

Legal Framework for Soil Degradation in India: Evaluating Environmental Governance, Regulatory Gaps and Sustainable Land Management

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Abstract: Soils underpin agriculture, ecosystems and livelihoods, but face severe degradation from erosion, salinization, pollution and unsustainable practices. Globally an estimated 18.1 million km² of land is degraded (mostly by unsustainable farming), and India alone has nearly 97.85 million hectares (~29.8% of its land area) under degradation. This paper examines India's legal response to soil degradation using doctrinal methods. It critically surveys constitutional provisions (e.g. Articles 21, 48A, 51A(g)), relevant statutes (Environment, Water, Air, Forest, Biodiversity and NGT laws), major judicial decisions (*RLEK v. U.P.*, *Vellore Citizens*, etc.), and policies (Soil Health Card, National Action Programme to Combat Desertification). The review of literature reveals technical studies on soil decline in India but highlights a research gap in legal analysis. The paper finds that India's framework is fragmented and lacks dedicated soil legislation. Weak enforcement, institutional overlaps and inadequate soil monitoring persist. We recommend a unified Soil Protection Act, stronger central authority, digital soil mapping, community-based management and incorporation of Precautionary and Polluter Pays principles in law. The study contributes a novel legal analysis of India's soil governance and offers actionable reforms.

Keywords: Soil degradation, environmental law, India, constitutional duty, Precautionary principle, Land Degradation Neutrality, desertification

I. INTRODUCTION

Meaning and Significance of Soil Degradation. Soil degradation means any decline in soil health or fertility that impairs its capacity to support agriculture and ecosystems. It encompasses physical loss (erosion, compaction), chemical issues (salinity, contamination, acidification) and biological decline (nutrient depletion, loss of soil biodiversity). Healthy soils are vital for crop production, water regulation, carbon storage and biodiversity. Degraded soils yield less food, store less carbon and amplify climate impacts. Globally about 30% of soils are moderately to highly degraded; water erosion is the dominant process worldwide.

Status of Soil Degradation in India. India's soils are under intense pressure. Technical estimates suggest approximately 97.85 million hectares (~29.8% of India's geographic area) were undergoing degradation in 2018–19. Major drivers include unsustainable agriculture (soil tillage, imbalanced fertilization), deforestation and mining. Kumar and Sharma (2020) report “nearly 147 million ha” (~44% of land) subjected to degradation—94 Mha by water erosion, 23 Mha by salinity/alkalinity, 14 Mha by water-logging and 9 Mha by wind erosion. The government has set a target to restore 26 Mha by 2030 under its international commitments. Figure 1 (below) illustrates global land degradation patterns, with India heavily affected by water erosion (blue shading).



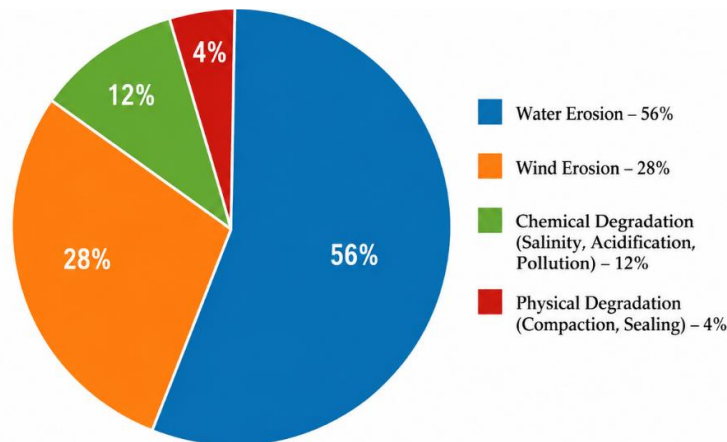


Figure 1: Global land degradation by process type (2016). Water erosion (blue) dominates in regions including India.

Need for Legal Intervention. Soil, unlike air and water, has received relatively little direct legal attention in India. Yet degradation threatens food security and livelihoods, especially among marginal farmers. Soil is linked to human rights (right to food, healthy environment) and international commitments (UNCCD's Land Degradation Neutrality by 2030). India's Constitution explicitly directs the State and citizens to protect the environment (Articles 48A, 51A(g)) and courts have read an environmental component into the right to life (Article 21). However, enforcement gaps and policy fragmentation hamper progress. This research argues that a comprehensive legal framework is urgently needed to arrest soil degradation and guide sustainable land management.

