

The Future Ground: Urban Planning Under Climate Uncertainty

PhD Request for Collaboration / **Supriya Krishnan**, Resilience Lab, TU Delft, Netherlands

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This note provides an introduction to my ongoing research focusing on urban planning and climate risks. Using Amsterdam and Mumbai as its two case studies, this 4 year Ph.D. research will develop a methodology to systematically formulate urban planning strategies for long-term climate resilience. The methodology will combine quantitative research and qualitative design methods to inform strategic urban planning. As a research that aims at improving urban planning processes, collaboration with urban planning experts is essential.

1. The research will require insights on urban plans, policies, visions, land-use and infrastructure maps, upcoming mega projects, and primary and secondary socio-economic data for Amsterdam and Mumbai.
2. We would like to engage with key experts **working at the intersection of urban planning, infrastructure and climate risks** to explore deeper issues and opportunities for resilient urban planning through semi-structured interviews (max 1 hour).
 - (including city governments, academic and research institutions, public and private organisations interested in urban planning, policy, and climate risks).
3. We are open to engaging formally and informally with organisations/research institutions who are investigating related or complementary research on urban planning.

The need for resilience

By 2050, more than two-thirds of the world's population will live in cities. This wave of urbanisation brings with it the urgent need and opportunity to provide reliable infrastructures such as transport, energy, and water that will shape cities for decades to come. Because of climate change, these infrastructures will be increasingly exposed to a range of natural and man-made hazards putting a high concentration of people, environmental, and infrastructure assets at risk. Cities have the opportunity to guide integrated development that factors in climate change, thereby paving the way for climate resilience. A variety of approaches such as water management plans, nature-based solutions, retrofitting and replacement of large infrastructure systems are being adopted by cities. Because infrastructures shape cities for decades, these plans have far-reaching impacts on land-use change, future growth, and socio-economic development. If implemented without sufficient foresight, these investments may have negative consequences such as higher development in hazard-prone areas, damages to lifeline infrastructure, impacts on productivity, and reduced quality of life. **This research will develop and test a methodology for urban planning under climate uncertainties.**

To plan for climate change, urban planning must adapt. This research will use two case studies to design, test and validate the methodology. The application cases will determine the boundary conditions, choice of climate risks and uncertainties, infrastructure systems and development trends. Two cases of different planning cultures and complexity have been selected to test the robustness and limits of the methodology. At a later stage, this widens the scope of the methodology so it can potentially be modified for usage to other city cases.

Case study 1: Amsterdam

The City of Amsterdam has strong climate ambitions while striving to maintain its role as an economic and cultural hub of the Netherlands. It faces a range of hazards coupled with aging infrastructure, demographic changes and

ground for technological innovations, the impacts on the urban environment are getting more uncertain. The city grapples with migration and the need to create more housing and infrastructure, hence, managing urban expansion and peripheral growth. This level of complexity and limited decision-making timelines for urban planning have made it challenging to integrate long-term resilience objectives (with the exception of some sectors).

Case study 2: Mumbai

The Mumbai Metropolitan Region (MMR) is complex and already deals with impacts from chronic urban floods and associated damage to its lifeline infrastructure, socio-economic disparities. This is compounded by infrastructure systems that have reached the limits of their capacity, and the challenge of balancing new types of infrastructure (like the metro) in an already dense urban fabric and maintaining environmental sustainability. The complexity and the focus of planning and political decisions on the present situation have made it challenging to establish and implement long-term planning goals (beyond 20 years), which are critical to managing climate uncertainties.

Knowledge impact

The following components will be developed in the course of the research:

1. **A methodology that allows setting long-term development strategies while accounting for short-term development needs.**
 - a. A **site suitability plan** for Amsterdam and Mumbai that can form the basis for long-term urban planning.
 - b. The use of adaptive planning to develop an urban strategy for climate resilience. The approach was initially developed in the Netherlands and is used for the Netherlands flood risk management (Delta) Programme. This will be its first application to urban planning.

Bio

I am a second-year doctoral researcher at [TU Delft's Resilience Lab](#) in The Netherlands. I studied architecture at Sir J J College of Architecture followed by a Masters in Urbanism (Honours in Infrastructure and Environment) at TU Delft. Most recently, I was on the core working team of the Coalition for Disaster Resilient Infrastructure (CDRI) in New Delhi with the United Nations Office for Disaster Risk Reduction and National Disaster Management Authority. Previously, I have worked full-time at architectural design offices in India.

I am currently working on building the first set of research material, data, and a list of experts and organizations that are interested in this subject. Please do reach out to s.krishnan@tudelft.nl/ www.supriykrishnan.com for further discussions.
