

Climate Change and India's Cities: Judicial Responses Through the Lens of Sustainability Transformations

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Abstract

Cities and urban communities constitute a challenging paradox. Both are contributors to climate change and simultaneously are essential focal bases for economic activity. Urbanization, population growth, economic development, and prosperity contribute to increased city greenhouse gas emissions. Envisioning and shaping a shift toward more ambitious climate responses is both an opportunity and a challenge for cities to action transformations toward sustainability. The discourse on sustainability transformations involves the reorientation and restructuring of governance processes and actions. Though the governance of transformation involves multiple actors, this article examines the role of the Indian judiciary in steering a transformation process toward a sustainable and equitable future. Indian city-and-climate change case law is examined as a case study. Sectoral examples from construction, waste, livestock, transport, and renewable energy illustrate key areas addressed through the judicial incremental-reformist approach. Bolstering the implementation and enforcement of environmental and climate laws alongside the infusion of a powerful sustainability agenda, the Indian judiciary creates enabling conditions for transformational change.

Keywords

India, cities and climate change, case law, sustainability transformations, incremental-reformist dimensions, sectoral examples (construction, waste, livestock, transport, renewable energy).

1. Introduction

Cities and urban communities present a challenging climatic paradox. Both are contributors to climate change and simultaneously essential focal bases for economic activity. The OECD defines 'cities and settlements' as concentrated human habitation centres (along a dynamic continuum from rural to urban) that are fundamentally interconnected to other urban centres and rural areas as nodes within broader networks.¹ According to the World Bank (2023), between 1970 and 2021, the global urban population increased from 1.19 billion to 4.46 billion, and, by 2050, nearly 70 per cent

¹ IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by Hans-Otto Pörtner et al., (Cambridge UK: Cambridge University Press, 2022), at 914
https://report.ipcc.ch/ar6/wg2/IPCC_AR6_WGII_FullReport.pdf.

of the world's population will live in cities.² In India, the current urban population accounts for 36.3 per cent (518 million) of the national population (1,436 million).³

Cities are increasingly creative engines of growth and prosperity whilst at the same time being hubs of consumption. Urbanization, population growth, economic development, and prosperity contribute to increased city greenhouse gas emissions. Though all cities are at a risk from climate change, it is the low- and lower-middle-income countries that face the highest exposure to climate-induced hazards. These include floods, heat stress, tropical cyclones, sea-level rise, water stress, and wildfires.⁴ For instance, more than one billion people live in urban slums and informal settlements, where they face the brunt of climate vulnerability.⁵ The unprecedented climate change hazards combined with vulnerability and exposure in cities pose local and sustainability challenges that result in reduced urban liveability, exacerbated inequality, and damaged infrastructures.⁶

According to the 2023 report of the Centre for Science and Environment, India, between 1 January and 30 September 2023, experienced extreme weather events that claimed 2,923 lives, affected 1.84 million hectares of crop area, damaged 80,563 houses, and killed over 92,519 animals.⁷ The projected climate change impact from 2036 to 2057 for 57 Indian cities indicates that 33 are likely to experience extreme precipitation and flood risk and 24 will face higher drought risk due to reduced rainfall.⁸ On 4 December 2023, Chennai experienced over 40 centimetres of rainfall in 48 hours due to cyclone Michaung. It resulted in extensive damage and loss of life.⁹ Mumbai also faces a rising sea level and an inland-flooding climate crisis. The city, with a population of 20 million people, is the world's eighth most populous coastal city. Forty-two per cent of Mumbai dwellers live in slums occupying 12 per cent of its total geographic area, making it the largest slum in Asia. Rising sea levels, cyclonic storms, and heavy rains result in lethal inland flash floods affecting the urban poor residing in informal or slum settlements.¹⁰ The megacity of Kolkata faces multiple climatic risks, of rising sea level, flooding, excessive heat, and disaster-related mortality. Kolkata lost a substantial portion of its green cover during cyclone Amphan (2020), with an estimated damage of US\$13.4

² Megha Mukim and Mark Roberts, *Thriving: Making Cities Green, Resilient, and Inclusive in a Changing Climate* (Washington DC: World Bank 2023), at xvii.

³ Worldometer, India Population Live, <https://www.worldometers.info/world-population/india-population/>.

⁴ Mukim, supra n.2.

⁵ UN-Habitat, *COP27 Cities and Climate Change* (2022), <https://unhabitat.org/cities-and-climate-change>

⁶ Brenda B Lin et al., 'Integrating solutions to adapt cities for climate change', 5(7) *The Lancet Planetary Health* e479 (2021). See also Heather Anu Kramer et al., 'High wildfire damage in interface communities in California', 28 *International Journal of Wildland Fire* 641(2019); Alice Newton, Tim J B Carruthers and John Icely, 'The coastal syndromes and hotspots on the coast', 96 *Estuarine, Coastal and Shelf Science* 39 (2012).

⁷ Centre for Science and Environment, *Climate India 2023: An Assessment of Extreme Weather Events January- September* (New Delhi: Down to Earth 2023), at 10.

⁸ Rajveer Kaur and Puneeta Pandey, 'Air Pollution, Climate Change, and Human Health in Indian Cities: A Brief Review', 3 *Frontiers in Sustainable Cities* 1 (2021), at 2.

⁹ HT News desk, 'Dozens of Cities in India likely to go 3 feet under? Here is why', *Hindustan Times*, 7 December 2023, <https://www.hindustantimes.com/environment/dozen-cities-india-3-feet-under-why-101701919642629.html>.

¹⁰ Quaid Najmi, 'Climate Change @ 2050; Why Mumbai may get that 'sinking feeling'', *Business Standard*, 13 November 2022, https://www.business-standard.com/article/current-affairs/climate-change-2050-why-mumbai-may-get-that-sinking-feeling-122111300289_1.html.

billion and 2.4 million people displaced.¹¹ The IPCC's Sixth Assessment Report states that the evidence from Kolkata demonstrates the 'limitation of resilience plans to address underlying conditions of climate vulnerability, including the commodification of hazardous land, under-provision of informal settlements and spatial segregation of the urban poor'.¹²

Heatwaves in India will become more intense and frequent as climate change progresses. According to an Indian Meteorological Report (2023), India witnessed a rise of 34 per cent in deaths due to heat waves in the period 2012-2022 as compared with 2003-2012.¹³ Nearly 10,000 people died due to heat waves in northern India in 2002-2022.¹⁴ In New Delhi and Ahmedabad, the urban heat island effect is caused by sprawling developments and heat-intensifying paved surfaces that trap heat. The heat effects are unevenly distributed in built-up areas, where the temperature can be hotter than in peri-urban areas and rural surroundings. Cities including Chennai, Hyderabad, and Surat face the compound effect of climate change and vulnerability in the form of severe and intense heatwaves leading to heat stroke and death.¹⁵

Increasingly, in the face of the intensifying climate crisis, the international community recognizes that cities around the world need to unite and become 'vocal advocates of climate action'¹⁶ and 'platforms for networking and communication'.¹⁷ For instance, C40, a global network of 96 cities, which claims to account for more than 20 per cent of the global economy, confronts the climate crisis by implementing progressive and equitable climate action through partnerships, programmes, and access to global data on cities.¹⁸ The Global Covenant of Mayors for Energy and Climate Change epitomizes this trend to combat climate change through collaboration. This network, with 13,261 cities from six continents and 144 countries with a total population of 1.23 billion, works toward a low-emission and climate-resilient future.¹⁹

Within individual but different socio-spatial contexts, cities can make a distinctive contribution to accelerating climate action. Envisioning and shaping a shift toward more ambitious climate responses is both an opportunity and a challenge for cities to action transformations toward sustainability. 'Experimentation, learning and upscaling, partly because they are embedded in networks at national and global level [and] proximity for

¹¹ Martina Angela Caretta et al., '2022 Water' in IPCC supra n.1, at 590.

¹² IPCC, supra n. 1, at 982.

¹³ Robert Mizo, 'Riding the heatwave: India's sweltering exposure to climate change', *Global Outlook Toda Peace Institute*, 13 July 2023, <https://toda.org/global-outlook/2023/riding-the-heatwave-indias-sweltering-exposure-to-climate-change.html>.

¹⁴ Ibid.

¹⁵ Madhavi Jain, 'Two decades of night time surface urban heat island intensity analysis over nine major populated cities of India and implications for heat stress', 5:1084573 *Frontiers in Sustainable Cities* 1 (2023); India Meteorological Department, *Annual Report 2021*, Ministry of Earth Sciences, Government of India (2021) https://mausam.imd.gov.in/imd_latest/contents/ar2021.pdf

¹⁶ Mukim, supra n. 2, at 1.

¹⁷ European Environment Agency (EEA), *Perspectives on transitions to sustainability*, EEA Report No. 25/2017 26 (2018).

¹⁸ C40 Cities,

https://www.c40.org/?gclid=CjwKCAiAqNSsBhAvEiwAn_tmxScA4daX6_IPxRhcN34iPTDmNhMcQWmbRkZ_BnU_nhkT6Pz8JUVuNB0CL4wQAvD_BwE.

¹⁹ Global Covenant of Mayors for Climate and Energy, <https://www.globalcovenantofmayors.org/>.

creating actor networks, as well as substantial governance capabilities at city level²⁰ contribute to a transformational programme.

In this context, the powerful message of transformations toward sustainability moves centre-stage due to its institutionalization within global scientific and policy discourses. The UN 2030 Agenda for Sustainable Development envisions ‘transforming our world ... a call for action to change our world’²¹ to achieve a better and sustainable future for everyone. By embedding SDGs in plans for urban cities and settlements,²² the global mission is to make communities inclusive, safe, resilient, and sustainable.

Sustainability transformations involve the reorientation and restructuring of governance processes and actions. The term ‘governance’ ‘covers the whole range of institutions and relationships involved in the process of governing’.²³ It is how ‘collective goals are chosen, decisions are made, and actions are taken to achieve those goals’.²⁴

Governance, operating at multiple levels, involving multiple actors, includes structures and processes for policy and decision-making, exercising responsibility, and ensuring accountability.²⁵ However, this article focuses on the role of the judiciary in steering a transformation process toward sustainable and equitable cities. The judiciary is identified as a crucial partner in achieving sustainability and the SDGs, under Goal 16. Judicial intervention, as a strategic tool, can effect transformative change through implementation, development, and enforcement of environmental and climate laws as well as the promotion of the sustainability agenda.

²⁰ EEA, *supra* n. 17, at 13.

²¹ UN General Assembly Resolution 70/1, *Transforming our World: The 2030 Agenda for Sustainable Development*, UN Doc. A/RES/70/1 (2015). See also TWI2050 – *The World in 2050, Transformations to Achieve the Sustainable Development Goals. Report prepared by the World in 2050 initiative*, TWI2050 (2018); United Nations Environment Programme, *Making Peace with Nature: A Scientific Blueprint to Tackle Climate, Biodiversity and Pollution Emergencies*, UNEP (2021); IPBES, *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, IPBES (2019).

²² For this article, the following SDGs are the most relevant regarding urban cities and settlements, and are present in several goals and targets- SDG 6 (clean water and sanitation), 7 (affordable and clean energy), 9 (industry, innovation and infrastructure), 11 (sustainable cities and communities), 12 (responsible consumption and production), 13 (climate action), and 16 (peace, justice and strong institutions).

