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Heat and the Constitution: Article 21, Marginalisation, and the Limits of Climate Governance in India

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Intensifying heatwaves in India, exacerbated by anthropogenic climate change, represent a direct and escalating assault on the constitutional promise of a life with dignity. This paper argues that the disproportionate burden of heat-related mortality, morbidity, and economic loss borne by marginalised communities is a manifestation of systemic 'thermal injustice'—a failure of governance that implicates the State's core obligations under Articles 14 and 21 of the Constitution. While Heat Action Plans have been implemented nationwide, they suffer from significant shortcomings, including a lack of localised data, legal enforceability, and adequate funding. The analysis integrates current research on advancements in artificial intelligence and remote sensing for heat vulnerability mapping, the application of nature-based solutions, and the development of nuanced governance models, such as the Chief Heat Officer framework, alongside multi-stakeholder collaboration and innovative financing. Drawing on recent judicial interventions, particularly the Supreme Court's landmark 2024 recognition of climate resilience under Article 21, this paper advocates for a paradigm shift towards legally binding, equity-focused policies. Such policies must integrate granular vulnerability assessments, enforceable labour standards, inclusive urban planning, and innovative cooling strategies to uphold constitutional rights and foster genuine heat-resilient governance amidst a growing climate crisis.

Keywords: *thermal injustice, heat governance, climate justice, environmental constitutionalism.*

INTRODUCTION

Climate change-induced heatwaves are no longer rare or localised phenomena in North-West India. Over the past two decades, India has witnessed an alarming increase in both the

intensity and frequency of these extreme heat events, with the summer of 2025 documented to be among the hottest on record. Regions in the Northwest, such as Rajasthan, Delhi and Uttar Pradesh, experience the most severe and prolonged heatwaves, which push wet-bulb temperatures dangerously close to 35°C, the physiological limit beyond which the human body can no longer regulate its temperature through perspiration and leads to severe and even fatal consequences.[1] What is most disturbing here is the profoundly unequal and unjust impact of these extreme climate events on marginalised communities, representing the Indian version of climate injustice. Daily wage labourers, sanitation workers, urban poor women and the homeless stand to bear the brunt of both environmental exposure and systemic neglect.

This crisis and inequity of climate relief measures towards various marginalised groups bring to light the institutional fragility of India's climate governance in relief planning, public transport and urban infrastructure. Despite an emerging rights-based constitutional framework to recognise climate vulnerability and mobilise climate action, systemic lapses in state response persist, which further deepens existing social inequities that feed into the cycle of climate injustice. There is a global momentum taking into account the relationship between climate change and constitutional rights to most effectively mobilise climate action at the institutional level, with courts recognising environmental rights as fundamental to human dignity and survival.[2] In India, this jurisprudential evolution is echoed in judgements such as the Supreme Court's landmark 2024 judgment in M.K. Ranjitsinh & Ors v Union of India, which explicitly recognised that 'the right to life under Article 21 includes protection from the adverse effects of climate change.'[3]

The Supreme Court's explicit constitutional recognition of climate protection under Article 21 can potentially transform climate action from a discretionary policy matter into a fundamental right, creating a new imperative for governance, thereby providing a powerful legal impetus for advocacy and compelling large-scale state action. However, despite such significant legal advancements, the on-the-ground reality and practical implementation of these rights is often impeded by substantial roadblocks and challenges such as legislative

[1] *Annual Climate Summary 2024* (IMD 2024) 8
[2] Joana Setzer and Lisa Benjamin, 'Climate Litigation in the Global South: Constraints and Innovations' (2020) 9(1) Transnational Environmental Law 77 <https://doi.org/10.1017/S2047102519000268> accessed 22 May 2025
[3] *M K Ranjitsinh & Ors v Union of India* (2024) 6 SCC 112

deficiencies, fragmented institutional responsibilities and the inherent complexities of balancing economic development with environmental protection.

This tension between the need for a robust legal foundation and persistent practical barriers vitally characterises India's climate governance landscape. The legal framework should act as a powerful instrument for change, but its effectiveness is often constrained by the bureaucratic inertia of existing institutions and competing priorities. Oftentimes, even when the legal foundation is strong, the state mechanisms for translating these legal rights into tangible protections on the ground can still be nascent and flawed.

Furthermore, the increasing recognition of heat as a distinct and complex disaster is prompting a re-evaluation of its classification. While heatwaves have historically been addressed within already existing generic disaster management frameworks, there is significant tension between addressing the effects of climate change as primarily disasters or an ongoing development issue. Recognising climate as a distinct, persistent and intensifying phenomenon with stratified impact would necessitate specialised policy responses that must extend beyond generic disaster relief. This re-categorisation would have profound implications for policy and investment because if heat is viewed solely as a disaster, then it is primarily tackled through emergency funds and short-term responses. However, if understood as an ongoing development issue, it demands long-term structural changes, integration into urban planning and sustained financial commitment. The Ministry of Home Affairs' decision to include heatwaves as a nationally eligible disaster for State Disaster Mitigation Fund project-based funding is a positive step towards a hybrid approach that can recognise the acute disaster aspect while embedding heat resilience into long-term development planning. This would necessitate the need for a very ambitious shift from short-term life-saving responses to long-term institutional redesign and restructuring in fundamental ways.

THEORETICAL FRAMEWORK: ENVIRONMENTAL CONSTITUTIONALISM AND THERMAL JUSTICE

The Evolution of Environmental Constitutionalism: Environmental constitutionalism essentially recognises environmental protection as a fundamental matter of human rights and dignity. It acknowledges that the environment and climate system are subjects

fundamentally suited for recognition and protection within constitutional frameworks,[4] and this approach has increasingly gained significant traction and acknowledgement globally as a climate action mobilizer, with over 150 national constitutions now containing explicit environmental provisions.[5]

The Evolution of Environmental Constitutionalism has proceeded through Several Distinct Phases:

First-Generation Rights: Focused primarily on procedural environmental rights, such as citizens' access to information and participation in decision-making processes.

