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PrepAlpine

Email: info@PrepAlpine.com

Website: PrepAlpine.com

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GS Paper III: Environment

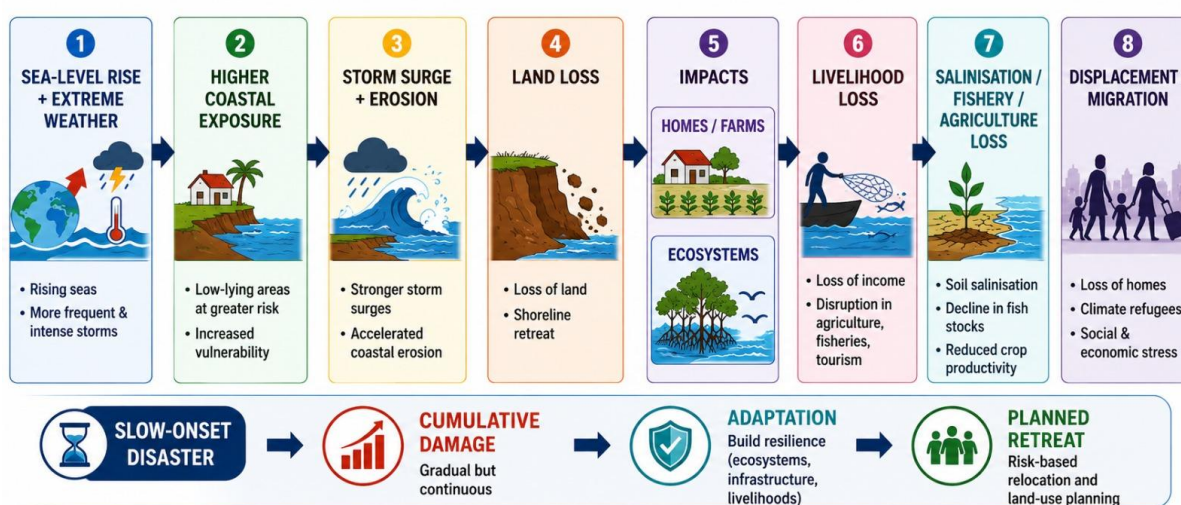
1. Odisha's Coastal Erosion: Climate Risk and Shoreline Management

a. Introduction

A National Centre for Coastal Research (NCCR) assessment has found that about 28.3% of Odisha's 564-km coastline is undergoing erosion. Several coastal villages have already faced land loss, displacement and livelihood disruption, prompting protective infrastructure and resettlement measures.

Shoreline change occurs due to waves, tides, storms, sediment movement, sea-level rise and human interventions such as ports, jetties, sand mining and unplanned construction. Odisha is highly exposed to cyclones and storm surges, increasing erosion risk.

CLIMATE-DISASTER CASCADE: COASTAL EROSION AS A SLOW-ONSET DISASTER



KEY INSIGHT: SLOW ONSET, LONG LASTING, REQUIRES PLANNING, NOT JUST REACTING.

b. Key Findings

- 28.3% of Odisha's coastline is eroding.
- 17.6% is broadly stable.
- 54.1% is witnessing accretion.
- Major affected districts include Jagatsinghpur, Ganjam, Kendrapara, Balasore, Puri and Bhadrak.
- Jagatsinghpur, Ganjam and Kendrapara have particularly high proportions of erosion-prone shoreline.

c. Analysis/ Observations

Coastal erosion is both natural and anthropogenic

Natural processes such as wave action, cyclones and sediment transport continuously reshape coastlines. However, human interventions can alter these processes.

Ports, breakwaters, seawalls and jetties may interrupt littoral sediment movement, protecting one location while increasing erosion further along the coast.

Hence, coastal protection cannot be planned structure-by-structure; it requires understanding the coastline as an interconnected sediment system.

Climate change is intensifying vulnerability

Sea-level rise, stronger storm surges and extreme weather increase the exposure of low-lying settlements.

