



Coastal Erosion

For Prelims: Coastal Erosion, Indian National Centre for Ocean Information Services, Coastal Vulnerability Index.

For Mains: Factors causing Coastal Erosion and its Impact, Conservation.

Why in News?

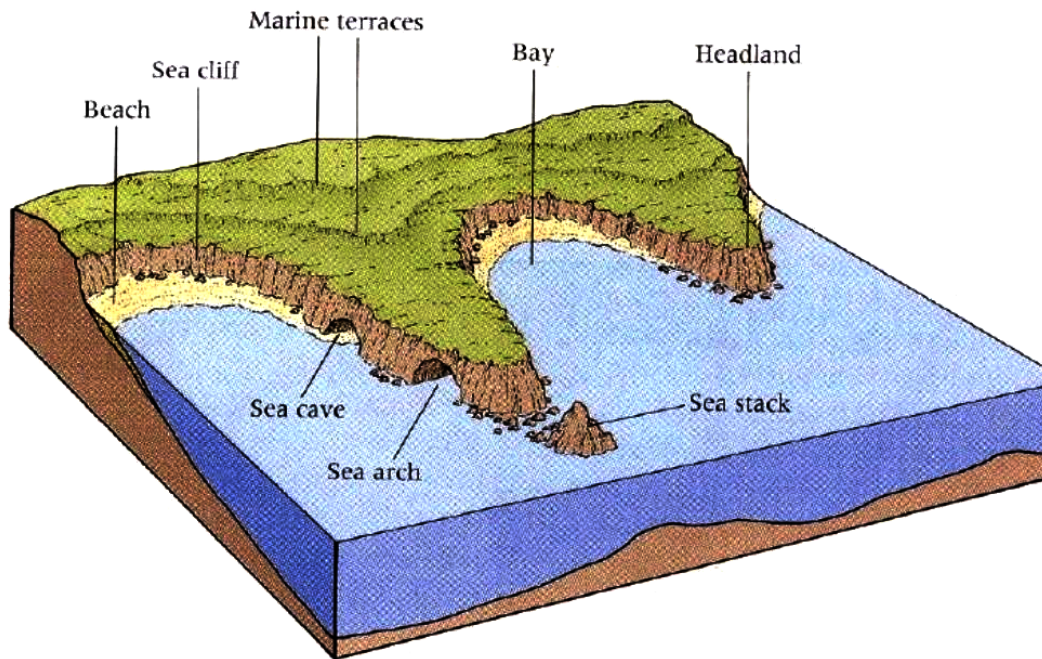
Recently, the Ministry of Earth Sciences informed the Lok Sabha that of the 6,907.18 km long Indian coastline of the mainland, a significant area is under varying degrees of [Coastal erosion](#).

- **About 34% is under varying degrees of erosion**, while 26% of the coastline is of an accreting nature, and the remaining 40% is in a stable state.
- **West Bengal suffered erosion along about 60.5% of the coast** (323.07 km) over the period from 1990 to 2018. This is followed by Kerala (46.4%) and Tamil Nadu (42.7%) respectively.
- Earlier, 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.

What is Coastal Erosion?

- **About:**
 - Coastal erosion is **the process by which local sea level rise, strong wave action, and coastal flooding wear down or carry away** rocks, soils, and/or sands along the coast.
 - **Erosion and Accretion:** Erosion and accretion are complementary to each other. If the sand and sediments have drifted from one side, it must accumulate somewhere else.
 - Soil erosion is the loss of land and human habitation as sea water washes off regions of soil along the coastline.
 - Soil accretion, on the other hand, results in an increase in the land area.
- **Impact:**
 - Recreational activities (sun bathing, picnicking, swimming, surfing, fishing, boating, diving, etc.) may be affected **if existing beaches are reduced in width or disappear altogether**. Also, there can be an impact on livelihoods of coastal communities.
- **Measures:**
 - Coastal habitats such as [Mangroves](#), [Coral Reefs](#) and [lagoons](#) are recognized as the **best defence against sea storms and erosion**, deflecting and absorbing much of the energy of sea storms. Therefore, it is important to maintain these natural habitats for shore protection as well as for environmental conservation.

