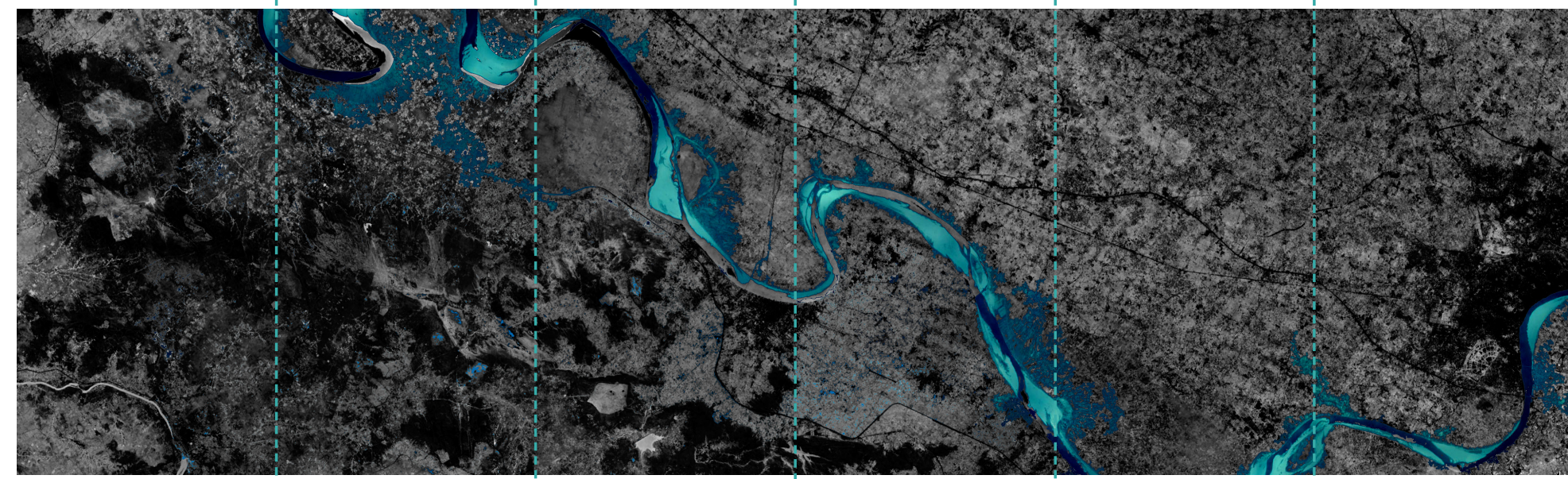


Beyond Cleansing

Transitioning towards Socio-Ecological Resilience in the Ganges River Basin

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Introduction

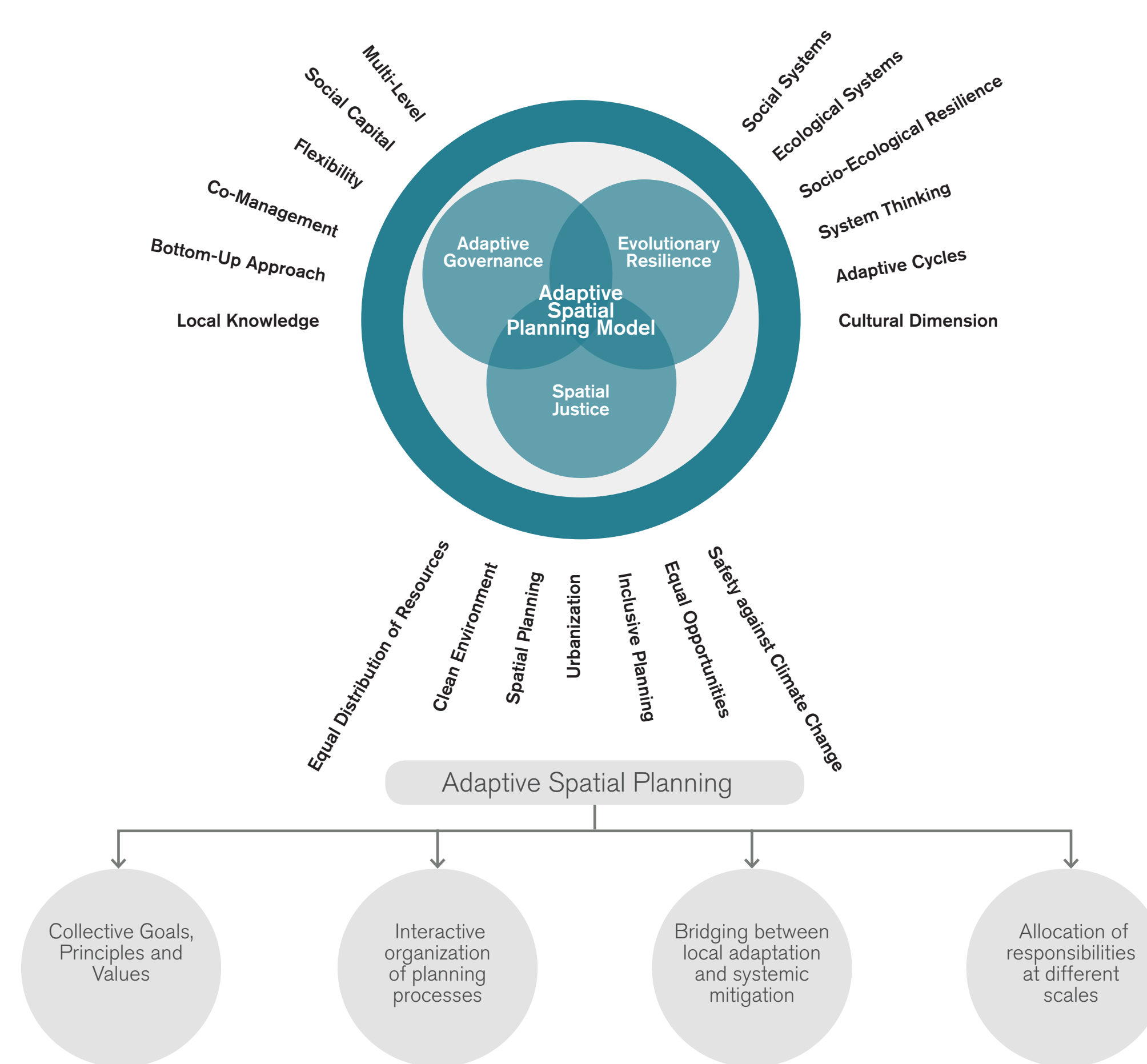


Social **Economic** **Environmental**

The Ganges River basin is a lifeline to millions of people (approximately 40% of India's population), sprawling through the great plains of India. The river has held a high ecological, social and environmental significance for the country and its people. With the rapid growth and development of urban areas along the river, the pressure on agriculture in the river basin and the water demands are constantly increasing. The unregulated urban development and growth of industries along the river bank have led to extreme degradation of the river. The current state of the river is severely impacting the communities directly or indirectly dependent on the river.

