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Sundarbans: A Critical Wetland

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Sundarbans: A Critical Wetland

Introduction and Brief History

The Sundarbans consists of about 200 islands, separated by some 400 interconnected tidal rivers, creeks and canals between India and Bangladesh. [Sundarbans](#) is the habitat of the world's largest contiguous mangrove forest. The area, over time, has been continuously shrinking in size and at present it is approximately three-fifths the size of what it was around 200 years ago (about 16,700 km²). This has been as a result of continuous deforestation and clearing of the forest for agriculture and allied activities. Of the current total area of around 10,217 km², 4262 km² (that accounts for 41.7% of the total area) is in India. The rest 5955 km² (58.3%) is in Bangladesh. The Sundarbans eco-region is part of the world's largest delta, formed from the sediments brought down by three great rivers, the Ganges, Brahmaputra and Meghna. Etymologically, Sundarbans means "Beautiful Forest" and the name itself, conjures images of a mystic forest, predators and hostile environments. Populated by both animals and humans, Sundarbans is a place that has continued to be a perpetual battleground between nature

and human. The landscape is one of low-lying forested alluvial islands (56 in the Indian sector), mud banks with sandy beaches, and dunes along the coast.

As per [WWF classifications](#), the Sundarbans are featured as two distinct eco-regions – 'Sundarbans freshwater swamp forest (IM 0162)' and 'Sundarbans mangroves (IM 1406)'. The Sundarbans Freshwater Swamp Forests eco-region is nearly extinct but Sundarbans Mangroves eco-region is the world's largest mangrove ecosystem. Named after the dominant mangrove species *Heritiera fomes*, locally known as Sundari, this is the only mangrove eco-region that harbours the Indo-Pacific region's largest predator, the [Royal Bengal Tiger](#). The Bangladesh and India part of the Sundarbans have been listed separately in the UNESCO World Heritage List as Sundarbans and Sundarbans National Park, respectively.

Importance of Sundarbans

The Sundarbans is the world's largest mangrove forests and one of the most biologically productive of all natural ecosystems. The mangrove habitat supports the single largest population of tigers in the world. The uniqueness of the Sundarbans is also associated with the fact that it is immensely rich in mangrove flora and fauna.



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Some 78 species of mangroves have been recorded in the area making it the richest mangrove forest in the world.

Further, Sundarbans islands are also of great economic importance as these act as a storm barrier, [shore stabiliser](#), [nutrient and sediment trap](#), a source of timber and natural resources. Sundarbans support a wide variety of aquatic, benthic and terrestrial organisms. They are an excellent example of the ecological processes of monsoon rain flooding, delta formation, tidal influence and plant colonisation. The total area of Sundarbans is estimated to comprise about [55% forest land and 45% wetlands](#) in the form of tidal rivers, creeks, canals and vast estuarine mouths of the river.

Sundarbans contains an [exceptional number of threatened reptiles](#) including the king cobra and significant populations of the endemic river terrapin which was once believed to be extinct. Sundarbans provide nesting grounds for marine turtles including the olive riley, green and hawksbill. Two of the four species of highly primitive horseshoe crab (*Tachypleus gigas* and *Carcinoscorpius rotundicauda*) are also found in Sundarbans. The [Sajnakhali area](#), listed as an important Bird Area, contains a wealth of waterfowl

and is of high importance for migratory birds.

Role of Sundarbans in Carbon Sequestration

[Carbon Sequestration](#) is the process of capturing and storing atmospheric carbon dioxide. Areas that can store large amounts of carbon are known as “carbon sinks”. These primarily include oceans and forests. Carbon sinks play an important role in combating both climate change and regulating global temperatures. Forest Carbon sinks also convert carbon dioxide into oxygen through photosynthesis. As per the study undertaken by researchers from the [University of Calcutta](#) in 2011, the Indian Sundarbans have soaked in 4.15 crore tonnes of carbon dioxide, valued at around \$79 billion in the international market.

