



THE HUMAN AND ECOLOGICAL HEALTH IMPACTS OF CARBON EMISSIONS: STRUCTURAL INJUSTICE, LEGAL FRAGMENTATION, AND THE PATH TO INTEGRATED CLIMATE GOVERNANCE

By
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1.0 INTRODUCTION

Carbon emissions are among the most pervasive and persistent outputs of the modern global economy. While conventionally monitored through physical metrics such as atmospheric concentration or temperature increases, their full impact is social, structural, and cumulative. Emissions drive not only environmental degradation, but also amplify inequities in health, ecological resilience, and legal protection. In recent years, climate science and public health literature have converged in showing that the consequences of emissions are neither randomly distributed nor biologically neutral; they are shaped by political, legal, and economic systems that determine who is protected and who is exposed.¹

This paper proceeds from the premise that carbon emissions function not merely as pollutants, but as structural determinants of human and ecological vulnerability. They exacerbate public health burdens, destabilise ecosystems, and challenge the coherence and legitimacy of international legal frameworks. While international law has made strides through instruments such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, these regimes remain largely non-binding in their health-related provisions and structurally fragmented in their integration of human rights or biodiversity protection. The absence of enforceable obligations to protect vulnerable communities from climate-related harm illustrates the limitations of current governance models.²

Three questions animate the inquiry. First, how do carbon emissions operate as structural drivers of human health and ecological harm, particularly in contexts of inequality? Second, how do legal systems, international, regional, and domestic, account for or fail to address these harms? Third, what would a more integrated and justice-oriented model of climate governance require in both normative and institutional terms?

To explore these questions, this paper adopts an interdisciplinary method that draws from legal analysis, ecological systems research, and public health frameworks. This approach allows for critical triangulation: legal doctrine is examined alongside climate-health indicators, while environmental rights norms are evaluated in light of empirical exposure data. It also allows space

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¹Romanello M et al., 'The 2023 Report of the Lancet Countdown on Health and Climate Change' (2023)

² UN Human Rights Council, *Resolution 48/13: The Human Right to a Clean, Healthy and Sustainable Environment* (2021)



for interpretive reflection, recognising that climate-related harms often outpace legal recognition and that human suffering does not always fall neatly within jurisdictional lines.

The sections that follow begin with an examination of health impacts, both direct and indirect, linked to carbon emissions. Subsequent sections address ecological degradation, the fragmentation of legal regimes, the emerging use of human rights frameworks, and the systemic blind spots in global climate governance. The final section proposes pathways for reform, arguing that integrated legal-ecological governance must be grounded in justice and guided by the lived experiences of those most affected.

In doing so, this paper does not claim that the IPCC or WHO use the language of legal complicity or structural injustice. Rather, it contends that their data, when read through the lens of international environmental law and human rights scholarship, reveal a profound misalignment between the scale of the crisis and the adequacy of institutional responses. This gap between knowledge and accountability demands both diagnosis and transformation.

2.0 CARBON EMISSIONS AND HUMAN HEALTH: A STRUCTURAL DETERMINANT OF INEQUALITY

2.1 Emissions as Embedded Health Risks

Carbon emissions are not simply byproducts of industrial activity; they function as structurally embedded public health risks. This claim is not merely metaphorical. Scientific evidence shows that carbon-based pollutants such as PM_{2.5} (fine particulate matter), black carbon, and ground-level ozone are among the leading contributors to premature death and disease globally.³ These pollutants do not accumulate randomly. They are concentrated in densely populated low-income urban areas, near transport corridors, and around extractive and industrial infrastructure. In these locations, regulatory safeguards are often weak or unenforced, and access to healthcare is limited.

According to the 2023 Lancet Countdown, air pollution attributable to fossil fuel combustion accounted for approximately 4.7 million premature deaths in 2021 alone.⁴ PM_{2.5}, which can penetrate deep into the lungs and bloodstream, has been directly linked to respiratory infections, cardiovascular disease, and strokes. Exposure is especially high in South Asia, Sub-Saharan Africa, and informal urban settlements globally; regions where legal standards for air quality, if they exist, are often not enforced.

Children are at particularly high risk. As reported by the World Health Organization, air pollution causes one in ten deaths among children under five, primarily through acute lower respiratory infections.⁵ These health burdens are not simply a function of emissions themselves, but of the governance choices that allow exposure to persist without redress.

³ WHO, *Air Pollution and Child Health: Prescribing Clean Air* (2018)

⁴Romanello M et al., 'The 2023 Report of the Lancet Countdown on Health and Climate Change' (2023) *The Lancet*

⁵ WHO, *Air Pollution and Child Health: Prescribing Clean Air* (2018)



2.2 Indirect Health Impacts: Food, Disease, Displacement, and Mental Health

In addition to their immediate physiological effects, carbon emissions generate indirect health harms by destabilising climatic and ecological systems. IPCC AR6 confirms that increased global temperatures are altering crop viability, intensifying droughts, and reducing nutritional quality of staple foods such as wheat and rice.⁶ These changes have clear implications for food insecurity, particularly in regions already facing agricultural stress and poor nutrition. The World Bank estimates that by 2050, without targeted mitigation, climate change could force over 183 million people into food-related vulnerability.⁷

Shifting climate conditions also expand the habitat range of disease vectors such as mosquitoes, leading to the resurgence of malaria and dengue fever in highland and previously temperate areas.⁸ The relationship between emissions, climate disruption, and vector-borne disease is now well established, yet few health systems are equipped to anticipate or mitigate these emergent patterns.

