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Reforming India's Legal Framework for Environmental Crimes: Integrating Technology and Global Best Practices for Climate Justice

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ABSTRACT

Environmental crimes, including illegal mining, pollution crimes and wildlife trafficking, undercut India's climate agenda, undermine the safety and security of vulnerable communities and compound climate injustice. Even with the legislative protection of acts, such as the Environment Protection Act (1986) or the National Green Tribunal (NGT), enforcement mechanisms themselves create a legitimate impediment to accountability. This paper investigates India's regulatory processes to examine how effective they can be as tools to prevent environmental crimes and how closely those regulatory processes align with principles of climate justice. The legal analysis of statutes and NGT rulings are supplemented by case studies (such as the Bellary illegal mining issue or the Ganga Pollution) that help highlight the issues of enforcement as well as the severity of penalties or monitoring. Examining international instruments like the European Union's Environmental Crime Directive and enforcement initiatives of the United States Environment Protection Agency (EPA) shows best practice in compliance and prosecution. The paper sets out options for reform, including the establishment of specialist environmental courts and examples of technology-driven approaches (e.g., satellite monitoring and using blockchain for product supply chain transparency) that could enhance enforcement. Given the disproportionate impact on Adivasi and coastal communities, the paper argues that strong regulation can improve equity in climate action. The paper relies on (1) recent data from the Ministry of Environment, Forest and Climate Change; (2) UNEP reports (2023 to 2025); and (3) expertise and best practices obtained through Interpol's Environmental Crime Programme to provide concrete recommendations. With an emphasis on global learning and technology, the research framework aims to inspire a reshaped legal framework that reinforces accountability and adheres to the conference's theme of rethinking environmental law and policy for climate action.

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INTRODUCTION

In addressing India's environmental governance in 2025, there is a paradoxical situation. India has advanced the substantial international climate agenda in having filed its updated Nationally Determined Contributions (NDCs) to the UNFCCC (Government of India, 2022); however, there is an ever-expanding shadow economy of environmental crime which successfully disables the very structural conditions these developments are based on. This is in no way merely a gap; there is a fundamental contradiction, or what is often described as the 'implementation gap', where strong laws, such as the Environment (Protection) Act of '86, fail to even begin to deal with the systemic nature of the conditions of these crimes (Rosencranz & Divan, 2021). The outcome is widespread impunity for pollution and environmental harm and the large destructive consequences for the global economy from environmental harm and pollution, and hence intrinsic generalised security threats (INTERPOL 2023, UNEP 2024).

But the real cost is not only measurable; it is human. Illegal mining intersects with persistent pollution of rivers and rampant deforestation and has caused the most damage to India's most vulnerable communities. This relationship connects social injustices to environmental harms (Kothari & Das 2020). Indian courts recognised this basic connection decades ago and later embraced it with an environmental justice framework for vulnerable populations (Vellore Citizens' Welfare Forum v. Union of India, 1996). However, by failing to meaningfully criminalise environmental offenders in India, the path for climate justice for indigenous Adivasi populations and coastal fishers has been foreclosed by resource extraction, which wastes and covers up the environmental harm with impunity.

I propose that breaking India's enforcement paradox can happen through two fronts: institutional reform and technological innovation. Drawing on the lessons of foreign examples of best practices, India theoretically could turn its environmental regulation within an appropriate preventative and just direction using new monitoring and transparency tools. I will first examine India's enforcement challenges through case studies, I will next engage examples of practical models of criminalisation and enforcement abroad, and I will finally propose a reform framework that incorporates institutional capacity and technological innovation.

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THE INDIAN LEGAL FRAMEWORK AND ITS ENFORCEMENT PARADOX

The constitutional framework of India, in Article 48A and Article 51A(g), articulates that the government shall protect the environment; therefore, there is intent, yet we can see a gulf between the intent and the application of the law. This section will review that gulf considering India's legal framework, the role of the National Green Tribunal (NGT) and two case studies, first, the Bellary illegal mining scandal and second, the ongoing pollution of the Ganga River, to illustrate failures to enforce the laws.

