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SFC Perspectives

Adaptation and Resilience

Building systems that allow India to adapt to multiple and increasingly severe climate impacts

Aditya Valliathan Pillai | Tamanna Dalal

SFC Perspectives are intended to stimulate discussion by providing an overview of key issues and avenues for action to inform India's sustainable development trajectory.

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Perspectives on Adaptation and Resilience

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Climate projections and the lived reality of weather events drive calls for urgent and concerted attention to climate adaptation. But what does this mean in practice? Indeed, seen through a conservative lens, one could quite convincingly argue that India and several other climate vulnerable countries have a long and storied history of reducing disaster mortalities in some areas. They should – in theory – be able to build sufficient reactive capacity to deal with climate impacts. Both India and Bangladesh have, for example, used policy and awareness building tools to drastically reduce annual deaths due to cyclones.[1,2] This perspective paper, however, argues that the scale and complexity of the climate challenge merits serious consideration of systemic change, and a re-examination of what is needed for economy and society to thrive in an era of frequent, and often ravaging, climate impacts.

This effort is particularly relevant to India's present developmental moment. Three decades of sustained growth have established an economy characterised by expanded trade[3], infrastructural advances[4], and both greater wealth and inequality[5]. This emergence coincides uneasily with alarming manifestations of a changing climate. India's deep vulnerability to climate change is likely to worsen as impacts become more frequent and intense in its teeming cities, along a 6100 km-long coastline, and across a mountain range that supplies water to a third of the world's population[6]. How does a modern economy simultaneously protect the gains of hard-won growth while climate-proofing the future? And, as the Indian state evolves, how should it shape itself to be appropriately responsive to these new threats?

The scale and complexity of the climate challenge merits serious consideration of systemic change, and a re-examination of what is needed for economy and society to thrive in an era of frequent, and often ravaging, climate impacts.

[1] Ubydul Haque et al., "Reduced Death Rates from Cyclones in Bangladesh: What More Needs to Be Done?" Bulletin of the World Health Organization 90, no. 2 (February 1, 2012): 150–56. https://doi.org/10.2471/BLT.11.088302.

[2] Sumit Khanna and Sudipto Ganguly, "India Cyclone: Casualties Averted with Early Warnings and Timely Evacuation," Reuters, June 16, 2023, https://www.reuters.com/business/environment/early-warnings-timely-evacuation-help-india-avert-casualties-cyclone-2023-06-16/.

[3] OECD, OECD Economic Surveys: India 2019 (Paris: OECD Publishing, 2019), https://doi.org/10.1787/554c1c22-en.

[4] CRISIL. "India's Infrastructure Spending to Double to Rs 143 Lakh Crore between Fiscals 2024 and 2030, Compared with 2017-2023." Accessed March 11, 2024. https://www.crisil.com/en/home/newsroom/press-releases/2023/10/indias-infrastructure-spending-to-double-to-rs-143-lakh-crore-between-fiscals-2024-and-2030-compared-with-2017-2023.html.

[5] Lucas Chancel, Thomas Piketty, Emmanuel Saez, Gabriel Zucman, et al., World Inequality Report 2022 (World Inequality Lab, 2022), https://wir2022.wid.world/www-site/uploads/2022/01/Summary_WorldInequalityReport2022_English.pdf.

[6] Philippus Wester, Arabinda Mishra, Aditi Mukherji, and Arun Bhakta Shrestha, eds., The Hindu Kush Himalaya Assessment: Mountains, Climate Change, Sustainability and People (Cham: Springer International Publishing, 2019), https://doi.org/10.1007/978-3-319-92288-1.

Competing Visions of Resilience

These questions evoke two competing visions of adapting to a deteriorating climate. A *laissez faire* approach calls for rapid and unconstrained growth in the hope that increasing incomes will facilitate personal and community-led adaptation decisions[7]; the state then is less concerned with preparing for an uncertain future than it is with growth and income gains.

This approach however fails to consider the possibility of persistent inequality, and the inability of the poorest and most vulnerable to adapt. Their lack of access to information, inability to move away from vulnerable physical environments (such as low-cost urban neighbourhoods that trap heat and flood frequently), and the likelihood of weak social safety nets (that prevent families from bouncing back from income shocks or climate deaths) are all challenges to this approach.

