



Human-Animal Conflict In The Anthropocene: Legal, Human Rights, And Governance Responses For Sustainable Coexistence

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Abstract

Human-animal conflict has emerged as one of the defining governance dilemmas of the Anthropocene, an epoch marked by profound human alteration of ecological systems. As expanding cities, linear infrastructure, extractive economies, and intensive land-use practices encroach upon natural habitats, the boundaries between human and non-human worlds increasingly blur. The consequences are often violent and unequal. It manifests in loss of human life, erosion of livelihoods, ecological fragmentation, and creates deep ethical questions about coexistence in a shared landscape.

This paper approaches human-animal conflict not merely as a problem of wildlife conservation or management, but as a complex legal and human rights issue embedded in development choices and institutional failures. It critically examines the legal and policy frameworks governing conflict mitigation, with reference to environmental law, forest governance, wildlife protection regimes, and disaster management responses. Particular attention is paid to the lived experiences of indigenous peoples, forest-dependent communities, and other marginalised groups who bear a disproportionate share of conflict-related harms. These often persists without adequate legal recognition, protection, or remedy.

At the same time, the paper explores the evolving normative space within environmental governance that increasingly acknowledges animal welfare, ecological integrity, and interspecies ethics. It interrogates the scope of criminal and civil liability arising from human-animal conflict, assessing state responsibility, administrative accountability, and the limitations of individualised, fault-based legal approaches in addressing structurally produced ecological harm. Compensation and rehabilitation mechanisms are analysed through the lens of environmental justice, revealing persistent gaps in accessibility, adequacy, and effective implementation.

The paper further evaluates the role of technology, such as, early warning systems, geospatial mapping, and data-driven monitoring, as both a tool of innovation and a site of new governance challenges, including concerns relating to surveillance, exclusion, and distributive equity. Situating domestic responses within the broader architecture of international environmental law, biodiversity conservation treaties, and cross-border wildlife governance, the paper ultimately argues for a paradigm shift. It calls for a move away from reactive, compensation-centric models towards rights-based, community-centred, and preventive governance frameworks capable of fostering sustainable and ethically grounded coexistence between humans and the more-than-human world.

Keywords: Human-Animal conflict, Anthropocene Governance, Human Rights, ESG, Surveillance Technology.

I. Introduction: Conflict in an Age of Ecological Disruption:

The Anthropocene is not merely a geological term; it is a mirror held up to humanity's developmental choices. In India, the Anthropocene is visible in widening highways cutting through elephant corridors, railway tracks crossing tiger habitats, solar parks rising over once-grazed commons, and expanding cities pressing against forest edges. As landscapes transform at unprecedented speed, the boundaries between human settlements and wildlife territories blur. What emerges is not simply "conflict," but a deeply structured crisis which is legal, ethical, and political in character.

Human-animal conflict (HAC) in India has grown more severe in the last thirty years. Data from the Ministry of Environment, Forest and Climate Change (MoEFCC) indicates that more than 500 individuals die each year due to incidents involving elephants, while wild herbivores damage thousands of hectares of crops annually. From 2019 to 2022, elephant attacks led to over 1,500 human fatalities across India. In the same timeframe, numerous elephants lost their lives due to train accidents, electrocution, poaching, and acts of revenge. Additionally, the tiger population has increased to over 3,000 individuals as reported in the 2022 All India Tiger Estimation, which has been linked to a rise in edge-based conflicts in states like Maharashtra, Uttar Pradesh, and Uttarakhand.

Yet, to describe this phenomenon as mere wildlife aggression is to misunderstand its roots. Conflict arises from structural ecological transformation i.e. deforestation, fragmentation, infrastructure expansion, mining, linear intrusions, monoculture plantations, and climate variability. India lost approximately 1.6 million hectares of tree cover between 2001 and 2023, according to Global Forest Watch data. Simultaneously, road density and railway expansion have dramatically increased in forested regions. These are not random occurrences; they are development decisions with spatial consequences.

The legal discourse surrounding human-animal conflict has traditionally oscillated between wildlife protection and compensation mechanisms. However, this framing is incomplete. Human-animal conflict implicates constitutional guarantees under Article 21 of the Indian Constitution – the right to life and dignity, as well as, environmental protections under Articles 48A and 51A(g). It also raises questions of environmental justice: Why are forest-dependent communities, Adivasi populations, and marginal farmers disproportionately exposed to wildlife incursions? Why does compensation often arrive late, or not at all? And how does the law reconcile the protection of endangered species with the survival anxieties of rural households?