India-Bangladesh 2011 MoU on Conservation of the Sundarbans

On 6 September 2011 India and Bangladesh signed a [Memorandum of Understanding](#) that called for undertaking collective measures between the two countries for protecting and conserving the Sundarbans ecosystem. There are 8 Articles in this MoU that are summarized as:

Article I

As per [Article 1](#) both states recognized the need for monitoring and conserving the Sundarbans.

Article II

[Article 2](#) highlights that in order to exploit the potential of the Sundarbans for development and alleviation of poverty, both states agree to undertake the following endeavors:

1. consider and adopt appropriate joint management and joint monitoring of resources;
2. explore the possibility of implementing conservation and protection efforts, encourage mangrove regeneration, habitat restoration and rehabilitation programs, which would eventually increase the potential for carbon sequestration;
3. develop a long-term strategy for creating ecotourism opportunities for both countries, which will create synergy and generate greater revenue.

Article III

[Article 3](#) of the MoU highlights that both states are in agreement that the Sundarbans

ecosystem is greatly influenced by human use and the human beings living around the Sundarbans. Therefore, both parties will map and delineate these human settlements on their respective sides so that a better understanding emerges of the relationship between human settlements and the ecosystems. Based on this information, both the states would also develop a management plan to address issues of livelihood, deprivation by flooding and other climate-related disasters, man-animal conflict, pollution, resource depletion, etc. India and Bangladesh will through the management plan, also identify opportunities for livelihood generation that do not adversely affect the Sundarbans ecosystem.

Article IV

As per [Article 4](#) of the MoU, both parties agreed on the need for an exercise to be conducted to identify and catalogue the diversity of flora and fauna found in the Sundarbans along with their spatial distribution across the countries of Parties. Through this exercise, both states will determine the areas and species that are under pressure including those facing the threat of endangerment and extinction. Acting on this the states will develop a comprehensive plan to tackle these threats along with a detailed action plan to adapt against perceived threats.

Article V

Article 5 highlights that both India and Bangladesh will carry out research to develop a common and shared understanding of the impacts of climate change along with adaptation strategies that can be implemented in the region.

Article VI

Article 6 of the MoU highlights that both states in order to strengthen the management of the Sundarbans, are committed to the advance their collaboration in the following areas:

1. Share relevant information between the concerned officials, forest and otherwise, of both the countries;
2. Explore the possibilities of joint research and management projects;
3. Share technical knowledge with the common goal of conservation and management of biodiversity of Sundarbans;
4. Organize joint tiger estimation at regular intervals;
5. Execution of patrolling exercises by the Forest and other relevant Officials of both the Parties along the respective borders to prevent poaching or smuggling of derivatives from wildlife;
6. Promote capacity building exercise and exchange visits of Forest

Officials of field level in order to better understand and share ideas and problems of management, biodiversity conservation, climate change adaptation and promotion of sustainable socio-economic development, and ecotourism;

7. Exchange personnel for training and promotion of education in forestry, including at the Wildlife Institute of India, Dehradun financed by the Government of India.

A Working Group will be set up to define activities, responsibilities, time, and resources involved, according to the activities established as per this Memorandum.

Article VII

As per Article 7 both states further agreed that:

1. Should changes of national policies in either country result in difficulties in the further development and implementation of this Memorandum, both countries will do their utmost to ensure a reconciliation vis-à-vis the difficulties raised.
2. This Memorandum is non-exclusive, allowing both Parties to enter into similar agreements with other countries.

3. This Memorandum does not constitute any legal obligations for either Party in any international forum and it does not conflict with any other treaty to which either country may be a party to.

Article VIII

Lastly, Article 8 highlights that this, Memorandum may be modified by mutual written consent of the States. The initial period of this Memorandum will be 5 (five) years and shall be extended automatically at the end of each period unless terminated by mutual consent by either Party by serving written notice 90 (ninety) days prior to the date of termination.