[7] Ted Nordhaus, Vijaya Ramachandran, and Patrick Brown, "The Obvious Climate Strategy Nobody Will Talk About," Foreign Policy, November 6, 2022, https://foreignpolicy.com/2022/11/06/climate-cop27-emissions-adaptation-development-energy-africa-developing-countries-global-south/.

Particularly relevant to adaptive capacity is the protective role of the welfare state and its policies such as job programmes, insurance schemes, and access to affordable or free healthcare, all of which can help stabilise communities in crisis.

A second approach calls for state-led policy actions to correct instabilities arising from impacts that overwhelm communities' capacity to adapt. That this responsibility to adapt should fall to the state rests on the observation that markets are typically unable to function (a) where uncertainty and the threat of physical loss are high, and (b) where communities are unable to organically summon resources to maintain social and economic normalcy in deteriorating circumstances.

This responsibility logically accrues to the level of government closest to the impact[8] – usually local governments. This focuses attention on local government capacity; the institutional context in which they operate (such as the federal structure and its financing arrangements); their ability to access, generate and utilise locally-relevant science; and the avenues through which the climate vulnerable influence policy outcomes. Particularly relevant to adaptive capacity is the protective role of the welfare state and its policies such as job programmes, insurance schemes, and access to affordable or free healthcare, all of which can help stabilise communities in crisis.

[8] Markus Jachtenfuchs and Nico Krisch, "Subsidiarity in Global Governance," Law and Contemporary Problems 79, no. 2 (2016): 1–26.

Four Reasons Climate Impacts Call for Rapid System-Scale Change

Four inherent features of the climate problem call for expanded state action supplemented by private enterprise and enhanced community capacity, which we call system-scale change (as opposed to relying on reflexive economic forces or technological innovation).