This paper argues that human-animal conflict in India must be reconceptualised as a multidimensional governance challenge embedded in environmental law, human rights jurisprudence, and administrative accountability. It calls for a shift from reactive compensation-centric frameworks toward preventive, community-based, and rights-sensitive governance models grounded in ecological coexistence.

II. Mapping the Conflict: Patterns, Causes, and Empirical Realities:

A. Species and Spatial Patterns:

India is home to nearly 8% of the world's recorded biodiversity, and its ecological diversity ranges from the Himalayan forests to the Western Ghats and central Indian landscapes that creates complex human-wildlife interfaces. Conflict is particularly associated with elephants, tigers, leopards, wild boars, and nilgai.

Elephants, classified as endangered by the IUCN, are responsible for the highest number of human fatalities linked to wildlife in India. Official figures indicate that between 2014 and 2019, approximately 2,361 people lost their lives due to elephant encounters. At the same time, over 500 elephants died annually due to anthropogenic causes, including electrocution and train collisions. Railway corridors in Assam, West Bengal, and Odisha have been repeatedly identified as hotspots of elephant mortality.

Leopards, highly adaptable and increasingly urban-proximate, have become emblematic of peri-urban conflict. Maharashtra alone reported dozens of leopard attacks between 2015 and 2022. Unlike tigers, which typically inhabit core forest areas, leopards frequently navigate sugarcane fields and suburban fringes, complicating containment strategies.

Wild herbivores such as wild boar and nilgai contribute substantially to crop depredation. In several northern states, farmers have demanded that nilgai be declared vermin under section 62 of the Wildlife Protection Act, 1972. Such demands reveal tensions between biodiversity conservation and agrarian livelihoods.

B. Habitat Fragmentation and Linear Infrastructure:

India's infrastructure expansion has accelerated dramatically. The National Highways network expanded from approximately 65,000 kilometres in 2004 to over 145,000 kilometres by 2023. Railway electrification and new track development have similarly intensified. Linear infrastructure like roads, canals, power lines, etc. fractures habitats, restricts migratory routes, and increases animal mortality.

The Supreme Court of India has repeatedly addressed this issue. In *Centre for Environmental Law, WWF-India v. Union of India*, the Court emphasised the need to preserve ecological corridors and mitigate anthropogenic barriers. Similarly, in *T.N. Godavarman Thirumulpad v. Union of India*, the Court expanded the interpretation of "forest" to strengthen conservation oversight.

Despite judicial interventions, environmental impact assessments (EIAs) often inadequately address wildlife corridors, and mitigation measures such as underpasses or overpasses remain inconsistently implemented.

C. Climate Change and Resource Stress:

Climate variability compounds conflict. Erratic rainfall patterns and prolonged droughts alter forage availability and water sources within forests, pushing animals toward agricultural landscapes. In parts

of Jharkhand and Odisha, reduced forest productivity has been linked to increased elephant movement into croplands.

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) warns that land-use change and climate stressors are accelerating species displacement globally. India's vulnerability to climate-induced ecological shifts thus intersects with wildlife movement patterns.

D. Socioeconomic Dimensions:

Conflict is rarely evenly distributed. Adivasi and forest-dependent communities residing near protected areas experience recurrent crop loss, livestock predation, and threats to personal safety. Compensation mechanisms exist under centrally sponsored schemes, yet delays are common, and bureaucratic hurdles discourage claims. For marginal farmers, even a single incident of crop destruction can trigger indebtedness.

Studies indicate that women bear disproportionate burdens, particularly in fuelwood collection and agricultural labour contexts where wildlife encounters occur. The social cost of conflict extends beyond quantifiable fatalities; it shapes mobility, schooling, mental health, and community cohesion.

E. Retaliatory Violence and Ethical Dilemmas:

Human retaliation in form of poisoning, electrocution, trapping, remains a significant cause of wildlife mortality. These acts are criminalised under the Wildlife Protection Act, 1972, yet enforcement must be understood within the context of desperation and perceived state neglect. Ethical tensions emerge: can conservation policy demand restraint from communities that feel unprotected and unheard?

The Anthropocene complicates moral boundaries. Wildlife is protected as national heritage, yet rural citizens often experience conservation as restriction. The law stands at this intersection that tasked with safeguarding endangered species while ensuring constitutional protections for human life and livelihood.

