Swami Vivekananda Advanced Journal for Research and Studies
Online Copy of Document Available on: www.svajrs.com

ISSN:2584-105X **Pg. 317- 329**

Illegal Sand Mining as Organised Environmental Crime: A Green Criminology Account of India's Resource Wars

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Accepted: 28/05/2026
Published: 02/06/2026 ***DOI: http://doi.org/10.5281/zenodo.20506133***

Abstract

Illegal sand mining, which is commonly discussed within the Indian legal community as a regulatory non-compliance issue or law and order issue, is actually a paradigmatic green criminological issue: a patterned, profit-driven generation of environmental harm, the victims of which are human and more-than-human, and the facilitating conditions of which include state-corporate entanglement, poor environmental governance, and pressure of demand created by infrastructure-led development. This paper constructs a green criminological explanation of the illegal sand mining in India by (i) explaining how green criminology expands the analytic prism of formal illegality to environmental degradation and distributive injustice; (ii) contextualising the sand mining in a political economy of construction-based resource demand; (iii) mapping the Indian legal framework of minor minerals and environmental clearance such as the centrality of District Survey Reports (DSRs) and replenishment studies and the role of the judiciary in enhancing procedural protection; and (iv) arguing that Based on that, the article suggests a reform agenda, combining environmental regulation with financial investigation, focusing on supply-chain governance, enhancing DSR integrity and public participation, and rebalancing sanctions to ecological and social harms. The main argument is that the enforcement policies that are still obsessed with site-based seizures and administrative fines will not work until the State approaches illegal sand mining as a networked and networked and sometimes violent organization that is part of the local political economies, which is exactly what green criminology was created to clarify.

Keywords*: Green criminology; illegal sand mining; organised environmental crime; District Survey Report; environmental clearance..*

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1. Introduction

Sand is a minor mineral in the Indian mining law, but the impact of its mining is anything but minor. Actually, sand and gravel combined are the most extracted solid materials in the globe in volume and they are the foundation of the modern construction economies that rely on concrete, roads, housing, ports, and urban infrastructure. This unremitting pressure has led to long-term pressure on riverbeds, floodplains, deltas, and coastal systems, which has fundamentally changed the geomorphology, hydrology, and ecological balance.[1] Although such an extent of influence, sand has traditionally been a regulatory blind spot, as a resource that is perceived as abundant and low-risk, as opposed to a finite ecological resource, the over-exploitation of which can lead to irreversible damage.

On the global scale, the United Nations Environment Programme (UNEP) has on several occasions warned that sand mining is not well regulated in comparison to its immense social and ecological consequences. The world has been consuming sand in unbelievable amounts due to the high rate of urbanisation, building of infrastructures and land reclamation, especially in the developing economies. UNEP evaluations indicate that the governance structures have failed to keep up with the extraction pressures and thus, there is poor monitoring, institutional fragmentation, and ineffective enforcement. This leads to underestimation of the real amounts of sand mined each year and much of the mining is done outside the legal system. The Indian experience is closely related to these global trends, but with some other complications due to the federal system and decentralised governance of minerals.

The high rate of infrastructure, real estate development, and government work in India has boosted the demand of sand drastically. At the same time, minor minerals are mostly regulated at the state level, which results in a high level of inter-state differences in regulations, enforcement levels, and administrative capacity. This decentralised regulatory framework, combined with asymmetrical enforcement and political influences, has provided an ideal environment of illegal mining, transportation, and trade. It has been reported in many studies and reports how illegal sand mining activities are perpetuated by organized corruption, coercion and violence, which in most cases involve local power brokers, contractors, transport operators and government officials.[2] The phenomenon is not limited to single acts of violation of the conditions of the permits but has become a system of shadow economy that exists parallel to and in some cases collusion with the formal governance systems.

The harms have been taken seriously by Indian courts. The judicial statements of the past ten years indicate an increased realization that sand mining is a major threat to biodiversity, river form, and other infrastructures as well as riparian habitats. Unscientific and excessive sand mining may cause riverbeds to deepen, groundwater tables to fall, bridges and embankments to be destabilised, floods to become more vulnerable, and aquatic life to be destroyed. Notably, the courts have dismissed the claim that the fact that sand is a minor mineral should be used to excuse the watered-down environmental scrutiny. The Supreme Court has once again emphasized that the environmental clearance requirements are fully applicable to the sand mining activities and that the regulatory protection cannot be avoided on semantic or administrative basis.