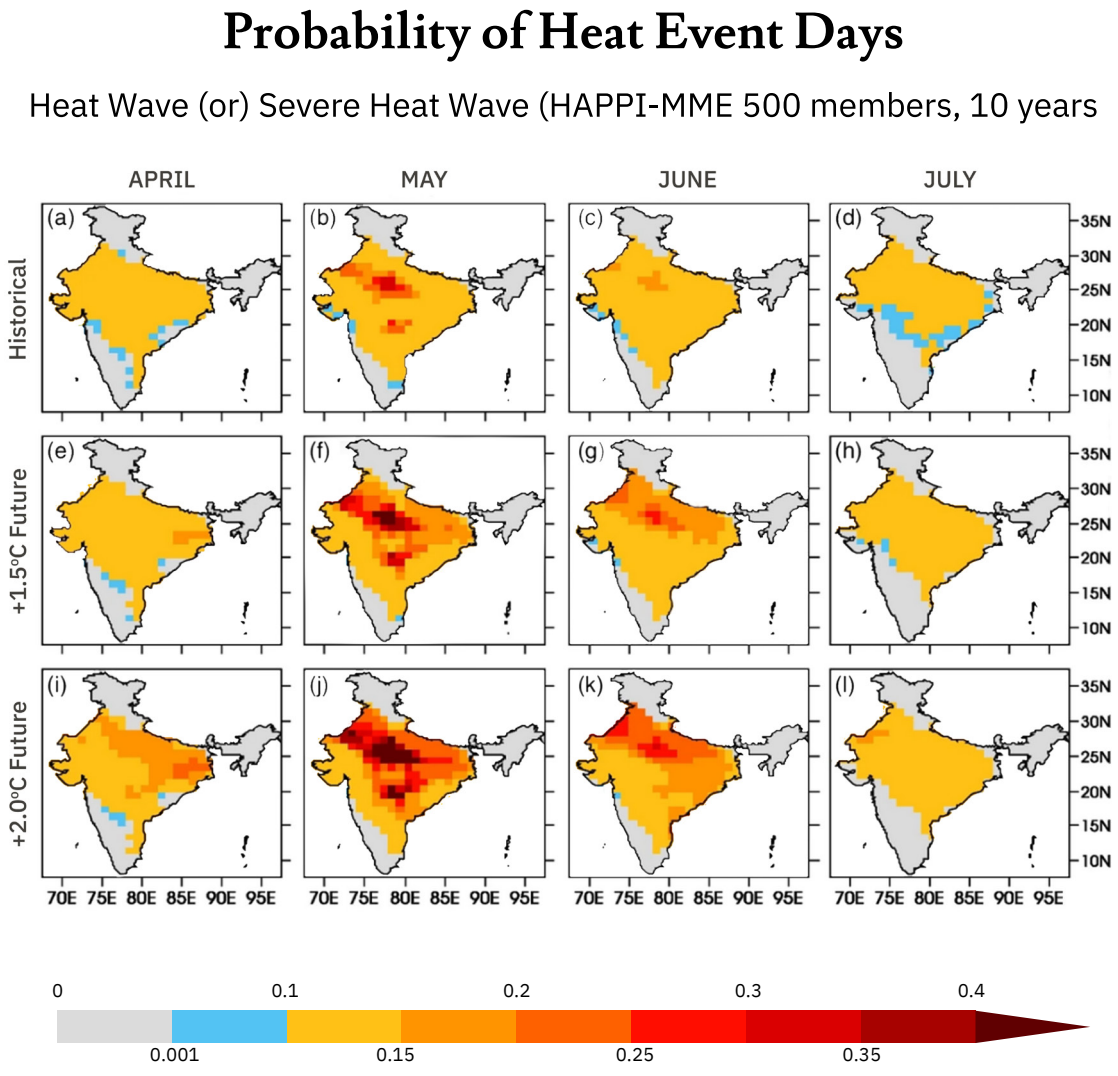

Figure 1: Probability of heat event days in a 1.5 degree and 2 degree future[11]

First, as impacts grow more intense and frequent, multiple, large disasters interacting with each other will begin to demand an expansion of adaptive capacity across geographies and sectors of the economy. Figure 1, for example, shows a sharp increase in the probability of heatwaves in a single month across a large swathe of the country. Multiple simultaneous heatwaves will likely intersect with compounding hazards[9] such as droughts, glacial lake outburst floods and wildfires in particularly bad years, and coincident risk factors such as high air pollution. Crucially, India's health system will likely struggle to cope with an increase in disasters and diseases[10] due to climate change. Weak capacity and fragmentation in the health system will disproportionately affect poor and vulnerable groups.

Indeed, estimates of damages to the Indian economy from climate impacts have increased in recent years. Extreme events led to an average loss of 0.38% of GDP between 2013[12] and 2019[13]. Damage forecasts for developing countries predict a two-to-three times increase in adaptation costs - from US$201-387 billion/year for 2021-2030 to US$340-600 billion/year by 2050[14] - which, if extrapolated to India, suggest that the state could be managing multiple interacting threats to the tune of hundreds of billion dollars per year.

Second, climate impacts today will likely reduce future resilience. Places that suffer large-scale impacts are less likely to be able to build capable systems and allocate resources to deal with the next major blow. The idea of cascading disasters[15] that reverberate through decades and possibly centuries is particularly relevant to developing countries that are forced to make hard choices between current growth and systemic adaptation investments.

[9] United Nations Office for Disaster Risk Reduction, "Compound Disasters and Compounding Processes: Implications for Disaster Risk Management," 2017, http://www.undrr.org/publication/compound-disasters-and-compounding-processes-implications-disaster-risk-management.

[10] Marina Romanello et al., "The 2023 Report of the Lancet Countdown on Health and Climate Change: The Imperative for a Health-Centred Response in a World Facing Irreversible Harms," The Lancet 402, no. 10419 (December 16, 2023): 2346–94, https://doi.org/10.1016/S0140-6736(23)01859-7.

[11] Arulalan Thirumavalavan, Krishna AchutaRao, and Ambuj D. Sagar, "Climate Science to Inform Adaptation Policy: Heat Waves over India in the 1.5°C and 2°C Warmer Worlds," Climatic Change 176 (May 11, 2023): https://doi.org/10.1007/s10584-023-03527-y..