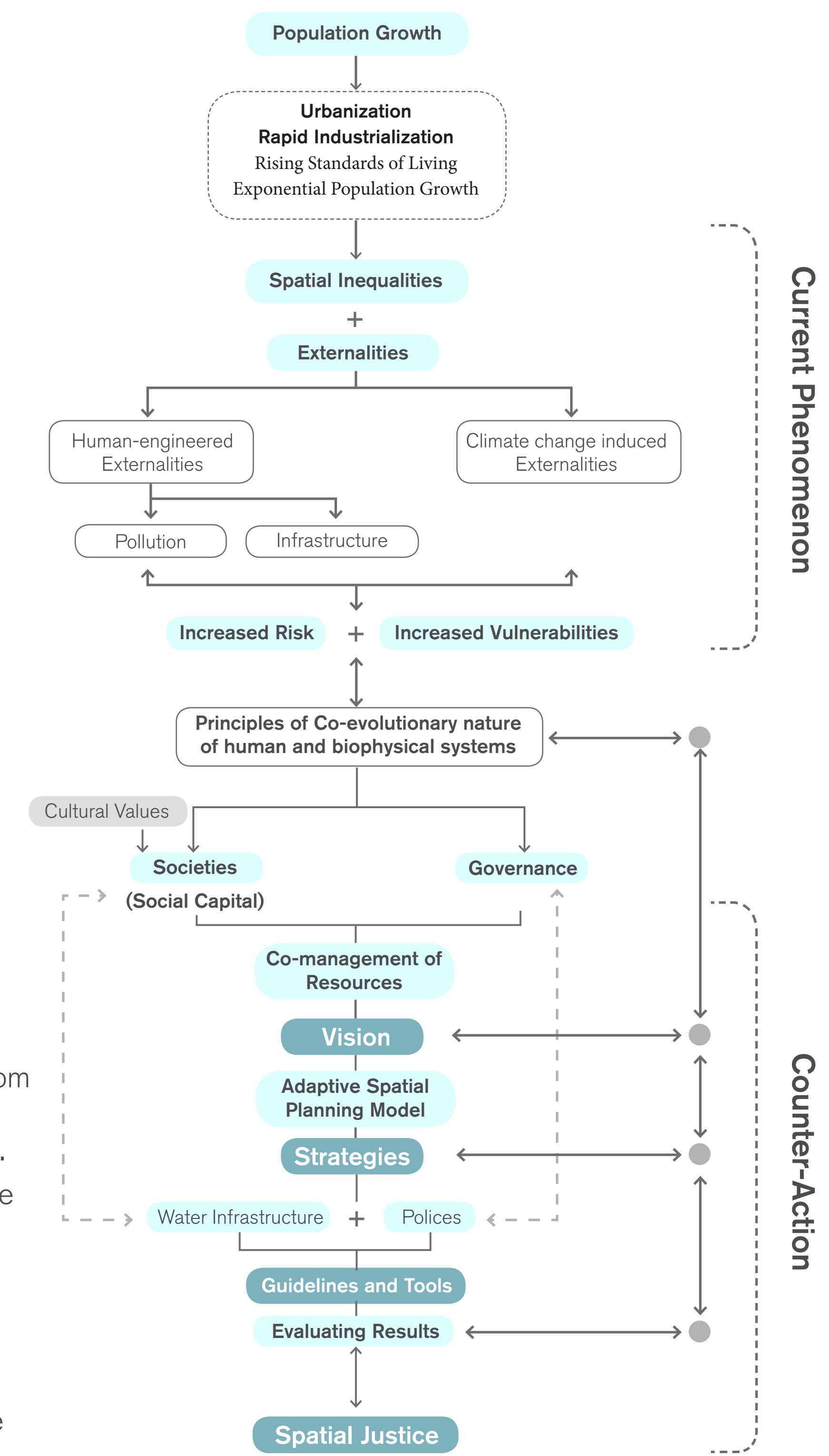
The river water is widely used for agriculture, irrigation, human consumption (domestic and industrial), tourism and recreation purposes. Over the years there has been a major shift in the hydrology and the quality of river water due to several human activities. The river is facing water challenges because of construction of huge barrages and dams for hydroelectricity and irrigation, unmonitored industrial use of water and intensive unplanned development of the cities and towns on its bank. Secondly, climate change is affecting the biophysical characteristics of the basin, leading to shifts in the monsoon regimes, which results in increasing floods and droughts that cause massive human destruction. The contamination and shortage of water are leading to more exploitation of groundwater for irrigation and domestic use (Luna Bharati, 2016).