Coastal erosion therefore represents a slow-onset climate disaster:

Sea-level rise + storms + erosion → Land loss → Livelihood loss → Displacement

Unlike sudden disasters, the damage accumulates over years, making adaptation planning and early relocation particularly important.

Livelihood impacts go beyond physical displacement

Coastal communities depend on land, fisheries, agriculture and access to beaches and estuaries. Erosion can therefore lead to:

- loss of homes and farmland;
- salinisation of soil and groundwater;
- destruction of local infrastructure;
- livelihood disruption; and
- forced migration.

The challenge is consequently not merely protecting coastlines but protecting coastal socio-economic systems.

Hard engineering has limits

Odisha has adopted measures such as geotextile tube embankments and sea wall-cum-service roads.

These can provide immediate protection to critical settlements, but excessive reliance on hard structures can:

- alter sediment flows;
- transfer erosion to neighbouring stretches;
- degrade beaches and habitats; and
- require continuous maintenance.

Thus, engineering solutions should be based on site-specific coastal morphology, rather than becoming the default response everywhere.

Importance of Nature-Based Solutions

Where suitable, restoration of mangroves, dunes, coastal vegetation and wetlands can absorb wave energy, trap sediments and create ecological buffers.

A hybrid strategy can combine:

Natural buffers + Carefully designed engineering + Land-use regulation

This is often more sustainable than relying solely on seawalls.

d. Governance Challenges

- Fragmented responsibility among coastal, environment, disaster-management, ports and local-government agencies.
- Continued construction in vulnerable coastal zones.
- Inadequate incorporation of long-term shoreline data into land-use decisions.

- Social and livelihood challenges surrounding planned relocation.
- Need to reconcile coastal infrastructure development with Coastal Regulation Zone (CRZ) safeguards.

e. Way Forward

- Develop district-level shoreline management plans using NCCR's long-term erosion mapping.
- Prioritise nature-based protection through mangrove, dune and wetland restoration where feasible.
- Use hard-engineering structures selectively after sediment-flow and downstream-impact assessments.
- Restrict new settlements and infrastructure in highly vulnerable stretches through risk-sensitive land-use planning.
- Create fair planned-retreat and rehabilitation frameworks where protection is physically or economically unsustainable.
- Integrate coastal erosion into State climate-adaptation and disaster-management planning.

Conclusion

Odisha's experience shows that coastal erosion is no longer merely a geomorphological process; it is becoming a climate adaptation, livelihood and displacement challenge. Sustainable shoreline management requires moving from reactive seawalls towards integrated coastal-zone planning that combines ecosystem restoration, risk-sensitive infrastructure and just rehabilitation of vulnerable communities.

Reader's Note — About This Current Affairs Compilation

Dear Aspirant,

This document is part of the PrepAlpine Current Affairs Series — designed to bring clarity, structure, and precision to your daily UPSC learning.

While every effort has been made to balance depth with brevity, please keep the following in mind:

1. Orientation & Purpose

This compilation is curated primarily from the UPSC Mains perspective — with emphasis on conceptual clarity, analytical depth, and interlinkages across GS papers.

However, the PrepAlpine team is simultaneously developing a dedicated Prelims-focused Current Affairs Series, designed for:

- factual coverage
- data recall
- Prelims-style MCQs
- objective pattern analysis

This Prelims Edition will be released separately as a standalone publication.

2. Content Length

Some sections may feel shorter or longer depending on topic relevance and news density. To fit your personal preference, you may freely resize or summarize sections using any LLM tool (ChatGPT, Gemini, Claude, etc.) at your convenience.

3. Format Flexibility

The formatting combines:

- paragraphs
- lists
- tables
- visual cues

—all optimised for retention.

If you prefer a specific style (lists → paras, paras → tables, etc.), feel free to convert using any free LLM.

4. Monthly Current Affairs Release

The complete Monthly Current Affairs Module will be released soon, optimized to a compact 100–150 pages — comprehensive yet concise, exam-ready, and revision-efficient.

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