[12] Germanwatch, "Global Climate Risk Index 2015". Accessed March 11, 2024. https://www.germanwatch.org/en/3667

[13] Germanwatch, "Global Climate Risk Index 2021". Accessed March 11, 2024. https://www.germanwatch.org/en/19777

[14] United Nations Environment Programme. "Adaptation Gap Report 2023: Underfinanced. Underprepared." Nairobi: United Nations Environment Programme, 2023.

[15] Susan L. Cutter, "Compound, Cascading, or Complex Disasters: What's in a Name?" Environment: Science and Policy for Sustainable Development 60, no. 6 (2018): 16-25. https://doi.org/10.1080/00139157.2018.1517518

Early investments in systemic capacity could well pay off over time, apart from generating social co-benefits. Imagine investments in structurally-transformed cities that make them less heat and flood-prone, with the introduction of canopied avenues and flood-overflow canals that also improve quality of life.

The third reason for system-scale change is that climate impacts could set off negative developmental spirals because they affect some groups of people worse than others. They will likely affect the poor and vulnerable (including the old, disabled or those who lack access to information) more than other groups, which suggests that future patterns of spatial development and, indeed, the national economic trajectory, could be greatly altered.

Droughts and floods in rural areas could, for example, not only affect rural consumption but lead to increased migration to cities, which are predicted to get hotter, more flood prone and generally approach the limits of liveability in coming decades[16]. These effects pose a challenge to rural growth and consumption while stretching the capacity of cities to protect their most vulnerable, leading to the loss of lives and productivity. Rural and urban governments, markets, and communities making economic decisions all require the capacity to understand and act upon these dynamics.

The final reason for urgent system-scale change is that measures to adapt today will likely be repeated in the future because they are embedded in institutions and memories. Errors in an initial response could prove sticky and worsen over time, or unleash path dependent forces that persist through time. This could trap communities between unprepared institutions prone to maladaptation on the one hand, and steadily worsening climate impacts on the other. Present day actions will have to, therefore, be embedded in an ethic of early and repeated experimentation and refinement, which is much harder to do as the climate worsens.

[16] Kanta Kumari Rigaud et al., Groundswell: Preparing for Internal Climate Migration (Washington, DC: World Bank, 2018). http://hdl.handle.net/10986/29461.


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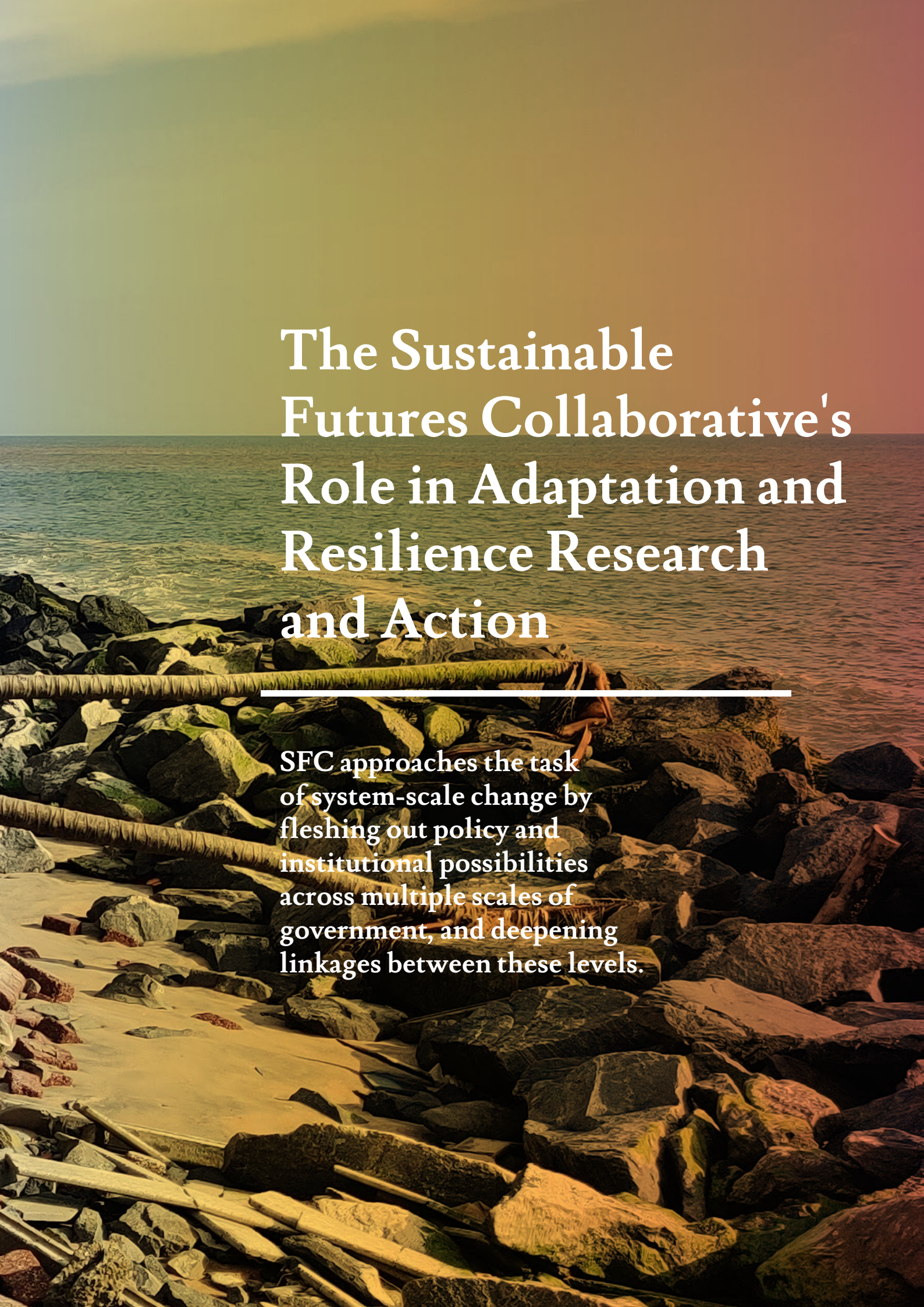