Equally significant are the psychosocial consequences of climate-induced displacement and trauma. In 2020, climate-related disasters was found to have displaced over 30 million people worldwide, with the majority of displacements occurring in the Global South.⁹ Displacement interrupts access to healthcare, education, and mental health services. Communities facing prolonged droughts or sea-level rise frequently experience increased rates of depression, anxiety, and suicide; particularly among youth and Indigenous populations. While these mental health consequences are increasingly recognised in climate-health literature, they remain peripheral in most national climate action plans. These impacts fall disproportionately on children, with organizations like UNICEF describing the climate crisis as a direct threat to children's health, education, and safety.¹⁰

2.3 Governance Gaps and Public Health System Failures

Despite growing evidence, emissions-linked vulnerabilities remain poorly integrated into national public health systems. Few ministries of health maintain dedicated units to track air pollution impacts or to model climate-health risk.¹¹ Where environmental impact assessments are conducted, they often omit long-term health indicators or are procedurally inadequate. This gap reflects a deeper institutional siloing: environmental ministries and public health agencies operate independently, even when the epidemiological connections between emissions and health are clear.

⁶ IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report*

⁷ World Bank, *Groundswell Part 2: Acting on Internal Climate Migration* (2021)

⁸ WHO and WMO, *Atlas of Health and Climate* (2012)

⁹ Romanello M et al., 'The 2023 Report of the Lancet Countdown on Health and Climate Change' (2023) *The Lancet*

¹⁰ UNICEF, *The Climate Crisis Is a Child Rights Crisis* (2021) <https://www.unicef.org/reports/climate-crisis-child-rights-crisis>

¹¹ Watts N et al., 'The 2018 Report of the Lancet Countdown on Health and Climate Change' (2018) *The Lancet* 392(10163) 2479–2514



This is particularly evident in national adaptation plans (NAPs), which are often disconnected from public health strategies and lack actionable indicators for climate-sensitive disease surveillance. While WHO and the UNFCCC have initiated frameworks for climate-resilient health systems, implementation remains limited due to capacity constraints, funding gaps, and the absence of legally binding obligations on emissions-health integration.¹²

Moreover, many states continue to treat pollution as a technical nuisance rather than as a rights-based violation. Emissions are rarely linked to violations of the right to health or clean environment, despite the 2021 UNHRC resolution recognising the right to a clean, healthy, and sustainable environment as a universal human right.¹³ Without enforceable standards or institutional mandates, public health systems remain reactive rather than preventative.

2.4 Patterns of Inequity: Geography, Race, Gender, and Class

The burden of carbon emissions is not borne equally. IPCC AR6 shows that low- and middle-income countries suffer disproportionately from emissions generated by high-income economies, a pattern often described as “climate colonialism” in critical scholarship.¹⁴ However, inequality also manifests within states. In the United States, for example, Black and Latinx communities are significantly more likely to live near highways, refineries, and industrial corridors with high PM2.5 concentrations.¹⁵

Rural populations, Indigenous communities, and migrants frequently lack the legal recognition or political power necessary to assert environmental health claims. In Sub-Saharan Africa and parts of South Asia, women and girls face unique risks due to their role in household energy use. The use of biomass for cooking in poorly ventilated spaces exposes them to sustained levels of indoor air pollution, contributing to millions of preventable deaths annually.¹⁶ These exposures are not incidental. They reflect legal and policy failures to regulate polluting industries, to provide access to clean energy, and to integrate gender-specific health risks into emissions control regimes.

¹² World Bank, *Groundswell Part 2: Acting on Internal Climate Migration* (2021) <https://openknowledge.worldbank.org/entities/publication/2f6d6eb6-6a46-59e9-a9d3-17fa587ee5d8>

¹³ UN Human Rights Council, *Resolution 48/13: The Human Right to a Clean, Healthy and Sustainable Environment* (2021)

¹⁴ IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report* (2022)

¹⁵ Sellers S and Ebi KL, ‘Climate Change and Health Inequities in the United States’ (2017) *Int J Environ Res Public Health* 15(1) 200

¹⁶ WHO, *Air Pollution and Child Health: Prescribing Clean Air* (2018) <https://www.who.int/publications/i/item/air-pollution-and-child-health>



3.0 ECOLOGICAL COLLAPSE AND THE SHORTCOMINGS OF CONSERVATION LAW IN THE CARBON AGE

3.1 Emissions as Ecological Drivers

Carbon emissions are more than climatic disruptors; they are potent ecological stressors that accelerate ocean acidification, coral bleaching, biodiversity collapse, and deforestation. According to the IPCC (2022), ocean pH has decreased by approximately 0.1 since pre-industrial times, threatening shell-forming marine life and entire aquatic food chains. Simultaneously, warming-induced coral bleaching events have increased in frequency and intensity, affecting 70 to 90 percent of reefs globally.¹⁷ These stressors compound habitat degradation and alter the ecological balance upon which both human and non-human communities depend.