Research Objectives and Scope. This study examines: (a) the constitutional and statutory provisions relevant to soil protection in India; (b) judicial interpretations that shape soil-related environmental rights and duties; (c) the extent of policy and regulatory gaps; and (d) recommendations to strengthen the legal regime. We cover central laws, policies (e.g. Soil Health Card, NAP for Desertification), and significant case law. The scope is national (India) but includes relevant international obligations (UNCCD, SDGs) as context.

II. LITERATURE REVIEW

Major studies on India's soil degradation have been largely empirical or agronomic. Kumar and Sharma (2020) surveyed salt-affected lands and food security, finding ~147 Mha degraded and 26 Mha targeted for restoration. Bhattacharyya *et al.* (2015) similarly estimated 147 Mha under degradation, emphasizing water erosion as the largest component¹. These studies underscore the scale of the problem. Peake and Robb (2021) provide a global policy analysis, highlighting that lack of dedicated farmland protection laws leaves prime agricultural land "between the stalls" of environmental and agricultural law².

Desai (2023) offers a legal perspective³, discussing India's obligations under international treaties (UNCCD, CBD, Paris Agreement) and noting a "worrying widespread absence of legislation" specifically safeguarding soils. He contrasts Indian sectoral laws with examples like Mongolia's Soil Law (2016). Nandi *et al.* (2025) review the concept

¹ Bhattacharyya, R., Pal, D.K., Misra, S. & Bose, S., "Soil Degradation in India: Challenges and Potential Solutions", 7(4) Sustainability 3528–3570 (2015).

² Peake, L. & Robb, C., "Saving the Ground Beneath Our Feet: Establishing Priorities and Criteria for Governing Soil Use and Protection", 8(11) Royal Society Open Science 201994 (2021).

³ Desai, B.H., "Soil Governance and Sustainable Development in India: Legal and Policy Challenges", 53(2) Environmental Policy and Law 95–108 (2023).



of Land Degradation⁴ Neutrality (LDN) under SDG 15.3 and identify gaps in policy coherence. Gorain *et al.* (2024) empirically link degraded land to lower crop productivity and income losses in India.

While these works quantify degradation and discuss broad frameworks, they reveal a *gap* in doctrinal legal analysis of India's soil governance. Few scholarly articles dissect the country's constitutions, statutes and case law on soil/land issues⁵. This paper fills that gap by synthesizing legal sources and highlighting institutional shortcomings.

III. RESEARCH METHODOLOGY

This is a doctrinal legal research, using analytical and descriptive methods. We examine primary legal sources (Constitution, statutes, regulations), relevant case law and international conventions. Secondary sources include government reports, policy documents, and recent academic articles (2020–2025) on land and environment. The approach involves critical interpretation of legal texts and decisions, comparing India's framework against principles of environmental governance. Where applicable, data (e.g., from the ISRO land degradation atlas) contextualize the legal analysis.

Conceptual Framework of Soil Degradation

Definition. Following FAO and UNDRR definitions, *soil degradation* is any change in soil health status that reduces its capacity to provide ecosystem goods and services. This encompasses a decline in physical (structure, stability), chemical (nutrients, salinity) and biological (microbial life) attributes. The UNDRR/FAO glossary notes that degradation can lead to “*total loss of the soil body*” and diminished fertility, with processes including erosion (water and wind), salinization, pollutants and compaction⁶.

Causes. In India, key causes are: (1) **Unsustainable agriculture**: intensive tillage, imbalanced fertilizer use, and removal of crop residues reduce organic matter. (2) **Deforestation and overgrazing**: removing vegetation cover exposes soils to erosion. (3) **Mining and infrastructure**: open-cast mines and unregulated stone quarries (e.g. the Himalayas' limestone quarries in RLEK v. U.P.) physically disturb land. (4) **Salinization and waterlogging**: poor irrigation practices create saline and waterlogged soils (over 6.7 Mha already salt-affected). (5) **Pollution**: chemical spills, heavy metals, and agrochemical runoff degrade soil quality. (6) **Urbanization**: land conversion to built-up areas seals soil. Climate change intensifies degradation via erratic rains (worsening erosion) and droughts (enhancing aridity).

