

MANGROVES - ENVIRONMENT

NEWS: Tamil Nadu's mangrove forest cover has nearly doubled from **4,500 ha in 2021 to 9,039 ha in 2024**, due to **new plantations** and **preservation of existing mangroves**.

WHAT'S IN THE NEWS?

- Mangroves are salt-tolerant plants found in tropical and subtropical intertidal regions, thriving in coastal zones with brackish water and wet, loose soil.
- They serve as crucial refuges for coastal biodiversity while acting as natural bio-shields against extreme climatic events such as cyclones and tidal surges.
- These ecosystems are uniquely adapted with specialized root systems, including tangled prop roots, which help stabilize coastlines by capturing sediments and slowing down water flow.

Importance of Mangroves

1. Climate Change Mitigation

- Mangroves stabilize coastlines by preventing erosion and reducing the impact of rising sea levels and storm surges.
- They provide protection to coastal communities by acting as natural barriers against extreme weather events, such as cyclones, hurricanes, and tsunamis.

2. Carbon Sequestration

- Mangroves store carbon at a rate up to four times higher than terrestrial forests, making them highly effective in reducing atmospheric carbon dioxide levels.
- Their ability to trap and store carbon in deep, waterlogged soils helps mitigate climate change and contributes to achieving global net-zero emissions goals.

3. Ecosystem and Habitat Support

- Mangrove ecosystems act as a bridge between terrestrial, freshwater, and marine habitats, supporting a diverse range of species.
- The Sundarbans mangroves, for example, are home to endangered species such as the Royal Bengal Tiger, fishing cats, estuarine crocodiles, and river dolphins.
- They help in sediment trapping, which contributes to the formation of fertile lands and supports the survival of marine life by improving water clarity and nutrient cycling.

4. Disaster Risk Reduction

- Mangroves function as the first line of defense against natural disasters such as tropical storms and coastal flooding.
- Their dense root systems slow down high winds and tidal waves, minimizing their destructive impact on land and human settlements.

5. Socio-Economic Importance

- Millions of small-scale fishers depend on mangrove ecosystems for their livelihood, as these forests serve as breeding and nursery grounds for various fish species.
- Mangroves provide sustainable resources such as timber, fuelwood, fodder, and non-timber forest products, which are essential for local communities.
- They also hold potential for eco-tourism initiatives and carbon credit programs, providing alternative income sources while promoting conservation.