Second-Generation Rights: Expanded to include substantive environmental rights, such as the right to a clean and healthy environment.

Third-Generation Rights: This present-day phase, which includes climate constitutionalism, recognises the rights of future generations and non-human entities, taking on a more eco-centric approach to constitutional interpretation.[6]

Climate constitutionalism specifically aims to address the constitutional implications of climate change by emphasising intergenerational equity, precautionary principles and recognising the state's obligations to mitigate and adapt to climate impacts as its fundamental duty.[7] This approach has been evident in landmark climate litigations globally like the Dutch Urgenda case, the German Constitutional Court's climate decision and now India's recognition of climate protection under Article 21.

Environmental constitutionalism in Indian jurisprudence and litigation is very significant for its potential to transform what might otherwise be dismissed as ambitious policies into enforceable constitutional rights. As Lavanya Rajamani notes, 'Constitutional environmental

[4] Erin Daly and James R. May, 'Learning from Constitutional Environmental Rights' in John Knox and Ramin Pejan (eds), *The Human Right to a Healthy Environment* (CUP 2018) 43
[5] David Boyd, 'The Constitutional Right to a Healthy Environment' (2023) 54 Environment: Science and Policy for Sustainable Development 3 <http://dx.doi.org/10.1080/00139157.2012.691392> accessed 22 May 2025
[6] Louis Kotzé, 'The Anthropocene, Earth System Vulnerability and Socio-ecological Injustice in an Age of Human Rights' (2019) 10(1) Journal of Human Rights and the Environment 62 <http://dx.doi.org/10.4337/jhre.2019.01.04> accessed 22 May 2025
[7] Setzer (n 2)

rights can serve as both shields and swords—shields against environmentally harmful actions and swords to compel affirmative environmental protection measures.'[8]

This constitutional potential is also particularly important in addressing climate impacts because of their disproportionate effects on marginalised communities with limited political power to influence policy decisions through conventional democratic processes, which is a significant age-old issue in the Indian polity.

The Indian Supreme Court's landmark 2024 judgment in M.K. Ranjitsinh & Ors v Union of India positioned environmental degradation as a matter of fundamental constitutional rights. The Court held that 'the right to life under Article 21 of our Constitution encompasses not merely animal existence but the right to live with human dignity. In the context of our present understanding of the profound threats posed by climate change, we must recognise that this right necessarily includes protection from the adverse effects of climate change.' The Court also held that a state's inaction on climate adaptation amounts to a denial of both the right to life under Article 21 and the right to equality under Article 14, by noting that climate impacts disproportionately affect marginalised communities. This ruling represents a major jurisprudential development in India for environmental law by positioning climate justice as a constitutional imperative. This judgment can be said to trace itself upon earlier precedents such as Virender Gaur v State of Haryana (1994) and M.C. Mehta v Kamal Nath (2000), where the Court linked environmental integrity directly with the right to life but this judgment goes further by also recognizing a distinct right against climate degradation for its disproportionate effect on the poor and other vulnerable populations. This places India within the growing global movement to recognise environmental protection as a human right.

Thermal Justice: Conceptual Foundations: Within the broader concept of environmental justice, 'thermal justice' has emerged as a useful way of understanding the inequitable distribution of heat impacts on marginalised and vulnerable populations. Thermal justice recognises that exposure to extreme heat is not merely a function of geographic location or climate conditions but is importantly shaped by social, economic and political factors too,

[8] Lavanya Rajamani, 'Rights Based Climate Litigation in the Indian Courts: Potential, Prospects and Potential Problems' (2013) Centre for Policy Research, Climate Initiative, Working Paper No 1/2013 <https://ssrn.com/abstract=2464927> accessed 22 May 2025

which creates different vulnerability and adaptive capacities.[9] Unlike a lot of other environmental hazards, heat is invisible and hence difficult to attribute causally to specific deaths or illnesses, leading to it being often perceived as natural and ignored rather than a human-caused phenomenon.[10] This characteristic is explained as a 'socially organised denial' about the severity and inequity of heat impacts.[11] The invisibility and abstractness of heat as an environmental and climate hazard have important implications for governance, as it fails to generate the same political urgency as more visible environmental threats such as floods or air pollution.

In the Indian context, thermal justice is particularly relevant given the deeply stratified nature of heat impacts along lines of caste, class and gender. Climate and thermal justice frameworks help to show how seemingly neutral technical interventions, such as air conditioning or building urban green spaces, will only reinforce existing inequities in climate vulnerability if not designed with attention to social justice considerations. Recent scholarship has also emphasised how historical patterns of development and infrastructure investment shape contemporary heat vulnerability, such as in India, where colonial-era urban planning decisions in Indian cities still carry influence and sustain patterns of thermal inequality that persist despite contemporary policy interventions. This historical perspective is essential for understanding the structural roots of climate injustice to develop governance approaches that address these deeper causes rather than merely treating symptomatically. Caste, class, gender, religion, age and ethnicity, etc. are all factors that exacerbate heat exposure and shape vulnerability to climate risks and disasters in India. Colonial legacies and legal pluralism have historically further reinforced caste and feudalism, which continue to impact social mobility and access to justice for marginalised groups and creating long-lasting disparities. Such identities interact and create unique, compounded disadvantages. A deeper understanding of this intersectionality in the Indian context is highly crucial for designing just and equitable heat governance that takes our complex social stratifications into account.