III. Legal and Policy Framework Governing Human–Animal Conflict in India:

Human–animal conflict in India is regulated not through a single comprehensive statute, but through a fragmented web of wildlife, forest, environmental, and administrative laws. This fragmented architecture reflects a deeper conceptual tension: the law has historically prioritised species protection and conservation, while mechanisms for protecting human communities affected by wildlife remain largely compensatory and reactive.

A. Wildlife (Protection) Act, 1972:

The primary statute governing wildlife conservation in India is the Wildlife (Protection) Act, 1972 (WPA). The Act provides for protection of specified species, establishment of protected areas, regulation of hunting, and penalties for offences. Elephants and tigers are listed under Schedule I, granting them the highest level of protection.

However, the WPA was not originally designed to address recurring interface conflicts. Section 11 allows for the killing or capture of wild animals in certain circumstances, including when an animal

becomes dangerous to human life. Section 62 permits the Central Government to declare certain species “vermin” for specified areas and time periods. These provisions have occasionally been invoked in response to crop depredation or attacks, revealing the tension between conservation goals and agrarian distress.

The Supreme Court has consistently emphasised ecological protection while balancing human interests. In *Centre for Environmental Law, WWF-India v. Union of India*, the Court underscored the State’s duty to protect endangered species as part of constitutional environmental obligations. Yet, judicial reasoning has increasingly acknowledged that conservation cannot disregard community survival.

B. Forest Rights Act, 2006:

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (FRA) marked a significant shift by recognising historical injustices faced by forest-dwelling communities. The FRA grants individual and community forest rights, including rights over minor forest produce and habitat use.

Human–animal conflict intersects with FRA implementation in complex ways. In some landscapes, relocation of villages from critical tiger habitats has been justified as a conservation measure. Yet displacement without adequate safeguards raises constitutional concerns under Article 21 and principles of informed consent. Conversely, failure to secure community tenure often results in marginalised groups bearing the brunt of wildlife incursions without legal empowerment.

The coexistence framework envisioned by the FRA suggests that conservation must be community-centred rather than exclusionary. However, implementation gaps persist across states.

C. Environmental Impact Assessment and Linear Infrastructure:

The Environment (Protection) Act, 1986, read with the EIA Notification of 2006, governs environmental clearance for major infrastructure projects. While EIAs are required to assess ecological impacts, studies frequently inadequately evaluate wildlife corridors or migratory patterns.

Linear infrastructure like highways, railways, transmission lines, remains a significant cause of wildlife mortality. The Wildlife Institute of India has developed mitigation guidelines recommending underpasses, canopy bridges, and fencing strategies. Nonetheless, compliance varies, and monitoring mechanisms are often weak.

In *Hanuman Laxman Aroskar v. Union of India*, the Supreme Court reaffirmed the precautionary principle and the need for meaningful environmental appraisal. The Court stressed that development cannot proceed on incomplete ecological assessment, reinforcing jurisprudence that ecological harm must be anticipated rather than remedied after damage.

D. Compensation and Administrative Schemes:

India operates compensation schemes under the Centrally Sponsored Scheme for Integrated Development of Wildlife Habitats. States disburse ex gratia payments for human death, injury, crop loss, and livestock predation. As of 2023, compensation for human death due to wildlife in many states ranges between ₹4–10 lakh.

Yet empirical studies show persistent delays, complex documentation requirements, and inconsistent valuation standards. Compensation, while necessary, does not address structural drivers such as habitat fragmentation or policy-induced displacement.

The law thus remains reactive. It treats conflict as episodic misfortune rather than as predictable governance failure.

IV. Human Rights, Environmental Justice, and the Politics of Vulnerability:

Human–animal conflict in India cannot be understood without acknowledging who experiences it most intensely. The burden falls disproportionately on Adivasi communities, smallholder farmers, pastoralists, and landless labourers living in forest-fringe villages.

A. Right to Life and Dignity:

Article 21 of the Indian Constitution guarantees the right to life and personal liberty. The Supreme Court has expansively interpreted this to include the right to livelihood, health, and environmental protection. In *Olga Tellis v. Bombay Municipal Corporation*, the Court recognised livelihood as integral to life. When crops are repeatedly destroyed or livestock lost, livelihood insecurity becomes existential.

At the same time, the Court has recognised environmental protection as intrinsic to constitutional values. In *Subhash Kumar v. State of Bihar*, it held that the right to life includes the right to a wholesome environment. Thus, human–animal conflict implicates a dual constitutional commitment: protection of human dignity and preservation of ecological systems.

