Topic: Climate Resilience of Energy and Mobility Infrastructure

Overview

An analysis of climate vulnerability by the Council on Energy, Environment and Water (CEEW)[1] indicates that implementing robust risk mitigation mechanisms and investing in better disaster preparedness alone could have saved India over Rs 6.76 trillion (USD 89.7 billion) in the past two decades. While exposure to extreme events could be linear, the impacts are mostly non-linear, depending on the sensitivity and adaptive capacity of the affected systems. Integrating climate risk profiling with infrastructure planning is critical to enhance adaptive capacity. This research will address the vulnerability and resilience of networked city infrastructure to climate change risk in the Indian context. It will focus on the integration of climate risk into strategic planning and decision-making processes for the development and management of networked city infrastructure systems in India. This is a topic identified as a priority by the 'Special Interest Group' (SIG) on climate resilience in CCG's Country Partnership with India. The research outputs will include primary knowledge products and/or applied tools and data systems to be applied in a context that explicitly contributes to decision-making on infrastructure investment needs. A systems approach with improved coordination and cooperation considering the interconnectedness and interdependencies of critical infrastructure sectors will help address potential intersectoral conflicts, to make optimised use of resources.

Research Questions

This research should contribute to the understanding of the risks posed by climate change to networked city infrastructure systems that are critical for economic growth and poverty reduction, to help decision-makers develop and implement strategies to strengthen the resilience of these systems.

Various infrastructure systems of cities such as energy, mobility, water, communication, waste management, and so on are interdependent. Identifying infrastructure interdependencies is a necessary step for building resilient infrastructure systems. The proposed research should be relevant to the CCG programme focus sectors, which are energy and transport, plus the relevant supply chain industries that support them. The project should align to several CCG ways of working:

- An emphasis in CCG's resilience work on systems-level analysis of critical energy and/or transport infrastructure (as opposed to project-level analysis). Other infrastructure sectors may be included, if necessary, where there are strong inter-dependencies.
- The research / innovation contribution of the project should be made clear. This could, for example, be new (or novel applications of) analytical methods, data, data acquisition methods, or decision-support approaches. Use of modelling, including spatially disaggregated modelling approaches is encouraged but not essential. Researchers may optionally consider incorporating AI tools and techniques as part of their approach.
- A whole systems approach is encouraged. In terms of scope, this means, for example, that both supply-side and demand-side factors affecting resilience should be included. In terms of spatial scale, cities should be assessed as part of the wider infrastructure systems they inhabit. Researchers are free to choose the spatial scale of the research, but it is expected this may include analysis up to the level of individual states.
- The route to impact or use case for the research should be made clear. This could include for example details of specific decision-making processes, policy documents, or investment plans

[1] Mohanty, A., and Shreya W. (2021). Mapping India's Climate Vulnerability – A District Level Assessment. New Delhi: CEEW. Available at: https://www.ceew.in/sites/default/files/ceew-study-on-climate-change-vulnerability-index-and-district-level-risk-assessment.pdf.

that the research is expected to feed into with details of how this will be undertaken. This may be augmented by the work of the SIG.

Research may cover one or more of the following topics:

- What city-level networked infrastructure investments (including for existing and new infrastructure) will be needed to support resilient economic growth and reduce poverty in the chosen context in the face of future climate changes?
- How may these be affected by wider trends such as urbanisation and industrialisation.
- What are the key vulnerabilities and resilience options available in these contexts, and what are the trade-offs between different options in terms of different social policy objectives?
- What is the institutional context and political economy for these decisions or interventions? For example, who has jurisdiction, who is responsible for investment decision-making, how are different stakeholders involved in decision-making, and what are the entry points for influencing these?
- How can resilience be integrated within the transition of energy and transport systems towards lower-carbon alternatives?
- What role can research evidence play in these decisions?
- How can alignment be achieved between existing national- and state-level policies, strategies, and plans with climate-compatible development goals.

Key Stakeholders

Expressions of interest should include a clear plan for stakeholder engagement. This should include as a minimum the decision-makers who are expected to use the research.

This call is open to research activities based in any Indian state, but interested applicants should note that CCG's network focal points in India are based in Tamil Nadu and Punjab/Haryana. For proposed projects relating to Tamil Nadu, engagement should include working with and through the multi-stakeholder networks and Special Interest Groups (SIGs) organised by the CCG India team based at Anna University, Chennai. For research relating to other states, projects should identify the networks that will be used to perform a similar function to these SIGs, and it should show how the results of the work will be made accessible and relevant to stakeholders in other parts of the country.