

International Day for Conservation of Mangrove Ecosystem

For Prelims: International Day for Conservation of Mangrove Ecosystem, Mangroves, Indian State Forest Report 2023, Sundarbans, MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes), Sustainable Aquaculture In Mangrove Ecosystem (SAIME) initiative.

For Mains: Significance of Mangroves, Challenges Related to Mangroves in India

Source: TH

Why in News?

The <u>International Day for Conservation of Mangrove Ecosystem</u> (26th July) serves as a crucial reminder that these coastal guardians are vanishing 3-5 times faster than global forests.

- UNESCO and IUCN data reveals that global mangrove cover has halved since 1985, with 50% of remaining ecosystems now at risk of collapse.
 - The Tamil Nadu Forest Department held an awareness camp, highlighting mangrove biodiversity and the **Fish Bone Channel Technique** for ecological restoration.

International Day for the Conservation of the Mangrove Ecosystem

- Observed annually on 26th July, this day aims to raise awareness about the significance of mangrove ecosystems as unique, special, and vulnerable ecosystems, and to promote their sustainable management, conservation, and use.
- It was adopted by UNESCO's General Conference in 2015 to highlight the vital ecological and socio-economic roles mangroves play in coastal protection, biodiversity support, and climate mitigation.

Fishbone Technique of Mangrove Restoration

- It is a mangrove restoration method for areas with poor tidal flow, involving a central "backbone" channel and angled feeder channels to divert water from creeks.
- Once salinity and water flow are suitable, mangrove seedlings are planted. It mimics natural creeks, enhances tidal reach, and supports natural regeneration with minimal effort.



What are Mangroves?

- About: Mangroves are specialized coastal ecosystems consisting of salt-tolerant (halophytic) trees and shrubs that flourish in the intertidal zones of tropical and subtropical regions.
 - They are uniquely adapted to survive in saline, low-oxygen (anaerobic) environments with slow-moving waters and accumulated fine sediments.
 - Common mangrove species include Red Mangrove, Grey Mangrove, and Rhizophora, which play a crucial role in coastal protection, carbon sequestration, and biodiversity conservation.
- Mangrove Cover in India: As per Indian State of Forest Report (ISFR) 2023, India's mangrove cover is about 4,992 sq. km, accounting for 0.15% of the country's geographical area.
 - West Bengal has the largest mangrove cover in India, followed by Gujarat in second place.

MANGROVES

*Diverse group of salt-tolerant plant communities found in the (tropical/subtropical) coastal intertidal zone



CHARACTERISTICS . S.

- Survive under hostile environments (high salt, low oxygen)
- Their roots (pneumatophores) absorb oxygen from atmosphere
- Thick succulent leaves to store fresh water



MANGROVE COVER &

- Global: Asia > Africa > North and Central America > S America
- India (ISFR 2021): West Bengal > Gujarat > A&N Islands > Andhra Pradesh > Maharashtra
 - Sunderbans World's largest single patch of Mangrove forests



- Stabilise the coastline and reduce soil erosion
- Protection against cyclones
- Improve water quality by absorbing nutrients
- o Important carbon sink



THREATS ____

- Commercialisation of coastal areas
- Emergence of shrimp farms
- Temperature fluctuations (Mangroves can't survive freezing temperatures)

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CONSERVATION MEASURES

Global

- Inclusion of Mangroves in Biosphere Reserves and UNESCO Global Geoparks
- Mangroves for the Future Initiative (IUCN & UNDP)
- Mangrove Alliance for Climate (UNFCCC COP27)

India

National Mangrove Committee (1976)

Mangrove Initiative for Shoreline Habitats & Tangible Incomes (MISHTI) (Union Budget 2023-24)



International
Day for Conservation
of the Mangrove
Ecosystem July 26 (UNESCO)



