# Synergising Spatial Development Strategies with Climate Action

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Having worked on several public sector projects, she strongly advocates for an integrated, research-based, participatory approach towards architecture, urban design and urban planning. With a passion for people-centric and inclusive spatial design, her research is focused on bridging the gaps between the providers and the users, to create a vibrant and accessible public

*Abstract*

Cities are key centres of economy and are rapidly expanding.With an increase in urbanisation, cities are one among the largest contributors of carbon emissions.We hear of changing weather conditions, floods, droughts, heat islands, health risks, more regularly with each new year, deteriorating thequality of urban life. To ensure livability, climate change mitigation strategies have to address the three principles of sustainable development – Environment, Economy and Equity. As cities work as interconnected and complex urban systems, change in one sector impacts other sectors, compounding the problem of climate change. Subsequently, this research paper examines case studieshaving spatial strategies -regional, urban, neighbourhood, street and blockscale - to contemplate the way forward in formulatingclimate action plans in the Indian context, that envision cities as interwovan urban systems.

*Keywords*

Climate change, urban system, sustainable development, urban planning, urban design, architecture

## 1 Introduction

Global temperature has increased by more than 1°C since the industrial revolution, the last decade being the warmest(United Nations, 2021). Road transport and buildings are the main sources of carbon emissions - including emissions from electricity consumption, construction and usage of private vehicles. For example, in the city of Bengaluru, the road transport sector contributes towards 43% of carbon emissions and the domestic sector contributes 22% of carbon emissions(IISc, 2015). As cities, with its many complex networks and dependencies,work as connected systems, activities in one sector impacts another. The consequences of climate change now include water scarcity, flooding, severe health risks and a decline in the environmental quality.

## 1.1 Climate change and development

*'There is a strong link between the quality of life in cities and the management of natural resources available to them. Rapid urbanisation is accompanied by increased pressure on the environment and accelerated demand for basic services, infrastructure, jobs, land, and affordable housing'(UNEP, 2016).*

Without synergising political will and climate change adaptation policies with resource management andland economics, the challenges faced by cities in India cannot be combated. The three sustainable development principles of Economy, Environment and Equity have to be kept at the forefront, integrating sustainable development goal /SDG 11 (Sustainable cities and communities) and SDG 13 (Climate action).Sound climate action plans cross-cuttingregional and urban planning, urban design and architectural practices, focusing on climate resilience and disaster management, have to be enforced.

*'Spatial development strategies - prioritising urban mobility, physical and social infrastructure such as water supply, affordable housing, sanitation, education, health care, housing, parks and open spaces - which are multi-disciplinary and multi-scale, while respecting the context and its community, ensuring universal access to all, is the need of the hour.'*

Thisresearch paperscrutinisescase studiesto tackle climate change atmultiplescales - regional, urban (city/ town), neighbourhood, street, block/ building. The aim of the paper is to further the discourse on facilitating comprehensive climate action plans for cities in Indiain order to address the issues of climate change at all scales.
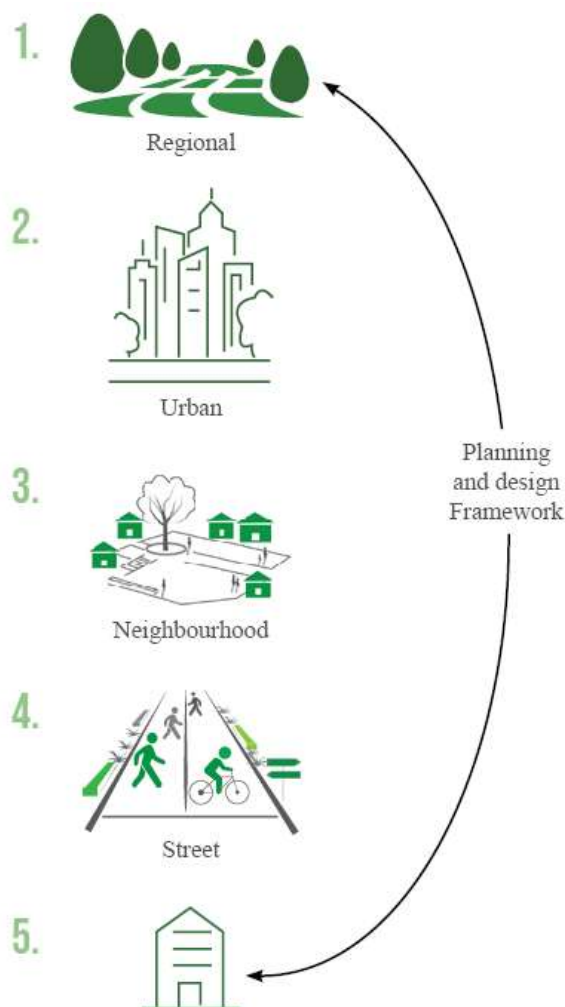