Types and Impacts. Major forms include water erosion (sheet, rill, gully), wind erosion, salinization/alkalization, acidification, erosion of organic carbon, and contamination. Degradation causes reduced agricultural yields, food insecurity, increased vulnerability to floods/droughts, and loss of biodiversity. For example, Gorain *et al.* (2024) estimated that a mere 10% increase in degraded land in India could cut average farm income by ₹3,845 per hectare. Degraded soils sequester less carbon, contributing to climate change feedbacks⁷. Economically, ongoing degradation is costly: one estimate puts losses to South Asia at US\$10 billion per year⁸.

⁴ Nandi, S., Das, S., Gorain, S., Dutta, S., Choudhury, M.R. & Das, S., “Land Degradation Neutrality: A Pathway to Achieving Sustainable Development Goals and Ecosystem Resilience”, 2 Discover Soil, Article 48 (2025).

⁵ Peake, L. & Robb, J., “Farmland Protection and Soil Governance: The Missing Link in Environmental Law”, 33(3) Journal of Environmental Law 451–474 (2021).

⁶ Pandey, S., “India Top Court Upholds Constitutional Right to Pollution-Free Environment”, JURIST (Oct. 25, 2024), available at: <https://www.jurist.org/news/2024/10/india-top-court-upholds-constitutional-right-to-pollution-free-environment/> (last visited June 21, 2026).

⁷ Nandi, R., Sharma, A. & Gupta, S., “Land Degradation Neutrality (LDN) and SDG 15.3 in India: Progress, Challenges and Policy Gaps”, 167 Environmental Science and Policy 103–115 (2025).

⁸ Bhattacharyya, R., Pal, D.K., Misra, S. & Bose, S., “Soil Degradation in India: Challenges and Potential Solutions”, 7(4) Sustainability 3528–3570 (2015).



Constitutional Framework for Soil Protection in India

Article 21 (Right to Life). The Supreme Court has read Article 21's right to life as inclusive of a right to a clean and healthy environment. In 2024, in the context of severe air pollution, the Court held that "*every citizen has a fundamental right under Article 21... to live in a pollution-free environment*". Although this case concerned air quality, the principle extends to soil: courts have recognized that degradation of land can threaten life and livelihood, especially for rural communities. Article 21 is thus a basis for environmental litigation even if soil is not mentioned explicitly⁹.

Article 48A. Added by the 42nd Amendment (1976), Article 48A directs the State to "protect and improve the environment and to safeguard the forests and wildlife of the country". This Directive Principle obliges governments to frame policies preserving natural resources. It underpins legislative and executive measures on forestry, pollution control and conservation. Though non-justiciable by itself, Article 48A has been invoked in judgments (e.g. *T. N. Godavarman Thirumulpad v. Union of India* (1996)) to reinforce environmental obligations. In the soil context, Article 48A supports laws like the Forest (Conservation) Act and policies restricting waste dumping on land.

Article 51A(g). This Fundamental Duty makes it the duty of *every citizen* "to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures". While also non-justiciable, it reflects constitutional intent that citizens (and indirectly governments) guard the environment. It has been cited in environmental cases to emphasize collective responsibility. For soil, Article 51A(g) reinforces the idea that preserving land health is a civic duty¹⁰.

Principles of Sustainable Development, Precautionary Principle, Polluter Pays. The Courts have integrated these international environmental law principles into Article 21 jurisprudence. In *Vellore Citizens* (1996), the Supreme Court declared that "*the precautionary principle*" and "*polluter pays principle*" are part of Indian law when dealing with environmental decisions. The precautionary approach mandates that lack of full scientific certainty should not postpone prevention of degradation. The polluter pays principle obliges those causing harm (e.g. illegal mining or industrial spills) to bear remediation costs¹¹. These principles, though not explicit in the Constitution, derive support from Article 48A and Article 21's protective ambit. Additionally, the concept of *sustainable development* (balancing growth and conservation) has been deemed intrinsic to environmental rights under Article 21. The Constitution's preamble also enjoins the State to aim for the people's welfare, implying preservation of resources for future generations.

