

# Marine Pollution

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**Source:** *The Hindu*

**Manifest pedagogy:** Many of the environment related questions have been asked as part geography mains. Environmental geography is significant both from prelims and mains perspective. Issues of marine ecosystem and threats to it have been asked earlier and may be repeated in future.

**In news:** Marine pollution

**Placing it in syllabus:** Marine ecology

**Static dimensions:** Marine ecosystem, Mangroves and Marine ecology

**Current dimensions:** Marine pollution & Way forward

**Content:**

**Marine ecosystem:**

- Marine ecosystems are **aquatic ecosystems whose waters possess a high salt content.**
- Out of all of the types of ecosystems on the planet, marine ecosystems are the most prevalent and provide nearly half of the Earth's oxygen.
- The marine ecosystems are classified into **six main categories:**

**Open Marine Ecosystems:** Many creatures living in the open ocean inhabit the **upper layer of the ocean where the sun's rays penetrate.** This is known as the euphotic zone. Sea life that float or swim, such as algae, plankton, jellyfish and whales live here.

**Ocean Floor Ecosystems:** At **greater depths sunlight cannot penetrate,** and organisms inhabiting this deep water rely on

the sinking of organic matter above for survival. Certain types of fish, crustaceans, clams, oysters, urchins, seaweed live here.

**Coral Reef Ecosystems:** Found only in **warm tropical waters and at relatively shallow depths**, they themselves are produced by simple animals that build external skeletons around themselves. A plethora of species like snails, sponges and seahorses inhabit coral reefs.

**Estuary Ecosystems:** These are the **shallow, sheltered area of a river mouth where freshwater intermingled with saltwater enters the sea**. It also includes lagoons or glades. The organisms inhabiting estuaries are specially adapted to these distinct conditions and hence the **diversity of species tends to be lower than in the open ocean**.

**Saltwater Wetland Estuary Ecosystems:** They consist of a **transition zone between land and sea**. Additionally, wetlands serve as a protective barrier to inland ecosystems, as they provide a buffer from storm surges.

**Mangrove Ecosystems:** Some tropical and subtropical coastal areas are home to special types of **saltwater swamps** known as mangroves.

#### **Mangroves and Marine ecology:**

- Mangroves are a critical forest ecosystem, dominating coastlines.
- As the primary species involved in forming mangrove forests prefer very warm, wet conditions, they are restricted to **tropical and warm temperate latitudes** around the world.
- Mangrove swamps are characterized by **trees that tolerate a saline environment**, whose **roots systems extend above the water line** to obtain oxygen, presenting a maze like web.
- There are **54-75 species of true mangroves, which are**

**found only in the intertidal zones of coasts**, and are taxonomically isolated from terrestrial counterparts.

- **Spatial variation, or zonation**, is a **common trait** for mangrove forests both horizontally and vertically.
- Mangrove height ranges from only a **few feet to over one hundred feet** and species exhibit **different adaptations to salinity**.

### **Services provided by Mangroves:**

- Networks of these sediment-trapping forests **buffer the coastline against wave-induced erosion** and provide coastal ecosystems and coastal communities a vital line of **defense against strong, tropical storms**.
- They act as **biofilters for nutrients** in upland runoff, such as nitrogen and phosphorous.
- They form **habitat for commercially important species** in the world.
- Mangroves are **incredible carbon sinks**, sequestering more carbon (nearly 1.5 metric tons/hectare/yr of carbon) than any of their terrestrial counterparts.
- Mangrove substrate may contain 20-25% carbon, which contributes to the **high productivity and biodiversity** of these ecosystems where wide array of **species use them as refuges, migration sites, and nurseries**.



### **Mangrove Ecology:**

- Many **threatened and endangered species** are native to mangrove forests, which provide critical habitat for diverse marine and terrestrial flora and fauna, such as **Manatees, Crab-eating monkeys, Fishing cats, Monitor lizards, Sea turtles, Royal Bengal tigers, Mud-skipper fish**.
- Mangroves are **prime nesting and migratory resting** and feeding sites for hundreds of **bird species**.

- Many species of tropical and subtropical **marine species**, such as fish and crustaceans, spend some part of their **lives in mangrove wetlands as juveniles**.
- Clear cutting for coastal development projects including construction of shrimp farms, hotels, and other structures, harvesting for wood and pollution threaten mangrove forests throughout their range.

### Marine pollution:

#### The main causes of marine pollution include:

- **Oil spills** cause huge damage to the marine environment. E.g. In December, 2014, a wrecked tanker released approximately 94,000 gallons (78,271 Imperial gallons) of **heavy fuel oil** into the **Shela River**, which runs through the **Sundarbans**, shared between India and Bangladesh in the Bay of Bengal.
- **Fertilizer runoff** from farms and lawns into coastal bodies cause **eutrophication**. E.g. Eutrophication has created enormous **dead zones in** several parts of the world, including the **Gulf of Mexico and the Baltic Sea**.
- **Solid garbage** also makes its way to the ocean in the form of plastic bags, balloons, glass bottles, shoes, packaging material etc...
- In many parts of the world, **sewage flows untreated, or under-treated**, into the ocean. E.g. 80% of urban sewage discharged into the Mediterranean Sea is untreated.
- **Man-made chemicals** such as pesticides and chemicals and **radioactive wastes** enter the sea through deliberate dumping.
- **Chemicals also enter the sea from land-based activities**. E.g. they can escape into water during their manufacture, use, or disposal, as well as from accidental leaks or fires in products containing these chemicals.
- **Plastic garbage** including plastic rings of bottles have been found blocking the breathing passages and stomachs

of many marine species.

- Small organisms feed on tiny bits of broken-down plastic, called **microplastics** and absorb the chemicals from the plastic into their tissues. Microplastics are **less than five millimeters (0.2 inches) in diameter** and they migrate up the **food chain**, eventually becoming part of the food that humans eat.

### Way forward:

**Nordic countries made a declaration in April, 2019 and have called for a global treaty to tackle the crisis of marine pollution.** This demand has also been sent to the European Union, United Nations Environment Programme, the G7 and the G20 groups.

In India, the **Coast Guard Act 1978** states that the preservation and protection of the marine environment and **control of marine pollution is the function of the Indian Coast Guard (ICG).**

Additionally, **below measures** would help tackle marine pollution:

- **Ban single use plastic** and adopting litter control policies.
- Encourage **reduction** of use of non-biodegradable products or packaging as well as reuse of plastic items.
- Increase treatment, **recycling and reuse of wastewater.**
- Identify chemical pollutants hotspots, control the use and release of chemicals in mining, **promote recycling of used oil** in urban areas.
- Increase funding for marine pollution prevention and control by introducing market-based incentives, applying the **“polluter pays” principle.**
- Reinforce **institutional and legal framework** to address marine pollution at regional and national levels.
- National policies and legislation should be aligned with

international commitments such as the Sustainable Development Goals (**SDG 14**).

- **Public-private partnerships** should also be established to provide financing, improve public awareness and develop innovative approaches to reduce marine pollution.