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[9] Sara Meerow et al., 'Defining Urban Resilience: A Review' (2019) 147 Landscape and Urban Planning 38 <http://dx.doi.org/10.1016/j.landurbplan.2015.11.011> accessed 22 May 2025

[10] Ollie Jay et al., 'Reducing the Health Effects of Hot Weather and Heat Extremes: From Personal Cooling Strategies to Green Cities' (2021) 398(10301) The Lancet 709 <https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)01209-5/fulltext> accessed 22 May 2025

[11] Kari Marie Norgaard, *Living in Denial: Climate Change, Emotions, and Everyday Life* (MIT Press 2011) 207

THE CURRENT STATE OF HEAT GOVERNANCE IN INDIA

The Stratified Nature of Heat Impacts: Rising temperatures in India are fundamentally characterised by their deeply stratified impact and nature. Caste, class and gender significantly determine exposure, resilience and access to adaptation resources. For instance, daily wage labourers from disadvantaged caste groups often work outdoors with limited access to rest, hydration or medical facilities. Occupational segregation of vulnerable populations ensures these communities remain overrepresented in heat-exposed sectors like construction, agriculture and waste collection. A 2025 study confirmed that the 'heat stress dose-workhours curve' for marginalised caste groups is 25% to 150% steeper than for dominant caste groups, highlighting significantly higher occupational heat exposure.[12] While precise mortality ratios from recent heatwaves are still being studied, the disproportionate impact on those in informal settlements is consistently documented. Water access and relief infrastructure also remain scarce in these under-resourced communities. In Delhi, recent surveys revealed that less than 30% of slums had even functional water coolers or community taps during peak summer months. While some municipal bodies have implemented 'cooling shelters,' these are typically inaccessible to daily wage labourers who must choose between seeking shelter and earning a living, where missing even a single shift can be highly detrimental. Gender further amplifies such inequities. Low-income women in informal settlements often have to face intense heat stress both outdoors and indoors within their poorly ventilated and heat-retaining dwellings. Women's domestic responsibilities, such as cooking over biomass stoves in unventilated kitchens and fetching water during supply shortages, are also factors that increase their exposure to extreme temperatures. A 2024 study found that women in low-income settlements experienced average indoor temperatures 3.2°C higher than outdoor temperatures during summer nights, creating conditions of chronic heat stress.

The economic toll of heat exposure is substantial. The 2025 Lancet Countdown report highlighted that over 470 billion labour hours were lost globally in 2021 due to heat exposure, with India among the countries that experienced substantial losses. Informal sector workers accounted for a disproportionate share of this loss in what can be amounted to as a form of

[12] Arpit Shah et al., 'Caste Inequality in Occupational Exposure to Heat Waves in India' (2025) 62(1) Demography 35 <https://doi.org/10.1215/00703370-11803010> accessed 25 may 2025

unacknowledged climate tax on the poor. According to the International Labour Organisation, India's workforce stands to lose around 5.8% of working hours by 2030, equivalent to 34 million full-time jobs, due to heat stress.[13] This economic dimension of heat impacts remains largely unaddressed in current policy frameworks, despite its significant implications for livelihoods and economic security. The economic burden of climate change is not evenly distributed but falls disproportionately on those least able to bear it, such as informal workers who lose wages, face health impacts and have limited social safety nets. This is not merely an economic loss but a regressive transfer and offloading of climate costs onto the most vulnerable, which directly undermines poverty eradication efforts. A significant portion of the workforce cannot work effectively due to heat, creating a drag on productivity and perpetuating cycles of poverty. A re-evaluation of economic policies to integrate heat protection as a core component of sustainable development and social welfare is necessary in these circumstances.

The Inadequacy of Heat Action Plans and Evolving Vulnerabilities: Heat Action Plans (HAPs) have been the primary defence against heat-related mortality in India since the pioneering 2013 Ahmedabad HAP. However, a lot of subsequent plans have been inadequate and under-resourced by prioritising only short-term band-aid interventions over long-term systemic solutions. Studies have found that most such HAPs use templatized and generic guidelines that fail to account for and integrate region-specific data such as local temperature thresholds, urban heat island intensities or demographic vulnerabilities.[14] It only issues guidelines on extreme heat preparedness but does not confer legal mandates upon states or municipalities to implement HAPs, which results in ineffectiveness and wide variations in quality and effectiveness.[15]

While Heat Action Plans (HAPs) primarily focus on outdoor heat exposure, they often neglect the significant risks posed by indoor heat, particularly in informal settlements with

[13] 'Working on a Warmer Planet: The Impact of Heat Stress on Labour Productivity and Decent Work' (*ILO*, 2019) <https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_711919.pdf> accessed 25 May 2025

[14] Mahaveer Golechha et al., 'India: Heat Wave and Action Plan Implementation in Indian Cities' in Chao Ren and Glenn McGregor (eds), *Urban Climate Science for Planning Healthy Cities* (Springer 2023)

[15] 'HOW INDIA SUCCESSFULLY REDUCED MORTALITY DUE TO HEAT WAVES' (*National Disaster Management Authority*) <https://ndma.gov.in/sites/default/files/IEC/Booklets/HeatWave%20A5%20BOOK%20Final.pdf> accessed 25 May 2025

precarious housing conditions. Such homes are typically small and very congested, with much of this housing stock comprising temporary structures made from heat-absorbing, cheap materials which lack proper insulation, like asbestos or tarpaulin sheets for walls and roofing. The further absence of proper land tenure in these settlements also exacerbates vulnerability to heat, as residents are reluctant to invest in better housing conditions and improve them due to the constant fear of eviction. Unlike outdoor heat, which can be more easily linked to occupational hazards, indoor heat is often a silent killer which mainly affects women and children who spend more time indoors. This invisibility and perceived mundanity contribute to its neglect in policy. It is a chronic, rather than acute, sort of heat stress burden that is less visible in mortality statistics but has major long-term health and well-being implications. Addressing indoor heat requires interventions beyond public cooling centres, such as promoting housing resilience through low-cost passive cooling technologies and addressing housing insecurity, which would require a paradigm shift in HAPs. Similarly, stronger protections and legal recognition for informal outdoor workers are also necessary. India's existing labour and occupational safety laws, such as the Occupational Safety and Health and Working Conditions Codes 2020, make no mention of ambient heat thresholds, hydration breaks or work-rest cycles adapted to heat stress levels.

