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News: Sundarbans

- Recently, a study conducted by prominent environmental scientists has warned about the substantial threat of air pollution to the Sundarbans, an essential mangrove ecosystem in West Bengal.

Sunderbans National Park

- Sunderbans is located in West Bengal.
- The Sunderbans ecoregion is located in the tidally active lower deltaic plain of the Ganges–Brahmaputra–Meghna (GBM) basin.
- It's a National Park, Tiger reserve, Biosphere reserve and Designated Ramsar Site (designated in January 2019).
- Part of Sunderbans on Ganges Delta, adjacent to Sunderbans Forest reserve in Bangladesh.
- In 2011, India and Bangladesh signed a MoU on Conservation of the Sundarbans, recognising the need to monitor and conserve the Sundarbans.
- It spans from the Hooghly River in India's state of West Bengal to the Baleswar River in Bangladesh.

- The Muriganga River runs through the Indian Sunderbans on the west, and the Harinbhahga and Raimangal Rivers run through it on the east.
- Saptamukhi, Thakuran, Matla, and Goasaba are some of the other major rivers that flow through this eco-system.
- Spread over parts of Bangladesh (around 60%) and India (around 40%), the Protected Areas (PA) within the forested parts is designated by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) as World Heritage Sites in both countries.
- The UNESCO designated the Sunderbans Indian portion as a World Heritage Site in 1987 and that of Bangladesh in 1997.
- Four protected areas in the Sunderbans are enlisted as UNESCO World Heritage Sites, viz. Sunderbans National Park, Sunderbans West, Sunderbans South and Sunderbans East Wildlife Sanctuaries.
- Sunderbans hosts the largest contiguous mangrove forest and the only mangrove tiger habitat in the world.
- Sunderbans is home to Royal Bengal Tiger, Salt-water Crocodile and Ganges River Dolphin and the Critically Endangered River Terrapin.
- Nine of the country's 12 kingfisher species can be found here, as well as rare species like the Goliath heron and Spoon-billed Sandpiper.

- Recently, Sunderbans was accredited with Conservation Assured | Tiger Standards (CA|TS) for its excellence in Tiger conservation.

Challenges faced by Sunderbans

- **Rising Sea Levels:** A consequence of climate change, rising sea levels threaten to inundate low-lying mangroves. This saltwater intrusion disrupts their delicate balance and makes them more vulnerable to storm surges during cyclones.
- **Increased Intensity of Cyclones:** Climate change is also linked to more frequent and intense storms. These cyclones can batter mangroves, causing physical damage and disrupting sediment patterns crucial for their survival.
- **Cash and Food Crops:** The conversion of mangrove forests for agriculture like cash crops (palm oil) or food production (rice paddies) destroys their habitat.
- This not only reduces the area available for these ecosystems but also fragments existing ones, impacting biodiversity.
- **Loss of Ecosystem Services:** Mangroves provide crucial services like shoreline protection and nursery grounds for fish. Deforestation disrupts these services, impacting coastal communities and fisheries.
- **Threat to Wildlife:** The loss of mangrove habitats due to climate change is leading to the loss of species in the near-threatened or endangered category.

- Settlement mangroves used to be safe havens for diverse molluscs and crustaceans, but they are disappearing due to polluted discharges and breeding activities of these species.
- **Effect of Pollutants:** Pollutants, enriched with black carbon or soot particles, from nearby urban areas and the entire Indo-Gangetic Plain region are worsening the air quality of the Sundarbans, impacting its ecosystem.
- These air pollutants significantly affect the ecology and biogeochemistry of the Sundarbans mangrove ecosystem.

Mangroves

- Mangroves are the characteristic littoral plant formation of tropical and subtropical sheltered coastlines.
- Mangroves are trees and bushes growing below the high water level of spring tides which exhibits a remarkable capacity for saltwater tolerance.
- They are basically evergreen land plants growing on sheltered shores, typically on tidal flats, deltas, estuaries, bays, creeks and the barrier islands.
- Mangroves have many special features for adapting to such a stressful coastal environment.
- Mangroves occur in a variety of configurations.

- Some species (e.g. Rhizophora) send arching prop roots down into the water, while others (e.g. Avicennia) send vertical Pneumatophores or air roots up from the mud.
- Most mangrove vegetation has lenticellated bark which facilitates more water loss, produces coppices.
- Mangroves exhibit Viviparity mode of reproduction. I.e. seeds germinate in the tree itself (before falling to the ground).
- This is an adaptative mechanism to overcome the problem of germination in saline water.
- Some secrete excess salt through their leaves and some others block absorption of salt at their roots.
- The roots of some mangrove species (e.g. Bruguiera gymnorrhiza, Kandelia obovata) form into "knees" that project above the mud surface to facilitate gaseous exchange.
- Salt glands are present in the leaves of some mangrove species (e.g. Aegiceras corniculatum).
- Salt glands are used to concentrate and actively excrete the absorbed salts so as to regulate the salt concentration inside the mangroves.