Statutory Framework Governing Soil Degradation

India has no soil-specific law; instead, soil protection is scattered across environmental and land-use legislation:

- **Environment (Protection) Act 1986 (EPA).** This is an umbrella law giving the central government power to issue standards and rules for environmental protection. It has been used to regulate hazardous substances, industrial effluents and waste disposal (e.g. Solid Waste Rules, Chemical Accidents Rules). While not soil-specific, the EPA enables authorities to ban dumping of toxic waste on land or set procedures for contaminated site remediation. The Act's Section 3 can be invoked to protect soil health via generic environmental notifications.
- **Water (Prevention and Control of Pollution) Act 1974.** Aims to prevent discharge of pollutants into water bodies. Its relevance to soil lies in controlling pollutants that might enter soil via water (e.g. irrigation of crops with contaminated water) or in prohibiting illegal dumping of effluents on land that could leach into

⁹ Gorain, S., Kuriachen, P., Kumar, C.V. & Suresh, A., "Land Degradation and Its Impact on Agricultural Productivity: The Case of India", 35(1) Land Degradation & Development 196–212 (2024).

¹⁰ Government of India, India's National Action Plan to Combat Desertification and Land Degradation (NAPCD) (Ministry of Environment, Forest & Climate Change, New Delhi, 2023).

¹¹ Gorain, S., Kuriachen, P., Kumar, C.V. & Suresh, A., "Land Degradation and Its Impact on Agricultural Productivity: The Case of India", 35(1) Land Degradation & Development 196–212 (2024).



groundwater. The Act empowers State Pollution Control Boards to enforce waste treatment, which indirectly safeguards soil quality.

- **Air (Prevention and Control of Pollution) Act 1981.** Focuses on air pollution. However, it may indirectly affect soil: for example, regulations limiting particulate emissions can reduce acid rain and airborne contaminants settling onto soils.
- **Forest (Conservation) Act 1980.** Prohibits non-forest use of forest land without central approval. By restricting deforestation, it helps prevent soil erosion and degradation of hilly and forested regions. The Act has been pivotal in cases like *RLEK v. U.P.*^[1^], where rampant quarrying in a forested valley was halted.
- **Biological Diversity Act 2002.** Seeks conservation of biological diversity, sustainable use of its components, and equitable sharing of genetic resources. It empowers the government to regulate access to biodiversity in all ecosystems, including soil biota. It allows framing of guidelines to prevent erosion of microbial diversity in soil and regulate bio-prospecting. While not directly about soil, it recognizes soil organisms as part of India's biodiversity heritage.
- **National Green Tribunal Act 2010.** Establishes the NGT with jurisdiction over all civil cases under environmental laws (including EPA, Water, Air Acts). Although it is not a substantive law, the NGT Act has been a game-changer for environmental governance. The NGT has tackled numerous cases impacting soil (e.g. illegal mining disfiguring land, toxic waste dumping on farmland). By providing speedy, expert adjudication, the NGT enforces statutory norms that indirectly protect soils.
- **Soil Health Card Scheme (2015, Government initiative).** Not a law, but a flagship program of the Agriculture Ministry. It provides farmers with periodic soil testing and fertilizer recommendations. The scheme's aim is sustainable land management: by informing balanced fertilizer use, it helps prevent overuse of chemicals and soil acidification. While administered by the Ministry of Agriculture, its success depends on integration with legal incentives and accountability for soil conservation.
- **National Action Programme to Combat Desertification (NAPCD, 2002, updated 2018).** A policy document under India's UNCCD obligations. It sets long-term objectives: drought-proofing, land use planning, and socio-economic strategies in drylands. NAPCD led to projects on afforestation, watershed management, and drought preparedness. Although a plan (not law), it reflects the Government's recognition of soil-land issues. The recent National Action Plan (NAP 2023) reaffirms India's commitment to restoring 26 Mha of degraded land and achieving Land Degradation Neutrality by 2030. These plans help coordinate ministries (agriculture, water, environment, etc.) but lack binding force without legal backing.

In summary, India's statutory tools for soil protection are *fragmented*: spread over environmental pollution controls, land and forest laws, and policy schemes. There is no single statute dedicated to soil conservation¹². Table 1 below summarizes the principal instruments:

Table 1: Legal instruments related to soil protection in India.