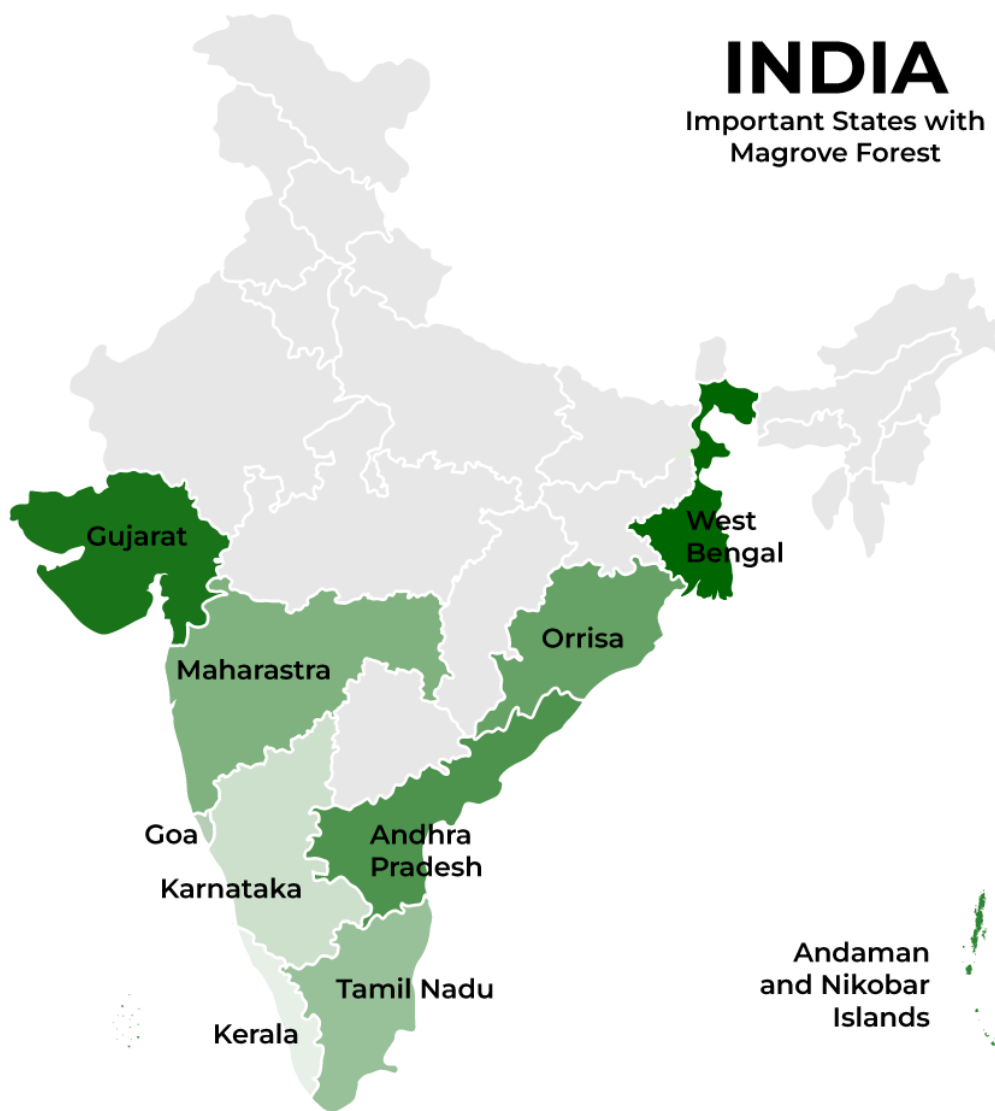
MANGROVES IN INDIA

- Mangroves are a unique type of coastal ecosystem found in **tropical and subtropical regions**. They are dense forests of salt-tolerant trees and shrubs that thrive in **intertidal zones, where land meets the sea**.
- These ecosystems are characterized by their ability to withstand harsh conditions, such as **saline water, tidal fluctuations, and muddy, oxygen-poor soils**.
- **Characteristics:**
 - **Mangroves exhibit Viviparity mode of reproduction**, where seeds germinate within the tree before falling to the ground. This is an adaptive mechanism to overcome the challenge of germination in saline water.
 - Some mangrove species **secrete excess salt through their leaves**, while others block the absorption of salt at their roots.
 - **Mangrove plants have special roots like prop roots and pneumatophores**, which help impede water flow and provide support in the challenging tidal environment.
- **Mangrove Cover in India:**
 - According to the **Indian State Forest Report 2021**, Mangrove cover in India is 4992 sq. Km which is **0.15% of the country's total geographical area**.
 - **Sundarbans** in West Bengal are the largest mangrove forest regions in the world. It is listed as a **UNESCO World Heritage Site**.

- Besides the Sundarbans, the Andamans region, the Kachchh and Jamnagar areas in Gujarat too have substantial mangrove cover.

- **Significance:**

- **Biodiversity Conservation:** Mangroves provide a unique habitat for a wide variety of plant and animal species, serving as **breeding, nursery, and feeding grounds** for numerous marine and terrestrial organisms.
 - For example, sundarban hosts the **Royal Bengal tiger, Irrawady Dolphin, Rhesus macaque, Leopard cats, Small Indian civet.**
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Not to Scale*

- **Coastal Protection:** Mangroves act as **natural buffers against coastal erosion, storm surges, and tsunamis.**
 - Their dense root systems and tangled network of prop roots stabilize shorelines and reduce the impact of waves and currents.
 - During hurricanes and cyclones, **mangroves can absorb and dissipate a significant amount of energy**, protecting inland areas and human settlements from devastating damage.
- **Carbon Sequestration:** Mangroves are **highly efficient carbon sinks**, sequestering large amounts of carbon dioxide from the atmosphere and storing it in their biomass and sediments.

- **Fisheries and Livelihoods:** Mangroves support fisheries by providing **nursery areas for fish and shellfish**, enhancing fishery productivity and contributing to livelihood and local food security.
- **Water Quality Improvement:** Mangroves act as **natural filters**, trapping and **removing pollutants and excess nutrients** from coastal waters before they reach the open ocean.
 - Their role in purifying water contributes to the **health of marine ecosystems** and helps maintain the balance of fragile coastal ecosystems.
- **Tourism and Recreation:** Mangroves offer recreational opportunities such as **eco-tourism, birdwatching, kayaking, and nature-based activities**, which can promote sustainable economic growth for local communities.