A comprehensive review of HAPs conducted by the Indian Institute of Public Health in 2024 identified several critical gaps in current approaches:[16]

- Limited Vulnerability Mapping;
- Inadequate Attention to Indoor Heat Exposure;
- Insufficient Integration with Urban Planning;
- Weak Monitoring and Evaluation Frameworks; and
- Limited Community Engagement.

Many HAPs fail to address underlying urban planning factors that contribute to heat vulnerability, such as the urban heat island effect and limited green space. They also lack robust mechanisms for assessing their effectiveness and adapting strategies based on outcomes. These limitations reflect broader governance challenges, including fragmented institutional responsibilities, limited technical capacity, and inadequate financial resources.

[16] *Ibid*

The inconsistency and weak targeting of long-term heat actions suggest that India will likely see heat waves with higher mortality levels more frequently in the coming years, as short-term life-saving responses and communities' adaptive capacities are overwhelmed by rising temperatures from global climate change.

North Indian Heat Crisis: A Case Study in Climate Vulnerability: The North Indian plains, particularly Delhi, Rajasthan, Uttar Pradesh, and Haryana, have emerged as the epicentre of India's heat crisis. The summer of 2025 was particularly devastating, where Delhi recorded temperatures above 45°C for 12 consecutive days in May and areas in Rajasthan experienced temperatures almost reaching 50°C.[17] Studies have demonstrated that the April 2025 heatwave in North India was primarily driven by human-induced climate change.[18] The effect of urban heat islands has significantly exacerbated these temperature extremes in North Indian cities. For instance, Delhi's concrete-dominated landscape increased ambient temperatures by an average of 6°C compared to surrounding rural areas during peak summer months, and this urban heat amplification has particularly severe consequences for informal settlements. Inadequate housing, limited green spaces and poor access to cooling resources create conditions of extreme vulnerability. The Council on Energy, Environment and Water's (CEEW) 2025 district-level heat risk assessment revealed that over 60% of districts in North Indian states face 'high' or 'very high' heat risk, with particularly severe conditions in regions like Rajasthan, Haryana and Delhi.

A concerning trend also identified is how the number of 'very warm nights' has been rising significantly in India, particularly in large urban populations. Warmer nights prevent the human body from cooling down after intense daytime heat, which significantly increases health risks such as heat strokes and other related diseases. For instance, in the last decade, Mumbai saw 15 additional very warm nights per summer, Bengaluru (11), Bhopal and Jaipur (7 each) and Delhi (6). Such increases can be directly attributed to the urban heat island effect, where cities trap heat during the day and release it at night. The increase in both very hot days and very warm nights, even in traditionally cooler Himalayan regions, poses a severe impact on fragile mountain ecosystems. Despite these alarming trends, institutional

[17] 'Annual Climate Summary 2025' (*India Meteorological Department*) <https://internal.imd.gov.in/section/nhac/dynamic/extended.pdf> accessed 25 May 2025

[18] Gianmarco Mengaldo et al., 'April 2025 India & Pakistan Heatwave Mostly Strengthened by Human-Driven Climate Change' (*Clima Meter*, 19 April 2025) <https://www.climameter.org/20250414-15-india-pakistan-heatwave> accessed 25 May 2025

responses to heat risk in North India remain inadequate, with most Heat Action Plans lacking region-specific data on temperature thresholds, urban heat island intensities or demographic vulnerabilities.

COMPARATIVE ANALYSIS: HEAT GOVERNANCE MODELS

Heat-Specific Labour Regulations in Gulf Countries: In contrast to India's limited regulatory framework to tackle the risks of heatwaves and rising temperatures, Gulf Cooperation Council (GCC) countries have implemented specific and effective labour regulations to protect workers from extreme heat. For instance, the United Arab Emirates prohibits outdoor work from 12:30 pm to 3:00 pm during summer months and has implemented an effective wet-bulb globe temperature (WBGT) threshold system that prohibits any outdoor work when the WBGT index exceeds 32.1°C, regardless of time of day.[19] Qatar similarly prohibits outdoor work between 10:00 am and 3:30 pm from June 1 to September 15 and requires employers to provide air-conditioned rest areas, hydration stations and annual health check-ups for workers exposed to heat.[20] Saudi Arabia and Kuwait have also implemented similar midday work bans enforced through regular inspections and significant penalties for non-compliance. The table below summarises the key differences between the regulatory approaches in the GCC and India.