Instrument	Enactment/Type	Primary Focus	Soil Relevance
Constitution of India: Article-21 (Right to Life)		Fundamental Rights	Implied right to healthy environment (pollution-free, secure livelihoods)
Constitution of India: Article 48A (DPSP)	1976 (42nd Amend)	Directive Principles; environmental duty of State	Directs State to "protect and improve environment" (basis for laws)
Constitution of India: Article 51A(g)	1976 (42nd Amend)	Fundamental Duty of citizens	Duty to "protect and improve natural environment"

¹² National Academy of Agricultural Sciences, Restoration and Improvement of Soil Health, Policy Paper No. 137 (NAAS, New Delhi, 2018).



Instrument	Enactment/Type	Primary Focus	Soil Relevance
Environment (Protection) Act	1986 (Central law)	General environmental protection	Enables standards/regulations for soil pollution (e.g. hazardous waste rules).
Water (P&CP) Act	1974 (Central law)	Prevent/control water pollution	Controls discharges that would contaminate land and groundwater.
Air (P&CP) Act	1981 (Central law)	Prevent/control air pollution	Limits emissions, reducing pollutants that could deposit on soil.
Forest (Conservation) Act	1980 (Central law)	Restrict deforestation	Protects forest soil by regulating conversion; used in <i>RLEK v. UP</i> ^[1] .
Biological Diversity Act	2002 (Central law)	Protect biodiversity, regulate bioprospecting	Includes regulation of soil bio-resources; requires conservation of microbial life.
National Green Tribunal Act	2010 (Central law)	Establish NGT for environmental cases	Provides forum to address soil-related violations (e.g. illegal mining, waste dumping).
Soil Health Card Scheme	2015 (Policy)	Agricultural extension scheme	Promotes balanced fertilizer use and soil testing (sustainable land management).
National Action Programme to Combat Desertification (NAPCD, updated NAP 2023)	2002 (Policy)	Drought and desertification plan	Sets goals (land restoration, drought management) under UNCCD obligations; no binding force but guides programmes.

Judicial Approach

The Indian judiciary has played a proactive role in environmental protection, often adopting broad interpretations to cover new issues. Relevant precedents include:

- **Rural Litigation & Entitlement Kendra v. State of U.P. (1985):** This famous *Himalaya Limestone Quarries* case (5 SCC 519) involved unregulated mining in the fragile Doon Valley. The Supreme Court held that Article 48A and Article 51A(g) empower the State to impose restrictions on environmentally hazardous industries, even in the absence of specific law. The Court ordered cessation of illegal quarries and the implementation of afforestation¹³. RLEK first applied the *precautionary principle* (later confirmed in Vellore) and underscored that “the State should ensure” environment protection as a policy. This case set a precedent for using constitutional duties to protect land and forests¹⁴.
- **Vellore Citizens Welfare Forum v. Union of India (1996):** The Supreme Court held pollution from tanneries in Tamil Nadu violated Articles 21, 48A and 51A(g). Crucially, the Court declared both the *precautionary* and *polluter pays* principles as part of Indian environmental law. It stated that the “onus of proof” that an activity will not harm environment is on the project proponent¹⁵. For soil, Vellore implies that industries dumping toxic sludge on land must prove harmlessness, and if damage occurs, must pay for remediation. The case also articulated *sustainable development* as law in India: damage to environment must be weighed against developmental benefits.
- **M.C. Mehta Cases (1980s–90s):** A series of public interest litigations by M.C. Mehta in the 1980s extended Article 21 to various pollutants. In *M.C. Mehta v. Union of India* (tanneries case, 1988) and others, the Court

¹³ International Union for Conservation of Nature (IUCN), Soil Atlas 2024 (2024), available at: <https://eu.boell.org/soilatlas2024> (last visited June 21, 2026).

¹⁴ United Nations Convention to Combat Desertification (UNCCD), The Global Land Outlook (UNCCD Secretariat, Bonn, 2017).

¹⁵ The Environment (Protection) Act, 1986, No. 29 of 1986, India.



ordered relocation or closure of polluting industries in absence of compliance with environmental safeguards. In Ganga-cleaning cases, the Court insisted on safe waste disposal (thus protecting riverine soils) and fined polluters. These cases reinforced that failure to control pollution implicates fundamental rights.

- **NGT and High Court Decisions:** Post-2010, the National Green Tribunal has banned or regulated activities causing land degradation (e.g. sand and mineral mining in riverbeds). For example, the NGT has issued injunctions against illegal sand mining on the Mandovi River (Goa), recognizing that riverbed mining causes land and ecological damage. In the *Goa Foundation v. MoEF* cases, the Supreme Court and NGT in 2013–15 struck down iron ore mining leases for failing environmental norms, highlighting land impact. NGT rulings also penalize dumping marble slurry or industrial waste on farmland (deficient EIA compliance), relying on “Polluter Pays” and public trust arguments.