Interesting Facts About Mangroves in India

- **Bay of Bengal Dominance:** India's largest mangrove forest is located along the Bay of Bengal coastline, which holds 60% of the country's total mangrove cover.
- **Regional Distribution:** The Arabian Sea coast accounts for 27% of India's mangrove area, while the Andaman and Nicobar Islands hold the remaining 13%.
- **Sundarbans – The Largest Mangrove Forest:**
 - The Sundarbans, spanning West Bengal (India) and Bangladesh, is the world's largest continuous mangrove region.
 - It is a designated **UNESCO World Heritage Site** and extends from the Hooghly River in India to the Baleswar River in Bangladesh.
 - This biodiversity hotspot is home to endangered species such as the Royal Bengal Tiger, fishing cats, macaques, and several migratory bird species.

Threats to Mangrove Ecosystems

1. Human-Induced Pressures

- Rapid population growth and increasing demand for land have led to large-scale deforestation of mangroves.
- Expansion of urban infrastructure, industries, and agricultural activities in **Coastal Regulation Zone (CRZ)** areas has severely impacted mangrove ecosystems.

2. Aquaculture and Fisheries

- Intensive aquaculture and unregulated fisheries often obstruct tidal flows, disrupting the natural regeneration process of mangrove forests.
- Shrimp farming, in particular, has led to large-scale mangrove destruction, especially in coastal areas of Southeast Asia and India.

3. Resource Exploitation

- Overharvesting of mangrove timber for fuelwood, fodder, and construction materials poses a significant threat to these fragile ecosystems.
- Unregulated fishing practices impact the breeding cycles of fish and other marine organisms dependent on mangrove habitats.

Steps Taken for Mangrove Conservation

1. MISHTI Initiative

- The **MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes)** project aims to promote large-scale mangrove plantations in India.
- It is implemented through various funding sources such as **MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme)** and **CAMPA Fund (Compensatory Afforestation Fund Management and Planning Authority)**.
- This initiative aligns with India's **Nationally Determined Contributions (NDCs)**, which aim to create an additional **2.5–3 billion tonnes of carbon dioxide equivalent carbon sink by 2030**.

2. Mangrove Alliance for Climate (MAC)

- India joined the **Mangrove Alliance for Climate (MAC)** at the **27th Conference of the Parties (COP27) in Egypt** to strengthen global efforts in mangrove conservation and climate adaptation.
- This initiative focuses on restoring mangrove ecosystems worldwide to combat climate change effects and improve coastal resilience.

Suggestions and Way Forward

1. Strengthening Conservation Efforts

- Mangroves play a crucial role in global conservation efforts by sequestering large amounts of carbon and helping mitigate climate change.

- Their conservation should be integrated into national and regional policies to ensure long-term sustainability.

2. Promoting Sustainable Livelihoods

- Encouraging **eco-tourism, community-based conservation programs, and carbon credit initiatives** can provide alternative income sources for local populations.
- Sustainable harvesting of mangrove resources must be promoted to balance economic needs with environmental protection.

3. District-Specific Planning and Restoration

- Conservation strategies should be **region-specific**, considering the unique ecological and socio-economic aspects of each mangrove area.
- Restoration efforts should focus on **natural regeneration methods** rather than artificial plantation alone to maintain biodiversity integrity.

4. Strict Regulation of Industrial and Agricultural Activities

- Stringent enforcement of **Coastal Regulation Zone (CRZ) norms** is necessary to prevent further encroachment and destruction of mangrove forests.
- Sustainable aquaculture and responsible fisheries management should be promoted to minimize negative impacts on tidal flows and marine ecosystems.

5. Community Involvement and Awareness

- Local communities should be actively engaged in mangrove conservation through **awareness campaigns, participatory afforestation programs, and livelihood support**.
- Schools and research institutions should promote education and field studies to enhance understanding of mangrove ecosystems.

Conclusion

- Mangroves are **natural guardians** of coastal ecosystems, offering protection against climate change, sustaining biodiversity, and supporting millions of livelihoods.
- Their conservation is **not just an environmental necessity but also an economic and social priority**.
- A **holistic approach** involving **government policies, scientific research, community participation, and international collaborations** is essential to safeguard these vital ecosystems for future generations.

Source: <https://www.thehindu.com/news/national/tamil-nadu/tns-mangrove-cover-grows-to-9039-ha-in-2024-has-significant-carbon-stock-report/article69336604.ece>