B. Environmental Justice and Unequal Exposure:

Environmental justice scholarship demonstrates that environmental harms are rarely evenly distributed. In India, villages bordering protected areas often lack robust infrastructure, healthcare access, or insurance mechanisms. Wildlife incursions therefore produce cascading vulnerabilities.

Data from the National Crime Records Bureau and parliamentary replies indicate that hundreds of individuals from economically weaker sections are killed annually in wildlife encounters. The victims are typically engaged in agriculture, forest produce collection, or grazing activities, the type of occupations structurally tied to ecological proximity.

Women face particular risks. Studies in central India indicate that fuelwood collection and water fetching expose women to higher probabilities of wildlife encounters. These risks remain largely invisible in policy design.

C. Animal Welfare and Ethical Recognition:

India's constitutional framework also includes a duty upon citizens to show compassion for living creatures under Article 51A(g). The Supreme Court in *Animal Welfare Board of India v. A. Nagaraja* recognised animals as sentient beings entitled to intrinsic value and protection from unnecessary suffering.

This jurisprudence expands the moral horizon of environmental law. Conflict management cannot legitimise cruelty or indiscriminate retaliation. At the same time, ethical recognition of animals must not negate the survival rights of marginalised humans.

The Anthropocene forces a difficult truth: coexistence cannot be achieved by privileging one form of life absolutely over another. Instead, governance must mediate shared vulnerability.

D. Retaliation, Criminalisation, and Structural Neglect:

When farmers resort to poisoning or illegal electrification, they commit offences under the WPA. Yet criminalisation alone does not address underlying distress. Enforcement without structural reform risks deepening mistrust between forest departments and communities.

Environmental justice requires not only compensation, but participatory decision-making, timely grievance redressal, and preventive planning. Conflict early-warning systems, community-based monitoring, and benefit-sharing from conservation tourism are emerging models in some states.

Ultimately, a rights-based approach demands that conservation policy incorporate social equity as a central design principle, not an afterthought.

V. Liability, Accountability, and the Limits of Fault-Based Governance:

Human–animal conflict exposes a persistent gap in Indian environmental governance: harm is recognised, compensation is promised, yet accountability remains diffuse. When a farmer is trampled by an elephant, or when a tiger is electrocuted by an illegal fence, responsibility is often individualised. Rarely does the law interrogate the structural conditions—habitat fragmentation, poorly designed infrastructure, delayed mitigation that create the setting for conflict.

A. State Responsibility and Public Trust:

Indian environmental jurisprudence has long invoked the public trust doctrine, holding that natural resources are preserved for public use and that the State acts as trustee. In *M.C. Mehta v. Kamal Nath*, the Supreme Court affirmed that the State cannot abdicate its duty to protect ecological resources.

Applied to human–animal conflict, the doctrine implies dual obligations: protection of wildlife as public trust assets, and safeguarding citizens whose lives are endangered by foreseeable ecological mismanagement. When railway lines repeatedly record elephant deaths in known corridors, or when mining clearances disrupt buffer zones, the issue transcends accident. It enters the realm of regulatory negligence.

Yet Indian courts have rarely framed human–animal conflict through a negligence or accountability lens against state authorities. Compensation schemes function as administrative relief rather than admission of systemic failure.

B. Absolute Liability and Its Limits:

The principle of absolute liability, articulated in *M.C. Mehta v. Union of India (Oleum Gas Leak)*, holds that enterprises engaged in hazardous activities are absolutely liable for harm. While originally framed in industrial pollution contexts, its logic raises provocative questions: could infrastructure developers be held strictly liable for wildlife mortality caused by foreseeable design failures?

Currently, wildlife deaths due to train collisions or transmission lines are treated as unfortunate by-products rather than legally actionable harms. The absence of structured liability mechanisms for ecological fragmentation reflects the limits of existing doctrinal tools.

Environmental governance in India often distinguishes between “pollution” and “biodiversity harm.” Yet from a rights-based perspective, both involve preventable ecological injury.

C. Criminal Liability and Retaliatory Violence:

The Wildlife (Protection) Act criminalises hunting, poisoning, and unlawful killing of protected species. Courts have imposed penalties in cases of poaching and retaliatory killings. However, enforcement disparities remain stark. Prosecutions tend to target individuals rather than institutional actors whose policies contribute to conflict intensity.