3.2 The Limits of Conventional Conservation Law

Conservation law has largely failed to internalize the atmospheric drivers of ecological degradation. Traditional regimes, such as those governing protected areas or species-specific protections, are territorially bounded and static. They presume a stable ecosystem, rather than a dynamic and rapidly warming biosphere.¹⁸ Instruments like the Convention on Biological Diversity (CBD) focus on in situ conservation while neglecting cross-cutting drivers like transboundary carbon emissions. As a result, carbon-intensive projects often proceed adjacent to or within buffer zones without legal consequence, fragmenting ecosystems despite nominal legal protection.¹⁹

3.3 Legal Fragmentation and the Illusion of Coverage

A major impediment to effective ecological protection is the fragmentation between climate, biodiversity, and land-use regimes. The Paris Agreement and CBD operate on separate institutional tracks, with limited policy coherence or procedural alignment. This siloed approach obscures ecological causality and weakens enforcement. For instance, deforestation linked to agricultural expansion is treated as a land-use issue under REDD+ mechanisms, rather than a convergent emissions and biodiversity issue requiring integrated oversight.²⁰

3.4 Colonial Legacies and Static Territorialism

Conservation law is also encumbered by historical and spatial assumptions rooted in colonial land governance. Protected areas have often been established without regard for Indigenous land tenure or the socio-ecological knowledge of local communities. These frameworks reify a binary between

¹⁷ IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report*

¹⁸ Watson JEM et al., "The performance and potential of protected areas" (2014) *Nature* <https://www.nature.com/articles/nature1394>

¹⁹ Secretariat of the Convention on Biological Diversity (CBD), *Global Biodiversity Outlook 5* (2020) <https://www.cbd.int/gbo5>

²⁰ Secretariat of the Convention on Biological Diversity (CBD), *Global Biodiversity Outlook 5* (2020) <https://www.cbd.int/gbo5>



'nature' and 'people' that undermines adaptive and community-led responses to climate-driven ecological change.²¹ The exclusion of frontline communities from decision-making reinforces extractive governance and marginalizes those best positioned to steward ecological integrity.

3.5 Toward Integrated Ecological Governance

What is needed is a paradigm shift from conservation as restriction to ecological governance as systemic adaptation. Legal frameworks must acknowledge the mutual constitution of atmosphere, biosphere, and human systems. This requires embedding emissions thresholds, ecosystem tipping points, and climate resilience into conservation statutes and treaty frameworks.²² Institutions must facilitate co-management with Indigenous and local communities, integrate climate science into conservation planning, and reimagine ecological baselines as dynamic rather than static.

In assessing the evolving role of environmental law, one must reckon with the increasing turn toward rights-based ecological governance. This development is neither superficial nor procedural. It represents a substantive shift in how legal systems interpret their obligations to both people and ecosystems. The Colombian Constitutional Court's decision in T-622/16, which recognized the Atrato River as a subject of rights, stands as a significant expression of this shift. This judgment goes beyond rhetorical affirmation. It institutes a guardianship model that legally empowers human representatives to act in the interest of the river's ecosystem.²³ The judgment reflects a constitutional re-imagining where biocentric principles are placed at the center of judicial reasoning. The decision gains further depth when examined within the broader socio-political realities of Colombia. The legal recognition of the Atrato River emerges from years of environmental harm and community-led resistance, particularly in contexts dominated by extractive industries.²⁴ The decision, therefore, is not isolated; it is embedded in a lived history of struggle and ecological marginalization.

Similarly, South Africa's National Environmental Management Act (NEMA) 1998 represents a legislative articulation of ecological integrity as a principle that must be balanced with human well-being and sustainable development. This statutory framing acknowledges that environmental protection cannot be treated as an external or secondary concern. It must be understood as foundational to development itself. NEMA's structure invites a mode of legal interpretation that is participatory, forward-looking, and responsive to environmental realities.²⁵ In both jurisdictions, the legal frameworks do more than provide regulatory guidance. They serve as blueprints for adaptive governance, oriented toward inclusion and climate consciousness. For countries seeking to integrate conservation into their legal systems, these examples offer pathways grounded in both

²¹Tauli-Corpuz V et al., *Cornered by Protected Areas* (2018) <https://www.forestpeoples.org/en/cornered-protected-areas-report-series>

²² PCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report*

²³ P Wesche, 'Rights of Nature in Practice: A Case Study on the Impacts of the Colombian Atrato River Decision' (2021) 33(3) *Journal of Environmental Law* 531

²⁴ W Richardson and JA McNeish, *Granting Rights to Rivers in Colombia: Significance for ExtrACTIVISM and Governance* (2021) in *Our Extractive Age: Expressions of Violence and Resistance*

²⁵ AAnsermino, *Rights of Rivers in South Africa: Is Transformative Adjudication Up to the Task?* (2024) LLM Dissertation, University of the Witwatersrand



normative commitment and institutional innovation. Only by confronting the juridical limits of current conservation law can we begin to build legal regimes that reflect the interdependence of life, land, and atmosphere.

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4.0 LEGAL FRAGMENTATION AND SYSTEMIC EVASION: WHY CLIMATE LAW FAILS TO PROTECT

4.1 Norm Formation, Legal Hesitancy, and the Architecture of Climate Treaties

International climate law is marked by a profound legal hesitancy: a reluctance to transform scientific consensus into binding legal obligations. This is not due to an absence of knowledge, but rather a function of the norms that structure the system itself. The UNFCCC and the Paris Agreement operate within a cooperative, state-centric paradigm. Sovereign discretion and political consensus are prioritized over enforceability.²⁶

The Paris Agreement's use of Nationally Determined Contributions (NDCs) reflects this logic. States retain full discretion over the ambition, content, and enforcement of their targets. The Agreement's Article 4 imposes a duty to "maintain" an NDC, but not to meet it. Its Article 15 compliance mechanism is non-adversarial and facilitative, a deliberate decision to avoid politicizing enforcement.²⁷ This has resulted in a regime where norm generation is strong, but norm compliance is voluntary.