²³ Andrew Jordan, ‘The governance of sustainable development: taking stock and looking forwards’, 26 *Environment and Planning C: Government and Policy* 17 (2018), at 21. See also, Frank Biermann et al. ‘Earth system governance: a research framework’, 10 *International Environmental Agreements* 277 (2010), at 279. Earth System Governance Framework (ESGF) defines governance as ‘the interrelated and increasingly integrated system of formal and informal rules, rule-making systems, and actor-networks at all levels of human society (from local to global) that are set up to steer societies towards preventing, mitigating, and adapting to global and local environmental change and, in particular, earth system transformation, within the normative context of sustainable development’.

²⁴ Barbara A. Cosens et al. ‘The role of law in adaptive governance’, 22(1) *Ecology and Society* 1(2017), at 1.

²⁵ James Patterson et al., ‘Exploring the governance and politics of transformations towards sustainability’, 24 *Environmental Innovation and Societal Transitions* 1 (2017), at 3; Jordan, *supra* n. 23, at 22. See also, Brian J Preston, ‘Changing climate law and governance: A multi-level perspective’, 00 *Global Policy* 1 (2023).

This article advances my earlier published work²⁶ that approached climate litigation in a novel way that ties together sustainability transformations, environmental rule of law, and the Indian judiciary. Acknowledging and building on authoritative works,²⁷ the term climate litigation has been used in the broadest sense to include cases relating to ‘raise material issues of law or fact relating to climate change mitigation, adaptation, or the science of climate change’, ‘cases that seek to accomplish goals arguably related to climate change adaptation or mitigation but that do not depend on the climate change dimensions of those goals’, ‘climate change cases touching all aspects of life’ and ‘use of climate language in the court judgments’. Consequently, the case selection found in this article is based on the presence of these terms in recorded judgments of the Indian Supreme Court, High Courts, and the National Green Tribunal (NGT). Herein, Indian cities and climate change case law is examined as a case study through transformative discourse. The article’s Section 2 weaves together the narrative of sustainability transformations, climate change, and cities to produce coherent responses for transformative change. Section 3 analyses illustrative Indian sectoral cities-and-climate cases, drawing from the sectors of construction and infrastructure development, water, energy, transport, and renewable energy. These progressive cumulative judicial decisions, albeit incremental and reformist, promote conditions for transformative change.

2. Interconnections: Sustainability Transformations, Climate Change, and Cities

Transformations, which are defined as ‘physical and/or qualitative changes in form, structure or meaning-making ... can also be understood as a psycho-social process involving the unleashing of human potential to commit, care and effect change for a better life’.²⁸ They involve social and technological innovations driven by multiple forms of knowledge in pursuit of desirable (sustainable) futures:

[An] organised, top-down managed process towards a certain goal in a given sector or as a radical, bottom-up perspective to change ... [It] includes the active construction of new practices and new meanings ... and involves an intention to change a situation to a more beneficial state.²⁹

²⁶ Gitanjali Nain Gill and Gopichandran Ramachandran, ‘Sustainability transformations, environmental rule of law, and the Indian judiciary: Connecting the dots through climate change litigation’, 23(2) *Environmental Law Review* 228 (2021).

²⁷ See, United Nations Environment Programme, *Global Climate Litigation Report: 2023 Status Review*, UNEP and Sabin Centre for Climate Change Law (2023); Joana Setzer and Catherine Higham, *Global Trends in climate change litigation: 2023 snapshot*, Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy, London School of Economics and Political Science (2023); United Nations Environment Programme, *Global Climate Litigation Report: 2020 Status Review*, UNEP and Sabin Centre for Climate Change Law (2020); Asian Development Bank, *Climate Change, Coming Soon to a Court Near You: Climate Litigation in Asia and the Pacific and Beyond*, ADB (2020); Jacqueline Peel and Hari M. Osofsky, ‘Climate Change Litigation’, 16 *Annual Review of Law and Social Science* 21 (2020); Joana Setzer and Lisa C. Vanhala, ‘Climate change litigation: A review of research on courts and litigants in climate governance’, 10(3): e580 *Wiley Interdisciplinary Review on Climate Change* 1 (2019).

²⁸ Karen O’Brien, ‘Global environmental change II: From adaptation to deliberate transformation’, 36 (5) *Progress in Human Geography* 667 (2021), at 670.

²⁹ Sara Grenni, Katriina Soini and Lummina G. Horlings, ‘The inner dimension of sustainability transformation: how sense of place and values can support sustainable place-shaping’ 15 *Sustainability Science* 411 (2020), at 412. However, for a critique on transformations, see Giuseppe Feola, ‘Societal

Drawing on a rich academic literature, Patterson and colleagues define transformations toward sustainability as

fundamental changes in structural, functional, relational, and cognitive aspects of systems that lead to new patterns of interactions and outcomes ... It places an explicit focus on the processes of change in human society involved in moving towards more sustainable and equitable futures, which can be approached in both a normative way (e.g. as a good/desirable thing to do) as well as an analytical way (what actually 'happens', and how and why).³⁰

Transformations toward sustainability deal with actions that strike at the roots of unsustainability, resulting in radical shifts in society's value-normative systems, simultaneously shifting relationships across personal, political, and practical levels.

Academic literature reflects a body of active discordant opinion about the type and degree of transformational change. However, that debate extends beyond the scope of this article.³¹ Incremental, reformist, and radical are three strategic interventions for change. Incremental change represents the 'growing awareness to make adjustments that allow the usual state of affairs to continue'.³² This involves 'small adjustments made in response to perceived or expected changes',³³ or 'slow, step by step, short term changes'³⁴ within existing boundaries in the face of a changing context and uncertainty.³⁵ Reformist (also referred to as transitional) involves an 'intention to change the features that cause the problems without fundamentally changing the structures'.³⁶ It produces precise and deliberate enabling blocks to support incremental changes to modify and reshape the existing landscape for improvement. By generating technical solutions and new knowledge, it provides solutions to the problem without significantly offering a different version of future action.

Incremental-reformist change is a safer and more predictable journey, and results in gradual but continuous improvement over an extended period. Radical change leads to a new system of 'alterations that have systemic consequences and are considered as structural shifts that challenge our assumptions, beliefs, and values, along with

transformation in response to global environmental change: A review of emerging concepts', 44 *Ambio* 376 (2015).

³⁰ Patterson, supra n.25, at 2.

³¹ Catrein J.A.M. Termeer, Art Dewulf and G. Robbert Biesbroek, 'Transformational change: governance interventions for climate change adaptation from a continuous change perspective', 60(4) *Journal of Environmental Planning and Management* 558 (2017); Robert W. Kates, William R. Travis and Thomas J. Wilbanks, 'Transformational adaptation when incremental adaptations to climate change are insufficient', 109(19) *Proceedings of National Academy Science USA* 7156 (2012); Sarah Park, Stuart M. Howden and Steven Crimp, 'Informing regional level policy development and actions for increased adaptive capacity in rural livelihoods', 15(1) *Environmental Science and Policy* 23 (2012).

³² Initiative for Climate Action Transparency (ICAT), *Transformational Change Methodology: Assessing the Transformational Impacts of Policies and Actions*, ICAT Series of Assessment Guides UNEP DTU Partnership (2020), at 14.

³³ EEA, supra n.17, at 32.

³⁴ Termeer, supra n.31, at 563.

³⁵ Julia Loginova and Simon P.J. Batterbury, 'Incremental, transitional and transformational adaptation to climate change in resource extraction regions', 2 e17 *Global Sustainability* 1 (2019), at 2.

³⁶ ICAT, supra n. 32.

government regimes, development paradigms, and power relations'.³⁷ In sustainability transformations discourse, radical actions are prioritized over incremental and reformist actions. Termeer states that 'changing the system by adding or adjusting some instruments, processes, or structures, without altering the taken-for-granted frames of reference, is deemed insufficient'.³⁸ However, the realities of actioning in-depth, quick, and large-scale radical changes are not easy. Radical change can be reactive, resisted, and trigger organizational crisis, thereby creating discontinuity. Despite increasing interest in Western societies for radical change, the position differs in developing and emerging economies. The questions about 'which transformation?', 'for whom?', and 'by whom?' are of relevance within these economies. High population densities, basic human needs, and fragile infrastructures create complex transformational challenges to reconfigure the relationship between nature, people, resource consumption, and emissions.³⁹

The sequenced combination of the three forms of change within the broader narrative of the transformative agenda may nonetheless provides enabling conditions that have the potential to cumulate into more substantial transformation over time.⁴⁰ In developing countries, cumulative and manageable transformational change through incremental-reformist action might be more effective in supporting a new equilibrium and sustained progress. Incremental-reformist changes 'when effective, do not necessarily stay small ... indeed, they can amplify and cumulate into large-scale change'⁴¹ having systemic outcomes rather than sweeping radical initiatives. Thus, embedding hybrid transformations would provide pathways, varying across nations, regions, and contexts, tending toward a sustainable future.

From a climate change perspective, the discourse on transformation as a pressing societal response is intensifying. It entails 'fundamental change in systems relevant to climate action, with large-scale positive impacts that shift and accelerate the trajectory of progress towards climate-neutral, inclusive, resilient, and sustainable development pathways'.⁴² As a complex process, transformation toward climate action presents both opportunities and risks for changes at organizational, institutional, cultural, and systems levels. Opportunity is associated with a green economy, creativity and innovation, and enhanced well-being. Risk may include unmanageable change due to disturbance and disorder, as well as powerful vested interests taking advantage of multitudinous crises.⁴³

Despite transformation not being a neutral process, it is increasingly presented as a solution to climate sustainability and societal change. Transformational change requires urgent and systemic societal change to produce far-reaching solutions that meet the

³⁷ Nathan J. Bennett et al. 'Just Transformations to Sustainability', 11(3881) *Sustainability* 1(2019), at 2.

³⁸ Termeer, supra n.31, at 561.

³⁹ United Nations, *Transformations for Sustainable Development: Promoting Environmental Sustainability in Asia and the Pacific*, UN ESCAP, UNEP, United Nations University and the Institute for Global and Environmental Strategies (2016), at 14.

⁴⁰ Climate Investment Funds (CIF), *Transformational Change Concepts: Transformational Change Learning Brief*, CIF (2021), at 9.

⁴¹ Termeer, supra n.31, at 564.

⁴² CIF, supra n. 40, at 6.

⁴³ University of Oslo, 'Proceedings of Transformation in a Changing Climate' (University of Oslo 19-21 June 2013), at 4.