ANGROVES IN INDIA Gulf of Kutch Gulf of Khambhat Dumas-Ubhrat Subarnarekha Dhamra Bhitarkanika Mahanadi Aumbra-Diva Vasai-Manori Vikroli Kundalika-Revdanda Shreevardhar Veldi East Godavari Achra-Ratnagiri Coringa Devgarh-Vijay Durg Krishna Dakshin Kannada/Honnavar Coondapur Mangalore Forest Division Kazhuveli Pichavaram Kannur (Northern Kerala) EACTS * UNESCO observes July 26 as the International Day for the Conservation of the Mangrove Ecosystem. * As per ISFR 2021, the mangrove cover in India is 4,992 sq km, which is 0.15% of the country's total geographical area. * West Bengal>Gujarat>A&N Islands>Andhra Pradesh>Maharashtra, have the largest Mangrove cover in India (ISFR 2021). * In India, mangroves are protected by the Environmental (Protection) Act 1986 and Coastal Zone Regulations. * Sunderbans, a UNESCO World Heritage Site, is the world's largest single patch of Mangrove Forests. * Sundarbans is the first Mangrove forest in the world, which was brought under scientific management, as early as in 1892. * The emergence of shrimp farms is responsible for at least 35% of the overall loss of mangrove forests.

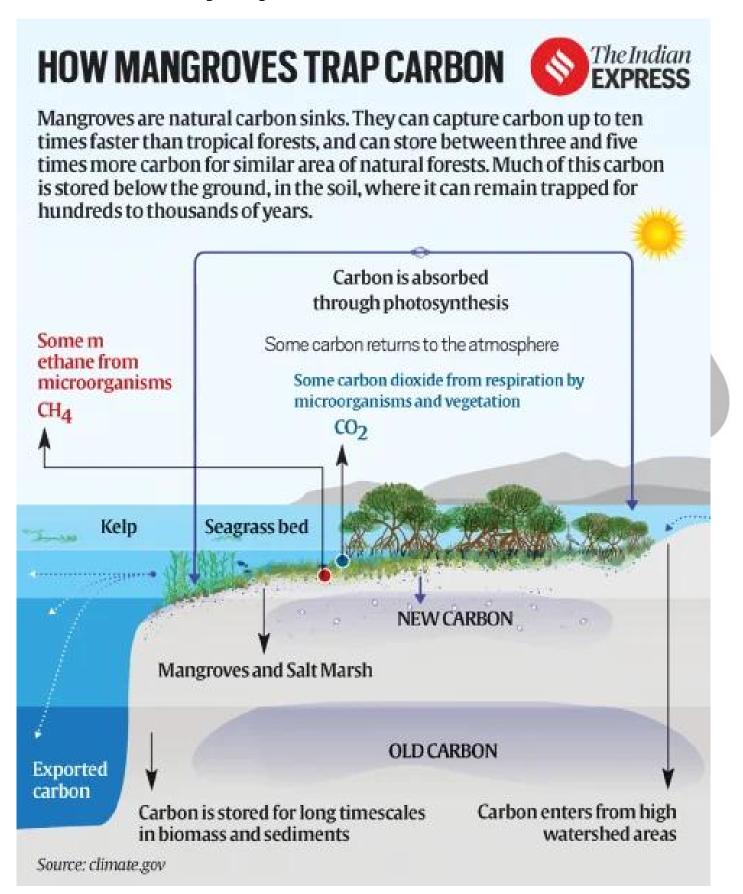
What is the Significance of Mangroves?

Carbon Sequestration: Mangroves store around 394 tonnes of carbon per hectare, exceeding most terrestrial forests, due to anaerobic and saline soils that slow decomposition.
 According to UNESCO, 1 hectare can store up to 3,754 tonnes of carbon, equivalent

Drishti IAS

to removing over 2,650 cars annually.

• They uniquely **lock carbon in soil for millennia**, making them critical for **climate change mitigation**.



• Coastal Protection: Mangroves serve as natural buffers against storm surges, tsunamis,

and coastal erosion acting as "bio-shields".