The dominance of constructive ambiguity, broad principles like "common but differentiated responsibilities" without quantifiable obligations, has undermined the system's normative clarity. Legal scholars have described this as a "managerial" model of compliance, relying more on peer pressure and transparency than coercive legal remedies.²⁸

²⁶LavanyaRajamani and Daniel Bodansky, 'The Paris Rulebook: Balancing International Prescriptiveness with National Discretion' (2019)

²⁷ Sam Varvastian, *Human Rights Approaches to Planetary Crises* (Cambridge University Press, 2024)

²⁸ Ibid



4.2 Structural Causes of Legal Fragmentation

Legal fragmentation in climate governance is not merely administrative. It is a symptom of deeper structural conditions: the sovereignty-based architecture of international law, the embeddedness of global economies in fossil fuels, and the division of law into artificially bounded domains.

The Convention on Biological Diversity (CBD), for instance, operates independently from the UNFCCC, despite the clear causal links between climate change and biodiversity loss.²⁹ The ICESCR recognizes rights to food, water, and health (Articles 11 and 12), yet says nothing specific about climate change. The resulting legal landscape is a patchwork of weak intersections and strong silos. Even the REDD+ mechanism, designed to reduce deforestation emissions, has contributed to ecological and rights-based harm when implemented without safeguards.

These regime gaps are exacerbated by the territorial bias of legal accountability. Emissions are global, but responsibility is local. A state may legally comply with treaty obligations while externalizing harm across borders. Yet no mechanism exists to attribute legal liability for transboundary or cumulative emissions.

4.3 Litigation as Jurisprudential Innovation and Its Limits

Where treaty law fails, litigation has begun to generate novel jurisprudence. In *Urgenda v. Netherlands*,³⁰ the Dutch Supreme Court grounded its decision not only in the European Convention on Human Rights, but in a science-based standard of care. The court held that a 25 percent emissions reduction from 1990 levels was the bare minimum necessary to meet human rights obligations.³¹

Similarly, in *Leghari v. Federation of Pakistan*,³² the Lahore High Court established a Climate Change Commission to oversee state compliance, interpreting constitutional rights to life and dignity in light of climate threats.³³

*Earthlife Africa v. Minister of Environmental Affairs*³⁴ expanded this reasoning into the realm of project-level accountability, rejecting a coal plant license due to the absence of a climate impact

²⁹ Elisa Morgera, 'Far Away, So Close: A Legal Analysis of the Increasing Interactions between the Convention on Biological Diversity and Climate Change Law' (2011) 2 *Climate Law* 181

³⁰ *Urgenda Foundation v State of the Netherlands (Ministry of Infrastructure and the Environment)*, *ECLI:NL:HR:2019:2007* (20 December 2019) (holding that the Dutch government has a duty under the ECHR to reduce emissions by 25% by 2020, based on scientific consensus and human rights obligations). <https://www.urgenda.nl/wp-content/uploads/ENG-Dutch-Supreme-Court-Urgenda-v-Netherlands-20-12-2019.pdf>

³¹ E Olsson, 'Greening the European Convention on Human Rights: Lessons from Urgenda' (2024) University of Gothenburg

³² *Asghar Leghari v Federation of Pakistan* (W.P. No. 25501/2015, Lahore High Court, orders 4 September 2015 and 14 September 2015; judgment 25 January 2018).

³³ Siri Gloppen and Camila Vallejo, 'The Climate Crisis and Economic, Social and Cultural Rights' in *Research Handbook on ESCR* (Edward Elgar, 2020)

³⁴ *Earthlife Africa Johannesburg v Minister of Environmental Affairs and Others* (65662/16) [2017] ZAGPPHC 58 (Gauteng Division, Pretoria, 8 March 2017).



assessment.³⁵ These decisions reflect a growing judicial willingness to breach the traditional separation of powers when existential rights are at stake.

However, litigation faces structural barriers. Courts rarely challenge the extraterritorial effects of emissions. Victims of cross-border climate harm have no standing in many jurisdictions. Moreover, judicial rulings often lack enforcement mechanisms, relying on executive goodwill. Litigation is necessary but insufficient; it produces islands of accountability within oceans of legal discretion.

4.4 Rights-Based Frameworks: Expanding Conceptually, Contracting Jurisdictionally

The recognition of a human right to a healthy environment by the UN Human Rights Council³⁶ and the OHCHR's Framework Principles³⁷ represent significant normative developments. These frameworks acknowledge that environmental degradation undermines the full enjoyment of fundamental rights, particularly for vulnerable populations.

Yet these rights remain formally universal and functionally jurisdiction-bound. The ICESCR, for instance, recognizes environmental determinants of health, but its monitoring body, the Committee on Economic, Social and Cultural Rights, lacks enforcement power. General Comments, while interpretively rich, remain legally soft.

There is also an epistemic gap between the rights discourse and the scale of climate harm. Rights frameworks often center individual injury and national remedies. Climate change, by contrast, is cumulative, probabilistic, and global. This mismatch makes it difficult to assign responsibility or remedy under existing doctrines. While human rights may offer moral legitimacy, their juridical traction remains weak.

