technical cooperation, capacity development and development of regional mechanisms and capacities for early warning among other things.

Stronger economic growth and poverty reduction are critical to sustainable management of the Sundarban. All plans with regard to conservation and management of the Sundarban must include the people of the region as part of the solution. Both countries recognize the potential of green economy to boost economic growth and meet conservation goals simultaneously. They can work together on this. Public services also need to be strengthened, and joint planning with a unifying agenda underpinned by goals and targets, and exchange of experiences can be the mode of cooperation.

Fisheries and aquaculture can be improved by measures such as joint fish stock assessment, helping local fishermen improve productivity and profitability, identifying more fish sanctuaries and fostering backyard hatcheries to reduce dependence on wild shrimp fry.

The two countries also need to focus more on marine resource conservation through ocean research and marine protected areas. Integrating mangroves conservation in the marine resources conservation can be an important approach for both countries. Joint courses and curriculum development focusing on applied /advance researches such as marine bio- technology, marine fertilization and habitat modelling can be introduced.

India and Bangladesh have agreed to work together on climate change adaptation and mitigation. Additional activities they can focus on are, among other things, conducting medium- and long-range planning that incorporates climate change and variability, creating clear and integrated regional guidelines for REDD+ (Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries) community forestry, and studying the capacity of mangroves to act as carbon sinks.

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The Way Forward



Successful management of the Sundarban will require crafting of effective institutions at multiple levels in order to provide incentives and disincentives.

While it is obvious that the Sundarban has to be considered as one ecosystem, the issue really is how to make this collaborative action workable. Bangladesh and India are separate countries and, therefore, any interaction between them needs the involvement of and clearance from their respective governments. However, it is the state government of West Bengal which is directly concerned with the Sundarban, so its involvement is crucial. Finally, the policies of governance and the problems are different on the two sides of the border. This makes it more complex.

Regional platforms need to be established and developed to work alongside other regional platforms across sectors and with the drivers of change in different rivers and basins. With multiple treaties signed between the two nations, the shared Sundarban region has a possibility where it is developed sustainably and managed as one ecosystem. In recent years, several joint bodies have been set up of the governments of India and Bangladesh for the protection of the Sundarban. The current level of cooperation is not enough to keep up

with the dynamics of climate change and emerging socio-economic needs of the people.

Consensus building in joint ecology management and conservation efforts starts with national interests, including economic development, security and concerns and needs of the local population. Hence, it requires trust and political will, platforms for dialogue and transparency, knowledge and information, capacity and tools for integration of competing demands and identification of mutual benefits. Successful management of the Sundarban will require crafting of effective institutions at multiple levels in order to provide incentives and disincentives. More importantly, the institutions need to be truly representative, processes that support interaction with stakeholders must also be included. Agreements will work on the ground only if they involve stakeholders and have their support and take into account local politics. In order to catalyse and mobilize regional platforms, it is necessary to include them in national agendas and international dialogues.

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