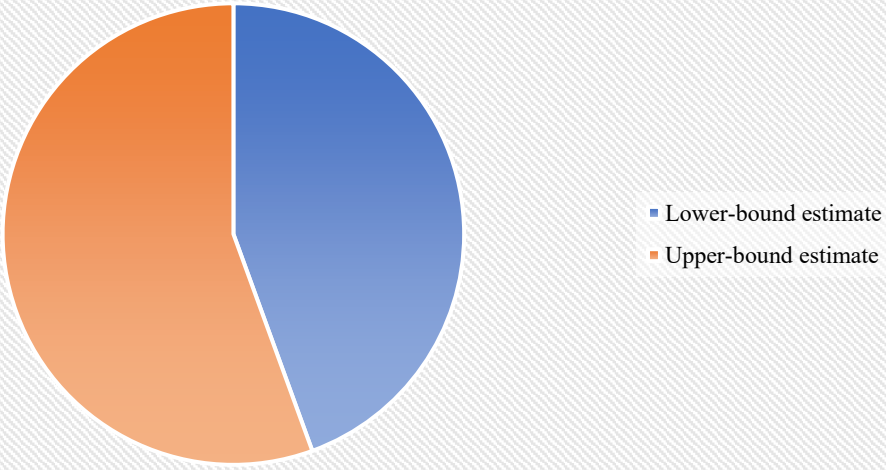
[1] *Mines and Minerals (Development and Regulation) Act 1957 (India) s 3(e).*

[2] *Comptroller and Auditor General of India, Performance Audit on Mining in Uttar Pradesh and Socio-economic impact of illegal mining (Report, CAG, Uttar Pradesh) (financial and governance impacts discussed).*

The Court has most recently stressed that environmental clearance to sand mining is a precondition that requires a valid and subsisting District Survey Report (DSR). DSRs are supposed to give scientific evaluations of riverine conditions, extraction limits and environmental carrying capacity. Courts have clarified that the use of draft, outdated or expired DSRs is an impermissible governance shortcut and that the whole idea of environmental regulation is defeated by it. This jurisprudence is an indication of a change to a more procedural rigour and scientific accountability in the governance of sand mining. But as much as this is needed in terms of strengthening the doctrines and procedures, it has not been enough to prevent illegal sand mining in practice.

The fact that the illegal sand mining continues even with improved regulatory systems indicates that there is a structural issue. Illegal sand mining is not just a sequence of opportunistic offences but in most cases, it is a networked and organised business. These networks involve the whole chain of supply, starting with the extraction at the riverbeds, transport permits and vehicle registration, local protection schemes, distribution on the market, and laundering of profits using legitimate businesses. The fact that whistleblowers, journalists and enforcement officials are also subjected to violence is another indication of the organised and coercive character of these activities. In this regard, the illegal sand mining is more of an organised crime than a non-compliance with regulations here and there.[3]

Fig. 1- Estimated Annual Global Demand for Sand and Gravel



The argument of this paper is that these realities require a conceptual change in the understanding and treatment of illegal sand mining. In particular, it assumes that green criminology is a better analytical model to study illegal sand mining in India. Green criminology broadens the criminological investigation to encompass not only the human-centric definition of crime, but also environmental damage, ecological victimisation, and powerful crimes. It does not just focus on formal illegality but also on socially harmful practices that lead to the extensive ecological harm, even when supported or condoned by legal and political frameworks.[4]

[3] *United Nations Convention against Transnational Organized Crime (adopted 15 November 2000, entered into force 29 September 2003) 2225 UNTS 209, art 2(a); UNODC, 'Definition in Convention (article 2a)' (Explainer on organised criminal group criteria).*

[4] *Avi Brisman and Nigel South (eds), Routledge International Handbook of Green Criminology* (Routledge 2013); Rob

Green criminology is not aimed at substituting doctrinal legal analysis but it is an addition to it, offering a diagnostic explanation of why environmental illegality continues to exist even in the presence of regulatory controls. In this view, structural incentives in the political economy, lack of motivation to enforce the law, regulatory capture, and power asymmetry between extractive actors and the affected communities are the reasons why illegal sand mining is perpetuated. The harms are usually spread among the ecosystems and future generations whereas the benefits are concentrated in the hands of a few economically and politically powerful actors. This dynamic is the reason why traditional enforcement methods, including occasional raids, vehicle seizures, or low-level prosecutions, are not very deterrent.

