

# Unchecked Sand Mining : A Threat to India's Rivers and Coasts



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Sand is a fundamental resource in construction and infrastructure, with applications extending to industrial processes. Beyond its utilitarian value, sand plays a vital ecological role, supporting biodiversity and contributing to groundwater recharge. It connects directly or indirectly to all 17 Sustainable Development Goals (SDGs). India, alongside China, is a leading consumer of sand, with demand having tripled between 2000 and 2017 due to urbanization and infrastructure expansion.

"Unchecked sand mining" in India refers to extraction activities that violate legal or environmental regulations. These include illegal operations without governmental permissions, mining beyond approved quotas, operations in ecologically sensitive or restricted zones (such as Coastal Regulation Zones or near critical infrastructure), and use of banned techniques like heavy machinery during monsoons. Many operations also violate environmental clearance (EC) requirements or deviate from approved mining plans, highlighting regulatory failures.

India's legal framework includes the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act), which classifies sand as a 'minor mineral,' granting states the power to regulate its extraction. The Environment Protection Act, 1986, and the Environmental Impact Assessment (EIA) Notification, 2006, mandate ECs for certain sand mining projects. The Sustainable Sand Mining Management Guidelines (2016) and the Enforcement and Monitoring Guidelines (2020) further aim to install sustainable practices. Despite these efforts, implementation gaps, weak monitoring, and decentralized regulatory authority hinder effectiveness.

Unchecked sand mining gravely affects India's river ecosystems. Excessive removal of sand alters river flow and sediment transport, leading to riverbed incision, bank erosion, and disrupted morphology. These changes heighten flood risks, destabilize infrastructure like bridges and dams, and result in the loss of riparian habitats and farmlands.

A major hydrological consequence is the depletion of groundwater. Sand facilitates aquifer recharge by aiding water percolation. Mining reduces this capacity, lowering the water table and drying up wells. This creates water scarcity for agriculture and domestic use. Sand also functions as a natural filter; its removal leads to polluted groundwater and, in coastal regions, saline water intrusion.

Ecologically, sand mining devastates aquatic biodiversity. It destroys spawning grounds, disrupts food webs through increased water turbidity, and threatens endangered species like gharials and river dolphins. Habitat loss and rising water temperatures further diminish aquatic populations and open doors for invasive species to thrive.

On India's coasts, unchecked sand mining contributes significantly to erosion and the destabilization of vital ecosystems. Beaches and sandbars act as natural buffers against sea erosion, floods, and storm surges. Mining undermines these features, accelerating shoreline retreat and increasing coastal vulnerability.

Deepening of estuaries and changes in tidal flows due to sand removal disturb sediment distribution, enlarge inlets, and weaken coastal defenses like dunes and sandbanks. These disturbances endanger human settlements and infrastructure.

Coastal ecosystems such as mangroves and coral reefs are especially affected. Mangroves, reliant on sediment

deposition, are uprooted, while coral reefs suffer from sedimentation and increased turbidity. The resulting ecological damage negatively impacts biodiversity and fisheries, and weakens the coast's resilience against climate change.

Unchecked sand mining has severely impacted numerous rivers and coastal regions across India. Rivers like the Ganga, Yamuna, Narmada, Sone, Cauvery, and Godavari have suffered from illegal extraction, leading to soil erosion, altered river morphology, groundwater depletion, and biodiversity loss. In Uttar Pradesh and Bihar, sand mafias control riverbeds, damaging ecosystems and threatening agriculture and aquatic life. Southern rivers in Karnataka and Andhra Pradesh face similar degradation, affecting water availability and farming.

Coastal areas have also been extensively harmed. Maharashtra's Konkan Coast has seen mangrove loss and landslides; Kerala's coast faces severe erosion and saline intrusion; and Tamil Nadu's and Odisha's shores are dealing with dried vegetation, reduced fisheries, and destruction of turtle nesting grounds. Rampant mining along Karnataka's coast has prompted expensive state-led restoration efforts. These cases illustrate a national pattern of ecological damage and socio-economic disruption driven by poor regulation and rising sand demand.