What features does coastal erosion cause?



What are the Factors causing Coastal Erosion?

NATURAL	ARTIFICIAL
a) Action of breaking waves	a) Construction of unplanned structures
b) Effect of severe cyclonic storms	b) Reduction of sediment supply due to damming of rivers
c) Rise in sea level	c) Removal of sand from beaches
d) Deflation	d) Dredging of inlet channels
e) Tidal current	e) Unplanned reclamation

▪ Natural Phenomena:

- Wave energy is considered to be the primary reason for coastal erosion.
- Natural hazards like cyclones, thermal expansion of seawater, storm surges, tsunami etc due to the melting of continental glaciers and ice sheets as a result of climate change hamper the natural rhythm and precipitate erosion.

▪ Littoral Drift:

- Strong littoral drift resulting in sand movement can also be considered as one of the major reasons for coastal erosion.
 - Littoral drift means the natural movement of sediment along marine or lake shorelines by wave action in response to prevailing winds.

▪ Anthropogenic Activities:

- Dredging, sand mining and coral mining have contributed to coastal erosion causing sediment deficit, modification of water depth leading to longshore drift and altered wave refraction.
 - Coastal erosion has been sparked by fishing harbours and dams constructed in the catchment area of rivers and ports reducing the flow of sediments from river estuaries.

What are the Indian Initiatives for Coastal Management?

- **[National Centre for Sustainable Coastal Management:](#)**
 - 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.
- **[Integrated Coastal Zone Management Plan:](#)**
 - It 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.
- **[Coastal Regulation Zone:](#)**
 - 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 to regulate activities in coastal areas of India.

What are the Methods for Coastal Protection?

- Artificial Beach Nourishment
- Protective Structures: Seawalls, Revetments.
- Structures to Trap Sediment Movement.
- Combination of Artificial Beach Nourishment & Structures.
- Control of Beach Groundwater Table or Beach Dewatering System.
- Vegetation Planting.
- Use of Geo-synthetic Tubes / Bags.

Way Forward

- The **[XVth Finance Commission](#)** had suggested, The National Disaster Management Authority (NDMA) and/or Ministry of Home Affairs may develop suitable norms for mitigation measures to prevent erosion and both the Union and the State Governments 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 'Mitigation Measures to Prevent Erosion' under **NDMF (National Disaster Mitigation Fund)** and 'Resettlement of Displaced People Affected by Erosion' under **[NDRF \(National Disaster Response Fund\)](#)**.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. In India, the problem of soil erosion is associated with which of the following? (2014)

1. Terrace cultivation
2. Deforestation
3. Tropical climate

Select the correct answer using the code given below

- (a) 1 and 2 only
(b) 2 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans: (b)

- Soil erosion is a natural process associated with geomorphic processes or agents such as running water, winds, coastal waves and glaciers.
- It occurs in forest lands, arid and semi-arid lands, agricultural lands, construction sites, roadways,

disturbed lands, surface mines, glaciated and coastal areas and in areas where natural or geologic disturbances take place. In extreme cases, it may lead to total loss of soil and exposure of the bedrock.

- In India, the problem of soil erosion is most related to deforestation. **Hence, 2 is correct.**
- Perfectly conducted terrace cultivation captures the water. It is used for the purpose of inhibiting erosion, although extreme heavy rainfall will eventually erode the terrace. Without the terrace, the slope depends entirely on ground cover to prevent erosion. Thus, it can be said that terrace cultivation is a distant and a secondary cause of soil erosion when compared to deforestation. **Hence, 1 is not correct.**
- Regions in the tropical climate zones suffer the greatest rainfall-related soil erosion. While rainfall provides moisture critical for plant growth, it is also one of the prime causes of soil degradation, referred to as rainfall erosivity, which threatens food and water sustainability. However, tropical climate is not the most important soil erosion causing agent in India because the maximum area under soil erosion comes under subtropical, temperate and alpine climate rather than a tropical climate. **Hence, 3 is not correct.**
- Therefore, option (b) is the correct answer.

[Source: TH](#)

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