Legislative Framework: Intent Versus Application

The Environment (Protection) Act 1986 (EPA) can provide the building blocks for a revised legal framework for regulation of the environment in India. The East National Environmental Law Centre 2the. EPA was passed following the horrific Bhopal Gas Tragedy, which illustrated the ineptness of the regulatory framework in India. The EPA gives broad powers to the Central Government to protect the environment and was an accompaniment to an array of acts to protect specific sectors, such as the Water and Air Acts (1974, 1981), which formally created pollution control boards.

In general, these laws have a large scope. However, high thresholds for liability, combined with convoluted prosecution processes, make it a limited legal approach for addressing corporate wrongdoing. Consider the Environment Protection Act's (EPA) Section 15, which has a maximum penalty of 5 years of incarceration or a ₹1 lakh (around $1,200) fine, which is trivial for multinational corporations who can commit serious harm to the environment (Lele & Menon, 2014). Case prosecutions are notoriously protracted and subject to delays associated with political influence and corporate obstruction (Prabhu, 2019). Conviction rates for environmental crimes are among the lowest in India, with cases congesting the courts for years (NCRB, 2023). In light of the weak enforcement of penalties, perpetrators seem to believe that penalties are just a "cost of doing business", rather than a deterrent.

The National Green Tribunal: Authority and Constraints

The NGT was founded in 2010 and is mostly considered a step forward as an authority that specialised in dealing with environmental cases, which imposed large fines, respected the

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"polluter pays principle", had the power to act suo motu without needing to wait for others, and could resolve cases quickly.

Nonetheless, efficacy is limited. As a civil quasi-judicial authority, the NGT cannot prescribe punitive criminal law enforcement under the Indian Penal Code or under the Wildlife Protection Act (Narain & Bhushan, 2018). The NGT relies on sub-national public bodies like the State Pollution Control Boards (SPCB); they have no resources, and a possibility of collusion is complicating enforcement. Thus, many NGT orders are not fulfilled and/or enforced, and the NGT is primarily a reactive body unable to direct enforcement orders (Roy, 2022). It cannot effectively counter the fundamental criminality of many environmental violations.

Case Studies of Systemic Failures

The Bellary Illegal Mining (State of Karnataka): The rampant illegal iron ore mining ongoing for a number of years from 2008 to 2011, supported by powerful corporations allied with their political and bureaucratic coalitions, all wilfully ignored prohibitive laws, like the Forest (Conservation) Act, 1980. During that entire period, it appeared that regulators were totally compromised by corruption, and it was only when the Lokayukta released a report to the Supreme Court that provided the evidence for intervention (Supreme Court of India, 2012). The social and ecological justice failures are significantly compounded at this point with large-scale deforestation and displacements by the state of Adivasi livelihood, in a two-fold colossal failure of climate justice.

Intractable Ganga Pollution: Despite significant government spending and repeated rulings by the National Green Tribunal, polluting industries are still operational, and the Ganga remains badly polluted. As noted by an audit (Comptroller and Auditor General of India, 2021), State Pollution Control Boards cannot keep tabs on the myriads of industrial discharges and municipalities which repeatedly assess their violations and discharge in quantitative terms without variances with any effluent specified times, as they have to with operational limits. A habitual disregard of the Water Act, not only harming the Exchequer but also millions of downstream communities, has ongoing health and economic consequences extending to millions and is, on account of its intractability, climate injustice.

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GLOBAL BEST PRACTICES: MODELS OF ACCOUNTABILITY AND COMPLIANCE

While India's enforcement woes are severe, they are not dissimilar from problems faced by other countries who have lessons to offer. Several such countries, especially the European Union and the United States, and international organisations (e.g., Interpol) provide best practices to consider in three important areas: criminalising environmental harms, distinct criminal enforcement activities, and proactively participating in transnational environmental enforcement partnerships.