Termination of this Memorandum shall have no effect on other similar agreements or projects entered into by the Parties.

Termination shall not affect the programmes under implementation. Finally, this Memorandum will come into effect on signature and will continue in operation, until terminated by either states as stated in this Memorandum.

Emerging challenges for Sundarbans

Rise in salt content

Rising saline content in Sundarbans' soil is becoming a major cause of concern. This is

having serious implications for the region's flora and fauna. High saline levels are causing the growth of algal blooms which cuts off a large amount of biological oxygen in the water. As a result of this fishes die in the ponds and other water bodies of the delta. This increased saline content in Sundarbans has even pervaded into the subsoil and groundwater making it extremely salty and harmful for consumption.

Agricultural Challenges in Sundarbans

The coastal region of Sundarbans is fertile but highly vulnerable to natural and human-made hazards. As discussed, salinity is a major problem in Sundarbans and has a significant negative impact on agricultural productivity. Rice is the main crop in the region. The acceptable salinity limit for rice cultivation is 4-6 parts per thousand (ppt), but post Cyclone Aila these salinity levels have reached up to 8 ppt and 20 ppt respectively in the northern and southern region of Sundarbans. Salinity levels are heavily influenced by the amount of freshwater supply, as well as the amount of saltwater intrusion from the Bay of Bengal. As a result of salinity in Sundarbans, cropping intensity is significantly lower than the average as compared to the other parts of West Bengal. Rainfall plays another significant role in Sundarbans' agriculture patterns and annual variation in

monsoons as a result of climate change is also impacting the region's crop outputs. Sundarbans farmers also rely on groundwater to meet their water demands of agriculture during the lean monsoon periods which has resulted in significant lowering of the [water table](#) and the drying of wells in some areas of the region.

Sundarbans Fisheries

[Fisheries](#) and [aquaculture](#) are integral components of the livelihood of the people of Sundarbans and contribute significantly to their economy. Earthen embankments surrounding the Sundarbans islands keep the brackish water away from the islands and make freshwater aquaculture viable within the islands. In addition to the brackish water aquaculture, freshwater aquaculture is also increasing day by day and securing parallel livelihoods in the Sundarbans ecoregion. Fish culture in ponds is the main freshwater aquaculture practice in the region. Though freshwater aquaculture has significant potential, it is threatened by climate change. It has been highlighted that coastal aquaculture is more vulnerable than inland aquaculture, future climate change is also predicted to severely affect inland fish production.

Saline water inundation due to breaches of river embankments, sea-level rise and subsequent erosion coupled with frequent

extreme weather also poses serious implications for fisheries and aquaculture in Sundarbans.

IPCC Warnings for Sundarbans

As per the 2021 [Intergovernmental Panel on Climate Change \(IPCC\) report](#), as a result of climate change sea level close to Sundarbans at the southern fringe of Kolkata, could rise about 60 centimetres during the end of this century. This would increase the intensity and duration of flooding in the region during high tides. This report further highlights that the Sundarbans could witness cyclones of Category 3-5 (extremely severe or super cyclones) in the near future.

Sustainable Aquaculture in Mangrove Ecosystem (SAIME), initiative

Under the [Sustainable Aquaculture in Mangrove Ecosystem \(SAIME\)](#), farmers have taken up sustainable shrimp cultivation at 20 hectares at Chaital in West Bengal's North 24 Parganas, and 10 hectares at Madhabpur in adjoining South 24 Parganas. For several years, environmentalists and experts have expressed concerns over unsustainable aquaculture, particularly shrimp collection, after cleaning large tracts of mangrove forests in Sunderbans. This new initiative

provides new hope for mangrove restoration in Sundarbans. Under this initiative, shrimp farmers are also planting mangrove trees around the shrimp ponds.” This community-based initiative of sustainable shrimp cultivation is being conceived by NEWS and Global Nature Fund (GNF), Naturland and Bangladesh Environment and Development Society (BEDS).

Some suggested Readings

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