Regulatory Provision	Gulf Cooperation Council (GCC) Countries	India
Midday Work Ban	Implemented across member states (e.g., UAE: 12:30 pm - 3:00 pm; Qatar: 10:00 am - 3:30 pm during summer).	No national mandate; some HAPs may contain advisories but lack legal enforceability.
Scientific Heat Thresholds	Utilised in some states (e.g., the UAE uses a Wet-Bulb Globe Temperature	Not integrated into national labour laws; HAPs rely primarily on

[19] Ministerial Resolution No 44 of 2024, art 7
[20] Ministerial Decision No. 17 of 2021, 3

	(WBGT) threshold of 32.1°C).	simple temperature triggers, ignoring humidity.
Mandatory Employer Provisions	Legally required provisions such as air-conditioned rest areas, hydration stations, and annual health check-ups (e.g., Qatar).	The Occupational Safety and Health Code, 2020, does not specify requirements for hydration breaks, work-rest cycles, or cooling facilities related to heat stress.
Enforcement & Penalties	Enforced through regular government inspections with significant financial penalties for non-compliance.	Weak to non-existent enforcement due to the non-binding, advisory nature of HAPs and the lack of specific heat provisions in labour law.

While these regulatory frameworks are more effective compared to India's approach, they are not without their limitations, as studies have found that the fixed time-based approach fails to account for variations in heat stress levels across different days and locations.[21] Despite these limitations, the GCC regulatory frameworks provide valuable models for India to emulate in developing more robust heat protection standards.

Urban Heat Island Mitigation in Global Cities: Various cities worldwide have also implemented strategies to mitigate urban heat island effects. For instance, Melbourne's Urban Forest Strategy aims to increase canopy cover from 22% to 40% by 2040, by also focusing significantly on vulnerable neighbourhoods.[22] Singapore combines extensive urban greening with innovative building design requirements through its Green Mark certification system.[23] And Phoenix has created a network of cooling centres, installed shade structures at

[21] Working on a Warmer Planet: The Impact of Heat Stress on Labour Productivity and Decent Work (n 13)
[22] 'Urban Forest Strategy: Making a Great City Greener 2012-2032' (*City of Melbourne*) <https://www.melbourne.vic.gov.au/urban-forest-strategy> accessed 25 May 2025
[23] Building and Construction Authority, *Green Mark Certification Scheme* (Singapore Government 2023) 8

transit stops and implemented cool pavement technologies that can reduce surface temperatures by up to 12°C.[24]

Beyond simple greening, the broader concept of Nature-Based Solutions (NBS) is also globally gaining traction due to their low-risk, low-cost and low-maintenance solutions with multiple benefits like reducing urban heat island effects, managing stormwater and improving air quality. Measures include green roofs, rain gardens, permeable paving, bio-swales, urban forests and green corridors. Indian cities are also adopting such approaches, with Chennai's 'Sponge Cities Initiative' aiming to manage urban flooding by making urban areas more permeable, recharging groundwater and storing rainwater. Delhi has established Biodiversity Parks to integrate plants, animals and microbes into the urban ecosystem. Emulating and borrowing from international examples to suit India's needs is highly useful for more effective heat governance in Indian cities. Some of the highly regarded measures in this way are the integration of cooling considerations into planning codes, prioritisation of natural cooling systems, development of heat-resilient public transport and pedestrian infrastructure, targeted interventions in vulnerable neighbourhoods and a combination of physical interventions with social support systems.

JUDICIAL DEVELOPMENTS: CLIMATE LITIGATION AND HEAT RIGHTS

The 2024 Supreme Court Judgment: A Constitutional Milestone: The Supreme Court of India's landmark 2024 judgment in *M.K. Ranjitsinh & Ors v Union of India*[25] positioned environmental degradation and the effects of climate change as a matter of fundamental constitutional rights, building upon earlier precedents such as *Virender Gaur v State of Haryana* (1994)[26] and *M.C. Mehta v Kamal Nath* (2000)[27] where the Court had linked environmental integrity directly with the right to life. The Court in *Ranjitsinh*[28] noted that while India lacks a unified climate change legislation, its statutory landscape, ranging from the Environment Protection Act (1986) to the Energy Conservation Act (2001), should reflect a sustained legislative intent to combat environmental degradation. The Court's reasoning drew from international environmental jurisprudence, acknowledging India's obligations

[24] 'Heat Action Plan' (*City of Phoenix*) <https://www.phoenix.gov/administration/departments/heat/heat-response-programs/heat-response-plan.html> accessed 25 May 2025
[25] *M K Ranjitsinh v Union of India* (2024) INSC 280
[26] *Virender Gaur & Ors v State of Haryana & Ors* (1995) 2 SCC 577
[27] *M C Mehta v Kamal Nath & Ors* (2000) 6 SCC 213
[28] *In re: Beat the Heatwave and Climatic Change to Save the Life of Public at Large* 2025 SCC OnLine Raj 1193

under the United Nations Framework Convention on Climate Change (UNFCCC), notably Article 3(1), which urges nations to act 'based on equity and by their common but differentiated responsibilities' to protect present and future generations. This is strengthened by the UN General Assembly's 2022 resolution declaring access to a clean, healthy and sustainable environment as a universal human right. Later in 2024, the Rajasthan High Court also made a notable judgement by taking judicial notice of heat-related fatalities in the state and echoing the Supreme Court's judgement by acknowledging protection from the effects of climate change as part of our fundamental rights. Responding to a suo motu petition initiated following heatwave deaths in summer 2024, the Court urged the government to declare heat-related fatalities as a national calamity to enable emergency disaster relief funds[29] that also includes specific provisions for vulnerable populations, including cooling centers in all urban wards, an early warning system for extreme heat events and mandatory water and shade provisions at work sites. The Court also directed the state to develop heat-specific occupational safety standards for outdoor workers.[30]