The EU's Environmental Crime Directive: Criminalisation

India relies on civil administrative penalties – a strategy that does not deter potential serious organised and/or lucrative environmental crimes. The EU's Directive 2008/99/EC (European Parliament, 2008) exemplifies an option to address this under the guise of some criminalisation in member states. The Directive requires member states to introduce "effective, proportionate and dissuasive" (Articles 5 and 6) sanctions for environmental criminal offences, including illegal discharge of pollutants and trafficking of endangered wildlife species. Considerable penalties can be imposed, including imprisonment against natural persons, as well as significant sanctions against corporations (Faure & Svatikova, 2012).

For India, this gives concrete actions to be taken almost immediately, namely an imperative to move away from simply nominal criminalisation by revising legislation, such as the EPA, to include mandatory minimum sentences and mandatory fines reflecting the ill-gotten illegal profits and any additional considerations imposed on the risk tolerance of the offender.

The U.S. EPA: Centralised and Specialist Enforcement

The U.S. EPA is the best example of a broadly coordinated system that is well-resourced and is able to use a range of administrative, civil, criminal and financial penalties to enforce compliance with environmental law. The U.S. EPA includes a Criminal Investigation Division (CID), which acts like a law enforcement agency that serves as a model for environmental police forces, having special agents that are trained in applying science, forensics and the law in investigating environmental crimes and have a close working relationship with the

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prosecutor, which is often critical in dealing with the complexities of environmental crime (U.S. EPA, 2024; Lazarus, 2019).

India can also learn from the advantages of specialisation in creating an agency like the EPA that is not subject to local political control, that is independent and has statutory powers to investigate and prosecute; that would close the enforcement gap in India.

Interpol's Environmental Crime Programme: Countering transnational networks

Environmental crimes might be increasingly cross-border and incremental, with a similar class of illegal logging and wildlife trafficking generally moving from India to (or from) global markets (World Bank, 2019). Domestic enforcement alone is not sufficient. Interpol's Environmental Security Programme facilitates police cooperation between 196 member states with technical assistance, intelligence sharing, coordination of operations, and focus on arresting key criminal organisations (Interpol, 2024).

India should embed its enforcement in global and regional security architectures, firstly by engaging with Interpol and secondly by bolstering bilateral arrangements, to disrupt the transnational criminal networks that are exploiting its natural resources.

A FRAMEWORK FOR REFORM

The role of technology in achieving climate justice while it is essential to diagnose the enforcement paradox and draw lessons from practices across the world, diagnosis is not enough. In 2021, India has a unique opportunity to leapfrog old models of enforcement and take advantage of its significant technological capacity and necessary institutional change. In this section, I propose a three-part framework to develop a transparent, accountable, and forward-thinking mechanism for environmental justice. The focus of the framework is to outline reform to the judiciary, enforcement through technology, and involving frontline communities.

Institutional Reform: Specialist Environmental Courts

Historically, the National Green Tribunal (NGT) has made progress with civil cases (although it cannot criminally prosecute). India needs specialist environmental courts, with criminal jurisdictions, for criminal cases with respect to major environmental statutes (for example) the

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Environment (Protection) Act of 1986 or the Wildlife (Protection) Act of 1972 (Law Commission of India, 2017). The solicitors' jurisdiction in specialist environmental courts would be:

- A criminal jurisdiction with respect to all serious offences relating to environmental harm.
- Judges and prosecutors who have an environmental law and science background, which would facilitate the processing of very complex technical evidence and statistics, which would also lead to a higher rate of convictions and better-articulated rationales for sentences or environmental harm.
- Little to no commercial – except for environmental matters – case backlog, with quicker resolutions to cases involving only environmental matters, creating enhanced deterrents (Sagar, 2023).

Specialist environmental courts would send the message that serious environmental crime which causes serious harm against the environment will have real, serious consequences, including imprisonment, effectively closing the gap in India's enforcement regime.