The main contribution of this approach is that the conceptualisation of illegal sand mining as organised environmental crime implies that the reform agenda will have to shift. The enforcement strategies should not be limited to episodic interventions but should be based on supply-chain governance, which should not only be concerned with extraction sites but also with transport logistics, market demand, and financial flows. On the same note, the accountability mechanisms should not be confined to small scale offenders only but should also target financiers, beneficiaries and enablers of illegal mining networks. Anti-money laundering, asset seizure and financial investigations become as significant as the conventional criminal prosecution. In addition, the regulatory reactions should shift to the harm sensitive sanctioning, ecological recovery, and victim-focused remedies to recognise the harm to river systems, local livelihoods, and intergenerational environmental interests.[5]

Overall, the issue of illegal sand mining in India cannot be properly perceived or resolved by the use of limited regulatory or doctrinal perspectives only. It is a multifaceted socio-environmental crime that is entrenched in more extensive systems of governance, development and power. Green criminology offers a critical approach to reveal these more fundamental processes and to shift legal and policy responses to systemic interference with environmental damage, as opposed to its surface containment.

2. Green criminology as approach

Green criminology was a reaction to the traditional shortcomings of traditional criminology, which has long been focused on visible, interpersonal, and street-level crime, including theft, assault, and homicide. This limited approach was becoming less and less sufficient in a world where some of the most serious evils are not caused by individual criminals in single acts, but are generated systematically in economic life, in development policies and in regulatory systems. Researchers started to note that environmental degradation, in the form of pollution, ecological destruction, loss of biodiversity, and massive depletion of resources, was seldom considered a primary criminological issue, despite the fact that its effects were extensive, long-lasting, and irreversible. Green criminology therefore emerged as a result of an increasing awareness that environmental evils are often created not only through overtly criminal activities but also through legal or semi-legal market activities that exist within the current regulatory frameworks.[6]

White, *Transnational Environmental Crime: Toward an Eco-global Criminology* (Routledge 2011).

[5] UNEP–INTERPOL, *The Rise of Environmental Crime* (UNEP/INTERPOL 2016) (environmental crime as organised and profitable; governance implications).

[6] *Nigel South, 'Green Criminology: Reflections, Connections, Horizons' (2014) 3(2) International Journal for Crime, Justice and Social Democracy 5; Rob White and Diane Heckenberg, Green Criminology: An Introduction to the Study of Environmental Harm (Routledge 2014).*

The fundamental analytical intervention of green criminology is its insistence on the need to differentiate crime and harm. Conventional criminology is more likely to define crime in strict terms as per the statutory prohibitions, thus limiting its study to acts that are officially considered illegal. Green criminology questions this legalistic distinction by claiming that law tends to underestimate, normalise or even legitimise environmental harm. In this sense, most of the environmentally harmful activities can be technically legal as they are licensed, permitted, or tolerated by the state, but they still have severe adverse effects on the ecosystem, non-human species, and vulnerable human populations. This change of concept is especially applicable to the natural resource extraction where licences, leases and environmental clearances can legitimize actions that disturb habitats, modify hydrological regimes and impose ecological costs in the long term. The very fact that it is legally allowed does not mean that it is not harmful; it may in fact blur responsibility and water down accountability particularly in situations where regulatory standards are lax or not well enforced.

This criticism is particularly relevant to extraction-based economies, where the developmental needs are often put above the ecological sustainability. Licences and permits tend to be tools of legalising harm, which reduce the complex ecological processes to administratively manageable levels. Extraction can lead to displacement, loss of livelihoods, or environmental insecurity of communities impacted by extraction, including riverine populations, indigenous communities, or small-scale agriculturalists, but these effects are hardly considered as criminal victimisation. Green criminology thus reveals the disjunction between formal and substantive justice, the way environmental damage can be systematically created without eliciting the usual criminal law reactions.