While India's legal framework appears comprehensive, it is plagued by implementation and enforcement failures. Sand's classification as a 'minor mineral' gives states wide discretion, leading to inconsistent rules and enforcement standards. Many state regulations are poorly enforced, and local authorities often lack the manpower and resources to monitor vast stretches of rivers and coasts.



Corruption and the influence of sand mafias further weaken enforcement. These criminal networks often enjoy political protection, use violence to silence opposition, and obstruct regulatory actions. Delays in legal proceedings and minimal penalties make violations cost-effective for illegal operators.

Another barrier is the lack of accurate data on sand availability and extraction rates, making monitoring difficult. While District Survey Reports are meant to guide sustainable mining, their quality and reliability vary significantly.

Addressing unchecked sand mining in India requires a comprehensive strategy involving stricter enforcement, sustainable alternatives, and a shift in construction practices. Stronger law enforcement, aided by technologies like satellite monitoring, drones, and GPS tracking, can help detect and deter illegal mining. Strict penalties and community involvement in monitoring are key to effective regulation.

Reducing reliance on natural sand is crucial. Alternatives such as manufactured sand (M-sand), recycled construction waste, industrial by products like fly ash and slag, and even materials like recycled plastic and bamboo can ease environmental pressure. Government support through mandates and incentives can boost their adoption.

Additionally, sustainable construction practices—such as optimizing existing infrastructure and using less sand-intensive methods—can further reduce demand. Together, these measures offer a path toward balancing development needs with environmental protection.

Unchecked sand mining in India has severe socio-economic impacts on local communities. It disrupts traditional livelihoods like agriculture and fishing by depleting groundwater, reducing fish populations, and

causing land and infrastructure loss due to erosion. Displacement is common, as riverbank and coastal erosion force families to abandon homes and farmland, often without proper compensation.

The sand mining industry is frequently linked to violence and intimidation by mafias, creating fear among locals. Though it offers some employment, the jobs are typically low-paying, unsafe, and lack social protections. Ultimately, the social and economic damage—including livelihood loss, displacement, and heightened vulnerability—far outweighs any short-term gains.

Multiple reports from environmental organizations and Indian government agencies highlight the serious environmental consequences of unchecked sand mining. The WWF and UNEP emphasize its role in riverbank erosion, biodiversity loss, sediment disruption, and groundwater depletion, identifying India as a global hotspot for unsustainable sand extraction.

Government bodies like the Ministry of Environment, Forest and Climate Change (MoEF&CC) and the Geological Survey of India (GSI) have acknowledged these issues in Guidelines, noting impacts such as habitat destruction, pollution, and altered riverbeds. The National Green Tribunal (NGT) has also issued several directives to combat illegal sand mining. Collectively, these sources call for urgent regulatory reforms and the adoption of sustainable alternatives.

Unchecked sand mining in India poses a significant and escalating threat to the nation's rivers and coasts, with far-reaching environmental and socio-economic consequences. The indiscriminate extraction of sand disrupts river flow, depletes groundwater resources, and devastates aquatic biodiversity, while also

accelerating coastal erosion and destabilizing fragile coastal ecosystems. Case studies from across the country vividly illustrate the severity of these impacts, highlighting the urgent need for effective intervention. Despite the existence of a comprehensive legal framework, weak enforcement mechanisms, corruption, and the influence of organized criminal elements continue to fuel unchecked mining activities. Addressing this crisis requires a multi-pronged strategy that includes stricter

enforcement of regulations, the promotion of sustainable alternatives to natural sand, and a fundamental shift towards responsible construction practices. The findings from numerous reports and studies by environmental organizations and government agencies underscore the gravity of the situation, emphasizing the need for immediate and concerted action to protect India's vital riverine and coastal environments for future generations.

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