Need for Paradigm Shift in Planning and Governance

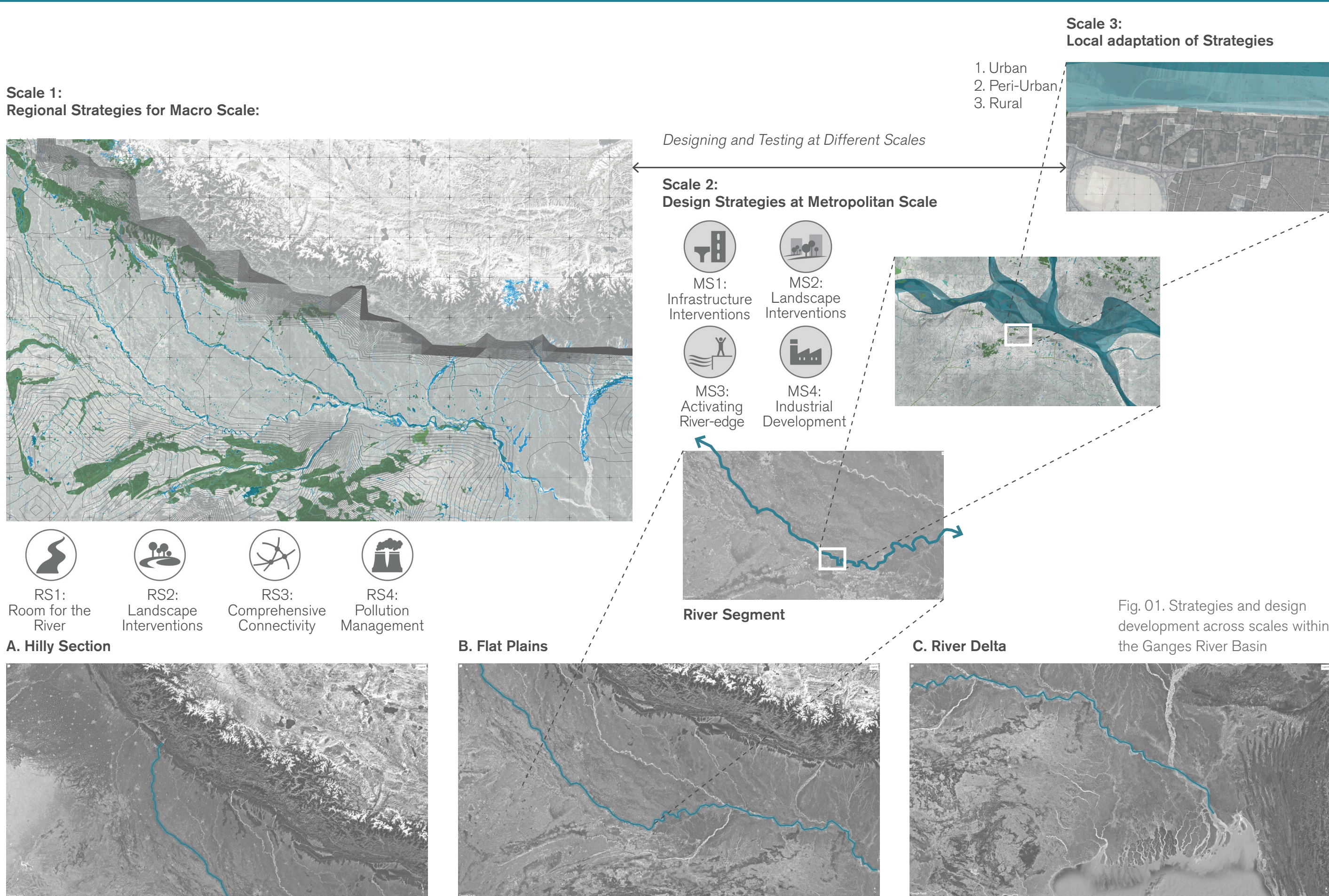


The 3 core concepts considered for the Adaptive Spatial Planning Model to address the constant rising risks of climate change and uncertainty are:

