Coastal Erosion

Published On: 09-12-2023

Why is in news? Over one-third of India's coastline is vulnerable to erosion, Union minister Ashwini Kumar Choubey told Lok Sabha, citing a study by the National Centre for Coastal Research (NCCR).

About the report:

A state-wise study on beaches facing erosion, carried out by the **National Centre for Sustainable Coastal Management (NCSCM).**

It is observed that **33.6 per cent of the Indian coastline is vulnerable to erosion**, **26.9 per cent is under accretion** (growing) and **39.6 per cent is in a stable state**.

The state-wise analysis suggests that in the West Bengal (63%) and Pondicherry (57%) coasts, **erosion exceeds more than 50%,** followed by Kerala (45%) and Tamil Nadu (41%).

Odisha (51%) is the only coastal state which is having more than 50% of accretion.

The receding coastline will cause loss of land/habitat and the livelihood of fishermen in terms of losing the space for parking boats, mending nets and fishing operations.

Coastal erosion:

Coastal erosion is the **loss or displacement of land**, **or the long-term removal of sediment and rocks** along the coastline.

Coastal erosion may be caused by hydraulic action, abrasion, impact and corrosion by wind and water, and other forces, natural or unnatural.

Causes of Coastal Erosion:

There are several causes of coastal erosion that can be a result of **either natural or man-made activities**. Sometimes, it is a **combination of both** natural and man-made factors.

Natural Causes:

Waves, winds, tides, near-shore currents, storms, sea level rise, etc. are examples of natural factors that affect coastal erosion.

Also, the natural variation in the supply of sediments to the coastline from the river can affect the erosion of the coastline.

An increasing sea level will promote shoreline setbacks.

Another factor is the **subsidence** occurrence. Subsidence is a regional phenomenon that reduces a region's surface area. It has similar effects on the coastline to sea level rise.

Severe storms, tidal surges, and cyclones are examples of catastrophic events that create abnormally high sea levels and significant erosion.

Man-Made Causes:

The majority of erosion that is caused by humans is a result of human interference with both the rivers' sediment load and the natural transportation process.

Coastal defence buildings, river management projects, sand and aggregate mining, oil and gas exploration (which results in long-term subsidence), **and ports and harbours** that affect sediment flow are examples of human activity.

Effects of Coastal Erosion:

Coastal erosion contributes to the **loss of animal habitat as well as economic loss** to the fishing industry.

Coastal erosion makes the landscape vulnerable, and in addition to this, climate change threatens these regions by rising sea levels and causing coastal floods all around the planet.

Coastal erosion has a **huge economic impact** in addition to environmental and social ones. Some of the economic impacts are **damage to property, loss of tourism, shipping, trade, fishing, etc**.

Coastal erosion is an increasing worry for countries all over the world due to lost land and ruined assets, as well as reduced revenue potential due to the threat it poses to tourism and other industries.

Recreational activities and the food industry are affected by coastal erosion, which in turn **impacts local employment and income**.

Coastal Erosion Protection Methods:

Artificial Beach Nourishment

Vegetation Planting like mangroves, coral reefs, and lagoons

Protective Structures: Seawalls, Revetments.

Use of Geosynthetic Tubes / Bags.

Combination of Artificial Beach Nourishment & Structures.

Structures to Trap Sediment Movement.

Control of Beach Groundwater Table or Beach Dewatering System.

Initiatives to Check Coastal Erosion:

The Ministry of Environment, Forest & Climate Change (MoEFCC) has **delineated the hazard line** for the entire coast of the country. The hazard line is indicative of the shoreline changes, including sea level rise due to climate change.

Coastal Management Directorate, Central Water Commission (CWC), Department of Water Resources, River Development & Ganga Rejuvenation have undertaken a project entitled, "**Shoreline Change Atlas of the Indian Coast"** along with the Space Applications Centre (ISRO), Ahmedabad.

The Indian National Centre for Ocean Information Services (INCOIS) had prepared and published an **atlas of Coastal Vulnerability Index (CVI) maps** for the entire coastline of India.

Coastal Management Information System (CMIS) has been initiated to collect data on coastal processes towards coastal protection measures.

National Centre for Sustainable Coastal Management aims to promote integrated and sustainable management of the coastal and marine areas in India for the benefit and wellbeing of the traditional coastal and island communities.

Integrated Coastal Zone Management Plan is a process for the management of the coast using an integrated approach, regarding all aspects of the coastal zone, including geographical and political boundaries, in an attempt to achieve sustainability.

The **Coastal Regulation Zone (CRZ) Notification** was issued in 1991 under the Environmental Protection Act, 1986, by the Ministry of Environment, Forest and Climate Change (MoEFCC) to regulate activities in coastal areas.

A **National Strategy for Coastal Protection** along with guidelines has been framed for all Coastal States and Union Territories by the MoEFCC.

The **Flood Management scheme** of Ministry of Jal Shakti, includes anti-sea erosion schemes.

The ministry had brought the **Coastal Regulation Zone (CRZ) notification, 2019** with a view to conserve and protect coastal stretches and marine areas, and to ensure livelihood security to fisherfolk and other local communities.

The notification also provides for **No Development Zones (NDZ) along various categories of coastal areas** to protect India's coastline from encroachment and erosion.

Technical support has been extended to the coastal states in the design of coastal protection measures at vulnerable stretches and preparation of shoreline management plans by the centre.

NCSCM:

The National Centre for Sustainable Coastal Management (NCSCM) is established **under the Ministry of Environment, Forest and Climate Change** to undertake studies and research in the area of Coastal Zone Management including coastal resources and environment.

It is located at **Chennai, Tamil Nadu**.

Objective:

It aims to **promote integrated and sustainable management of the coastal and marine areas in India** for the benefit and wellbeing of the traditional coastal and island communities.

It also intends to **promote sustainable coasts** through increased partnership, conservation practices, scientific research and knowledge benefit and well being of current and future generation.

Role:

It has various research divisions including, Geospatial Sciences, Remote Sensing and Geographic Information Systems (GIS), Coastal environmental impact assessment, Conservation of Coastal & Marine Resources, etc.

Survey of India and NCSCM have **mapped the Hazard Line for the entire coast of India**, which includes vulnerability mapping of flood, erosion and sea-level rise.

It also advices the Union and State Governments and other associated stakeholders on policy, and scientific matters related to Integrated Coastal Zone Management (ICZM).

Way Forward:

The **15th Finance Commission** had suggested, the National Disaster Management Authority (NDMA) and/or the Ministry of Home Affairs may **develop appropriate norms for erosion mitigation measures**, and both the Union and State Governments may develop a policy to deal with the extensive displacement of people caused by coastal and river erosion.

The Commission has also **made specific recommendations for NDMF** (National Disaster Mitigation Fund) '**Mitigation Measures to Prevent Erosion**' and resettlement of Displaced People Affected by Erosion' under NDRF.

Conclusion:

The coastal areas where land and water meet are biologically sensitive and dynamic because marine and coastal ecosystems constantly interact.

These areas have a diverse ecosystem that includes mangroves, water features, seaweed, coral reefs, fisheries, other marine life, and other coastal and marine flora.

These ecosystems safeguard the area from saline winds, cyclones, tsunami waves, etc. They also support carbon sequestration, biodiversity, and the provision of raw materials for various manufacturing processes.

Therefore, coastline erosion has put us in a precarious predicament that we must resolve.