Paris Agreement global warming limitation goals and avoid carbon lock-in and dependence on fossil fuels. According to the Initiative for Climate Action Transparency, envisioning and shaping a shift toward more ambitious mitigation and adaptation efforts in climate change involves a four-pronged approach that includes ‘technology change, agents of change, incentives for change and norms of behavioural change’.⁴⁴ These terms are explained:

Technology change involves processes, skills and practices that drive research and development, and early adoption and widespread scale-up of clean technologies; agents of change are the governments, entrepreneurs, the private sector and civil society, as well as cross-cutting coalitions and networks; incentives for change entail economic and non-economic incentives, along with disincentives, which play a critical role in shifting technology and societal change; norms and behavioural change include processes that influence awareness and behaviour of people to drive a long-lasting change in societal norms and practices.⁴⁵

This approach would help evaluate transformational change that addresses climate change in a more ‘real, consistently identifiable and lasting’⁴⁶ manner. These dimensions include

relevance (alignment with context and opportunities to advance transformational change goals); systemic change (fundamental shifts in system structures and functions); speed (accelerate or decelerate impacts to achieve the appropriate speed of change); scale (contextually large transformational change processes and impacts); and adaptive sustainability (robustness, resilience, and adaptiveness of change).⁴⁷

Thus, evaluation would provide foundations of ‘collaboration, learning, and sharing to advance [the] collective knowledge and skills and reward the piloting of new approaches’⁴⁸ to address the climate crisis in a better-informed and coordinated way.

Contextualizing this within cities, the urban systems are ‘relational, situational, multi-dimensional and continuously shifting’⁴⁹ due to complexities and contestation. The transformational change needs to ensure climate actions that are robust, improve resilience, move toward low-carbon or net-zero strategies for a lasting effect, and are equitable. The ‘dynamic integration of social, economic, and environmental factors ... recognises the importance for people, systems, and change processes to have the capacity to be responsive to changing circumstances and evolving needs over time’.⁵⁰ Factors including local urban context, vulnerabilities, histories, and cultures need to be addressed within the long-term, climate-transformative agenda.⁵¹ An integrated

⁴⁴ ICAT, supra n. 32, at 15-16.

⁴⁵ Ibid.

⁴⁶ Anna Williams et al., ‘Advancing Evaluation and Learning on Transformational Change: Lessons from the Climate Investment Funds’ Transformational Change Learning Partnership’, 42(1) *American Journal of Evaluation* 90 (2021), at 93.

⁴⁷ CIF, supra n.40, at 7-10.

⁴⁸ Williams, supra n. 46, at 103.

⁴⁹ Marius Pieterse, ‘Human Rights Cities in Africa? Rights as a Source of Urban Governance in the Global South’, 50 (4) *Journal of Law and Society* 538 (2023), at 542.

⁵⁰ CIF, supra n.40, at 10.

⁵¹ Aromar Revi, ‘Making adaptation work for the cities’, 3 *One Earth*, 384 (2020), at 384.

approach that combines ‘collaboration, empowerment, creativity and flexibility’⁵² can generate enabling conditions for change. This approach includes devolution of power, authority, and resources from the central and regional to the local level,⁵³ new policies, power, and responsibilities to local government,⁵⁴ stakeholder platforms of networking between citizens, firms, local governments, and non-governmental organizations,⁵⁵ and profound consideration of equity, urban equality, and the interests of disadvantaged and vulnerable groups.⁵⁶ This would provide pathways of transformational systemic change that would be deep, long-term, effective, equitable, and sustainable.

In this regard, city governance is crucial to steer and reconfigure climate action responses for transformative change. The cities, through empowered and improved governance interventions, provide pathways to develop and implement both short- and long-term integrated solutions for urban climate-sustainability transformations. The normative perspective requires ‘good governance ... associated with an efficient public service, an independent judiciary, a respect for law and order, as well as human rights’.⁵⁷ Robust judiciaries underpinned by the rule of law can promote good governance and help realize this vision to support solidarity, respect for all, and shared responsibility.

3. India’s Judiciary and Cities-and-Climate Change Through a Transformative Discourse

Climate litigation is increasing⁵⁸ and so is talk about it in the global discourse on climate jurisprudence.⁵⁹ Illustrative global climate change thematic litigation focuses on issues of rights-based litigation,⁶⁰ enforcement of statutory and executive commitments

⁵² EEA, n.17 above, 39.

⁵³ Patricia McCarney et al., ‘Cities and climate change: the challenges for governance’, in *Climate Change and Cities: First Assessment Report of the Urban Climate Change Research Network*, edited by Cynthia Rosenzweig et al., (Cambridge, UK: Cambridge University Press 2011), at 250.

⁵⁴ *Ibid*, at 266.

⁵⁵ EEA, *supra* n.17, at 26.

⁵⁶ Isabelle Anguelovski, ‘Just and transformative urban adaptation’, 3 *One Earth*, 384 (2020), at 385.

⁵⁷ United Nations Office on Drugs and Crime, *Commentary on the Bangalore Principles of Judicial Conduct*, UN (2007), at 5. The Bangalore Principles highlight seven core values: independence, impartiality, integrity, propriety, equality, competence, and diligence.

⁵⁸ As of May 2023, there were 2,341 cases on climate change litigation captured by Sabin Centre climate change litigation database, https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2023/06/Global_trends_in_climate_change_litigation_2023_snapshot.pdf

⁵⁹ Melanie Jean Murcott and Maria Antonia Tigre, ‘Developments, Opportunities, and Complexities in Global South Climate Litigation: Introduction to the Special Collection’, *huad070 Journal of Human Rights Practice* 1 (2024); Melanie Jean Murcott, ‘Emerging Climate Law and Governance Measures in South Africa: A Clash Between Policy and Practice?’, 12 *IUCN AEL Journal of Environmental Law* 76 (2022); Ivano Alogna, Christine Bakker and Jean-Pierre Gauci, *Climate Change Litigation: Global Perspective* (Brill, 2021); Brian J. Preston, ‘The influence of the Paris Agreement on Climate Litigation: Legal Obligations and Norms (Part I)’, 33 (1) *Journal of Environmental Law* 1 (2020), and ‘The influence of the Paris Agreement on climate litigation: causation, corporate governance and catalyst (Part II)’, 33 (2) *Journal of Environmental Law* 1 (2020); Benoit Mayer, ‘The State of the Netherlands v. Urgenda Foundation: ruling of the court of appeal of The Hague (9 October 2018)’, (2019) 8(1) *Transnational Environmental Law* 167 (2019).

⁶⁰ These include standing, right to a healthy life and environment, intra- and inter-generational equity, public trust doctrine and rights of nature. See, *Daniel Billy and others v. Australia (Torres Strait Islanders Petition)*, United Nations Human Rights Committee, CCPR/C/135/D/3624/2019, 23 September 2022;

relating to climate change,⁶¹ adaptation and its impacts,⁶² corporate liability and responsibility, especially of the fossil-fuel producers,⁶³ and climate vulnerability, including that of indigenous communities, women, and children.⁶⁴

India does not have comprehensive climate legislation, although several environmental acts address different facets of climate change.⁶⁵ Court cases on climate change have used a climate lexicon located within the broader meaning of environment, human and constitutional rights, disaster management, resource conservation, and enforcement of environmental and planning legislation.⁶⁶ However, in recent times Indian judicial intervention is being vitalized by incorporating the sustainable development principle and SDGs, thereby proactively facilitating transformational environmental and climate outcomes. For example, in *Hanuman Laxman Aroskar v. Union of India* (2019),⁶⁷ Judge Chandrachud (the current Chief Justice) stated that

to pursue the 2030 Agenda and the SDGs ... ‘transformative change’ which reconfigures basic social and production systems and structures is needed. This includes well-designed policies on institutional frameworks, social practices, cultural norms and values along with their implementation, compliance and enforcement.⁶⁸

Neubauer v. Germany, Federal Constitutional Court of Germany, 29 April 2021; *Steinmetz v. Germany*, Federal Constitutional Court of Germany, 24 January 2022; *Youth Verdict v. Waratah Coal* [2020] QLC 33; *Urgenda Foundation v. The State of The Netherlands* The Supreme Court of the Netherlands, Case No. 19/00135 (20 December 2019); *Leghari v. Federation of Pakistan* PLD (2018) Lahore 364

⁶¹ *PSB et al. v. Brazil (on Climate Fund)* [2022] ADPF 708, 11 July 2022; *Students for Climate Solutions Inc v. Minister of Energy and Resources New Zealand*, [2022] NZHC 2116; *KEPCO Bylong Australia v. Independent Planning Commission and Bylong Valley Protection Alliance*, Court of Appeal of Australia, [2021] NSWCA 216, *Gloucester Resources Limited v. Minister for Planning* [2019] NSWLEC 7.

⁶² *The Climate Movement v. Ministry of Transportation*, Western High Court of Denmark, 22 October 2021 (pending); *Asociación Civil por la Justicia Ambiental v. Province of Entre Ríos, et al. (Delta del Paraná case)*, (2020) CSJ 542/2020 Supreme Court of Argentina (Argentina).

⁶³ *Smith v. Fonterra Co-Operative Group Limited*, [2022] NZSC 35; *Milieudefensie et al. v. Royal Dutch Shell plc.*, The Hague District Court, C/09/571932/HA ZA 19-379 (26 May 2021); *ASA Ruling on Ryanair Ltd t/a Ryanair Ltd*, Advertising Standards Authority, Complaint No. G19-1035778, 5 February 2020 (United Kingdom of Great Britain and Northern Ireland).

⁶⁴ *Women from Huasco and Others v. the Government of Chile, Ministry of Energy, Environment and Health*, Court of Appeal of Copiapo, No. 323-2021 (7 May 2022); *Santos NA Barossa Pty Ltd v. Tipakalippa* [2022] FCAFC 193; *Association of Swiss Senior Women for Climate Protection v. Federal Department of the Environment Transport, Energy and Communications*, Federal Supreme Court of Switzerland, Case No. A-2992/2017 (26 November 2020).

⁶⁵ The acts include water, air and environment, electricity and energy efficiency, disaster management and forests. See also, C. Bhushan and T. Gopalakrishnan, *Environmental laws and climate action: A case for enacting a framework climate legislation in India*, (New Delhi: International Forum for Environment, Sustainability and Technology, 2021).

⁶⁶ Shibani Ghosh, ‘Climate Litigation in India’, in *Comparative Climate Change Litigation: Beyond the Usual Suspects*, edited by Franseco Sindico and Makane Moise Mbengue (eds) (Springer 2021), at 347–367; and ‘Litigating Climate Claims in India’, 114 *American Journal of International Law Unbound* 45 (2019), at 45; Jacquelin Peel and Jolene Lin, ‘Transnational Climate Litigation: The Contribution of the Global South’, 113(4) *American Journal of International Law* 679 (2019), at 683.

⁶⁷ 2019 SCC OnLine SC 441. SCC (Supreme Court Cases) is an authoritative commercial, subscription legal database for reported cases. It covers judgments of the Indian superior courts (Supreme Court and High Courts) and the National Green Tribunal. The language of the courts and the reported cases is in English. The citation is (year) SCC (OnLine database) (the court) (page number), <https://www.scconline.com/>.

⁶⁸ *Ibid*, at para 167.

Consequently, courts aim to prioritize and enforce sustainability. This is the *raison d'être* which drives judicial decision-making in environmental and climate cases. In several judgments, the Indian judiciary has stated that the

concept of 'Sustainable Development' apart from being enforceable under Section 20 of the National Green Tribunal Act is also a component of Article 21 of the Constitution (a fundamental right), which in turn creates reciprocal duties on the state authorities. This is required to be read into every Statute or Policy. This requirement is inherent.⁶⁹

Though this judicial trend is welcome, the conceptualization and operationalization of sustainable development raise important challenges about its definition as well as complex competing synergies and trade-offs. There is scholarship that critiques sustainable development and the SDGs, but addressing it is beyond the purview of this article.⁷⁰ Nevertheless, the Indian judiciary is obligated by constitutional and statutory law to follow a pathway toward sustainable development and the SDGs.