Green victimology is the second pillar of green criminology. This line of analysis undermines the conventional concept of victimhood, which is usually based on recognizable persons who suffer direct and visible damage due to a specific criminal act. Environmental harms are not in line with this model. Rather, they create victims that are widely spread in space and time, are frequently politically marginalised and not restricted to human beings.[7] Environmental degradation can impact ecosystems, animal species, future generations, and even whole communities, but they are not represented effectively by criminal justice systems that are structured to address immediate and individualised injuries.

Environmental damage is often cumulative, gradual and gradual. In contrast to traditional crimes, which are usually dramatic and event-oriented, ecological damage can occur over time through such processes as a decrease in groundwater recharge, changes in sediment flows, erosion, biodiversity loss, and exposure to floods or droughts. Such harms might not be felt when they happen, and the full impact of such harms might be felt only years or decades later. This spatial and temporal dispersion complicates the process of assigning blame, measuring harm or organising legal action. Consequently, the event-based logic of criminal law, which is organized around a particular act, a particular offender, and a particular victim, is inappropriate to the ecological injury.

Green criminology emphasizes the systematic disadvantage of environmental victims of this mismatch. The harm is widely spread and delayed, which means that the enforcement agencies and the courts are often unable to establish the cause and effect, causing under-enforcement or regulatory inertia. In addition, the communities that are the most vulnerable to environmental degradation often have no political power, financial means, or legal redress. Their

[7] *Rob Nixon, Slow Violence and the Environmentalism of the Poor (Harvard University Press 2011).*

misery can be made invisible in the mainstream discourses of development and economic growth. Green victimology redefines environmental degradation as a victimisation process that requires redress, preventative intervention and recognition by foregrounding these dynamics.

The third important aspect of green criminology is power. It contends that environmental damage is mostly generated by crimes of the powerful and not by marginal or street-level criminals. These are state-corporate partnerships, regulatory capture, selective enforcement, and institutional complicity in environmentally destructive practices.[8] Green criminology does not argue that every case of environmental destruction is due to conspiracies; it only highlights that the patterns of enforcement and non-enforcement are influenced by the unequal bargaining power, political economy factors, and vested interests. In most settings, the costs of environmental compliance are externalised to communities that have less political representation, and the economic gains are enjoyed by those actors who have more influence and access to decision making processes.[9]

This emphasis on power is not simply normative or moralistic, but is, in essence, explanatory. The absence of attention to governance incentives, local political arrangements and economic dependencies makes it impossible to fully comprehend why environmentally harmful practices are still practiced despite regulatory frameworks which are supposed to prevent them. Biased application, acceptance of illegality, and lax sanctions tend to be indicative of more general structural incentives, including revenue collection, employment issues, or political favors. Green criminology therefore gives the opportunity to view environmental damage as a structural consequence of governmental failures and power imbalances, as opposed to a chain of individual transgressions.

Altogether, green criminology extends the boundaries of criminological research by redefining harm, victims, and power in the regulation and enforcement of the environment. It goes beyond the limited scope of formal legality to provide a more detailed explanation of why environmental degradation still takes place in legally controlled situations. Its analytical resources are especially useful in disaggregating intricate, structured and institutionalised types of environmental damage, where the traditional criminal law methodology fails to reflect the magnitude, dispersion, and continuity of ecological damage.[10]

3. The sand politics of infrastructure demand and governance deficit

Sand is not interchangeable. Construction grade sand is usually obtained in rivers, floodplains, and some coastal and marine deposits, as desert sand is usually not suitable in concrete due to grain properties.[11] With urbanisation and infrastructure expenditure, demand increases; and where the demand increases more rapidly than legal supply, there are incentives to encourage illegal extraction, which are predictable.[12] In the case of governance, this forms a typical resource pressure situation: a commodity of high volume, a variety of players in the supply chain, and extraction sites that are spatially spread and hard to oversee at any given time.