- Their dense root systems absorb wave energy and stabilize shorelines, reducing wave energy by 5-35% and flood depths by 15-20%, with reductions exceeding 70% during extreme storms (100-year return period), playing a crucial role in disaster risk reduction and climate resilience of coastal regions.
- Biodiversity Hotspots: Mangroves support diverse terrestrial and aquatic species across habitats like mudflats and aerial roots.
 - India's mangroves host 5,746 species (84% animals) across 21 phyla, the highest globally, including Bengal tigers, estuarine crocodiles, Indian pythons, and 260+ bird species.
 - They serve as nurseries for marine life and support one-third of wild fish landings in Southeast Asia.
- Economic Significance, Food Security & Livelihood Support: Mangroves are vital to coastal economies, supporting fishing, honey collection, boating, and non-timber forest produce.
 - They nurture nearly 800 billion aquatic species annually, providing nutrient-rich seafood (rich in protein, omega-3s, vitamins D & B12, iron, and zinc) and sustaining livelihoods through the blue economy.
 - Mangroves also offer eco-tourism potential and play a key role in food security and human wellbeing in coastal regions.

Mangroves provide a variety of benefits including:

1Biodiversity Hotspots



Mangroves are home to an incredible array of species, providing habitat for fish, sharks, rays, sea turtles, and birds. An estimated 80% of the global fish catch relies on mangrove forests either directly or indirectly

2 Livelihoods



The fisher communities we work with depend on their natural environment to provide for their families. Healthy mangrove ecosystems mean healthy fisheries

3 Water Filtration



Mangroves are vital to maintain seawater quality. They retain flowing sediments, and can trap pollutants, protecting connected habitats such as coral reefs and seagrass beds.

4 Landmass builders



The dense network of roots and surrounding vegetation which trap sediment prevents erosion and can buildup coastlines and cayes over time

5 Fighting climate change



Mangroves extract carbon from the atmosphere at a higher rate than tropical forests, and can store up to 5 times more carbon per acre in their soils.

6 Economy



Many coastal communities rely on mangroves for their economic benefits, especially in the fisheries and tourism sectors. Mangroves also reduce costly damages from hurricanes by providing protection against wave action and storm surges.

Sundarbans: Ecological Significance, Threats & Conservation Efforts

- The <u>Sundarbans</u>, the world's largest mangrove forest in the Ganges-Brahmaputra-Meghna delta, holds immense ecological value as a UNESCO Biosphere Reserve and <u>Ramsar site</u>.
- It is a biodiversity hotspot, home to <u>Royal Bengal Tiger</u>, <u>Irrawaddy and Ganges dolphins</u>, saltwater crocodiles and crucial for coastal protection against cyclones and carbon sequestration.
- However, it faces severe threats from climate change (sea-level rise, cyclones), coastal erosion, and unsustainable livelihoods.
- Conservation efforts include increased government funding for mangrove plantations, Indo-Bangladesh climate-smart village initiatives, and community-led Joint Mangrove Management for sustainable preservation.

What are the Major Threats to Mangroves?

- Land Conversion for Agriculture: According to the "State of the World's Mangroves 2024" report, extensive conversion of mangrove land for aquaculture (26%), oil palm plantations, and rice cultivation (43%) is a major driver of loss.
 - Urbanisation, infrastructure projects, and coastal tourism also lead to large-scale deforestation and fragmentation of mangrove ecosystems.
- **Pollution & Industrial Activities: Oil spills**, industrial effluents, and plastic waste degrade water quality and hinder mangrove regeneration.
 - Cases like the **Niger Delta** highlight how oil contamination leads to long-term ecological damage. **Timber extraction** and **charcoal production** also contribute to degradation.
- Climate Change & Sea-Level Rise: Rising sea levels, increased frequency of cyclones, and coastal erosion due to climate change pose existential threats. As per the IUCN Red List of Ecosystems, climate change threatens 33% of mangrove ecosystems.
- Invasive Species & Biodiversity Loss: Species like Prosopis juliflora, found in Tamil Nadu and Sri Lanka, disrupt native mangrove habitats by altering soil salinity, reducing freshwater availability, and preventing natural regeneration, thereby threatening local biodiversity.



Threats to Mangroves

Around the world, mangroves are faced with many challenges, Below, we outline some of the threats to mangrove wetlands.