The role of the judiciary as an instigator and facilitator of sustainability transformations can help move society onto a sustainable trajectory. Independent, strong, and specialized judiciaries can provide steadfast foundations in climate change litigation.⁷¹ The Indian courts are concerned with making transformational decisions involving both 'processes and outcomes'.⁷² Processes include making public authorities accountable for their actions or omissions that produce unsustainable practices, non-implementation, and non-enforcement of laws. Desirable outcomes encourage and promote the sustainability agenda in line with the SDGs. This duality allows the judiciary to pursue sustainable development and sustainability.

⁶⁹ *Varun Gulati v. Union of India* 2023 SCC OnLine NGT 163; *Arti v. Central Ground Water Authority* 2023 SCC OnLine NGT 24; *Madhya Pradesh High Court Advocates Bar Association v. Union of India* 2022 SCC OnLine SC 639; *Ashish Kumar Garg v. State of Uttarakhand* 2022 SCC OnLine Utt 1074; *Shashikant Vithal Kamble v. Union of India* 2022 SCC OnLine NGT 292; *Reliance Infrastructure Limited v. Uttar Pradesh Pollution Control Board* 2021 SCC OnLine NGT 1810; *Srishti Kumar v. State of Uttar Pradesh* 2021 SCC OnLine NGT 475; *Shubhendra Kumar Pandey v. v National Highway Authority of India* 2021 SCC OnLine NGT 4475; *Nitin Singh Solanki v. State of Madhya Pradesh* 2021 SCC OnLine NGT 2010; *Nagarik Upbhokta Margdarshan Manch v. State of M.P.* 2020 SCC OnLine NGT 1324; *State of Himachal Pradesh v. Bhag Singh* 2020 SCC OnLine HP 2680; *Society for Protection of Culture, Heritage, Environment, Traditions and Promotion of National Awareness v. National Highway Authority of India* 2019 SCC OnLine NGT 1779.

⁷⁰ See generally, John C Dernbach and Federico Cheever, 'Sustainable Development and Its Discontents', 4(2) *Transnational Environmental Law* 247 (2015); Seema A Johnson, 'The Sustainable Development Goals: A Universalist Promise for the Future', 146 103087 *Futures* 1 (2023); Stellina Jolly and Siddharth Singh, 'Critiquing Sustainable Development and Analyzing Avenues for Just Sustainability in India', 51 *Tex Env't LJ* 187 (2021); Michelle M. L. Lim, Peter Sogaard Jørgensen and Carina A Wyborn, 'Reframing the sustainable development goals to achieve sustainable development in the Anthropocene—a systems approach', 23(3) *Ecology and Society* 1 (2018); Emily Fisher, 'Sustainable Development and Environmental Justice: Same Planet, Different Worlds?', 26 (3) *ENVIRONS ENV'T L. & POL'Y J.* 201 (2003).

⁷¹ See Brian J. Preston, 'The contribution of the courts in tackling climate change', 28 (1) *Journal of Environmental Law* 11 (2018); and Asian Development Bank, *Climate Change, Coming Soon to a Court Near You: Climate Litigation in Asia and the Pacific and Beyond*, (ADB 2020), at x.

⁷² United Nations Research Institute for Social Development, *Policy Innovation for Transformative Change: Implementing the 2030 Agenda for Sustainable Development*, (UNRISD 2016), at 38.

As members of a dynamic adjudicatory forum, the Indian judiciary, by spotlighting sustainability, can contribute in two ways to transformations through climate change litigation. First, this may be achieved through the traditional law-enforcement and compliance processes, wherein the power of legitimacy and high standards of accountability and transparency are maintained. The judiciary's contribution to the transformative agenda is by 'bolster[ing] environmental [climate] laws and policies and strengthen[ing] the rule of law by ensuring consistent enforcement of all laws'.⁷³ Second, the judiciary, through the 'culmination of many seemingly small but strategic actions',⁷⁴ can implement a powerful sustainability agenda that direct transformative change. A people-and-planet-centred perspective employing synergetic and holistic approaches can support the sustainability agenda in judicial decision-making.⁷⁵ The affirmation, adoption, and scaling up of sustainability decisions by the judiciary can thus contribute toward transformational change. This include achieving a good life and well-being, sustainable consumption and production patterns, values of responsibility, decarbonization, reduced inequalities, and technological innovation. The overall goal is 'achieving institutional legitimacy, inclusion of previously excluded values and implementation of legal responsibilities'.⁷⁶

The Indian judiciary is slowly addressing city-climate change cases. These progressive outcomes, albeit incremental-reformist, create conditions for transformative change. Below, city-climate change cases are examined as illustrations of this trend, wherein the judiciary acts as a lever of transformation by creating sustainable niches that become enabling blocks for change. Sectoral examples are used from construction and infrastructure, waste, water, transport, and renewable energy.

3.1. Construction

The construction sector includes the following subsectors: commercial (leisure and hospitality buildings, office buildings, outdoor leisure facilities, retail buildings, and commercial construction), industrial (plants, such as chemical and pharmaceutical manufacturing, metal and material production and processing units, and waste processing), infrastructure (rail and road and related projects), energy and utilities (electricity and power, oil and gas, telecommunications, sewage infrastructure, and water infrastructure), institutional (such as educational, healthcare, institutional, research, and religious buildings), and residential (single and multi-family housing).⁷⁷ It is estimated that, by 2025, the construction industry across multiple subsectors will

⁷³ United Nations Environment Programme, *Making Peace with Nature: A Scientific Blueprint to Tackle Climate, Biodiversity and Pollution Emergencies*, (UNEP 2021), at 103.

⁷⁴ Ibid.

⁷⁵ TWI2050, supra n. 21, at 12, 20. Synergetic approach 'truly integrates all possible domains affected, focuses on trade-offs and co-benefits ... strives to harness science, technology, and innovation (STI) to accelerate progress'. Holistic approach implies 'the basic values and world view of individual societies and cultures, to their ways of interacting, their institutions, their governance...impact on every aspect of present and future societies'.

⁷⁶ Loginova, supra n. 35.

⁷⁷ Global Data Report, *India Construction Market Size, Trend Analysis by Sector, Competitive Landscape and Forecast to 2027*, (December 2023) <https://www.globaldata.com/store/report/india-construction-market-analysis/>.

reach US\$1.4 trillion, with cities accounting for 70 per cent of India's GDP.⁷⁸ India currently ranks third in the world for the construction sector, with the potential to take the lead in the next five years.⁷⁹

The government is committed to addressing India's carbon footprint under its National Action Plan on Climate Change 2008, with eight 'missions' focusing on different aspects of development, adaptation, and mitigation to enhance climate sustainability.⁸⁰ The government's ambition for sustainable transformations in construction activities is a long-term, low-carbon development strategy with fresh initiatives, especially in urban agglomerations, and also in cities with high carbon footprints.⁸¹ According to data provided to the UNFCCC in India's Third Biennial Update Report, buildings and construction account for 32 per cent of national greenhouse gas emissions.⁸² Consequently, reducing the carbon footprint or achieving a net-zero target is challenging, as it needs large-scale investment to implement appropriate green measures.

In this context, judicial responses to major construction activities in Indian cities have been made through the introduction of small systematic incremental-reformist responses within the sustainability transformations narrative. The transformational-change spectrum focuses on heightened awareness that helps understand, identify, and respond through climate change co-adaptation and mitigation strategies, thereby contributing to sustainability. For instance, judicial intervention in the construction of highways reflects a sense of awareness, connection, and responsibility toward the development and management of green corridors. Highways, with special reference to those passing through cities and towns, are not solely for transportation but are a part of the environment and socio-economic milieu reflects the overarching principle of sustainable development. They are essential for achieving progress by interconnecting cities and towns for economic growth and providing better access to services, including jobs, healthcare, and education.

⁷⁸ Invest India, *Building a Sustainable Future*, National Investment Promotion and Facilitation Agency, <https://www.investindia.gov.in/sector/construction#:~:text=The%20construction%20Industry%20in%20India%20is%20expected%20to%20reach%20%241.4,sectors%20with%20linkages%20across%20sectors.>

⁷⁹ IANS, 'India's construction sector ranks third largest: Gadkari', *Economic Times*, 13 December 2023, <https://infra.economicstimes.indiatimes.com/news/construction/indias-construction-sector-ranks-third-largest-gadkari/105964550>.

⁸⁰ The eight missions are: National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Eco-system, National Mission on Strategic Knowledge for Climate Change, National Mission for a Green India, and National Mission on Sustainable Agriculture.

⁸¹ Ministry of Environment, Forest and Climate Change, *India's long-term low-carbon development strategy*, (MoEFCC Government of India 2022), at 8-9. This includes mainstreaming adaptation measures in urban planning, enhancing energy and resource efficiency and low-carbon development measures within urban planning guidelines, policies, and bye-laws; promoting climate-responsive and resilient building design, construction and operation, and pursuing low-carbon municipal service delivery through resource efficiency and management of water, solid and liquid waste.

⁸² Ministry of Environment, Forest and Climate Change, *India: Third Biennial Update Report to the United Nations Framework Convention on Climate Change*, (MoEFCC Government of India 2022), at 190; Royal Institution of Chartered Surveyors (RICS), *Decarbonising the built environment in India: Addressing operational and embodied carbon*, *RICS Policy Paper* 2023, at 6.

In *Society for Protection of Culture, Heritage v. The National Highway Authority of India*,⁸³ the National Green Tribunal (NGT) dealt with the absence of green-belt areas on the sides of highways passing through cities and towns, and the increased concentrations of PM (particulate matter) 2.5 and PM 10 air pollution. Particulate matter also modifies atmospheric circulation, and the hydrological cycle, thereby increasing the local temperature.⁸⁴ The case related to remedial action to ensure green cover in order to minimize PM levels in the air by leaving space on the sides of national highways for tree-planting and ensuring no illegal encroachment for private gain. The NGT ordered the development and maintenance of the green corridor by following the 2009 Guidelines on Landscaping and Tree Plantation, the 2015 Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy, and the 2016 National Green Highways Mission of the Ministry of Road Transport and Highways. Green belts are an intrinsic part of the government's commitment under the Paris Agreement.⁸⁵ India's target is 'to reduce emissions intensity of its GDP by 45 percent by 2030, from 2005 level'.⁸⁶ This supports ambitious climate targets and is directly linked to the SDGs. Further, green belts maintain air quality in the interest of public health in the context of sustainable development. By coupling air pollution and climate change, the NGT developed a climate-sustainability narrative that promotes green-corridor development and management rather than highway development.

Similarly, in *Reliance Infrastructure Limited v. Uttar Pradesh Pollution Control Board*,⁸⁷ the NGT reiterated the climate-sustainability rationale of mandatory green cover on the sides of highways to mitigate the adverse impact of PM 2.5 and PM 10 and consequential health and climate challenge. These rulings suggest that the tribunal considers green highways to be the future of road design for transformative change that promotes healthy communities and helps deliver climate pledges.