4.5 Fossil Fuel Governance, Soft Law, and Structural Inertia

One of the most striking absences in climate law is the lack of legal governance over fossil fuel production. The UNFCCC and Paris Agreement focus on emissions reduction targets, not on constraining fossil fuel supply. As a result, coal mines, oil fields, and gas infrastructure continue to expand, often with state support.³⁸

Soft law instruments, such as the Glasgow Climate Pact, call for "phasing down" coal but lack any enforcement tool. Similarly, the Fossil Fuel Subsidy Reform initiative and the Fossil Fuel Non-Proliferation Treaty remain outside the formal treaty system. Their normative influence is real but easily ignored.

³⁵ Elisa Colombo and Andrea Giadrossi, 'Comparative International Litigation and Climate Change' (2019) *Pittsburgh Law Review*

³⁶ UN Human Rights Council, *Resolution 48/13: The Human Right to a Clean, Healthy and Sustainable Environment* (2021) A/HRC/RES/48/13

³⁷ John Knox, *Framework Principles on Human Rights and the Environment* (OHCHR, 2018)

³⁸ Stockholm Environment Institute (SEI), *The Production Gap Report 2022*
<https://www.sei.org/publications/production-gap-report-2022/>



This legal silence reflects the political economy of carbon inertia. States remain structurally reliant on fossil fuel revenues, employment, and geopolitical leverage. Treaty design reflects these pressures, embedding policy space and legal discretion in place of mandatory action.

International climate law has failed not due to ignorance or malice, but because it was never designed to produce accountable transformation. It was designed for cooperation without compulsion, for norm diffusion without enforcement, and for sovereignty without liability.

Addressing legal fragmentation requires more than institutional reform. It requires a fundamental retheorization of international law's purpose in the Anthropocene. Legal regimes must evolve from enabling symbolic compliance toward a jurisprudence of shared, enforceable, and ecologically grounded responsibility.

5.0 THE RIGHT TO BREATHE: CARBON EMISSIONS AS A HUMAN RIGHTS VIOLATION

5.1 Framing Emissions as a Human Rights Violation

Carbon emissions are not merely an environmental concern. They represent a structural assault on a range of internationally recognized human rights. The right to health, life, food, water, and a clean environment are all deeply interlinked with climate stability. The emission of greenhouse gases contributes directly to rising mortality through heat stress, respiratory illnesses, and food insecurity.³⁹ More indirectly, it undermines access to water, disrupts housing through displacement, and degrades ecological systems essential to human flourishing.⁴⁰

The framing of climate change as a human rights issue offers a counter-narrative to prevailing regulatory inertia. Where conventional legal regimes emphasize voluntary cooperation, the rights-based approach demands enforceable obligations rooted in dignity, equity, and survival. This framing repositions emissions not as unfortunate byproducts of progress, but as violations of obligations owed to current and future generations.

5.2 Regional Rights Frameworks as Vectors of Environmental Justice

In several Global South jurisdictions, socio-economic rights have emerged as powerful legal tools to contest environmental degradation. The South African Constitution, with its explicit right to a healthy environment (Section 24), and the Colombian Constitutional Court's ruling in the Atrato River case, which granted legal personality to ecosystems, show how courts can embed environmental protection within socio-economic rights frameworks.⁴¹

³⁹ Watts et al., 'The 2023 Report of the Lancet Countdown on Health and Climate Change' (2023) *The Lancet*

⁴⁰ IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report* (2022)

⁴¹ Constitutional Court of Colombia, *Judgment T-622/16* (2016)



In India, the right to life under Article 21 of the Constitution has been interpreted to include the right to a pollution-free environment, laying the groundwork for extensive climate jurisprudence.⁴² In Pakistan, the *Leghari* decision reinforced the duty of the state to integrate climate planning into socio-economic rights realization.⁴³

These frameworks show that constitutional rights are not static declarations but dynamic instruments that can be mobilized to frame climate inaction as a breach of enforceable duties.

5.3 Emerging Global Norms: Recognition and Legal Precedent

Three recent legal developments have advanced the global recognition of environmental rights:

- I. In 2021, the UN Human Rights Council (UNHRC) adopted Resolution 48/13, formally recognizing the right to a clean, healthy, and sustainable environment. While not legally binding, it consolidates decades of soft law and creates a normative standard for interpreting existing obligations.⁴⁴
- II. In Advisory Opinion OC-23/17, the Inter-American Court of Human Rights held that states have extraterritorial environmental obligations. The Court declared that environmental damage can violate human rights even without direct borders being crossed, particularly for rights to life and personal integrity.⁴⁵
- III. The UN Committee on the Rights of the Child, in its 2023 decision in *Sacchi et al. v. Argentina et al.*, recognized that children are disproportionately affected by climate change and that states must cooperate to prevent foreseeable harm, even if emissions occur outside their borders. While the case was dismissed on admissibility grounds, the Committee's reasoning signals a growing acceptance of cross-border climate accountability.⁴⁶

These developments represent a shift in international law from viewing environmental harm as collateral to viewing it as central to human dignity and state responsibility.

