



Coastal Adaptation

For Prelims: India's Coastal Ecosystems, Coastal Regulation Zone Notification 2019, Coastal Management Information System, [Mangroves](#).

For Mains: Advantages Resulting from Coastal Adaptation, Indian Government Initiatives Related to Coastal Management.

[Source: DTE](#)

Why in News?

A recent study published in the **journal Nature Climate Change**, has emphasised the [coastal adaptation initiatives](#) in several regions, encompassing Indian coastal areas such as **Mumbai, Ghoramara in Sundarbans, Puri in Odisha, and the Konkan regions**, categorizing their efforts as 'moderate-to-high' in terms of adaptation measures.

What are the Key Findings of the Study?

- **Impact on Low-Lying Coastal Regions:**
 - **Low-lying coastal areas**, at risk of flooding, comprise approximately 11% of global population densities and contribute around **14% to the global Gross Domestic Product (GDP)**.
- **Regional Adaptation Disparities Worldwide:**
 - Close to **50% of surveyed regions** displayed considerable gaps in adaptation, focusing on individual risks while overlooking the root causes of vulnerability.
 - Around **13% of case studies revealed high-to-very-high adaptation**, predominantly witnessed in Europe and North America.
 - The **rest fell into the moderate category**, including Australia and New Zealand.
- **Varying Adaptation Measures in Specific Indian Coastal Regions:**
 - Mumbai, Puri, Konkan, and Ghoramara region in Sunderbans, from India exhibited varying adaptation measures.
 - **Ghoramara** displayed generic adaptation plans, **lacking local state-agency-specific strategies**.
 - The **Konkan region** also lacked adaptation plans, neglecting multiple coastal hazards in the state's action plan.
 - While **Mumbai possesses a climate action plan**, its adaptation strategies failed to accurately evaluate risks and address the specific needs of vulnerable residents.
 - Puri, despite having action plans, **lacked sector-specific adaptation strategies** and identification of high-risk communities.

What is Coastal Adaptation?

- **About:**
 - **Coastal adaptation** involves strategies and actions taken to **deal with and reduce the**

impact of natural hazards and [climate change](#) on coastal areas, aiming to protect communities and infrastructure from [rising sea levels](#), erosion, and [extreme weather events](#).

- Additionally, coastal adaptation measures have the potential to create a range of opportunities.

▪ **Advantages Resulting from Coastal Adaptation:**

- **Economic Diversification:** Implementation of coastal adaptation initiatives can spur economic growth through the **creation of new industries related to climate-resilient infrastructure, [renewable energy](#), and [eco-tourism](#)**, potentially generating employment and business opportunities.
- **Biodiversity Enhancement:** Effective coastal adaptation can **inadvertently lead to the restoration and preservation of natural ecosystems**.
 - This restoration aids in **preserving [indigenous species](#)** and fostering the development of habitats for endangered or vulnerable species.
- **Disaster Risk Reduction and Resilience Building:** Coastal adaptation plays a crucial role in reducing the vulnerability of coastal communities to disasters.
 - By implementing measures such as **building resilient infrastructure, early warning systems, and natural barriers**, it helps in minimising the impact of natural disasters like storms, [tsunamis](#), and sea-level rise.
 - Strengthening coastal resilience reduces the risks associated with such calamities, **safeguarding lives, property, and livelihoods**.
- **Sustainable Food Sources and Livelihoods:** Effective coastal adaptation, especially practices like [aquaculture](#), [sustainable fishing](#), and **integrated farming** in coastal areas, can ensure a steady supply of seafood and agricultural produce.
 - This secures livelihoods for coastal communities and contributes to global [food security](#).

▪ **Related Challenges:**

- **Complex Stakeholder Coordination:** Coastal adaptation involves multiple stakeholders, including **government bodies, local communities, businesses, and environmental groups**.
 - Coordinating these diverse interests and ensuring effective collaboration among them is **often difficult due to differing priorities**, leading to delays and conflicts.
- **Uncertainty in Future Climate Projections:** Predicting **future climate scenarios**, including sea-level rise and extreme weather events, poses a challenge.
 - Adapting to uncertain climate projections while **planning for long-term strategies can be a complex task**, leading to uncertainties in infrastructure and development planning.
- **Community Fragmentation and Social Cohesion:** In some cases, relocation or changes in land use due to coastal adaptation initiatives can lead to the **fragmentation of communities**.
 - Dispersing or **relocating populations might disrupt social structures** and community cohesion, impacting their resilience and cultural practices.

What are the Indian Government Initiatives Related to Coastal Management?

- The **Ministry of Environment, Forest & Climate Change (MoEFCC)** set the **hazard line for India's coast** to manage shoreline changes due to climate change.
- The [Coastal Regulation Zone Notification, 2019](#) aims to conserve coastal areas and livelihoods, allowing erosion control measures while defining **No Development Zones**.
- The **Coastal Management Information System (CMIS)** collects near-shore coastal data for designing and maintaining protection structures at vulnerable stretches.
- Successful coastal erosion mitigation measures were demonstrated in **Puducherry and Kerala**, aiding restoration and protection of coastal areas.

Way Forward

- **Nature-Based Solutions (NBS):** Emphasise [nature-based solutions](#) that work with natural processes rather than against them.
 - Implementing strategies like the **restoration of mangroves, salt marshes, and dunes** can provide cost-effective and environmentally friendly coastal protection.
- **Community-Centric Approaches:** Engage local communities in the design and implementation of coastal adaptation measures.
 - Complement them with the **scientific knowledge and resources to contribute to decision-making**, as they already possess valuable traditional knowledge of the area.
- **Use of Advanced Technology:** Utilise innovative technologies such as [remote sensing](#), [artificial intelligence](#), and **predictive modeling** for better understanding and predicting coastal changes.
 - These tools can provide real-time data for more accurate planning and response.
- **Hybrid Engineering Solutions:** Combine traditional hard infrastructure with innovative hybrid engineering solutions.
 - For example, **integrating natural features like artificial reefs** within traditional structures can enhance coastal protection **while supporting biodiversity**.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q. Which one of the following regions of India has a combination of mangrove forest, evergreen forest and deciduous forest? (2015)

- (a) North Coastal Andhra Pradesh
- (b) South-West Bengal
- (c) Southern Saurashtra
- (d) Andaman and Nicobar Islands

Ans: (d)

Mains

Q. Discuss the recent measures initiated in disaster management by the Government of India departing from the earlier reactive approach. (2020)