These judicial decisions collectively show that Indian courts have recognized environmental (and implicitly soil) protection as integral to citizens’ rights. However, courts often rely on generic environmental duties rather than soil-specific law due to the legislative gap.

Critical Analysis

This section evaluates the strengths and weaknesses of India’s soil governance:

- **Absence of Dedicated Soil Legislation.** Unlike some countries (e.g., Mongolia’s Soil Law 2016), India lacks a specific Soil Conservation Act. Soil issues are treated as subset of broader environmental or land laws. This leaves a regulatory gap: many interventions (like crop residue burning, urban sealing of fertile lands) are not directly governed by any soil-specific legal standard¹⁶. The absence of a unified soil law means no clear authority or uniform standards for soil quality and restoration.
- **Fragmented Legal Framework.** Responsibility is spread across multiple ministries and laws (Environment, Agriculture, Mines, Forest, etc.). For example, EPA focuses on toxic waste, Water Act on effluents, and Forest Act on tree cover. Such fragmentation leads to siloed action¹⁷. Agencies like the Central Pollution Control Board (CPCB) oversee water/air; the Forest Department oversees lands classified as forests; the Agriculture Ministry handles soil health. Overlaps and gaps arise: e.g., no single body monitors nationwide soil erosion or mandates land-use planning to prevent degradation.
- **Weak Enforcement Mechanisms.** Even where laws exist, enforcement is often weak. Pollution control boards are understaffed; clearances for projects may ignore cumulative land impact; illegal mining or deforestation persist despite Court orders. The NGT, though empowered, handles only judicial remedies, not proactive monitoring. Penalties under laws like the EPA are nominal, failing to deter violations. In practice, farmers and industries may flout soil conservation guidelines due to lack of incentives or weak regulatory pressure¹⁸.
- **Institutional Overlap.** Agencies’ mandates can overlap (e.g. both the Ministry of Environment and the Ministry of Agriculture have soil-related programs) but coordination is limited. For example, wetlands and floodplains may be caught between Water and Forest Departments. The multiplicity of schemes (e.g. MNREGA’s watershed projects, State agriculture schemes) can duplicate efforts or leave beneficiaries confused about compliance.

¹⁶ Patwardhan, A. & Ramesh, P., “Climate Change and Its Impacts on Soils in India: Critical Review of Science and Policy”, 115(9) Current Science 1744–1751 (2018).

¹⁷ Food and Agriculture Organization (FAO), Key Definitions – FAO Soils Portal (2020), available at: <http://www.fao.org/soils-portal/soil-survey/soil-maps-and-databases/soil-management/soil-definitions/en/> (last visited June 21, 2026).

¹⁸ Gorain, B., Kumar, R. & Singh, P., “Land Degradation, Agricultural Productivity and Rural Livelihoods in India”, 139 Land Use Policy 107105 (2024).



- **Regulatory Deficiencies.** Many activities degrade soil without specific regulation: groundwater over-extraction (leading to salinity), open dumping of waste, bunding of rivers. Environmental Impact Assessments (EIA) for new projects often inadequately study long-term land impact. Moreover, the “development vs. environment” bias still influences approvals; soil impacts are sometimes discounted¹⁹.
- **Climate Change Interplay.** Changing climate regimes aggravate soil threats (intense rains cause erosion, and rising temperatures increase evaporation/salinization). Yet current laws do not explicitly link soil health with climate resilience. There is no mandatory adaptation planning for soils under climate stress.

In summary, while India has strong environmental constitutional ideals and some sectoral laws, the **regulatory architecture is fragmented and reactive**. It lacks a cohesive vision for soils. Implementation failures further undermine even the existing norms.

Research Gap and Contribution of Present Study

Previous studies have thoroughly documented the technical aspects and extent of soil degradation in India (e.g. remote sensing analyses by ISRO, salinity surveys). International literature calls for *soil-specific governance*. However, little research has rigorously mapped India’s legal landscape on soil.²⁰ This paper fills that gap by systematically analyzing constitutional provisions, key statutes, case law and policies related to soil and land. It identifies that no single Indian law mandates soil protection; current rules address it only indirectly. By highlighting this legal lacuna and synthesizing judicial pronouncements, our study adds a clear legal lens to soil conservation discourse. In doing so, it paves the way for targeted reforms.