Natural Disasters



Hurricanes and tsunamis are a major threat to mangroves. Strong winds and large waves can damage and uproot trees while some storms can wipe out entire forests. This can then lead to changes in hydrology and increase the risk of erosion from storm surge.

Climate Change



Rising sea levels, higher temperatures and changes in weather patterns all have an effect on mangroves. With current global sea level rise at a rate of around 4mm per year, coastal mangroves are being forced further inland. An increase in more powerful hurricanes and longer droughts are also some ways climate change is threatening mangroves.

Deforestation



Deforestation is just as big of a threat to coastal forests as it is to tropical and dry forests. In addition to clearing the trees for land use, many places use the trunks of mangroves as timber to build homes, some also use the tannins from the red mangrove bark as dye for clothing and leather.

Aquaculture



The construction of coastal farms, like shrimp farms, can damage mangrove trees and interfere with the hydrology to the rest of the forest. Many farms use pesticides and chemicals which can pollute the surrounding area and lead to eutrophication. This can then have a negative impact on the biodiversity of the ecosystem.

Coastal Development



Developing coastal areas does not only destroy mangroves and the habitat they create, but it also disturbs the sediment which stores large amounts of carbon dioxide. Mangrove forests are carbon sinks that absorb and store carbon dioxide, helping to reduce the effects of climate change. When the sediment is disturbed, this stored carbon is re-released into the atmosphere.

Pollution



Pollution of all kinds can be harmful to mangroves. Plastic pollution can become caught in the trees and their roots, entangling or suffocating marine life and birds. Water pollution is also a major threat to mangroves as contaminated water can poison the tree.

mangrove action project

Key Initiatives Related to Mangroves Conservation

- Mangrove Alliance for Climate (MAC)
- Mangroves for the Future (MFF)
- MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes)
- Sustainable Aquaculture In Mangrove Ecosystem (SAIME) initiative
- Coastal Regulation Zone (CRZ) Rules
- CAMPA Funds & National Coastal Mission
- Vana Samrakshana Samitis (Andhra Pradesh)
- Green Tamil Nadu Mission

Way Forward

- Strengthen Legal Framework: Enforce stricter laws to prevent deforestation, pollution, and unsustainable coastal development.
- Community Participation: Involve local communities through sustainable livelihoods and initiatives like "adopt a mangrove" for conservation and restoration.
- Research & Technology: Promote <u>phytoremediation</u>, medicinal research, and use
 of drones and <u>AL</u>for real-time monitoring and protection.
- Bio-Restoration: Rehabilitate degraded areas using bio-restoration and ensure species diversity to build climate resilience.
- Sustainable Development: Encourage eco-friendly coastal infrastructure, regulate aquaculture, and integrate mangroves into urban planning.
- International Collaboration: Leverage global platforms like the <u>Ramsar Convention</u> and <u>Blue</u>
 <u>Carbon Initiative</u> for coordinated conservation efforts.

World Nature Conservation Day (28th July)

- Celebrated annually, World Nature Conservation Day underscores the critical need for environmental protection and biodiversity conservation.
- It reinforces commitments under international environmental frameworks such as the <u>UNFCCC</u>, <u>CBD</u>, and <u>SDGs</u> (especially Goals 13, 14, and 15).
- The observance complements India's <u>LiFE (Lifestyle for Environment) initiative</u>, advocating sustainable habits like water conservation, waste reduction, and eco-friendly mobility.

Drishti Mains Question:

Discuss the ecological and economic significance of mangroves in the Indian context. Propose a comprehensive strategy for their conservation and sustainable utilisation.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims:

- Q. Which one of the following regions of India has a combination of mangrove forest, evergreen forest and deciduous forest? (2015)
- (a) North Coastal Andhra Pradesh
- (b) South-West Bengal
- (c) Southern Saurashtra
- (d) Andaman and Nicobar Islands

Ans: (d)

Mains:

Q. Discuss the causes of depletion of mangroves and explain their importance in maintaining coastal ecology. (2019)