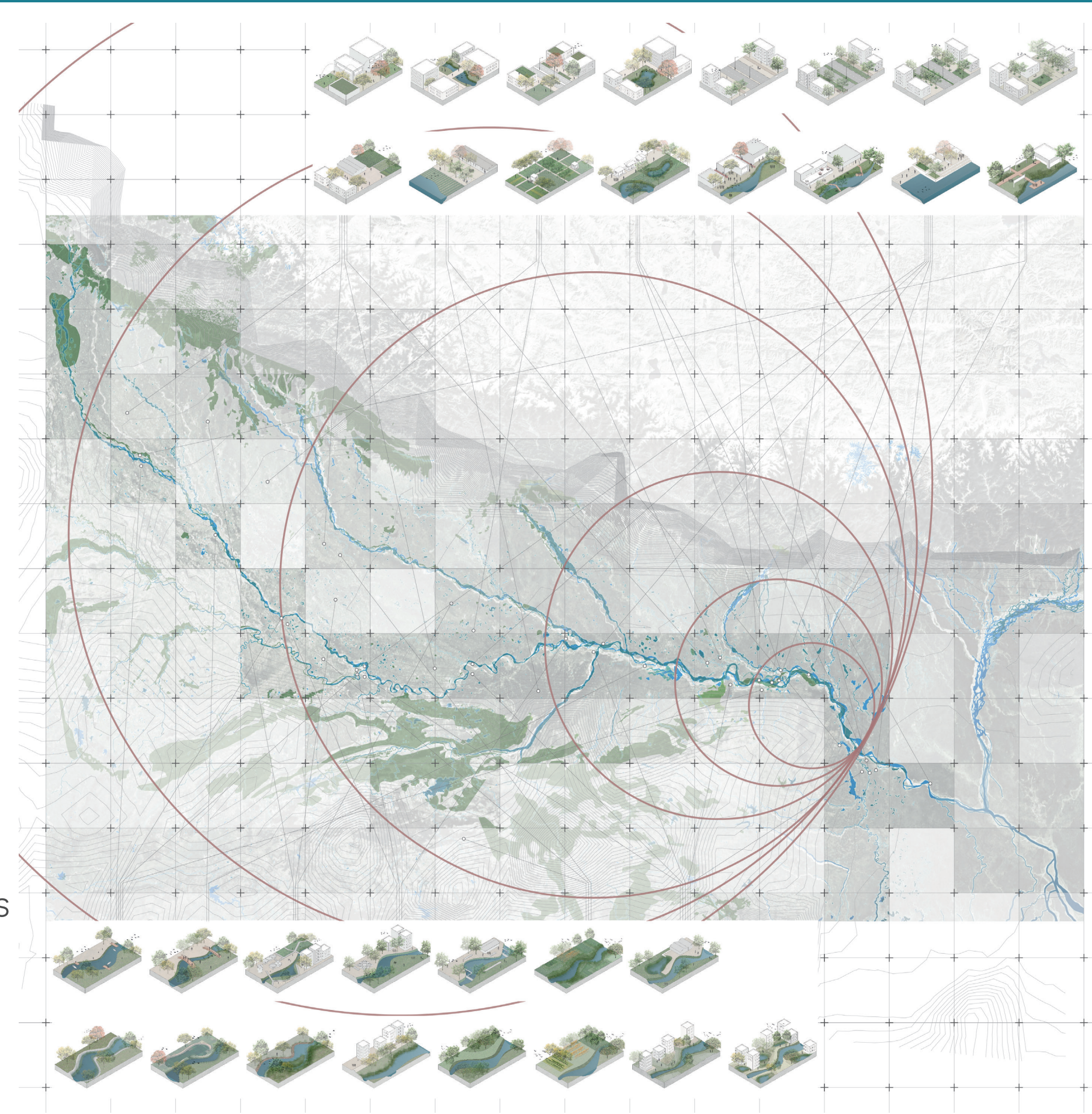
- Adaptive Governance:** The concept of adaptive governance highlights the importance of Actor-Network Theory aiming to achieve Actor-Relational Approach in planning. The process aims to achieve outside-inward planning rather than planning policies coming from inside of planning departments. This new model of Adaptive Governance emphasises on social capital and co-management of resources for resilient future (Luuk Boelens, 2010).
- Evolutionary Resilience:** The socio-ecological system is a framework to understand the dynamics of human-environment relation. Resilience has always been understood as the ability of the ecological system to reach back to equilibrium after a disturbance. While, evolutionary resilience, a forward-looking approach was developed to understand the integrated dynamic nature of human and biophysical systems to form adaptive cycles for resilient development (Muriel Cote and Andrea J. Nightingale, 2012).
- Spatial Justice:** Spatial justice can be defined as fair and equitable distribution in space of socially valued resources and the opportunities to use them. (Soja, 2009) To achieve an Adaptive Spatial Planning Model it is extremely important as it can empower local communities and provide them with equal rights to participate and use resources.