The Sustainable Futures Collaborative's Role in Adaptation and Resilience Research and Action

SFC approaches the task of system-scale change by fleshing out policy and institutional possibilities across multiple scales of government, and deepening linkages between these levels.

SFC approaches the task of system-scale change by fleshing out policy and institutional possibilities across multiple scales of government, and deepening linkages between these levels. It builds on the premise that adaptation must be locally driven but can only truly be innovative and effective if it occurs in an institutional environment that facilitates action and experimentation[17].

To ensure that future actions are based on effective policy frameworks (and avoid potentially damaging path dependence), we invest **in establishing evidence that examines the extent to which current actions are working and how they might be improved**. Our work spans current policies and crucial insights from health outcome data. For example, in the area of extreme heat resilience, an analysis of 37 heat action plans (HAPs) across the country found that these crucial new policy instruments were insufficiently grounded in local context and lacked the financing and institutional backing to be implemented[18]. This work has subsequently shaped approaches to heatwave planning at the national and state levels, both in national policy guidance and how subnational entities formulate HAPs.

Similarly, an all-cause mortality study on heat deaths across ten major cities in India, which goes beyond often faulty reported death statistics to piece together community-wide increases in mortality due to extreme heat, found over a thousand heat deaths attributable to extreme heat annually, and that heat deaths had begun occurring at much lower temperatures than previously imagined[19]. Future work will explore how poor air quality interacts with temperature to increase mortality during periods of extreme heat.

To help improve state capacity in dealing with simultaneous and temporally persistent threats, we focus on **understanding bottlenecks to the implementation of India's wide array of adaptation plans**. Plans like the State Action Plans on Climate Change (SAPCCs) and HAPs are often unevenly implemented across the country, poorly resourced, and forced to compete with more pressing developmental and political priorities. We engage with state governments on shaping their plans and understanding how best to facilitate implementation in areas such as HAP implementation and SAPCC updates.

Previous research has focused on improving climate knowledge flows to - and within - government. We have explored the merits of creating an expert, law-backed body to generate credible analysis on low-carbon and resilience pathways at national and state levels[20]. We have also suggested ways of achieving crucial governance functions such as coordination, incentives for localised action, and capacity building at the local government and state levels[21].