IV. RECOMMENDATIONS

To strengthen India’s soil governance, we propose the following reforms:

- **Enact a Dedicated Soil Protection Act.** A specialised *Soil Conservation and Protection Act* should clearly define soil degradation and prescribe standards and penalties. It could mandate periodic soil health surveys, restrict activities in high-erosion zones, and set restoration targets. A central Soil Authority (or expanding NGPAs) could oversee implementation. This would mirror successful models (e.g., EU’s proposed soil directive, and specific forestry laws).
- **Establish an Integrated Soil Governance Authority.** Institutional reform is needed. A high-level body (perhaps under the NGT or the Environment Ministry) for soil/land (maybe a “National Soil Commission”) could coordinate across departments (Environment, Agriculture, Water, Mines). This authority would integrate data (from agencies like ISRO/NASA), set unified guidelines, and ensure enforcement on land-use planning, mining, waste disposal, etc.
- **Stronger Monitoring and Enforcement.** Use technology (satellite monitoring, GIS) to track land-use change and erosion. Implement systematic soil-quality monitoring (e.g. automated sensors for salinity). Enhance the NGT’s investigative wing or empower state bodies to act as “environmental police” on soil issues. Impose stiffer penalties on illegal mining or dumping – including restoration obligations. Enable public interest organizations to file PILs under Article 32 to address soil harms.
- **Digital Soil Mapping.** Create a national digital soil map (expanding on ISRO’s work) that is updated regularly. This map should be publicly accessible and inform land-use decisions. Coupled with Soil Health Card data, it would help target conservation efforts where soils are most vulnerable.

¹⁹ Lal, R., Breaking New Ground: The Science of Soil and a New Green Revolution (International Scientific Congress on Climate-Smart Agriculture, 2020).

²⁰ Romshoo, S.A., Yadava, P. & Ganeshraj, K., Desertification and Land Degradation Atlas of India: Assessment and Analysis of Changes Over 15 Years Based on Remote Sensing (Space Applications Centre, ISRO, 2021).



- **Community and Farmer Participation.** Local communities and farmers must be empowered. Encourage community-led watershed projects and agroforestry. Legal recognition of traditional practices (like community forestry or grazing management) can help. Provide incentives (subsidies, payments for ecosystem services) for conservation practices such as cover cropping, crop rotation, and organic amendments. Education campaigns can raise awareness of soil as a shared resource (echoing Article 51A(g)).
- **Sustainable Agricultural Practices.** Modify agricultural policy to discourage practices that degrade soils. For example, link subsidies (water, electricity, fertilizers) to soil-friendly practices. Promote organic farming, reduced-till methods and integrated pest management through legal standards. Strengthen extension services so that Soil Health Cards translate into real changes in fertilizer use.
- **Incorporate Climate Concerns.** Amend laws and policies to explicitly address climate change impacts on soils. For instance, water laws should enforce water-table recharge to prevent salinization. Afforestation programmes (like the National Mission for a Green India) should prioritize soil stabilization. Recognize soil carbon conservation in climate law (as a mitigation and adaptation measure).

Implementing these reforms would build on the legal principles already embedded in the Constitution (Precaution and Polluter-Pays) and align with India's international commitments (UNCCD, SDG 15.3). They would create a coherent regime treating soil as a vital natural capital rather than a residual byproduct of land use.

V. CONCLUSION

Soil degradation in India is a severe environmental and socio-economic issue, yet the legal framework addressing it is piecemeal. The Constitution and courts provide broad environmental protections and duties, but there is no dedicated soil law. Sectoral statutes only indirectly safeguard soils, and enforcement is weak. This paper has shown that India needs a more integrated and proactive approach: a legal structure that recognizes soils' strategic importance to food security, climate resilience and equity. Enacting a Soil Protection Act, centralizing oversight, and leveraging both technological tools and community action are key steps. Ultimately, translating constitutional ideals (Articles 21, 48A, 51A(g)) into effective soil policies will be critical. Without such reforms, India risks continued erosion of its land base and the livelihoods it supports.

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