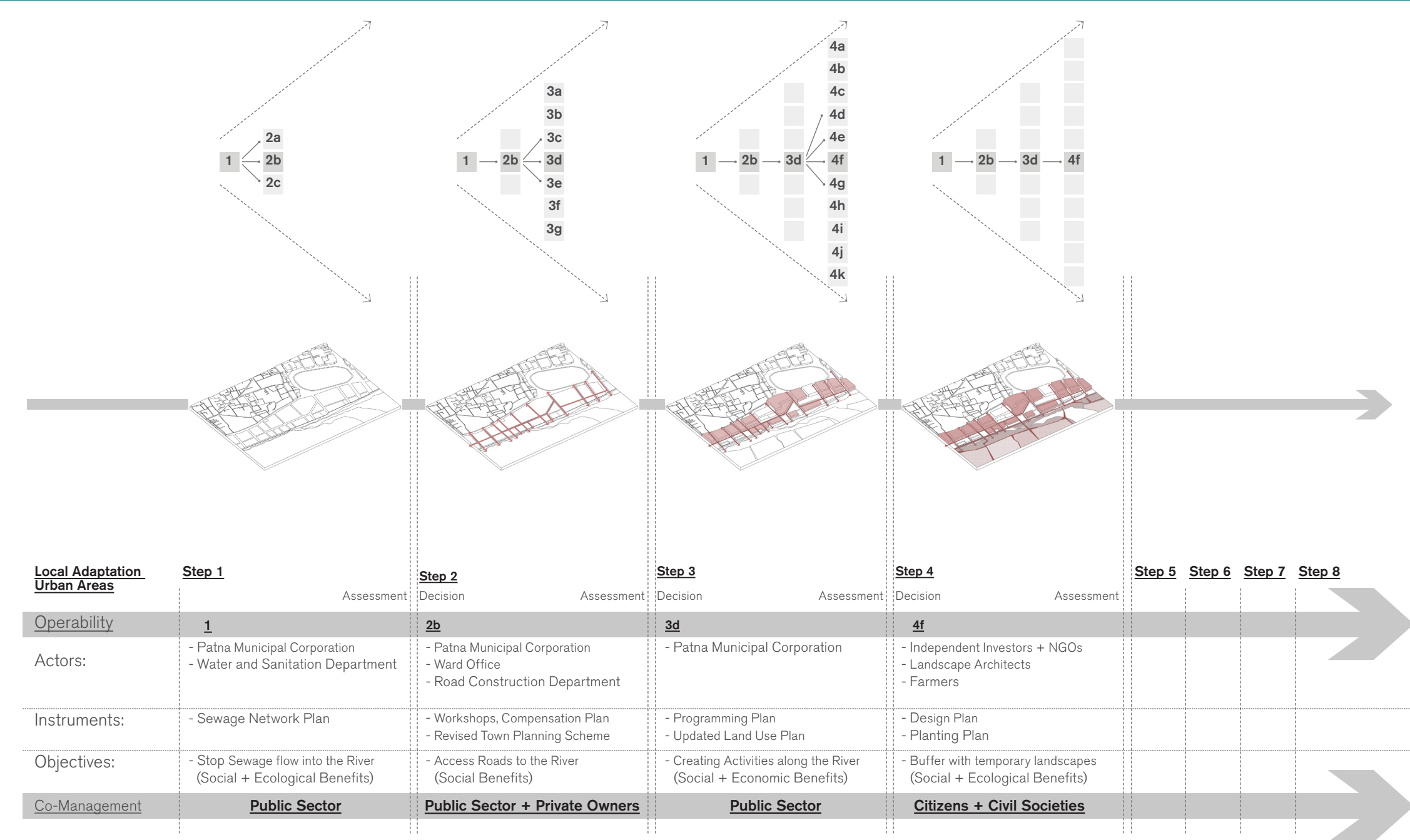
Adaptive Planning and Governance



Effects of anthropogenic interventions at one location are noticed at different locations and scales within the system. Beginning with the regional scale, strategies derived, are aimed to address the challenges witnessed across the basin. These strategies form a strong framework for interventions at different scale, focusing on holistic development and vision for the basin. While most strategies are applicable directly at local scales some might require negotiations and exceptions based on local culture, practices and context. For this purpose set of metropolitan scale strategies are developed. These strategies are location specific. They are formulated under the overall vision and framework of regional strategies for socio-ecological resilience. The involvement of local actors and participants become more prominent and necessary for strategy development and execution at this scale. Furthermore, local adaptation tests and establishes how the combination of different mitigation strategies from larger scales work to achieve adaptation to climate change at the local scale. A detailed framework of dynamic adaptive pathway is prepared based on the strategies derived at different scales.



Dynamic Planning Pathways



Interventions in ecological layers especially project related to water management have long term visions and consequences. Often these projects need to be planned in advance or in a near time. Making decisions now for future uncertainties is quite challenging and also requires flexibility. Thus, the dynamic adaptive pathways provide an opportunity to explore possibilities by sequencing a set of possible actions considering different external developments over time (Haasnoot, Kwakkel, Walker & ter Maat, 2013). The adaptive plan accommodates both the actions required to be taken now to prepare for the immediate future as well as the actions needed to keep future options open. Within the adaptive pathways, a long term strategic vision for the future and then commit to short-term actions that can set up a framework for possible future actions are derived. Often in the system, there are several tipping points like extreme climate risks or crisis, the points where the current actions may no longer be valid and hence additional actions are required. These are the points where there lies a possibility for new pathways to emerge with a shift in stakeholder and their actions.

Conclusions

The framework of adaptive spatial planning enables a flexible approach to plan for uncertainty, integrating local communities in the planning process. Local adaptation allows early testing of strategies and informing policies simultaneously with results and local knowledge, reducing the time-line compared to traditional planning where policies are derived at a central level without an in-depth understanding of local context. Furthermore, adaptive spatial planning allows shifting pathways, when desired outputs are not met or when the system is hit with an unexpected challenge. Thus, adaptive spatial planning model is the new model of planning that needs to be explored and utilised for climate change adaptation.

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