Transformative change builds support for a culture of compliance and long-term climate sustainability to drive a sustainable future for present and future generations. The Indian judiciary through its checks and balances plays a crucial role in addressing climate change by holding actors responsible for their decisions that fail to reduce greenhouse gas emissions. As climate change is a collective concern, accountability is at the heart of emission reductions and the decarbonization agenda. An example is the felling of trees for the purpose of constructing smart cities. India's Smart Cities Mission, with a focus on sustainable and inclusive development, aims to 'drive economic growth and improve the quality of life of people by enabling local area development and harnessing

⁸³ 2019 SCC OnLine NGT 1779.

⁸⁴ Sunmin Park, Robert J Allen and Chul-Hee Lim, 'A likely increase in fine particulate matter and premature mortality under future climate change', 13 *Air Quality, Atmosphere and Health* 143 (2020), at 143; Weeberb J. Requia et al., 'Climate impact on ambient PM_{2.5} elemental concentration in the United States: A trend analysis over the last 30 years', 13 (1104888) *Environment International* 1 (2019), at 12; The World Bank, 'What do you need to know about climate change and air pollution', *World Bank*, 1 September 2022, <https://www.worldbank.org/en/news/feature/2022/09/01/what-you-need-to-know-about-climate-change-and-air-pollution>.

⁸⁵ 2019 SCC OnLine NGT 1779, at para 15.

⁸⁶ Government of India, *India's updated first nationally determined contribution under Paris Agreement (2021-2030)*, (Government of India 2022), at 2, <https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20Nationally%20Determined%20Contrib.pdf>.

⁸⁷ 2021 SCC OnLine NGT 1810.

technology, especially technology that leads to Smart outcomes'.⁸⁸ This includes the creation of walkable localities to reduce congestion, air pollution, and resource depletion and to create or refurbish the road network for vehicles, cyclists, and pedestrians. Trees, as a city resource, offer immense benefits that include carbon capture, air-quality improvement, and well-being. In *Re: Recent Felling of Trees in Gangtok*,⁸⁹ the Sikkim High Court, in a suo-motu petition, declared the felling of trees illegal under the Smart City project in Gangtok. The felling of 121 trees in Gangtok contradicted smart and sustainable urban green infrastructure aims. According to the court, sustainable development encompasses social and economic progress, along with climate protection, for present and future generations. Later, in *Ashish Kumar Garg v. State of Uttarakhand*,⁹⁰ the High Court of Uttarakhand endorsed the view that, because trees sequester carbon, their felling contradicts the goal of sustainable development.

The Indian judiciary, through strategic actions, has pushed urban nature-based solutions that build resilience while tackling climate-sustainability challenges. This is a positive development that accords with the International Union for Conservation of Nature (IUCN), nature-based solutions mandate. These solutions are 'actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits'.⁹¹ In cities, they provide for the creation and management of green urban spaces that not only improve environment and climate but also deliver health and well-being outcomes.⁹² For instance, 'tree cover is often used to cool transportation corridors, and regional tree cover can itself influence meso-climatic patterns'.⁹³ Effectively developed, the urban green spaces increase the delivery of ecosystem services and benefits, and reduce adverse climatic impact.

Another example involves the construction of urban high-rise buildings. Carrying capacity is a yardstick of sustainability in cities' urban planning. Originally developed by ecologists, it refers to the maximum number or density of individuals of a population that a specific area can sustainably support. It is an essential

tool for sustainable development of human settlements especially in the face of the serious environmental degradation of air, water, and land ... a threshold level of anthropopression at which decisions in the field of spatial planning can be considered consistent with principles of sustainable development pressure ... 'there is a need for

⁸⁸ Ministry of Urban Development, *Smart Cities: Mission Statement and Guideline*, (Government of India 2015), at 6.

⁸⁹ 2020 SCC OnLine Sikk 75.

⁹⁰ 2022 SCC OnLine Utt 1074. See also, *Seagull Cooling Private Ltd v. Ministry of Environment, Forest and Climate Change* 2020 SCC OnLine NGT 1599.

⁹¹ International Union for Conservation of Nature, *WCC-2016-Res-069: Defining Nature-based Solutions*, World Conservation Congress Hawai'i, (IUCN 2016). See also, United Nations Environment Programme and International Union for Conservation of Nature, *Nature-based solutions for climate change mitigation* (UNEP-IUCN 2021), at 5.

⁹² Forest Research, *Benefits of green infrastructure*, (Report to Defra and CLG Forest Research, Farnham, 2010), at 7-13.

⁹³ Lin, *supra* n. 6, at e480. Paris is a good example where the government ordered the plantation of trees to reduce city temperature and also combat climate change.

conducting [an] analysis of city shape, its spatial limit and—connected with them—[the] amount of needed resources and area required to satisfy them'.⁹⁴

In *University of Delhi v. Ministry of Environment, Forest and Climate Change*,⁹⁵ the NGT suspended environmental clearance for the construction of a high-rise building project close to a reserve forest area. High-rise buildings use more energy than low-rise buildings per square meter, thus generating higher greenhouse gas emissions.⁹⁶ In this case, the regulatory authorities had failed to consider the vital requirements including location and height of the buildings, air quality, noise level and traffic congestion, waste water and solid waste disposal, fire incidences, energy and carbon emission, green belt cover to the carrying capacity assessment of the project. The environmental clearance was granted mechanically, without meaningful appraisal of the above missing estimations. According to the tribunal, '...carrying capacity is an integral part of sustainability, without which working towards SDGs 2030 to tackle climate change only remains a dream...'.⁹⁷

The weakening of environmental clearance requirements for building projects in cities in the name of 'ease of doing responsible business' has a direct bearing on the climate-sustainability agenda. For example, in *Society for Protection of Environment and Biodiversity v. Union of India*,⁹⁸ the NGT declared illegal those parts of a government notification that exempted specific building and construction projects from the environmental-clearance requirements. This exemption, according to the NGT, was in derogation of India's international commitments under the 1992 Rio Declaration and the Paris Agreement especially when read in conjunction with the precautionary principle.⁹⁹ Environmental clearances, as a part of the precautionary approach, require the drafting of an environmental impact assessment (EIA). The EIA evaluates greenhouse gas emissions associated with the construction project, their adverse impact on the environment and climate, and offers best practice strategies to reduce emissions.¹⁰⁰

The construction of city airports is another subject where the Supreme Court of India has used a climate-sustainability narrative. According to the court, reconfiguring social and production systems and structures would help transition toward transformative change and advance the 2030 agenda on sustainable development. In the first *Hanuman Laxman Aroskar v. Union of India (2019)* case,¹⁰¹ the Supreme Court suspended as flawed an environmental clearance granted for the development of a greenfield international airport at Mopa, in Goa. The integrated environmental parameters across the SDG domains, for example the emissions from aircraft and their anticipated impact on forests and terrestrial ecosystems, were overlooked in the EIA report. Despite the

⁹⁴ Malgorzata Świąder, Szymon Szewrański and Jan K. Kazak, 'Foodshed as an Example of Preliminary Research for Conducting Environmental Carrying Capacity Analysis', 10(3) 882 *Sustainability* 1 (2018), at 2.

⁹⁵ 2020 SCC OnLine NGT 557.

⁹⁶ UCL, 'High-rise buildings much more energy-intensive than low-rise', *UCL News*, 28 June 2017, <https://www.ucl.ac.uk/news/2017/jun/high-rise-buildings-much-more-energy-intensive-low-rise>.

⁹⁷ 2020 SCC OnLine NGT 557, at paras 17.

⁹⁸ 2017 SCC OnLine NGT 981.

⁹⁹ *Ibid.*, at para 48.

¹⁰⁰ *Ibid.*, and para 18.

¹⁰¹ 2019 SCC OnLine SC 441.

shortcomings, the Expert Appraisal Committee granted clearance without following the statutory approval process.¹⁰² Relying on the SDGs, Paris Agreement, India's NDC, and international reports, the court directed the government to balance the environmental issues, including climate issues, with the airport construction objective.¹⁰³

In the second *Hanuman Laxman Aroskar v. Union of India (2020)* case,¹⁰⁴ the Supreme Court relied on sustainability to advance low-carbon initiatives to reduce greenhouse gas emissions. The court allowed the Mopa airport to proceed on the assurance from the relevant authorities to adopt a Zero Carbon Programme, both in the construction and operational phases of the airport.¹⁰⁵ It directed the regulatory authorities to explore best practices for climate change and energy conservation in the construction of greenfield airports. These could include green-infrastructure development programmes, the adoption of less emission-intensive technologies, renewable-energy programmes, electrical vehicles, airport-carbon accreditation, and the installation of LED lights.¹⁰⁶

These judicial interventions reflect the increasing importance of progressive urban technological solutions that support green-infrastructure development. Advancing climate action through systemic technological innovations that bolster low-carbon urban ecosystems helps create resilient systems for sustainability transformations. However, there are city challenges for the implementation of judicial decisions. They include 'resources to implement and maintain them',¹⁰⁷ as well as 'vested and powerful interests that are contested, conflictual and deeply political'.¹⁰⁸ Consequently, these 'influence and define the conditions of change thereby often placing the cities in a state of inertia or lock-in'.¹⁰⁹ It is important that social and governmental interventions overcome the challenges that hinder technological transformative change.

3.2. Waste

Waste (municipal solid waste, industrial, hazardous, biological) is one of the major and continuing challenges in Indian cities and has negative implications on the climate, environment, economy, and public health. As biological material decomposes, it gives off heat and increases global greenhouse gas emissions. Poorly maintained landfills and the release of leachate are hazardous to health by contaminating the air, soil, and water and affecting the climate. According to the 2023 Report of The Energy Research Institute (TERI),

India generates 160,038.9 tonnes per day (TPD) of solid waste, of which 152,749.5 TPD (95.40%) is collected, 79,956.3 TPD (50%) is processed, 29,427.2 (18.4%) TPD is landfilled; 50,655.4 TPD (31.7%) of the total waste generated remains unaccounted for ... India recycles 50% of the total MSW [municipal solid waste] produced, while the remainder ends up in landfills, having a negative influence on the society's health, safety,

¹⁰² Ibid, at paras 127 and 160.

¹⁰³ Ibid, at paras 154 and 157.

¹⁰⁴ (2020) 12 SCC 1.

¹⁰⁵ Ibid, at para 57.

¹⁰⁶ Ibid, at para 56.

¹⁰⁷ Lin, supra n. 93.

¹⁰⁸ EEA, supra n.17, at 56.