5.4 Challenges of Enforcement: Jurisdictional Barriers and Legal Gaps

Despite normative advances, enforcement remains elusive. Rights-based climate claims are often dismissed for lack of standing, justiciability, or extraterritorial reach. Courts are reluctant to

⁴²*M.C. Mehta v. Union of India* AIR 1987 SC 965 <https://indiankanoon.org/doc/549489/>

⁴³SiriGloppen and Camila Vallejo, 'The Climate Crisis and Economic, Social and Cultural Rights' in *Research Handbook on ESCR* (Edward Elgar, 2020)

⁴⁴ UN Human Rights Council, *Resolution 48/13: The Human Right to a Clean, Healthy and Sustainable Environment* (2021) A/HRC/RES/48/13

⁴⁵ Inter-American Court of Human Rights (IACtHR), *Advisory Opinion OC-23/17 on the Environment and Human Rights* (2017)

⁴⁶ UN Committee on the Rights of the Child, *Sacchi et al. v. Argentina et al.*, CRC/C/94/D/104/2019 (2023) <https://www.ohchr.org/en/press-releases/2021/10/childrens-climate-case-committee-declares-communication-inadmissible-views>



impose liability for transboundary emissions, particularly where causal attribution is probabilistic and cumulative.⁴⁷

Moreover, international human rights bodies often lack the capacity to issue binding judgments. Treaty bodies can make recommendations, but compliance remains voluntary. This legal gap allows carbon-intensive states and corporations to continue harmful practices with limited legal risk. Sovereignty continues to shield states from scrutiny, even as their emissions contribute to displacement, health crises, and food insecurity beyond their borders. Until international law reconciles sovereignty with transnational obligation, the right to a healthy environment will remain aspirational rather than operational.

5.5 Rights as Legal Resistance to Regulatory Inaction

In a global legal architecture designed to facilitate market cooperation rather than ecological protection, the language of rights serves as a form of legal resistance. It reframes climate inaction as injustice, not inefficiency. It elevates the experiences of frontline communities, children, and Indigenous peoples from the margins to the center of legal analysis.

If taken seriously, a rights-based framework offers not only normative critique but procedural transformation. It demands participatory decision-making, access to justice, and affirmative state obligations. In doing so, it provides a pathway to re-imagine climate law as a field committed to equity, survival, and intergenerational justice. Instruments such as the Escazú Agreement⁴⁸ and jurisprudence like *Saramaka People v. Suriname*⁴⁹ support this vision by embedding free, prior, and informed consent and environmental defenders' rights into binding legal doctrine.

6.0 CLIMATE GOVERNANCE, STRUCTURAL INJUSTICE, AND THE FALSE PROMISE OF REFORM

6.1 The Power Geometry of Carbon Governance

Climate governance, despite its normative language of equity and cooperation, operates within structures of deep global asymmetry. The institutional architecture of the UNFCCC and its associated frameworks prioritizes state sovereignty and market participation over redistribution and accountability. This orientation benefits historically high-emitting states and corporations, while transferring disproportionate burdens onto low-income nations, Indigenous communities, and future generations.⁵⁰

These asymmetries are particularly pronounced in the governance of carbon emissions. Technological solutions such as carbon capture and renewable energy transitions, often

⁴⁷ Michael Burger and Jessica Wentz, 'Advancing the Climate Change "Attribution" Debate' (2018) *Yale Journal on Regulation Bulletin*

⁴⁸ Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (Escazú Agreement) (2018)

⁴⁹ Inter-American Court of Human Rights, *Saramaka People v. Suriname* (2007) Series C No. 172

⁵⁰ Pettit, Philip, 'The Domination of the Many by the Few: A Republican Theory of Climate Justice' (2020) *Philosophy and Public Affairs*



championed by wealthy nations, are presented as universally applicable while ignoring the differentiated vulnerabilities of the Global South. Such solutions rarely address the long-standing ecological harm caused by fossil extraction, biodiversity loss, and air pollution. Moreover, the failure to integrate the health impacts of emissions, particularly on respiratory illness and food security in low-resource settings, underscores how climate governance has remained detached from the lived realities of those most affected.⁵¹

6.2 Distributive Fault Lines: Who Pays and Who Is Paid

The question of who bears the cost of climate change has become increasingly contested. The Loss and Damage agenda, long resisted by industrialized nations, seeks to rectify historic imbalances by requiring compensation for irreversible climate harms. Although the 2022 COP27 decision established a funding mechanism, actual disbursements and operationalization remain unclear and slow-moving. According to UNFCCC reports, most pledges have yet to be fulfilled, and institutional mechanisms for equitable fund distribution remain underdeveloped.⁵²

This resistance to redistributive climate finance illustrates the limits of a voluntarist system. For small island nations and drought-stricken regions, the distinction between adaptation and loss is no longer theoretical. They face existential threats without corresponding legal remedies or fiscal support. The marginalization of these demands within climate negotiations underscores the enduring dominance of powerful states in defining the boundaries of legitimate claims.