The environmental science of the ecological costs of riverbed mining is well-documented, and has been progressively summarised in Indian judicial reasoning:

[8] Paul B Stretesky and Michael J Lynch, 'Corporate Environmental Violence and Racism' (1999) 30(2) *Crime, Law and Social Change* 163.
[9] South (n 6); White and Heckenberg (n 6).
[10] UNEP–INTERPOL (n 9); White (n 6).
[11] UNEP, 'Sand mining: the problem with our dwindling sand reserves' (Story, UNEP, 2023) (construction dependence and extraction locations); Vince Beiser, *The World in a Grain: The Story of Sand and How It Transformed Civilization* (Riverhead Books 2018).
[12] UNEP (n 5); Beiser (n 11).

channel incision, bank erosion, destruction of benthic habitats, fish breeding and migration, turbidity and sediment transport changes, weakening riverine infrastructure (including bridges and embankments). The process of sand extraction may also interfere with the dynamics of groundwater by reducing the riverbeds and changing the hydraulic connectivity, thus contributing to the local water insecurity. These are not just environmental issues in some abstract sense; they directly involve constitutional values of life, health and livelihood, especially to communities who rely on riverine ecosystems to farm and fish.[13]

In the case of extraction being unlawful, the injuries are normally compounded. The unlawful miners can mine faster than the replenishment rates, work at night, avoid safety standards, and threaten the complainants and authorities.[14] What it has led to is not just environmental degradation but also governance degradation: enforcers are threatened, evidence chains are broken, official permission can be forged, manipulated or even laundered through administrative loopholes. It is these patterns that are the reason why illegal sand mining should be considered as an organised environmental crime and not a series of isolated offences.[15]

4. The legal framework of India: minor minerals, environmental clearance and centrality of DSR

4.1 Minor minerals and decentralised MMDR control

The Mines and Minerals (Development and Regulation) Act 1957 (MMDR) defines minor minerals to include ordinary sand (with certain exceptions), and gives significant regulatory authority to States in minor mineral concessions.[16] This decentralisation is frequently justified administratively, States being more proximate to extraction sites and able to make rules more responsive to local geographies.[17] However, decentralisation also creates enforcement variance, disjointed data, and disproportionate monitoring ability, as well.[18]

The MMDR Act provides penalties in case of violation of mining restrictions and it gives the State Governments the power to issue rules to prevent unlawful mining, transportation and storage.[19] Nevertheless, institutional and doctrinal boundaries are important. Section 22 of the MMDR Act prohibits the courts to assume cognisance of MMDR offences other than on a complaint by an authorised officer, which has influenced enforcement strategy and litigation.[20] This does not make the general criminal law irrelevant; it simply causes a coordination issue between the police investigation and specialised complaint processes.[21]

4.2 Environmental clearance and the EIA regime

The Environmental clearance of the mining is based on the Environment (Protection) Act 1986 and the Environment (Protection) Rules 1986, according to which the EIA Notification 2006 (S.O. 1533(E), 14 September 2006) established a systematic clearance procedure of the specified types of projects. The Supreme Court made a decisive move on the regulatory path of minor minerals by insisting that

[13] Constitution of India, art 21; *Subhash Kumar v State of Bihar* (1991) 1 SCC 598 (SC) (right to life includes pollution-free water/air principles); *Vellore Citizens Welfare Forum v Union of India* (1996) 5 SCC 647 (SC).
[14] MoEFCC, *Enforcement & Monitoring Guidelines for Sand Mining* (MoEFCC 2020) (illegal mining and monitoring rationale).
[15] UNEP–INTERPOL (n 5); UNODC, *World Wildlife Crime Report* (UNODC, latest ed) (organised environmental crime dynamics, where relevant).
[16] Mines and Minerals (Development and Regulation) Act 1957 (India) s 3(e).
[17] Mines and Minerals (Development and Regulation) Act 1957 (India) ss 15, 23C.
[18] Press Information Bureau (India), 'Rules and Measures in Place to Curb Illegal Mining in States' (Press Release, 21 March 2022) (state responsibility for control).
[19] Mines and Minerals (Development and Regulation) Act 1957 (India) ss 21, 23C.
[20] Mines and Minerals (Development and Regulation) Act 1957 (India) s 22.
[21] Environment (Protection) Act 1986 (India) s 3; Ministry of Environment and Forests, Environment Impact Assessment Notification 2006, S.O. 1533(E) (14 September 2006).

small-area leases could not be considered ecologically insignificant: in Deepak Kumar, the Court criticised the issuance of minor mineral leases without environmental appraisal and insisted on the need to conduct scientific assessment and sustainable limits of extraction of minor minerals.[22] The regulatory reaction involved amendments which added district-level procedures and made DSRs and replenishment studies the center of decision-making in sand mining.[23]