¹⁰⁹ Ibid, at 36.

and environment ... India has 1,924 identified landfills and 3,184 dumpsites/unscientific landfills in total.¹¹⁰

Indian municipal authorities are responsible for managing municipal solid waste under the MSW Rules 2000 and 2016, but are often unable to perform their statutory duties effectively. The factors include financial shortages to set up waste-processing and disposal facilities, the need to scale up technological innovations, a lack of scientific and technical knowledge of waste management, and limited awareness and motivation of stakeholder involvement across value chains of waste management.¹¹¹ However, waste management is now identified as a key priority area due to India's commitment under SDG 12. The government has introduced new policies and strategies, including Swachh Bharat Abhiyan (Clean India Mission), the Smart Cities programme, amendments to the Solid Waste Management Rules 2016, and introducing Swachh Survekshan as a competitive framework to motivate cities to improve their urban sanitation conditions with citizen participation.¹¹²

From a judicial perspective, the NGT has identified legacy waste (containment and storage of waste, buried garbage, soil and groundwater contamination, and waste from contaminated construction materials and buildings) in Indian cities and towns as a complex challenge and a priority area.¹¹³ The legacy waste dump sites occupy large areas of valuable public land. They emit carbon and methane, and they are a serious threat to public health. Their emissions are toxic and noxious.¹¹⁴ To combat carbon dioxide and methane emissions, the NGT in the ongoing *In re: Compliance of Municipal Solid Waste Management Rules 2016* case developed constructive solution-oriented incremental-reformist strategies to address legacy waste. For instance, the strategies included building a committed expert team to drive effectiveness and efficiency.¹¹⁵ By communicating and facilitating the involvement of all stakeholders (the central and state governments, regulatory authorities, local bodies, and the community, including welfare associations, educational institutions, corporations, and social organizations, as well as individuals) through open dialogue and consultation, the NGT recognized the need for

¹¹⁰ The Energy Research Institute (TERI), *State of Waste Management Report*, (TERI: Project Report No. 2021CW12, 2023), at 12-13.

¹¹¹ *Ibid*, at 10-11. See also, Gitanjali Nain Gill, *Environmental Justice in India: The National Green Tribunal*, (Abington: Routledge 2017), at 82-83; Anonymous, 'India Solid Waste Management', *International Trade Administration*, 27 April 2023, <https://www.trade.gov/market-intelligence/india-solid-waste-management>.

¹¹² *Ibid*, at 15.

¹¹³ *In re: Compliance of Municipal Solid Waste Management Rules 2016*, NGT Order 31 August 2018. See also *Suo Motu Proceedings initiated against the Unscientific of accumulated Waste leading to environmental pollution and health problem v. State of Kerala*, NGT Order 3 October 2018. For the NGT orders, the official website for the reported orders/judgments is <https://www.greentribunal.gov.in/>.

¹¹⁴ Richa Singh, *Methane emissions from open dumpsites in India: Estimation and mitigation strategies*, (New Delhi: Centre for Science and Environment, 2023), at 15-25; James L. Hanson, Derek C. Manheim and Nazli Yeşiller, 'Geo-environmental assessment of climate impacts from landfill gas emissions', 63 (2) *101279 Soils and Foundations* 1 (2023), at 2.

¹¹⁵ For instance, the NGT established a Tribunal-monitored mechanism through the formation of Apex Level, Regional Level and State Level Committees to prepare action plans under the Solid Waste Management Rules 2016 and execute the same. The three committees meet regularly and take stock of the progress and identify new targets. See, Gitanjali Nain Gill, 'The National Green Tribunal, India: Evolving Adjudicatory Dimensions of a specialized Forum', 49 (2-3) *Environmental Policy and Law* 153 (2019).

local and national legacy waste planning and implementation. A participatory process envisions and sets goals, provides space for actors to have a constructive dialogue amongst themselves, and coordinates interventions across various domains of governance, thereby opening opportunities and removing barriers to advance sustainable transformational changes.¹¹⁶

Further, the NGT has promoted accountability, based on answerability and enforceability, in the delivery of climate sustainability and SDGs. This is illustrated by responsive, strategic, and coordinated action plans and pathways for handling legacy waste. This included the tribunal ordering the closure and capping of those legacy waste dumps that have reached their full capacity.¹¹⁷ Thereafter, the tribunal directed the States to create inventories about the number of legacy waste dumps,¹¹⁸ the quantity of their waste,¹¹⁹ and the number of cleared dump sites.¹²⁰ Additionally, the NGT mandated the publication of the number of bio-mining and bio-remediation legacy sites for effective disposal and treatment through a timed action plan.¹²¹ By directing the State authorities to provide metric and data information and monitoring, the NGT required coordination between different levels of authorities to ensure actions to stop or remedy the legacy waste problem through transformational decisions.

The NGT has also considered the quantification of the monetary cost of damage caused to the environment and climate.¹²² For example, the tribunal-appointed committee on legacy waste found that damage on account of the existence of a legacy waste dump site at Gurgaon (Bandhewadi) was US\$18 million.¹²³ The cost of the damage includes drivers of externalities, including greenhouse gas emissions, air pollution, water pollution, soil pollution, and aesthetic loss. The NGT observed:

the valuation of damages is done for greenhouse gas emissions using social cost of carbon approach recommended by USEPA. The social cost of carbon is [an] indirect measure of loss in economy due to emission of CO₂ and is contributing by 73% of total

¹¹⁶ EEA, *supra* n. 17, at 11.

¹¹⁷ *In re: Compliance of Municipal Solid Waste Management Rules, 2016*, NGT Order 5 March 2019. See also Solid Waste Management Rule 2016, Clause J Appendix 1 that deals with legacy waste.

¹¹⁸ *In re: Compliance of Municipal Solid Waste Management Rules, 2016*, NGT Order 22 May 2023. According to the information provided by 28 States, in 2023, there were 2,129 legacy sites.

¹¹⁹ *Ibid.* The quantity of legacy waste from 27 States amounted to 85,558,287.3 tonnes.

¹²⁰ *Ibid.* The total number of legacy sites removed were 498.

¹²¹ See Central Pollution Control Board, *Guidelines for disposal of legacy waste (old municipal solid waste)*, (CPCB 2019), at 10-13. Bio-mining refers to the scientific process of excavation, treatment, segregation, and gainful utilization of aged municipal solid waste lying in dump sites. Bio-remediation involves exposure of all the waste to air along with the use of composting bio-cultures followed by the waste's sustainable management through recycling, co-processing, and road-making. See *In re: Compliance of Municipal Solid Waste Management Rules, 2016*, NGT Order 22 May 2023. As of that date, the number of dump sites that had initiated bio-mining amounted to 496. Regarding bio-remediation, in the State of Gujarat, out of 25 million metric tonnes (MT) of legacy waste, 14 million MT had been remediated (NGT Order 23 March 2023, State of Gujarat). In the Union Territory of Chandigarh, out of 800,000 MT legacy waste, 250,000 MT had been remediated (NGT Order 18 May 2023). In the State of Haryana, out of 5.4 million MT legacy waste, approximately 3.1 million MT waste had been processed. The processing of the remaining waste was to be completed by December 2023 (NGT Order 16 January 2023).

¹²² *In re: Compliance of Municipal Solid Waste Management Rules, 2016*, NGT Order 5 March 2019.

¹²³ *Ibid.*, NGT Order 23 March 2020.

damage due to Bandhewadi municipal dumpsite ... GHG emissions are a part and parcel of any dumpsite. If proper control systems are kept in place these emissions can be controlled and may be utilized as well and hence maximum damages can be averted.¹²⁴

The tribunal has applied the polluter pays principle to cover 180 million tonnes of legacy waste.¹²⁵ Deposited as environmental compensation, money was collected from various States, including the States of West Bengal, Rajasthan, Maharashtra, Karnataka, Telangana, Punjab, and Kerala.¹²⁶ To implement the orders of the NGT, the States started to earmark finance to scientifically process legacy waste. For example, the State of Haryana has ringfenced about US\$31million on processing legacy waste. For Bengaluru, a sum of US\$116 million was sanctioned by the State government for clearing legacy waste and processing it through new technologies.¹²⁷ In the State of Delhi, the monthly disposal rate has increased by over 400 per cent to an average of 600,000 metric tonnes compared to the earlier average of 151,000 metric tonnes between May 2019 and May 2022.¹²⁸

Further, the outcomes of the NGT's orders are evidenced by community involvement in handling legacy waste. For example, the participation of people, central government agencies, and industries resulted in the flattening of the garbage mounds in Delhi's three landfill sites. People's participation as stakeholders in the Jan Bhagidaari project¹²⁹ encourages them to remove the legacy (construction and demolition) waste free of cost for use in construction activities. From January 2022 to February 2023, over 100,000 metric tonnes of legacy waste were taken by people from the landfill sites.¹³⁰ Likewise, the cement and paper industries are also involved in removing the legacy (refused derivate fuel) waste from the landfill sites.¹³¹ Such innovative stakeholder initiatives create platforms for action to engage with the transformative discourse.

Though the process has started the transformational change by infusing accountability, its desired impact is only partially achieved in the legacy waste sector.¹³² Restricting factors include inadequate data on waste, disengagement with the judicial process and consequent non-compliance, lack of coordination between multiple authorities leading

¹²⁴ Ibid, NGT Order 29 January 2021, at para 8.

¹²⁵ National Green Tribunal, 'Bird's eye view of NGT performance in the last five years (July, 2018 – July, 2023)', https://greentribunal.gov.in/sites/default/files/important_orders/NGT_Initiatives%20final-1.pdf.

¹²⁶ Ibid.

¹²⁷ Naveen Menzes, 'Bengaluru: NGT order prompts Rs 967 cr grant for sewage and garbage management', *Deccan Herald*, 5 April 2023.

¹²⁸ The Lieutenant Governor Delhi, 'Clearing the legacy waste at the landfill sites', Lieutenant Governor's Secretariat, 28 March 2023, <https://lg.delhi.gov.in/swachh-delhi/clearing-legacy-waste-landfill-sites>

¹²⁹ Citizen participation in local governance (translation).

¹³⁰ The Lieutenant Governor Delhi, supra n. 128.

¹³¹ Ibid.

¹³² An example is 2024 satellite data that shows methane emissions are 'super emitters' of greenhouse gases in Delhi's legacy sites. See, Hannah Ellis-Petersen and Aakash Hassan, 'It's impossible to breathe: Delhi's rubbish dumps drive sky-high methane emissions', *The Guardian*, 12 February 2024, https://www.theguardian.com/world/2024/feb/12/delhi-india-rubbish-dumps-sky-high-methane-emissions?CMP=Share_iOSApp_Other.

to shifting of blame, shortage of funds for urban local bodies to make changes, and lack of reliable, efficient waste handlers for effective disposal.¹³³

The shift takes time as ‘transformations take place at different timeframes and speed’.¹³⁴ The NGT’s initiatives reflect institutional innovations across climate change governance wherein a polycentric and participatory approach accelerates enabling blocks for sustainable transformations. A more

nuanced understanding acknowledges the constraints on government actions but also recognises that governments have an essential role to play ... governments have unique capacities, resources and authority to identify and agree society-wide goals and targets, to create institutions and networks, and enable transitions.¹³⁵

Hence, participatory cross-sectoral coordination in the cities focuses on substantial governance capabilities that drive the narrative of change. The interaction of the government with networks, businesses, people, and relevant stakeholders facilitates sustainable change through shifts in social values and behavioural adaptation.