[17] Aditya Valiathan Pillai and Navroz K. Dubash, "Compensatory Climate Governance in Indian federalism". Working Paper, Initiative on Climate, Energy and Environment. (New Delhi: Centre for Policy Research, 2021). https://cprindia.org/briefsreports/compensatory-climate-governance-in-indian-federalism/

[18] Aditya Valiathan Pillai and Tamanna Dalal, "How Is India Adapting to Heatwaves?: An Assessment of Heat Action Plans With Insights for Transformative Climate Action", CPR report (New Delhi: Centre for Policy Research, 2023). https://cprindia.org/briefsreports/how-is-india-adapting-to-heatwaves-an-assessment-of-heat-action-plans-with-insights-for-transformative-climate-action/

[19] Jeroen de Bont et al., "Impact of heatwaves on all-cause mortality in India: A comprehensive multi-city study," Environment International (2024). https://doi.org/10.1016/j.envint.2024.108461.

[20] Navroz K. Dubash, Aditya Valiathan Pillai, and Parth Bhatia, "Building a Climate-Ready State: Institutions and Governance for a Transformative Low Carbon Development," Policy Brief, Initiative for Climate, Energy, and Environment, Centre for Policy Research (New Delhi: Centre for Policy Research, 2021). https://cprindia.org/briefsreports/building-a-climate-ready-indian-state-institutions-and-governance-for-transformative-low-carbon-development/.

To help guard against negative climate spirals that implicate urban and rural India, we focus on **helping unlock climate policy experimentation within India's federal structure**. Ongoing work, for example, attempts to find ways of using India's national social policy framework (Centrally-Sponsored Schemes), which comprises a significant portion of annual national government expenditure but is implemented in the states, to further complementary climate goals. The national urban greening programme, for example, can be creatively deployed in urban heat islands to increase shade cover – an important long-term heat resilience measure[22].

We focus on **reimagining and buttressing India's health system for future climate impacts** – which is the product of policy actions at national, state and local levels. Health systems are at the frontlines of impacts and are often stretched beyond capacity in disasters but, at the same time, are buffeted by climate impacts themselves (such as heatwaves cutting off power to hospitals or floods restricting healthcare workers' access to hospitals). Upcoming work in this area focuses on laying out a research agenda that clarifies the impact of climate change on public health and health systems in India.

We facilitate system-level thinking on climate adaptation through **national standards, frameworks and processes.** While adaptation and resilience can only be achieved locally, national coordination, norm-setting and resources play an important role in unlocking local actions and facilitating their improvement over time. This area of work is particularly important given the history of Indian climate policymaking, where national frameworks have had an influential role in determining the action of the states in areas such as the SAPCCs, HAPs, coastal erosion policy and so on. Our work in this area includes engagement with the National Disaster Management Authority in establishing frameworks for heat wave preparedness, and possible future research that drives towards a national adaptation framework.

And finally, to establish general understanding of what is to come and changes needed, we **communicate knowledge on adaptation to the public and governments**. We focus on breaking down complex climate impacts and responses into easily understandable narrative pieces[23], and working with key institutions such as the Lal Bahadur Shastri National Administrative Academy (LBSNAA) and media groups, among others, to improve system-wide thinking about climate adaptation.

[21] Aditya Valiathan Pillai, Navroz K. Dubash, and Parth Bhatia, "Unlocking Climate Action in Indian Federalism," Policy Brief, Initiative for Climate, Energy, and Environment (New Delhi: Centre for Policy Research, 2021). https://cprindia.org/briefsreports/unlocking-climate-action-in-indian-federalism/.

[22] Shreya Shekhar et al., "Finding the Finance: A Guide to Identifying Centrally Sponsored Schemes to Fund Heat Resilience Solutions," Working Paper, Initiative on Climate, Energy, and Environment (New Delhi: Centre for Policy Research, 2023). https://cprindia.org/workingpapers/finding-the-finance-a-guide-to-identifying-centrally-sponsored-schemes-to-fund-heat-resilience-solutions/.

[23] Aditya Valiathan Pillai, "Karnataka's Crumbling Coastline Shows Climate Battles Are Political," Scroll.In, 2022. https://scroll.in/article/1020609/karnatakas-crumbling-coastline-shows-climate-battles-are-political.

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