Limitations of Judicial Interventions and Enforcement Challenges: While judicial recognition and interventions are very important, they alone are not enough to offset institutional inertia. Many of India's climate change mitigation and protection legislation is lacking in many ways, with existing labour and occupational safety laws being poorly suited to address heat-induced health risks. While the Disaster Management Act 2005 provides a framework for addressing natural disasters, its implementation for heat emergencies has been inconsistent and inadequate. The Occupational Safety, Health and Working Conditions Code 2020, for instance, makes no mention of ambient heat thresholds, hydration breaks or work-rest cycles adapted to heat stress levels in its guidelines.[31]

This legislative vacuum is also particularly glaring regarding acknowledging the high risk and enacting specific protections against heatwaves for vulnerable populations. Broader challenges exist across the spectrum in enforcing climate litigation outcomes in India, where the judiciary is often left to choose between various competing strains of environmentalism and responding to the needs of development. Public Interest Litigations (PILs) have since become the dominant pathway through which environmental cases are filed, often on human

[29] *M K Ranjitsinh v Union of India* (2024) INSC 280
[30] *Ibid*
[31] Occupational Safety, Health and Working Conditions Code 2020

rights grounds, often invoking and incorporating international human rights and environmental law principles such as the polluter pays principle, the public trust doctrine and the right to free, prior and informed consent.

This tension is further illustrated by criticisms regarding the legislation and judiciary's myopic view on renewable energy benefits while potentially ignoring or not adequately accounting for their problems, such as, for instance, depriving tribal communities of access to their land, fragmentation of wildlife habitats and unsustainable consumption of water. This points to a potential for judicial overreach or incomplete consideration of socio-environmental impacts in its implementation, thereby inadvertently creating new forms of injustice and exacerbating existing ones. For example, promoting large-scale renewable energy projects (seen as climate action) without adequate safeguards for land rights or ecological impacts can severely and immediately harm marginalised communities residing there. The judiciary, operating within its legal mandate, might not always fully grasp these complex socio-ecological trade-offs, and this requires future climate litigation and policy development to adopt a more holistic impact assessment framework that considers not only climate mitigation/adaptation benefits but also potential negative social and environmental externalities. Moving beyond a narrow interpretation of environmental protection, a 'just transition' framework should be integral to climate mitigation efforts that ensure climate actions do not disproportionately burden vulnerable populations or undermine other fundamental rights.

Ultimately, the judiciary's ability to drive such a 'just transition' is constrained by its institutional role, which can lead to a legislative vacuum and institutional inertia. While courts can declare rights and issue directives, they cannot legislate, fund or directly administer programs, and this creates a legislative vacuum where the legal right exists but the detailed statutory framework in combination for its realisation is often absent and hard to realise. The Supreme Court's observations in February 2025 acknowledge these limitations by noting the need to examine the enforceability and binding force of national climate initiatives and to undertake a 'meticulous examination of the existing environmental statutes... to incorporate climate-centric mandates.' These observations can be interpreted as a self-acknowledgement of the judiciary's limitations and crucial interdependence of the branches of government for effective climate governance, and hence calling upon the

executive and legislative branches to fulfil their roles. Without corresponding legislative and executive action to translate judicial pronouncements into enforceable laws, coordinated institutional frameworks and adequate funding, the constitutional right to a healthy environment will only remain partially realised.

POLICY RECOMMENDATIONS: TOWARDS COMPREHENSIVE HEAT-RESILIENT GOVERNANCE

Data-Driven, Vulnerability-Centred Heat Action Plans: Effective heat governance at this stage of intense and rapid climate change requires a fundamental shift from generic, template-based approaches to vulnerability-centred planning. Heat Action Plans (HAPs), for instance, should be developed based on comprehensive vulnerability assessments that identify the most at-risk populations and areas within each jurisdiction. These assessments should incorporate both biophysical factors, such as urban heat island intensity and building thermal performance, and social vulnerability factors such as income, occupation, age, gender and access to cooling resources. The Council on Energy, Environment and Water's (CEEW) 2025 district-level heat risk assessment provides one such valuable model for integrated vulnerability mapping. Thus, the urgent need for HAPs to transition from generic approaches to highly localised and data-driven frameworks is paramount. The CEEW's 2025 district-level assessment reinforces this widespread nature of heat risk, with 57% of Indian districts (home to 76% of the population) facing high to very high risks and a faster rise in 'very warm nights' than 'very hot days', further exacerbated by the urban heat island effect which disproportionately impacts vulnerable populations.

Based on these assessments, HAPs should strive to prioritise interventions in the most vulnerable areas and for the most vulnerable populations. This might include establishing cooling centres in informal settlements, providing targeted support for outdoor workers and developing early warning systems that can efficiently reach those with limited access to technology or formal communication channels. A vulnerability-centred approach would also require meaningful community engagement throughout its planning process. Community knowledge about local heat risks and adaptive strategies is an essential complement to

technical expertise in developing effective heat governance approaches.[32] This engagement should go beyond token consultation and must include genuine collaboration of knowledge and solutions with particular attention to ensuring the participation of marginalised communities as a whole, who are often excluded from conventional planning processes.

Technical Annexe: Advanced Technologies for Heat Risk Mapping: Advancements in geospatial and AI/ML technologies can offer significant potential for enhanced heat mapping and prediction. Studies are now able to evaluate urban heat stress at city, neighbourhood and even ward scales using techniques like integrated datasets, remote sensing and spatial analysis. This reveals that a substantial portion of major Indian cities are under heat stress compounded by a concerning decline in natural buffers like green and blue spaces. Artificial intelligence and machine learning models are already starting to be deployed to predict urban heat island hotspots and understand their contributing factors, with initiatives like ARTPARK's AI-driven system driving hyperlocal heat risk forecasting in India.