6.3 Intergenerational Equity and Displacement

Another neglected dimension of climate governance is intergenerational equity. Current emissions trajectories violate the rights of future generations, yet international law lacks mechanisms to protect their interests. Although cases like *Urgenda v. Netherlands* and *Sacchi et al. v. Argentina* have brought youth climate claims into legal consciousness, there is still no robust international framework for safeguarding the unborn against long-term climate harm.⁵³

Closely related is the crisis of climate-induced displacement. Rising sea levels, prolonged droughts, and ecosystem collapse have already displaced millions. Yet climate refugees fall outside the 1951 Refugee Convention and are not entitled to legal protection under international law. Statelessness and forced migration are treated as collateral effects rather than systemic injustices, further entrenching the legal invisibility of climate victims.⁵⁴

⁵¹ IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report* (2022)

⁵² UNFCCC, *Loss and Damage Fund Launch* (2023) <https://unfccc.int/news/cop28-loss-and-damage-fund-launches>

⁵³ Joana Setzer and Lisa Vanhala, 'Climate Litigation: A New Era for Human Rights?' (2019) *Annual Review of Law and Social Science*

⁵⁴ Jane McAdam, 'Protecting People Displaced by the Impacts of Climate Change: The UN Human Rights Committee and the Principle of Non-Refoulement' (2021) *UNHCR Research Paper No. 43*



6.4 The Mirage of Market Solutions: Green Capitalism and Corporate Capture

The rise of green capitalism, or market-based climate solutions promoted as environmentally friendly, has created a new frontier of governance evasion. Carbon offsetting schemes, voluntary net-zero pledges, and Environmental, Social, and Governance(ESG) branding allow powerful actors to claim climate leadership without altering core extractive practices.⁵⁵

Offset markets, in particular, have allowed firms in the Global North to finance projects in the Global South in lieu of actual emissions reductions. Many of these schemes have led to land grabs, displacement, and rights violations, particularly among Indigenous populations. Despite growing critiques, international frameworks continue to integrate such schemes into official climate accounting.⁵⁶ The Clean Development Mechanism has been shown to overstate emissions reductions while failing to address cumulative atmospheric degradation.

Moreover, ESG frameworks and net-zero targets lack legal enforceability. They often exclude full value-chain emissions and allow delayed action while reputational benefits are reaped.⁵⁷ This enables corporations to promote a narrative of responsibility while continuing harmful practices. The depoliticization of governance through technocratic tools ultimately privileges carbon efficiency over ecological or social integrity.

6.5 Toward a Justice-Centered Climate Future

Reforming climate governance requires more than incremental adjustments. It demands a reorientation toward justice, grounded in historical responsibility, ecological limits, and collective rights. Legal scholars and climate justice advocates have called for a pluralist governance model that centers vulnerable populations, incorporates binding obligations for transnational corporations, and recognizes ecological debt as a matter of law and morality.⁵⁸

Such a model would treat loss and damage as an enforceable obligation, intergenerational equity as a guiding principle, and displacement as a rights issue. It would also challenge the territorial limitations of legal responsibility, incorporating climate attribution science and human rights law to hold actors accountable for global harms. Crucially, it would link governance to the tangible health and ecological consequences of emissions, ensuring that future policy is informed by the lived experience of climate vulnerability.

In this vision, governance is no longer about consensus among emitters but solidarity with the impacted. Climate law becomes a space not just for coordination but for reckoning, a forum for redistributive justice in the carbon age.

⁵⁵Bumpus, Adam and Diana Liverman, 'Accumulation by Decarbonization and the Governance of Carbon Offsets' (2008) *Economic Geography*

⁵⁶Cames, Martin et al., 'How Additional is the Clean Development Mechanism?' (2016) *Oeko-Institut Report for the European Commission*

⁵⁷ Jason Hickel, 'The Anti-Social Logic of Net Zero' (2022) *Lancet Planetary Health*

⁵⁸ Harriet Anguelovski and Dianne Roberts, 'The Climate Justice Movement: Research, Policy, and Practice for a More Equitable and Sustainable Future' (2011) *Geoforum*



7.0 INTEGRATED GOVERNANCE: TOWARD LAW THAT HEALS CLIMATE, HEALTH, AND HABITAT

7.1 Legal Integration as Climate Repair

A structurally sound climate legal order must unify the fragmented silos of environmental, public health, and human rights law into a coherent normative system. The growing body of climate science confirms that atmospheric carbon concentrations are simultaneously environmental disruptors, public health hazards, and rights violations.⁵⁹ Thus, legal responses must be interdisciplinary by design and binding in operation. One reform imperative is the universal recognition and constitutional embedding of the right to a healthy environment. While some states, particularly in Latin America and Africa, have adopted this right domestically, its absence in key climate treaties such as the UNFCCC and the Paris Agreement perpetuates normative ambiguity and weakens enforcement. To ensure implementation in the Global South, international assistance mechanisms and legal capacity-building must be embedded into treaty design.⁶⁰

7.2 Ecological Personhood and Legal Standing

Another avenue of reform lies in expanding legal personhood to nonhuman entities such as rivers, forests, and ecosystems. Legal developments in New Zealand (Whanganui River), Colombia (Atrato River), and India (Ganges and Yamuna Rivers) demonstrate how courts and legislatures have conferred rights or guardianship models on nature. These models offer a framework for ecological stewardship that transcends anthropocentric valuations. Legal personhood not only enables litigation on behalf of ecosystems but also introduces enforceable procedural constraints on emissions-intensive infrastructure. Where formally recognized, such standing has enabled communities and environmental defenders to block polluting projects that pose both ecological and public health risks.⁶¹

7.3 Linking Emissions, Health, and Biodiversity: The Role of Monitoring

Legal systems must move beyond reactive litigation and adopt anticipatory monitoring mechanisms. One concrete recommendation is the mandatory integration of emissions, health, and biodiversity indicators into environmental decision-making. Climate-health-biodiversity dashboards, operated by independent agencies, could support real-time tracking of atmospheric pollution, respiratory illness clusters, deforestation hotspots, and species decline (WHO, 2018; IPBES, 2019).⁶² Pilot models such as the WHO-WMO Climate and Health Office and national

⁵⁹ IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report*

⁶⁰ Boyd DR, *The Rights of Nature: A Legal Revolution That Could Save the World* (ECW Press 2017)

⁶¹ Constitutional Court of Colombia, *Judgment T-622/16* (2016)

⁶² IPBES, *Global Assessment Report on Biodiversity and Ecosystem Services* (2019) <https://ipbes.net/global-assessment>



biodiversity observatories illustrate the feasibility of such tools. Their incorporation into environmental licensing frameworks would make emissions-health links legally actionable and visible to policymakers. Furthermore, early warning systems could support adaptive decision-making and enhance public trust in environmental governance.