4.3 DSRs as governance infrastructure: transparency, replenishment, and legality

The DSR is not a red tape requirement; it is supposed to be the informational basis of whether, where, and how much sand can be mined. Appendix X to the EIA framework establishes the structure of the DSR, which involves defining deposition areas, areas around infrastructure where the prohibition is required, and the calculation of the replenishment rates, and the procedures of the draft publication and finalisation are carried out in the public domain.[24] The Supreme Court has not considered these requirements aspirational: in State of Uttar Pradesh v Gaurav Kumar, it dismissed environmental clearances based on a draft DSR and stressed the obligatory nature of a valid and subsisting DSR.[25] The Court also placed sand governance in a rule-of-law framework in Union Territory of J and K v Raja Muzaffar Bhat, where sustainable sand mining is said to be conditional on the quality of the DSR and the integrity of the replenishment assessment.[26]

4.4 Regulatory technique: guidelines SSMG 2016 and EMGSM 2020

The Sustainable Sand Mining Management Guidelines 2016 (SSMG) and the Enforcement and Monitoring Guidelines of Sand Mining 2020 (EMGSM) of MoEFCC are a soft law with hard practical implications: they define monitoring structures, underline replenishment research, and facilitate technology-based tracking between source and destination. The EMGSM specifically identifies illegal mining as a longstanding governance issue and identifies enforcement with digital monitoring, surveillance and traceability as an implicit recognition that traditional site-based enforcement is structurally inadequate.[27] That is, Indian sand governance has already started to shift, at least ideally, toward the type of supply-chain and networked governance that green criminology would prescribe to it.[28]

5. Organised environmental crime of illegal sand mining

5.1 The reason why organised is not rhetoric

An organised criminal group is a common definition used internationally (to serve transnational purposes) of a structured group of three or more individuals, operating over a duration of time, in concert to engage in serious crime with the aim of financial gain. Although illegal sand mining is not necessarily transnational, the analytic usefulness of this definition is that it focuses on structure, continuity, coordinated roles, and profit motive.[29] Illegal sand mining is perpetuated, organized, and justified in most Indian contexts, which are not characteristic of the portrait of a random person grabbing sand at once.

[22] *Deepak Kumar v State of Haryana* (2012) 4 SCC 629 (SC) (environmental harms of sand mining and need for precautionary approach).
[23] *Union Territory of J & K v Raja Muzaffar Bhat* (n 22) (describing 2016 amendments and DSR centrality); Ministry of Environment, Forest and Climate Change, Notification S.O. 141(E) (15 January 2016) (EIA amendment for minor minerals).
[24] Environment Impact Assessment Notification 2006 (n 21).
[25] *State of Uttar Pradesh v Gaurav Kumar* (2025) INSC 650; also reported as 2025 SCC OnLine SC 1069 (DSR must be valid and subsisting; draft DSR insufficient).
[26] *Union Territory of J & K v Raja Muzaffar Bhat* (2025) INSC 1025 (summarising ecological impacts and regulatory regime).
[27] MoEFCC (n 14).
[28] *Union Territory of J & K v Raja Muzaffar Bhat* (court treatment of 2016/2020 guidelines).
[29] UNEP-INTERPOL (n 11)

In green criminological terms, what is more significant is that the organised environmental crime is often entrenched in the local political economy. The sand being heavy, it is of low value per unit, but of high value in bulk, profitability is a matter of volume and continuity, which in turn is a matter of predictable protection against disruption. This may create a governance ecology where violence, intimidation, and selective enforcement are normal elements of the business model. The organisation might not be like a traditional mafia hierarchy; it might be more like a loose network linking extraction crews, transport operators, permit intermediaries, and market distributors.

5.2 Convergence of offences: environmental violation to financial crime

When the illegal sand mining is considered as an MMDR or environmental clearance violation, the enforcement is usually focused on the tip of the iceberg: trucks, drivers, and small-scale mining equipment. However, the strength of the enterprise is normally upstream (financing, political protection) and downstream (market absorption, documentation, and cashflow concealment).[30] This implies that successful disruption demands offence convergence: through environmental law, general criminal law (theft/receiving), and financial crime structures (money laundering and proceeds attachment) in which facts warrant.