Robust Legal and Regulatory Frameworks for Heat Protection: India urgently needs to develop legal and regulatory frameworks specifically and efficiently designed to address heat-related risks. Drawing on the GCC model, India should consider implementing heat-specific labour regulations that establish clear thresholds for work restrictions during extreme heat events, and these regulations would need to move beyond the fixed time-based approach used in most GCC countries and adopt a more flexible and WBGT-based system that accounts for variations in heat stress levels across different days and locations. The regulations should establish mandatory rest periods, hydration requirements and shade provisions for outdoor workers, with specific attention to the informal sector where enforcement challenges are greatest.

Beyond labour regulations, India should also establish legally binding standards for heat-resilient urban planning and building design, which include requirements for minimum green space ratios, tree canopy coverage and building thermal performance standards that reduce indoor heat exposure without increasing energy consumption for cooling. Legal

[32] Isabelle Anguelovski et al., 'Equity Impacts of Urban Land Use Planning for Climate Adaptation: Critical Perspectives from the Global North and South' (2022) 36(3) Journal of Planning Education and Research 333 <http://dx.doi.org/10.1177/0739456X16645166> accessed 25 may 2025

frameworks should also address the specific needs of vulnerable populations, like provisions for heat-specific social protection measures such as subsidised cooling for low-income households, heat-responsive healthcare services and targeted support for communities with limited adaptive capacity. The Integrated Health Information Platform (IHIP) already provides nationwide and daily, near real-time data collection from primary health centres, enhancing the country's ability to monitor and respond to heat-related health risks. Further innovative social protection models like SEWA India's pioneering heatwave insurance program for informal sector women workers provide financial support during extreme heat and offer valuable lessons for scaling up such initiatives. Heat protection measures must be designed with explicit attention to equity considerations to ensure that they reach those most in need rather than primarily benefiting already privileged groups in a form of bourgeois environmentalism.

The scaling of low-cost passive cooling technologies for informal settlements is another particularly crucial element. For instance, the architectural studio CoolAnt has developed innovative terracotta cooling towers called 'Beehive', which use evaporative cooling by pumping recycled water over stacked terracotta cones to cool the surrounding air.[33] Cool roofs, which involve painting roofs with reflective white paint, have also shown promising temperature reductions (between 1.2°C and 1.7°C indoors) and associated health benefits (e.g., reduced heart rates) in trials in Ahmedabad. These solutions are low-cost, can be self-administered and provide immediate cooling benefits to residents and communities. Other passive design measures, such as improving building envelopes, using internal thermal mass and natural ventilation, can also significantly reduce indoor heat stress compared to outdoors during the hottest hours of the day. Community-led initiatives like RAHAT in Jodhpur are empowering women to lead climate adaptation efforts through housing design solutions like reflective roofs, thereby directly addressing heat-health inequalities in vulnerable communities.

The convergence of advanced technology with traditional knowledge and community-led initiatives is thus highly crucial for effective and equitable heat resilience. Artificial intelligence and machine learning can provide macro-level insights and hyperlocal

[33] Drishya, 'Indian Architects Are Turning To Ancient Cooling Methods To Design For A Warmer Future' (*Homegrown*, 11 September 2024) <https://homegrown.co.in/homegrown-creators/indian-architects-are-turning-to-ancient-cooling-methods-to-design-for-a-warmer-future> accessed 25 May 2025

predictions, while community knowledge and citizen science can validate and supplement these models in practice, provide ground-truth data and ensure interventions are appropriate for the community and are context-specific. Consequently, this creates a feedback loop where technology informs community action and community insights refine technological applications, and such a convergence has the potential to democratize climate resilience. Empowering communities with data and tools like low-cost sensors and accessible heatwave insurance, and valuing their traditional coping mechanisms, can move beyond just a purely technocratic approach to climate and heat mitigation to one that is truly inclusive and responsive to local needs. This is highly vital for ensuring equity and inclusion in heat resilience.

Multi-Stakeholder Collaboration and Capacity Building: Effective heat governance requires coordinated action across multiple sectors and levels of government. India needs to establish formal coordination mechanisms that bring together health, labour, urban planning, disaster management, and social welfare agencies to develop integrated approaches to heat resilience. This includes strengthening the often-lacking vertical and horizontal coordination across central ministries, state departments, and Urban Local Bodies (ULBs) for the implementation of heat action plans.

To address these complexities, innovative governance concepts are emerging. The 'Chief Heat Officer' (CHO) model, for instance, is gaining global recognition for driving both short-term preparedness and long-term urban redesign. The National Disaster Management Authority (NDMA) has highlighted the need to replicate this model in India. The creation of a CHO role signifies an acknowledgement of heat as a complex, multi-sectoral challenge requiring dedicated leadership. This would move beyond ad-hoc committees to a formal, accountable position focused solely on heat, which is crucial for breaking down institutional 'silos' and integrating heat considerations into diverse policy domains.

The CHO model embodies a positive shift from reactive disaster management to proactive and integrated urban redesign. This aligns with discussions at forums like the 2025 Global Heat & Cooling Forum, which emphasise the need to institutionalise heat action plans within long-term urban development frameworks. This necessitates integrating heat resilience into urban planning, food system designs, and broader climate strategies, reinforcing the need for a multidisciplinary approach.

A key conceptual hurdle that shapes policy is the tension between acknowledging heat as primarily a disaster or an ongoing development issue. If seen as a disaster, responses lean towards emergency relief and short-term interventions. If understood as a development issue, it demands structural changes and sustained investments. The current inadequacy of HAPs stems largely from this ambiguity. The most effective approach is a hybrid one, as hinted by figures like the UN Secretary-General, which maintains robust disaster preparedness while simultaneously embedding heat resilience into all aspects of long-term development.