7.4 Rethinking Environmental Impact Assessment

Traditional Environmental Impact Assessments (EIAs) remain procedural checklists, often captured by political and corporate interests. To meet the realities of the climate crisis, EIAs must be reconceived as tools of distributive and procedural justice. This requires extending the scope of assessments to include climate vulnerability, intergenerational equity, and public health consequences.⁶³ Jurisdictions like Canada, through the Impact Assessment Act (2019), and Kenya, via constitutionally anchored environmental rights, have broadened the content and participation frameworks of EIAs. Meaningful community consultation, especially with Indigenous peoples and frontline communities, must be codified into these protocols. The failure to include cumulative emissions pathways and health externalities in current systems undermines their democratic function. Courts should be empowered to invalidate development permits when EIAs omit these criteria, making emissions a justiciable issue.

7.5 Institutional Innovations for Democratic Climate Law

Reform also demands institutional redesign. National legal systems could establish citizen climate councils; multi-stakeholder bodies tasked with overseeing climate legislation, evaluating trade-offs, and recommending adaptive policies. France's Citizens' Convention on Climate illustrates how deliberative bodies can shape national climate responses while enhancing policy legitimacy and public trust (French Citizens' Convention, 2021). These councils help democratize governance, mitigate elite capture, and ensure transparency in regulatory design. Transparency mandates requiring public disclosure of carbon inventories, environmental health data, and ecological risk assessments should be standard practice. In lower-income regions, this may necessitate investment in technical infrastructure and training to ensure accessibility. Finally, real-time climate-health dashboards, operated by environmental and health ministries, would enable integrated governance, allowing agencies to respond rapidly to emissions-linked public health threats.

7.6 From Fragmented Legality to Systemic Legal Ecology

The path forward must be more than technocratic. It must be transformative. Fragmented legality has allowed the climate crisis to fester, enabling emissions to rise while ecological and human systems deteriorate. A systemic approach (what may be termed legal ecology) treats law as a co-evolving interface between human and nonhuman worlds. Drawing on ecological jurisprudence, legal ecology centers relationality, resilience, and planetary boundaries.⁶⁴ It draws from allied

⁶³ IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report* <https://www.ipcc.ch/report/ar6/wg2/>

⁶⁴Bosselmann K, *Earth Governance: Trusteeship of the Global Commons* (Edward Elgar 2016)



paradigms such as ecological constitutionalism⁶⁵ and Earth law frameworks that recognize the interdependence of law, health, and habitat. These frameworks challenge anthropocentric baselines and expand the domain of legal responsibility to include biotic systems. In this model, law becomes an instrument for regeneration, equity, and interspecies justice.

8.0 CONCLUSION

The climate crisis is no longer a distant risk. It is an unfolding reality that reveals the structural fault lines of global governance and challenges the moral legitimacy of our legal and political institutions. Carbon emissions are not simply a technical problem, nor are they a singular environmental hazard. They are symptoms of deeper systemic inequities, embedded in law, normalized in economic systems, and perpetuated by governance models that isolate rather than integrate.

This paper has traced the human and ecological impacts of emissions across interlinked domains. It has shown how emissions drive respiratory disease, disrupt ecosystems beyond legal control, and exacerbate socio-economic disparities in health and exposure. It has revealed how climate treaties underperform, litigation only partially fills accountability gaps, and rights frameworks offer an emerging but underutilized path toward repair. In each case, the evidence points to a shared cause: legal fragmentation and the absence of integrative accountability. The law has too often treated emissions as externalities to be managed, rather than consequences of decisions rooted in unsustainable and unjust paradigms. It has focused on mitigation targets while neglecting the people and ecosystems harmed by delay, inaction, and distraction.

If the climate crisis is to be addressed meaningfully, a new legal vision is required. One that understands law not as static constraint, but as a living framework capable of restoring trust, repairing damage, and redistributing power. This vision must be guided by ecological realities, grounded in scientific knowledge, and animated by the voices of those most affected. It must treat health, habitat, and human dignity not as parallel concerns but as interconnected elements of any viable future.

The path forward is neither easy nor linear. It will require dismantling entrenched interests, confronting political denial, and embracing uncertainty. But it also offers a rare opportunity to rebuild a legal order that reflects our collective responsibilities and ecological interdependence. It demands institutional frameworks that connect ecological rights with enforceable legal personhood, community oversight, and anticipatory public health law. Reclaiming responsibility in the carbon era is ultimately about redefining the function of law. Not merely to govern conduct, but to safeguard life in all its complexity, resilience, and relationality.

⁶⁵Cullinan C, *Wild Law: A Manifesto for Earth Justice* (Green Books 2002)