Technology-Driven Enforcement: Reactive to Proactive

For new courts and agencies to operate, the incorporation of technology into enforcement systems has to be more than just papering over the bad social and environmental outcomes of poor enforcement and reacting to non-compliance in an old-school way, systemically moving from a regime of reactive and compliance-based enforcement responses to preemptive monitoring and surveillance.

Satellite Monitoring and Geospatial Intelligence: While using high-resolution images available from some of India’s ISRO satellites in combination with AI technologies, India could develop a national platform called "Environmental Crime Watch" to facilitate real-time detection and reporting of illegal activities such as forest clearance or illegal mining or, given enough information, unlawful dumping procedures. The advantage of satellite imagery and the geospatial intelligence is that they could provide evidential-quality images of environmental crimes and gross environmental and social harm that will be admissible as evidence in a court

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of law and trigger immediate alerts to the relevant government enforcement agencies (Kumar & Sharma, 2021).

Blockchain technology to trace sources within supply chains: Blockchain technology works like a tamperproof ledger, referred to as "blockchain", to trace the legitimate sources of natural resources for every transaction, like red sanders wood. IP and associated enforcement agencies will be able to track illegal or legitimately sourced material (particularly when the resulting transaction exposes a break in the chain of custody) with accountable transparency on both private and corporate entity actions, which can only assist investigations into corruption and illegal trading (Tapscott & Tapscott, 2017).

AI and data analytics in pollution monitoring: AI-enabled real-time monitoring proves blatant discrepancies against emissions, with low cost vs. monitoring (i.e., GPS on cell phones), especially without credibility independent of factory emissions when inspectors are on the scene; targeting randomly shows what effective behaviour modification both the individuals do and when it is germane to data-driven governance economically. Moving beyond what we have been slacking on in pollution control measures (Coglianese & Tennant, 2022).

Empowering Communities to Use Technology

After all, climate justice means empowering those people who are most exposed. Technology can connect vigilant citizens with government 'on-the-ground' enforcement.

A secure, multilingual mobile app – “Jan Van Nigrani” (“Public Watch on the Environment”) – can allow people from coastal fishing villages or forest communities to report illegal activity anonymously with a geotagged photo or video. If we visualise the data generated from citizen inputs, which has valuable information on the ground, eventually, everything will be assembled into an enforcement dashboard. In this, citizens could be mobilising, and this monitoring activity can be recognised as citizen science; also note that participatory monitoring in conservation is a successful use of empowering vulnerable communities when they become active stewards in their environment (Danielsen et al. 2014).

CONCLUSION

India's environmental laws are soundly founded upon the Constitution, but an enforcement paradox rests on a middle ground of good laws and bad accountability that deprives the former

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of power and renders the latter futile. This paper has argued that this gap is not merely due to regulatory failure but is situated within a layer of climate injustice that is affecting and measuring damage from lasting harm against some of India's most vulnerable populations. The institutional failures displayed in the Bellary mining scandal and Ganges pollution are demonstrative and depict an enforcement network that is outdated, passive-reactive, and under-resourced.

The solution is not more laws, and rather we propose a shift in paradigm in how environmental justice is pursued. We propose a model that creates a combination of institutional reform and technological advances. Institutional reforms can combine specialist environmental courts with strong criminalisation, like the EU has done, and specialised enforcement, like the U.S. EPA and other countries. These would reinforce India's institutional footing, but with high-tech enforcement tools, like satellite monitoring to provide real-time surveillance, blockchain to establish and track openly transparent supply chains, and AI to predict and trigger unsuccessful pollution. In short, all of these tools have the ability to bring one global enforcement regime that is fast, transparent, and data-driven to enforce environmental laws in India.

Fundamentally, this vision will allow communities to become active custodians of their environment through technology, converting victims into stewards and partners. Outside the confines of bureaucracy, this is also a moral imperative for an India grappling with worsening climate and social crises. A legal framework that punishes environmental crime is not only a climate accountability and commitment issue – it is also about India's constitutional obligation to provide justice, equality and sustainability for all (Kothari & Das, 2020).

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