The roles of non-governmental actors are also critical. NGOs and civil society organisations foster community-led adaptation, advocate for stronger policies, and focus on climate justice. Examples include Sphere India's national consultations on heatwave preparedness and SEWA India's heatwave insurance program. Citizen science initiatives, such as the densely distributed meteorological sensor network established in Pune (2023), empower communities through participation in data collection, providing high-resolution data for local adaptation strategies.

The private sector has a crucial role in assessing climate impacts, such as productivity decline, and tackling them by bringing in private capital and building resilient infrastructure. The Confederation of Indian Industry (CII)'s role in promoting the green buildings movement, resulting in over 14,000 projects, is a good example of this potential. This highlights the clear necessity for public-private partnerships to co-develop solutions.

The table below summarises the distinct but complementary roles of these key stakeholders:

Stakeholder	**Key Roles in Heat Governance**	**Examples from Text**
Government	- Establish formal coordination mechanisms (e.g., CHO). - Integrate heat into long-term policy (urban	- NDMA highlighting the CHO model. - ULBs implementing local plans.

	planning, labour laws). - Implement and enforce HAPs. - Provide capacity building for local officials.	- Discussions at the Global Heat & Cooling Forum.
NGOs & Civil Society	- Foster community-led adaptation and climate justice. - Advocate for policy and raise public awareness. - Pilot innovative solutions (e.g., insurance). - Facilitate citizen science and data collection.	- SEWA India's heatwave insurance program. - Sphere India's national consultations. - Pune's meteorological sensor network.
Private Sector	- Invest private capital in resilient infrastructure. - Assess and mitigate climate impacts on business operations. - Drive innovation in sustainable building and technology. - Participate in public-private partnerships.	- Confederation of Indian Industry (CII) is promoting the green buildings movement.

Finally, these coordination mechanisms must be supported by significant investments in capacity building, particularly at the local government level where implementation occurs. This includes training for municipal officials, healthcare workers, and community leaders on risk assessment and response, alongside developing the technical expertise needed for effective heat governance in areas like climate data analysis and heat-resilient urban design.

Innovative Financing Mechanisms for Heat Resilience: Addressing India's heat crisis will require significant financial resources for both immediate interventions and longer-term structural changes. The Ministry of Home Affairs' 2024 decision to include heatwaves as a nationally eligible disaster for receiving project-based funding under the State Disaster Mitigation Fund represents an important step forward, which should lead to additional financing mechanisms in the sector. States should seriously consider establishing dedicated heat resilience funds that pool resources from various sources, including central and state government allocations, international climate finance and private sector contributions. Innovative social protection models like SEWA India's pioneering heatwave insurance program for informal sector women workers provide financial support during extreme heat and offer valuable lessons for scaling up such initiatives.[34] Similarly, innovative financing mechanisms such as heat resilience bonds, which link financial returns to specific heat-related outcomes, could help mobilise additional resources while ensuring accountability for the results.[35] While challenges such as a lack of private sector mobilisation strategy and transparency persist, exploring these avenues is still highly crucial. The ideal is for targeted finance to tackle heat and protect livelihoods, while simultaneously sustaining economic growth and creating jobs.

Crucially, these financing mechanisms must be designed with explicit equity criteria. Without this, there is a risk that private investment or large-scale projects might bypass or even disadvantage the most vulnerable communities, who often lack the collateral or political leverage to attract such funding. The challenge is not just how much money is supplied, but how it is channelled to address the deeply stratified nature of heat impacts in India and to ensure that solutions reach those most in need to prevent further amplification and entrenchment of socio-economic disparities.

[34] Reema Nanavaty and Prerna Saxena, 'How Heatwaves Have Sparked New Ways for Women Farmers in India to Protect Their Crops' (*World Economic Forum*, 25 March 2025) <https://www.weforum.org/stories/2025/03/the-heatwave-that-sparked-a-new-era-for-women-workers-in-india/> accessed 25 May 2025

[35] Dr. Sutandra Singha, 'Just Transition, Climate Change, And India: A Mid-2025 Perspective' (*Eurasia Review*, 25 June 2025) <https://www.eurasiareview.com/25062025-just-transition-climate-change-and-india-a-mid-2025-perspective/> accessed 25 May 2025

CONCLUSION

India's heat crisis represents a profound challenge to our constitutional rights and social equity. The disproportionate impact of rising temperatures on marginalised communities reflects and reinforces already existing patterns of social exclusion and vulnerability. Despite recent judicial recognition of climate protection as a constitutional right, significant gaps remain in India's heat governance framework and addressing these gaps requires a fundamental shift from reactive and generic approaches to proactive and vulnerability-centred governance that prioritises the needs of the most at-risk populations.

A large-scale systemic shift such as this must be supported by robust legal and regulatory frameworks, institutional coordination mechanisms, significant investments in urban cooling infrastructure and social support systems. There exists a fundamental constitutional imperative to protect the right to life amidst intensifying heat extremes, and it necessitates that for its meaningful realisation, it must extend to a comprehensive, multi-sectoral and financially robust heat-resilient governance. This would further necessitate measures such as leveraging advanced data and technology for granular vulnerability mapping and prediction, integrating nature-based and passive cooling solutions into urban planning, ensuring equitable financing through innovative mechanisms and fostering robust multi-stakeholder partnerships across government, civil society and the private sector. By embracing such integrated strategies, India can move towards a truly heat-resilient and just future, ensuring the right to life is meaningfully upheld for all. Future legislative efforts should focus on codifying these strategies into a national framework for heat resilience, while continued interdisciplinary research will be essential to refine and adapt these approaches as the climate crisis evolves.