Criminalisation without parallel structural reform risks deepening antagonism between forest departments and communities. Accountability must therefore extend beyond punitive models toward participatory governance.

D. Compensation as Governance Substitute:

Compensation frameworks, while necessary, often function as substitutes for preventive policy. Data placed before Parliament indicates that crores of rupees are disbursed annually for ex gratia payments relating to wildlife conflict. Yet recurring hotspots persist year after year.

Compensation addresses immediate loss; it does not restore psychological security, nor does it prevent repetition. A governance system oriented around post-harm payments risks normalising conflict as inevitable.

VI. Technology, Prevention, and Ethical Governance:

In recent years, India has adopted technological interventions aimed at mitigating human–animal conflict. These include early warning SMS systems, GPS collaring of elephants and tigers, drone-based surveillance, thermal imaging, and geospatial corridor mapping.

A. Early Warning Systems:

States such as Karnataka and West Bengal have deployed SMS-based elephant alert systems to warn villagers of herd movements. These systems have reduced surprise encounters in certain regions. Geofencing technologies similarly enable forest departments to monitor animal movement in real time.

While promising, technological systems must be evaluated through an equity lens. Mobile-based alerts presuppose connectivity, literacy, and network access. Marginalised households may remain excluded.

B. Corridor Mapping and Infrastructure Redesign:

The Wildlife Institute of India has identified over 100 critical elephant corridors nationwide. Infrastructure redesign like overpasses, underpasses, speed restrictions, etc. has demonstrated measurable success in reducing animal mortality in selected stretches. However, implementation remains uneven. Budgetary prioritisation often favours new construction over ecological retrofitting.

C. Surveillance and Ethical Concerns:

Technological monitoring also raises privacy and autonomy questions. Expanded surveillance in forest-fringe areas may inadvertently criminalise subsistence activities. Governance must ensure that technology empowers communities rather than subjects them to disproportionate scrutiny. Preventive governance, therefore, must combine ecological science with social consent.

VII. International Environmental Law and Comparative Context:

India's domestic legal framework operates within broader international environmental commitments.

A. Convention on Biological Diversity (CBD):

India is a Party to the Convention on Biological Diversity (CBD). The CBD obliges states to conserve biodiversity and promote sustainable use. Human-animal conflict directly implicates these obligations, as habitat loss undermines conservation objectives.

The Kunming-Montreal Global Biodiversity Framework (2022) emphasises ecosystem connectivity and community participation. These principles resonate strongly with India's need for corridor preservation and decentralised conflict mitigation.

B. Convention on Migratory Species (CMS):

The Convention on the Conservation of Migratory Species of Wild Animals (CMS) addresses transboundary wildlife movement. For species such as elephants that cross national boundaries in northeastern India, international cooperation becomes critical.

C. Comparative Approaches:

Countries such as Kenya and Namibia have experimented with community conservancies that share tourism revenues with local populations. Such models suggest that when communities perceive tangible benefits from conservation, tolerance for wildlife presence increases. India's eco-development committees represent a partial analogue, but benefit-sharing remains limited and uneven.

VIII. Conclusion: Toward Rights-Based and Preventive Coexistence:

Human–animal conflict in India is not an aberration. It is the predictable outcome of ecological transformation in the Anthropocene. Highways, railways, mines, and urban expansion reshape landscapes, compelling species to navigate human-dominated terrains. Communities at the forest's edge experience the consequences most directly.

The law has responded with species protection statutes, compensation schemes, and judicial affirmations of ecological values. Yet the framework remains largely reactive. Compensation follows death; mitigation follows tragedy.

- i. A rights-based approach demands deeper structural reform. It requires:
- ii. Integration of corridor protection into infrastructure planning;
- iii. Transparent and timely compensation mechanisms;
- iv. Recognition of forest-dependent communities as partners in governance;
- v. Liability frameworks that internalise ecological costs;
- vi. Ethical balancing of animal welfare and human dignity.

Article 21 protects life. Article 48A directs the State to protect the environment. Article 51A(g) calls upon citizens to show compassion toward living creatures. Together, these provisions envision coexistence not as sentiment, but as constitutional responsibility.

The Anthropocene challenges India to reimagine governance beyond binaries of development versus conservation. Sustainable coexistence is neither romantic ideal nor technocratic fantasy. It is a legal, ethical, and political imperative, one that recognises that in a shared ecological future, security cannot belong to humans alone, nor survival to wildlife alone. It must be negotiated, collectively and justly.

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