3.3. Livestock

Livestock constitutes a major source of methane emissions. India has the ‘world’s largest livestock population (>500 million), contributing nearly 10-15 Tg CH₄ emission annually’¹³⁶ in the urban and peri-urban areas.¹³⁷ In *Nuggehalli Jayasimha v. Government of Delhi*¹³⁸ the NGT noted the link between methane emissions and livestock and created a climate-sustainability narrative to adopt necessary safeguards to protect the environment and public health. The livestock sector in India, according to the NGT, has the potential to cause surface temperatures to surge up to 0.69 millikelvin

¹³³ In India, the judiciary has consistently maintained that the success of judicial orders are dependent upon the effective implementation and enforcement. However, the non-compliance of judicial orders reveals a stark account of India’s environmental misgovernance. See, *In re: Compliance of Municipal Solid Waste Management Rules, 2016*, NGT Orders 16 February 2023 (State of Delhi); and 18 May 2023 (State of Karnataka). See also *Confederation of Trans Hindan RWA’s Ghaziabad v. U.P. State Pollution Control Board* 2021 SCC OnLine NGT 306; *In Re : Report received from State Level Monitoring Committee, Kerala, constituted by this Tribunal vide order dated 16.01.2019 in O.A. No. 606/2018, headed by Justice A.V.R. Pillai, former Judge of Kerala High Court, to oversee compliance of directions on the subject of Solid Waste Management* 2021 SCC OnLine NGT 695; *Confederation of Trans Hindan RWA’s Ghaziabad v. U.P. State Pollution Control Board* 2021 SCC OnLine NGT 306. See also, Central Pollution Control Board, *Consolidated Annual Report (For the Year 2016–17) on Implementation of Solid Waste Management Rules 2016*, (CPCB 2018), at 11. The official agency CPCB in its report stated ‘waste processing and disposal facilities in most of the states are not in working conditions...there is lack of coordination between urban local bodies and state pollution control boards and other concerned agencies... it indicates poor implementation of Solid Waste Rules 2016’.

¹³⁴ CIF, supra n.40, at 15.

¹³⁵ EEA, supra n. 17, at 25.

¹³⁶ Shilpi Kumari et al., ‘Climate change impact of livestock CH₄ emission in India: Global temperature change potential (GTP) and surface temperature response’, 147 *Ecotoxicology and Environmental Safety*, 516 (2018), at 516.

¹³⁷ Johanna F. Lindahl et al., ‘The Extent and Structure of Peri-urban Smallholder Dairy Farming in Five Cities in India’, 7 (359) *Frontiers in Veterinary Sciences* 1 (2020), at 2. The authors define peri-urban area ‘not a term with an official definition ... as locations outside the official municipality city limits ... but within 5 km of these’.

¹³⁸ 2020 SCC OnLine NGT 513.

over 20 years, which is roughly 14 per cent of the total increase caused by the global livestock sector.¹³⁹ Accordingly, the NGT directed the CPCB to develop an evidence-based, livestock-methane inventory for dairies throughout the cities of India and lay down sustainability indicators as guidelines for the management and monitoring of livestock farming. For the tribunal, the precautionary principle and the requirement of sustainable development created reciprocal duties to protect the environment and the climate.¹⁴⁰

Subsequently, in a series of cases,¹⁴¹ the NGT adopted an incremental-reformist approach by declaring the management and monitoring of norms a pan-India issue. The CPCB was directed to develop national guidelines for the operation of dairies. Accordingly, the Guidelines for Environmental Management of Dairy Farms and Gaushalas¹⁴² came into force, following consultation with the relevant stakeholders. The guidelines cover carrying-capacity requirements for commercial dairy activities, enforcing the consent-to-operate requirement, appropriate siting policy, and disposal of waste.¹⁴³ Additionally, the CPCB was directed to evolve an appropriate monitoring and training mechanism, including a provision for audit of compliance at least once every six months.¹⁴⁴ The involvement of the local authorities in whose jurisdiction the dairies fell were directed to ensure the implementation of the guidelines. Further, stakeholders, including local people, dairy workers, and entrepreneurs, were to be trained for the handling and management of waste. The training would cover treatment technologies, scientific feeding for enteric methane reduction, and waste-to-wealth management programmes.¹⁴⁵

By framing the problem and desired outcomes at a national level, the NGT's intervention has contributed toward regulating dairies within a climate-sustainability narrative. The judicial approach focuses on urban social solutions through

social mobilisation initiatives from government-led planning processes to neighbourhood-scale grassroots initiatives, [which] can lower perceived barriers around sustainable climate solutions and motivate action through engagement, learning, and hands-on involvement.¹⁴⁶

Such partnerships help transformative shifts in behaviour and practices and strengthen climate resilience.

¹³⁹ Ibid, at para 12.

¹⁴⁰ Ibid, at para 14.

¹⁴¹ *Ved Prakash Aggrawal v. Municipal Commissioner, Nagar Nigam Ghaziabad* 2022 SCC OnLine NGT 29; *Pushpendra Kumar v. Block Development Officer, Kadaura* 2022 SCC OnLine NGT 1714; *Nitin Singh Solanki v. State of Madhya Pradesh* 2021 SCC OnLine NGT 2010; *Nagarik Upbhokta Margdarshan Manch v. State of M.P* 2020 SCC OnLine NGT 1324; *Nuggehalli Jayasimha v. Government of Delhi* 2022 SCC OnLine NGT 90.

¹⁴² Central Pollution Control Board, *Guidelines for Environmental Management of Dairy Farms and Gaushalas*, (CPCB 2020).

¹⁴³ Ibid, at sections 2-4.

¹⁴⁴ Ibid, at section 5

¹⁴⁵ Ibid.

¹⁴⁶ Lin, *supra* n. 93.

3.4. Transport

Transport is the fastest growing sector in India. It accounts for 14 per cent of India's energy-related CO₂ emissions and is a key contributor to urban air pollution.¹⁴⁷ According to Niti Aayog, the 'increasing demand for private mobility and the transport of goods, energy use and CO₂ emissions from road transport could double by 2050 ... private cars and the expanding truck fleet, with continued reliance on gasoline and diesel, [will] drive the rise'.¹⁴⁸ According to 2022 figures, there were 326.3 million vehicles registered in India, including both private and public vehicles.¹⁴⁹ For 2023, as at 14 July, there were 340 million vehicles registered with the road transport ministry's e-vahan portal,¹⁵⁰ with 800,000 registered as e-vehicles.¹⁵¹ The government has developed a policy roadmap, with decarbonization integral to 'reduc[ing] energy demand by 30% in 2050 relative to current policies, saving India 70 million tonnes of oil equivalent (80% of the sector's current energy needs)'.¹⁵² The two flagship programmes – the Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme, and the Production-Linked Incentive (PLI) schemes – will help drive the electrification strategy to decarbonize transport. In addition, other measures include strengthening fuel-economy standards, fully implementing the scrappage policy for polluting vehicles, strengthening policies and mechanisms to improve access to EV financing and reducing the cost of financing, developing long-term transport policy for the 2070 net-zero goal, and international engagement collaboration.¹⁵³ These initiatives create enabling conditions supporting sustainable transformational change that aligns with long-term climate goals and commitments.

In this context, the Indian judiciary's incremental-reformist approach focuses on a climate-sustainability narrative and the switch to cleaner energy sources within the road-transport sector. For example, in *Ajay Khera v. Container Corporation of India*,¹⁵⁴ the NGT used carrying capacity as a guideline for sustainability.¹⁵⁵ In this case, the NGT directed the regulatory authorities and experts to carry out capacity assessments in 102 'non-attainment cities' relating to air pollution.¹⁵⁶ The assessment includes the number of vehicles, population, traffic congestion areas, pollution hot spots, odd-even

¹⁴⁷ Megha Kumar et al., 'Decarbonising India's road transport: A meta-analysis of road transport emission models', (Washington DC: International Council on Clean Transportation, 2020), https://theicct.org/wp-content/uploads/2022/05/Meta-study-India-transport_final.pdf.

¹⁴⁸ International Energy Agency and Niti Aayog, *Transitioning India's Road Transport Sector: Realising climate and air quality benefits*, (IEA- Niti Aayog 2023), at 9.

¹⁴⁹ Statista, 'Number of vehicles in operation across India from financial year 1951 to 2020', <https://www.statista.com/statistics/664729/total-number-of-vehicles-india/#:~:text=In%20a%20country%20with%20the,2022%20stood%20at%20326.3%20million.>

¹⁵⁰ E-government tool, to streamline and automate vehicle-related activities nationwide (translation).

¹⁵¹ Paras Yadav, 'In India, out of 34 crore registered vehicles, only 0.8 percent are EVs', *News8*, 25 July 2023, <https://www.news18.com/auto/in-india-out-of-34-crore-registered-vehicles-only-0-8-percent-are-evs-8417707.html>.

¹⁵² IEA and Niti Aayog, *supra* n. 148.

¹⁵³ *Ibid*, at 13-14.

¹⁵⁴ 2019 SCC OnLine NGT 1346 and 2018 SCC OnLine NGT 2188.

¹⁵⁵ Świąder, *supra* n. 94.

¹⁵⁶ Cities are identified as 'non-attainment' if they do not meet the National Ambient Air Quality Standards for particulate matter and nitrogen oxide over a 5 year period.

daily vehicle registration control, and limiting the flow of vehicles. This helps develop policy decisions for comprehensive sustainability actions to combat air pollution. The tribunal, using a sustainable development vision, held that it is imperative to devise measures in climate capacity to restrict overuse of natural resources on reaching optimum capacity.¹⁵⁷

Promoting the use of electric vehicles and alternative green fuels is another emerging area where the judiciary acts constructively to promote a climate-sustainable vision, albeit read within the narrative of air pollution and environmental protection. In 2024, the Supreme Court of India, in *Container Corporation of India v. Ajay Khera*,¹⁵⁸ underscored the need to transition to electrification and cleaner modes, such as CNG, hybrid, and electric. Further, it directed the government to formulate a policy to phase out heavy-duty diesel vehicles and replace them with BS-VI vehicles.¹⁵⁹ In *Kankana Das v. Union of India*¹⁶⁰ the government of Telengana, in its compliance report, informed the NGT about its initiatives to promote battery/electric vehicles and alternative fuels.¹⁶¹ It stated that road tax was fully exempted, as was the registration fee for passenger vehicles. Further, there were 132 CNG and 40 electric public-transport vehicles in operation.¹⁶² A further nudge for electric vehicles was given by the NGT in relation to proper infrastructure facilities, such as charging-station networks.¹⁶³ In *Vinay Shivanand Naik v. State of Karnataka*¹⁶⁴ the NGT accepted the statement of the State of Karnataka for a transitional move to electric vehicles as an alternate clean, green fuel.

The judicial approach reflects a technology pathway that leads to the electrification of urban road transport and cleaner fuels. Interlinking air pollution and climate change creates a clear mandate to scale up urban transport solutions that enable conditions for cleaner air and reduced carbon emissions. By developing appropriate air-climate sustainability responses, including a better understanding of travel behaviour, energy consumption, emissions from the sector, and decarbonization initiatives, the judiciary is acting in a transformative capacity.

3.5. Renewable energy

The use of renewable energy in urban cities ‘improves liveability, promotes innovation and reduces environmental impacts while maximising economic and social co-benefits’.¹⁶⁵ According to Invest India, as of December 2023, renewable energy sources

¹⁵⁷ 2018 SCC OnLine NGT 2188, at para 17.

¹⁵⁸ 2024 SCC OnLine SC 35.

¹⁵⁹ *Ibid*, at para 11.

¹⁶⁰ 2021 SCC OnLine NGT 2721.

¹⁶¹ *Ibid*, at para 13.

¹⁶² *Ibid*.

¹⁶³ *In re: Compliance of Municipal Solid Waste Management Rules, 2016 and other environmental issues News item published in “The Times of India” Authored by Shri Vishwa Mohan titled “NCAP with multiple timelines to clean air in 102 cities to be released around August 15”* 2020 SCC OnLine NGT 1975.