The jurisprudence of the Indian Supreme Court has made it clear on more than one occasion that MMDR offences and IPC offences may be legally distinct: State (NCT of Delhi) v Sanjay acknowledged that illegal extraction could be theft under the IPC despite the fact that MMDR procedures limited cognisance of MMDR offences.[31] Subsequent cases have restated that the MMDR scheme does not always protect conduct against prosecution under the general criminal law where the elements of those offences are established. The practicality of the doctrinal importance is that it allows the policing strategies that do not stall when an authorised-officer complaint is delayed, yet it does not breach the procedural bars of MMDR to MMDR-specific offences.[32]

5.3 Violence, intimidation and the ecology of impunity

Green criminology asserts that violence is not an appendage to environmental crime; it is frequently part and parcel of the process of keeping unlawful access to nature. Intimidation may be used to silence complainants, scare off journalists and civil society watchdogs, and dishearten officials to enforce the law in the long term in sand mining situations.[33] The consequence is not just the failure to punish, but the distortion of the law as such, in which legal permissions and enforcement measures are selectively triggered. Under these circumstances, a legalistic definition of the phenomenon, which would be to say that illegal mining is a regulatory violation, is a misstatement. It should be called governance capture: a systematic subordination of environmental protection to unlawful profit-making.

6. Victims and victimisation: green victimological mapping

The unique input of green criminology is that it insists that environmental damage creates plural victims. The riverine habitats, fish spawning areas, riparian vegetation and benthic organisms are the most immediate non-human victims in illegal sand mining; the damages are mediated by the changed sediment regimes and physical habitat disturbance. Human victimisation is also plural. Communities that rely on

[30] Prevention of Money Laundering Act 2002 (India)
[31] *State (NCT of Delhi) v Sanjay*
[32] *Jayant v State of Madhya Pradesh* (2021) 2 SCC 670 (SC); *Kanwar Pal Singh v State of Uttar Pradesh* (2020) 14 SCC 331 (SC).
[33] UNEP–INTERPOL (n 6)

rivers can lose their livelihood (fisheries reduction), be affected in agriculture (bank erosion, changed irrigation patterns), and become more vulnerable to disasters (flooding, bank collapse risks).[34]

Victimhood is also procedural. The lack of meaningful participation of communities in clearance decisions may occur when DSRs are not well prepared, not publicised, or are considered as technical documents that cannot be scrutinised by the community.[35] In the case where the DSR is the legal and scientific basis of clearance, flawed DSRs do not merely result in bad decisions, but in a kind of epistemic injustice, communities are deprived of the informational basis to oppose the extraction plans that recreate their environments.[36] This insistence of the Supreme Court on valid, subsisting DSRs can be interpreted, therefore, as administrative law as well as victim-protection logic: without a reliable baseline knowledge and replenishment assessment, the clearance process turns into a legality facade.

Lastly, green criminology expands the timeframes. Most of the harms of sand-mining are slow in the sense that they build up and can only be readable after a period of years, through deepening of channels, or through changes in the interaction of groundwater, or through recurrent seasonal destabilisation. Such harm is not well accommodated in criminal justice systems that depend on instantaneous injury reporting and brief causal links, and this is exactly why the design of regulations (replenishment studies, periodic DSR updates, transparent monitoring) is not an ancillary to enforcement- it is the state of meaningful legality.

7. Reform agenda: illegal sand mining as an organised environmental crime

7.1 Enhance DSR integrity as a rule-of-law priority

DSR integrity is the initial reform frontier in case the governance foundation is the DSR. This entails (i) autonomous technical capability (remote sensing support, hydrology expertise), (ii) obligatory conflict-of-interest protection of preparers and reviewers, and (iii) transparency that faces the public making DSR assumptions contestable. The articulation of the Supreme Court that sustainable sand mining is based on the quality of the DSR must be operationalised as an accountability criterion: flawed DSRs must be the source of administrative accountability, rather than the cancellation of the project itself.

Another related priority is update discipline. The update horizon (periodic renewal) of Appendix X must be considered as an enforcement trigger: the leases and auctions based on expired DSRs must be assumed to be illegal, and downstream implications of the permits, transport passes, and eligibility to procurement. In a word: DSR validity must be a compliance gateway that is integrated throughout the sand supply chain, rather than a document submitted at the clearance point and then lost.

