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Q7

Coastal sand mining, whether legal or illegal, poses one of the biggest threats to our environment. Analyze the impact of sand mining along the Indians coasts, citing specific examples.

UPSC Civil Services Mains 2019 · GS III · 10 marks · Environment and Conservation

Conservation, environmental pollution and degradation, environmental impact assessment.

Core demand of the question

- Analyse environmental impacts of legal and illegal sand mining on India's coasts
- Cite specific regional examples
- Keep a 10-mark length

Revision summary

Beaches and dunes are storm buffers, freshwater lenses, and nest sites.

Mining, licensed or not, causes erosion, salinity, and fishery decline.

Kollam-Alappad, Tamil Nadu mineral coasts, Odisha turtle beaches and Konkan dunes are cited cases.

Monazite belts add a radioactive-tailings risk.

CRZ, sand-mining guidelines and inland manufactured sand are the way forward.

Introduction

Coastal sand is not an inert pile. It is the **beach-dune-bar** system that absorbs waves, stores freshwater, and hosts nests and fisheries. **Legal leases** for construction sand or **placer minerals** (ilmenite, garnet, rutile, monazite) and **illegal night mining** both strip that buffer. The **Coastal Regulation Zone** notifications and **Sustainable Sand Mining Management Guidelines (2016)** try to draw a line; the shoreline still recedes where the line is ignored.

Body

Impacts

- **Erosion and storm surge:** removing sand starves downdrift beaches. After the **2004 tsunami**, Kerala's **Chellanam** and parts of **Puducherry-Tamil Nadu** showed how a thin beach lets waves hit homes. Mining makes that thinning faster.
- **Saline intrusion:** dunes and sand bars hold a freshwater lens. When they are cut, **wells in coastal panchayats** turn brackish, which hits drinking water and coconut/paddy.
- **Biodiversity:** **Olive Ridley** mass nesting at **Gahirmatha, Rushikulya and Devi** (Odisha) needs a dark, sloped beach. Lights, pits and vehicle tracks from mining destroy nests. **Leatherback and olive ridley** stretches of **Tamil Nadu-Kerala**, and **turtle beaches of Goa and the Andamans**, face the same logic.

- **Fisheries and livelihoods:** surf-zone sand flats are nursery habitat. Turbidity and channel change cut **artisanal catch**. **Alappad and Chavara (Kollam)** in Kerala became national examples of villages fighting **Indian Rare Earths / private dredging** and illegal removal.
- **Radioactive and heavy-mineral waste:** Kerala-Tamil Nadu **monazite** sands, if mined without tight control, leave **thorium-bearing** tailings and dust - a public-health layer on top of erosion.
- **Legal mining is not harmless:** even a licensed **CRZ** clearance can over-extract if replenishment studies are paper exercises. Illegal mining adds **no royalty, no restoration, and often armed local cartels** (reported on stretches of **Tamil Nadu, Andhra Pradesh and Maharashtra's Konkan**).

Examples

- **Kerala:** Kollam-Alappad mineral sand belt; protests after coastal erosion and well salinity.
- **Tamil Nadu:** Kanyakumari-Tuticorin garnet and silica belts; illegal river-mouth and beach removal feeding the construction boom.
- **Odisha:** pressure on turtle coasts if ports and sand barges disturb Gahirmatha's intertidal profile.
- **Goa and Maharashtra:** dune flattening for construction sand despite **CRZ**.

Response

- Enforce **CRZ 2011/2019, Environment Protection Act, MMDR** leases, and **NGT** orders; map replenishment; use **NDMA** coastal-hazard views in clearances; give fishers a stake in watch.

Flow diagram

Coastal sand mining -> Beach erosion
 Coastal sand mining -> Saline wells
 Coastal sand mining -> Turtle and fishery loss
 Beach erosion -> Homes and surge risk
 Saline wells -> Livelihood harm
 Turtle and fishery loss -> Livelihood harm
 Homes and surge risk -> CRZ NGT NDMA enforcement

Conclusion

Legal and illegal coastal sand mining both strip the natural seawall. Kollam, the Tamil Nadu mineral belt, Odisha's turtle beaches and the Konkan dunes are the proof. Production of sand must shift inland to manufactured and recycled aggregate, with **CRZ** and replenishment rules that are policed, not only gazetted.

Facts & figures

CRZ

Coastal Regulation Zone notifications (2011, revised 2019) restrict mining and construction on sensitive shores.

Sand mining guidelines 2016

MoEFCC Sustainable Sand Mining Management Guidelines: replenishment study before extraction.

Alappad-Chavara

Kerala mineral-sand coast; long-running conflict over erosion, salinity and dredging.

Olive Ridley

Mass nesting in Odisha (Gahirmatha, Rushikulya, Devi) needs undisturbed beach profile and darkness.

National Disaster Management Authority (NDMA)

National Disaster Management Authority coastal and tsunami guidance treats dunes and mangroves as living infrastructure.

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