¹⁶⁴ 2020 SCC OnLine NGT 613, at para 5.

¹⁶⁵ European Environment Agency, ‘How can cities transform to become more sustainable?’ *EEA Report No. 16/2020* (2020), <https://www.eea.europa.eu/en/topics/in-depth/urban-sustainability/how-can-cities-transform-to-become-more-sustainable>.

have a combined installed capacity of 180.79 GW. This includes wind power (44.73 GW), solar power (73.31 GW), biomass/co-generation (10.2 GW), large hydropower (46.88 GW), small hydropower (4.98 GW), and waste to energy (0.58 GW).¹⁶⁶ This places India fourth globally in renewable-energy-installed capacity (including large hydropower), wind-power capacity, and solar-power capacity.¹⁶⁷ For the 2030 low-carbon energy targets, India's commitment includes installing 500 GW of renewable-energy capacity, reducing the emissions intensity of its economy by 45 per cent, approving fifty solar parks with an aggregate capacity of 37.49 GW, identifying potential sites for off-shore wind energy with a target of 30 GW by 2030, and allocating \$2.4 bn to the National Hydrogen Mission for production of 5 million metric tonnes by 2030, with an additional \$36 million in the national budget for green growth.¹⁶⁸

Indian judicial decisions reflect a complementary approach that promotes the mandate of the government toward clean-energy transformations for a sustainable future. By adopting an incremental-reformist approach, the judiciary stresses the advancement of the renewables-based economy and society to improve resilience and support decarbonization. Unlocking the potential of green and low-carbon renewable energy will accelerate progress toward more inclusive Indian cities. This would benefit 'its citizens, and limit the potential trade-offs between affordability, security and sustainability'¹⁶⁹ and help achieve SDGs 7 and 13.

There is an emerging judicial trend that favours a smooth transition toward clean and green electricity generated from renewable sources. This is of national and universal importance and needs to be appreciated and nurtured. In *Jal Grahan Vikas Sanstha, Riwadi v. State of Rajasthan*¹⁷⁰ the High Court of Rajasthan allowed the establishment of a solar-power project in a village, which it characterized as being of 'great importance to mother earth and humanity ... and the courts would be loath to obstruct [it] by invoking the public interest litigation jurisdiction'.¹⁷¹ The court observed that fossil fuels significantly contribute to rising temperature levels. Quoting Prime Minister Modi, the court stated: 'Solar Energy is "Sure", "Pure" and "Secure"'; and 'India plans to produce 450 [GW] of power through solar energy and other renewable energy sources by 2030'.¹⁷² Thus, by setting up such projects, the optimal generation of solar energy in Western Rajasthan places the State at a global standard as a leading generator of green energy through solar power. Similarly, the Delhi High Court, in two cases – *Saisudhir Energy Limited v. NTPC Vidyut Vyapat Nigam Limited*¹⁷³ and *Sun Renewable*

¹⁶⁶ Invest India, *Building a Sustainable Future*, National Investment Promotion and Facilitation Agency, <https://www.investindia.gov.in/sector/renewable-energy#:~:text=India%20aims%20to%20produce%20five,2030%2C%20with%20potential%20sites%20identified>

¹⁶⁷ REN21, *Renewables 2022 Global Status Report*, (REN21 Secretariat 2022), at 26-28.

¹⁶⁸ Fatih Birol and Amitabh Kant, 'India's clean energy transition is rapidly underway, benefiting the entire world', *The Times of India*, 10 January 2022, <www.iea.org/commentaries/india-s-clean-energy-transition-is-rapidly-underway-benefiting-the-entire-world>.

¹⁶⁹ *Ibid.*

¹⁷⁰ 2022 SCC OnLine Raj 3164. See also *Narendra Singh Bhati v. State of Rajasthan* 2023 SCC OnLine Raj 1251.

¹⁷¹ *Ibid.*, 1195.

¹⁷² *Ibid.*, 1188.

¹⁷³ 2016 SCC OnLine Del 5093. See also, *Sheela Bahuguna v. Union of India* (2018) SCC OnLine Utt 1268.

*Private Limited v. Ministry of New and Renewable Energy*¹⁷⁴ – highlighted the importance of renewable energy sources for facilitating sustainable power generation to address India’s energy-security challenge. For the court, solar energy cannot be replaced by thermal power. Use of solar energy is environmentally friendly, promotes ecologically sustainable growth, and meets the challenges of climate change.¹⁷⁵ In *Hindustan Zinc Limited v. Rajasthan Electricity Regulatory Commission*¹⁷⁶ the Supreme Court promoted renewable energy sources in the larger public interest to reduce pollution. To reduce dependency on fossil fuels, it is imperative to follow the renewable-energy obligations as framed under the energy regulations.¹⁷⁷ As India has ratified the Kyoto Protocol, it said, the promotion of efficient and environmentally friendly measures to generate and consume green energy should be encouraged for sustainability and the SDGs.¹⁷⁸

In *AGP City Gas Private Limited v. Petroleum and Natural Gas Regulatory Board*¹⁷⁹ the Delhi High Court decided a complex question concerning the nature of exclusivity that can be claimed by an authorized entity to supply natural gas in all its forms to the city and within the geographical area. The Petroleum and Natural Gas Regulatory Board (Exclusivity for City or Local Natural Gas Distribution Networks) Regulations 2008 adopt and incorporate principles relating to infrastructure and marketing exclusivity. The legislation principally seeks to promote two fundamental objectives. They are to lay in place a city gas distribution (CGD) network throughout the country to protect the interest of consumers and provide them access to a sustainable and economical energy source. From a climate change perspective, the court observed, in order to support the drive of the gas-based economy, the nation needs to augment all types of energy sources to optimize India’s energy mix for long-term environmental sustainability and to reduce greenhouse gas emissions.¹⁸⁰ This can be achieved by leveraging natural gas as a green fuel for Smart India through development of a robust cross-country pipeline and CGD sector at equal pace. CGD includes Clear Natural Gas (auto-fuel) and Piped Natural Gas (domestic, commercial, and industrial sectors).¹⁸¹

The case of *Gujarat Urja Vikas Nigam Limited v. Renew Wind Energy (Rajkot) Private Limited*¹⁸² illustrates the importance of renewable-energy sources for future sustainable-energy growth. The case relates to the review of the tariff order (amendment or revocation) with respect to power-purchase agreements in terms of the Renewable Energy Certificate for Renewable Energy Generation) Regulations 2010 in the light of coercion and duress charges. It provides clarity on how regulatory frameworks should interact with power-purchase agreements in the renewable energy sector. However, the Supreme Court judgment is also significant as it emphasizes the global shift toward renewable energy. Solar, wind, and other renewables can potentially transform the

¹⁷⁴ 2023 SCC OnLine Del 467.

¹⁷⁵ *Ibid*, para 20.

¹⁷⁶ (2015) 12 SCC 611.

¹⁷⁷ For example, the Electricity Act 2003 through regulatory commissions promotes generation of electricity from renewable sources.

¹⁷⁸ (2015) 12 SCC 611, at 625 and 632.

¹⁷⁹ 2023 SCC OnLine Del 1575.

¹⁸⁰ *Ibid*, at para 165.

¹⁸¹ *Ibid*, at para 181.

¹⁸² 2023 SCC OnLine SC 411.

energy landscape, increase access, and help India meet its climate change objectives under the National Action Plan on Climate Change and Tariff Policy 2016.¹⁸³ Green and clean energy sources are in the larger public interest and can potentially transform the energy landscape.¹⁸⁴

India's judicial approach demonstrates a vision of renewable energy sustainability to advance low-carbon initiatives to reduce greenhouse gas emissions in the cities and the country. The judiciary contributes to transformations by promoting structural reforms needed to address climate change and the environment, energy insecurity and vulnerability, and sustainable growth.

4. Conclusion

The discourse on sustainability transformations is increasingly important as it addresses societal challenges from the environmental and climate crises and the capacity to sustain human well-being. Within the cities/climate context, transformations entail changes that open opportunities and pathways toward low-carbon sustainable development. This involves design and implementation of interventions through governance interactions. The reorientation and restructuring of governance processes and actions within integrated systems contribute to transformational change. Though the governance of transformation involves multiple actors, this article focuses on the role of the Indian judiciary in publicly recognizing and steering a transformational process toward a sustainable climate future.

The judiciary, identified here as a crucial partner in achieving sustainability and the SDGs, helps coordinate and promote an incremental-reformist change. By addressing the root cause of the problem and responding progressively, the Indian judiciary produces enabling blocks toward transitions to new or realigned systems. Multiple actors and their interactions necessitate adaptive and participative governance capabilities, thereby promoting urban sustainable solutions to overcome the climate crisis. Despite the lack of comprehensive domestic climate change legislation, the Indian judiciary, with an infused direction and commitment, is focusing its attention on the complex dynamic of the cities/climate change nexus. Sectoral examples from construction, waste, livestock, transport, and renewable energy, illustrate key areas addressed through the judicial incremental-reformist approach. Bolstering the implementation and enforcement of environmental and climate laws while infusing a powerful sustainability agenda, the courts create enabling conditions for transformational change. The realization of the collective vision of a sustainable future fosters the ability to identify actions for implementing climate solutions, either at the pan-India level or within the local context. To maximize benefits of 'improving liveability, sustainability, and equality',¹⁸⁵ the judicial decisions reflect three

¹⁸³ Ibid, at para 38

¹⁸⁴ See also other cases that encourage a move towards renewable energy source- *T N Godavarman v. Union of India* (2016) 13 SCC 586, 604; *K v. P Paras v. Union of India* 2015 SCC OnLine NGT 193; *M.P. Power Management Co. Ltd. v. ReNew Clean Energy (P) Ltd* (2018) 6 SCC 157.

¹⁸⁵ Lin, supra n. 93.

complementary solutions, namely urban nature-based,¹⁸⁶ technological,¹⁸⁷ and social,¹⁸⁸ as sustainable pathways to solve current issues and plan future change.

By creatively reimagining and developing new strategies that create and mobilize partnerships between different departments, agencies, and regulatory authorities, the courts (especially the NGT) have underwritten institutional interactions to develop climate-sustainability solutions. A participatory approach that promotes open and constructive dialogue and consultation contributes to learning that can mobilize broad support for transformative change. Developing this capability through ‘collaboration, empowerment, creativity and flexibility’¹⁸⁹ is necessary for climate change solutions. This not only infuses accountability but also advances city-level planning and implementation. A ‘sound urban governance requires longer planning horizons, effective implementation mechanisms and coordination’.¹⁹⁰ Exploring the decarbonization trajectory, both actual and potential, offers legitimacy, sustainability, progress, and support for the SDGs. The judiciary, as an instigator and facilitator through its incremental-reformist approach, offers progressive cumulative judicial outcomes that create conditions for transformative change.

¹⁸⁶ See the construction sector above.

¹⁸⁷ See renewable energy, transport and construction sectors above.

¹⁸⁸ See legacy waste and livestock sectors above.

¹⁸⁹ EEA, *supra* n. 17, at 39.

¹⁹⁰ Cynthia Rosenzweig and Willian Solecki, ‘Action pathways for transforming cities’, 8 *Nature Climate Change*, 754 (2018), at 757.