7.2 Change of location-based seizures to supply-chain governance

Taking cars and hiring drivers can be required, yet it is hardly enough. A green criminological approach suggests breaking the chain of commodities: traceability to the destination, checking at the points of sale, and purchasing regulations that demand evidence of legality of origin. EMGSM already points to this model by focusing on source-to-destination monitoring and tracking technology-enabled tracking. The implementation requirement is the need to reform: interoperable databases between mining, transport, revenue and environmental authorities; real-time

[34] *Deepak Kumar* (n 4)
[35] Environment Impact Assessment Notification 2006 (n 34), Appendix X (public domain and consultation mechanisms as applicable).
[36] South (n 7); White and Heckenberg (n 7).

anomaly detection; and plausible penalties against documentation frauds.

7.3 Combine financial investigation and proceeds-based disruption

Since sand mining is illegal, it is necessary to disrupt it on a proceeds basis. Agencies ought to employ financial investigation devices to determine beneficiaries, affix proceeds, and prosecute laundering routes where evidence is available to do so, instead of concentrating on immediate extraction offences only.[37] This is not punitive maximalism, it is rational enforcement design. Economic incentives keep organised environmental crime going and enforcement that leaves profit structures intact becomes a cost of doing business.

7.4 Calibrate approves and sanctions ecological harm

The enforcement of the environment tends to swing between the symbolic punishment and periodic crackdowns. To have a harm sensitive approach, sanction needs to be calibrated: penalties must be based on (i) the magnitude of extraction beyond replenishment, (ii) ecological sensitivity of site, (iii) repeat offending and organised participation, and (iv) victim effects. The remedies must focus on restoration, rather than on revenue recovery; otherwise the State will face the danger of transforming environmental damage into a financial flow. In this case, the jurisprudence of NGT on restitution and ecological service valuation offers a conceptual basis, although the implementation is not evenly spread yet.[38]

7.5 Conform criminal law change to environmental enforcement realities

The criminal law system in India has experienced significant changes in legislation with the introduction of new criminal codes in July 2024. Although the doctrinal aspects of theft, receiving stolen property, obstruction and organised violence now need to be overlaid onto the new statutory framework, the principle of enforcement is the same: environmental illegality often intersects with general criminality and legal frameworks should not impose artificial silos that favour organised offenders. Courts already provided interpretive directions on MMDR-general-crime coexistence; enforcement agencies and legislators now need to institutionalise inter-agency protocols that operationalise this interpretive direction into practice.[39]

8. Conclusion

The sand mining in India is not merely a compliance failure in the area of a small mineral. It is a repetitive, large-scale production of environmental damage, facilitated by local political economies and enforcement failures, and frequently maintained by organised networks that border organised criminality. Green criminology elucidates the failure of conventional frames: due to the narrowness of the legal category of crime compared to the social fact of harm; due to the diffuseness of victims and their often silence; due to the fact that the most serious causes of environmental harm are often power, profit, and capture of governance and not isolated wrongdoing.

In theory, the environmental clearance regime in India has shifted towards more procedural discipline with DSR requirements, replenishment studies and judicial demands that shortcuts, including use of draft DSRs, are illegal. Procedural safeguards are, however, as effective as the governance infrastructure that breathes life into them. When DSRs are weak, surveillance is disjointed, and the enforcement is obsessed with low-level actors, the illegal sand mining will keep on reproducing itself. The correct answer is thus

[37] Prevention of Money Laundering Act 2002 (India).

[38] Press Information Bureau (India), 'Highlights of new criminal laws' (Press Release, 30 July 2024) (commencement); Ministry of Home Affairs, *The Bharatiya Nyaya Sanhita, 2023* (Act 45 of 2023) (text and repeal clause).

[39] Mines and Minerals (Development and Regulation) Act 1957 (India).

combined: make serious illegal sand mining an organised environmental crime; break the profits by financial investigation; establish supply-chain traceability; make DSR integrity a rule-of-law priority; and scale sanctions to ecological damage and harm to victims. It is not just an enforcement strategy. It is a jurisprudential position that is in line with the constitutional environmental promises of India and with the main point of the green criminology: environmental damage is not a marginal issue of justice, it is one of its problems.

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