Strengthening Ecological Monitoring for Mangrove Management in West Bengal

Sundarbans

Background

Coastal ecosystems and their diverse biodiversity are under threat due to the impacts of global climate change, specifically due to **rising sea levels**. Mangroves, crucial as socio-ecological systems, play a vital role in combating climate change, safeguarding coastlines, and sustaining the livelihoods of coastal communities.

Despite their immense provision of ecosystem services and myriad benefits to society, mangrove ecosystems face immense pressure from both human-induced and natural causes. The Indo-Pacific region, boasting the highest mangrove area and species diversity, experiences a significantly faster sea level rise (3.14 mm/yr) compared to the global average (2.5 mm/yr). This accelerated rise inhibits the natural adaptation processes of mangroves, which is further compounded by urbanization, expansion of aquaculture, and related land use changes that restrict the movement of mangroves inland. Collectively, these challenges increase coastal vulnerability and diminish ecosystem resilience, leading to unprecedented changes in these coastal areas.

The Sundarbans, the world's largest mangrove ecosystem, spread across Bangladesh and India, derives its name from the 'sundri' tree, translating to 'beautiful forest' in Bengali. Covering **9,600 square kilometers** in India, it represents half of the country's mangroves and holds **UNESCO and Ramsar** status, highlighting its conservation importance.

The Sundarbans' ecosystem services **sustain millions of people**, and efforts are needed for West Bengal's coastal resilience and long-term sustainability. Effective restoration, along with conservation, hinges on location-specific ecological data and data-driven decisions for prioritizing actions on the ground.

Study Area
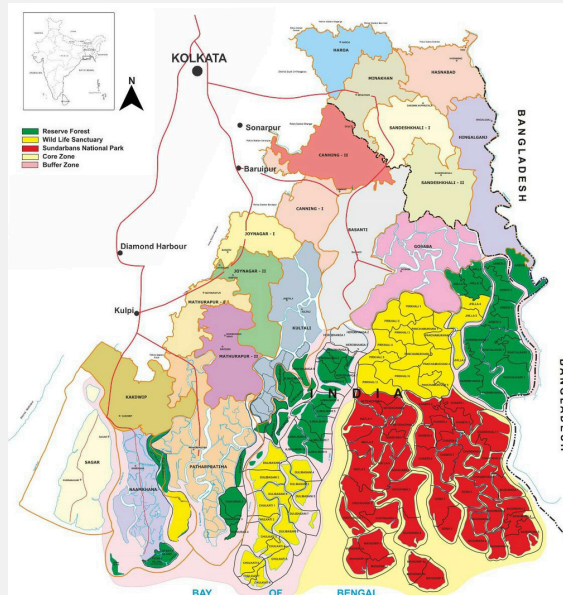
Source: Ratul Saha

- Districts: South 24 Parganas and North 24 Parganas, West Bengal.
- Lat: 21° 27' 30" and 22° 30' 00" N & Long: 89° 02' 00" and 90° 00' 00" E.

Biodiversity

- **Flora**: 27 mangrove species including the critically endangered *Sonneratia griffithii* and endangered *Heritiera fomes*.
- **Fauna**: Over 240 bird species - Spoon-billed Sandpiper (*Calidris pygmaea*), Masked Finfoot (*Heliopais personatus*), 58 mammals - Royal Bengal Tiger (*Panthera tigris*), Ganges River Dolphin (*Platanista gangetica*), and Irrawady Dolphin (*Oracella brevirostris*).

Socio-Economic Importance

- Has a long history of human habitation dating back to the Mauryan era (4-2 century BC).
- Over 3.5 million people are dependent on provisioning services.
- Estimated to provide economic benefits of US$ 43 million/year (2011).
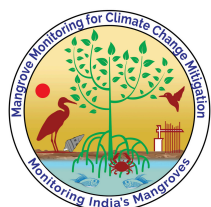
Aim

This project aims to establish ecological monitoring sites to better comprehend the future climate change vulnerability of mangrove ecosystems within the Sundarbans. The information and scientific data gathered will assist in evaluating the effectiveness of current restoration and conservation practices, enabling the development of robust scientific management practices for mangrove conservation. Currently, the project is planned to conduct scientific data collection for the next 1-2 years.

Project activites

The goals of this project will be achieved by carrying out activities which consist of field-based studies, data and information collection, analysis, knowledge exchange, communication, and capacity enhancement. These include:

- Establishing **ecological monitoring sites** to understand vegetation characteristics, carbon stocks, and influence of environmental parameters (such as salinity, pH, inundation frequency, etc.) on the mangrove ecosystem.
- Setting up a network of **rod surface elevation tables (rSETs)** to understand sedimentation and erosion rates.
- Provision of **training opportunities** for mangrove monitoring & **best practices** in mangrove management and restoration aimed at forest department staff, researchers in local institutions, & other stakeholders.

Program Outcomes

- Scientific information for informed decision-making.
- Long-term ecological monitoring scheme for adaptive management.
- Identification of mangrove restoration priority areas.
- Planning interventions for mangrove conservation and management.

Impact on Climate Efforts

- Enhancement of India's climate ambition by developing baseline information.
- Improvement in carbon stock inventory from coastal systems.
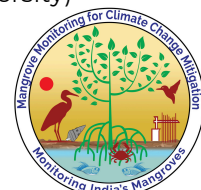- Refined and accurate accounting for carbon sources and sinks in the context of nationally determined contributions (NDCs).