Figure 1 Spatial development scales

**Source:Author**

## 2   The Asian Context

### 2.1 Case study 1: Putrajaya, Malaysia

Putrajaya was designed as a new administrative capital for Malaysia in order to ease the congestion in Kuala Lumpur. While designing new cities as administrative capitals is not a new practice, Putrajaya was conceptualised as a 'Green Intelligent City'.

***At an urban scale,*** the city core comprises of the government, commercial and cultural zones.The periphery comprises of residential zones and social infrastructure. In the middle

is the man-made Putrajaya Lake and boulevard. The lake not only regulates the surrounding temperature but also acts as a regional and international wetlands research centre. A cycle network was incorporated into the plan, making the city 'people oriented'. Traffic calming measures were introduced to discourage excessive vehicular usage. Piped and networked utilities are placed underground, avoiding disturbance in the surrounding landscape. Deliberate attempts have been made to move away from using non renewable energy sources, reduce carbon emission, reduce paved surfaces to limit the urban heat island effect and flash avoid flooding. Paved surfaces to limit the urban heat island effect and flash avoid flooding.

*At a neighbourhood and block scale,* the design discourages fencing in residential areas to encourage social interaction. The buildings employ indigenous technologies such as 'tempayans' or traditional ceramic water pots used to cool the surrounding temperature(Ujoh, 2020).



Figure 2 Putrajaya Lake with a view of the city architecture in the Islamic style

**Source: Author**

## 2.2 Case study 2: Singapore

Singapore isarguably one of the best examples of a small hamlet evolving into a global mega city. It ranks high in quality of living (Mercer, 2019)and is considerably equipped to withstand the onslaught of urbanisation.The key contributing factor to the success of Singapore is its comprehensive approach towards spatial development. It offers an immersive experience of the urban realm by augmenting the master plan with supplementary plans. Some of the examples are: Green Plan 2030; Accessibility Master Plan 2016; Green Mark 2015; Conservation Guidelines 2017.

Founded in 1819, by Sir Stamford Raffles, Singapore was a colony under the British Empire and was projected as the 'Manchester of the east'. It's strategiclocation along prime maritime trade routes between Europe and Asian East, made Singapore an important port. This node at the mouth of the Singapore river is presently the central business district (CBD) of Singapore City.Initially, the city witnessed a huge influx of immigrants.



Figure 3 Singapore: A juxtaposition of the old and the new

**Source: Author**

This resulted in haphazard developmentwith a mixed bag of architectural styles and urban character.'Plan of the Town of Singapore' or the Jackson Plan, with grid iron streets, public squares, commercial zones and ethically segregated residential blocks, was formulated in 1822 as a response to bring order to the rapidly growing city. Many heritage areas were demolished to make way for new construction.However, when Singapore gained independence, the nascent city provided a canvas for urban planners to test contemporary urban planning theories.

*At a regional scale*, the Singapore State and City Planning Project, commissioned in 1967, comprises of satellite town development, infrastructure building, industrial districts, transport interchanges, high rise social housing, land reclamation, and the expansion of the city centre as strategies for spatial planning. Land was reserved for future growth and to act as a source of real estate revenue for the city – state.Now, Singapore has master plans which integrated green strategies, compact development and Transit Oriented Development strategies.

### 2.2.1. Singapore Green Plan 2030

This directly responds to the UN's Sustainable development agenda 2030. Its main targets include:

- Plant 1 million more trees
- Quadruple solar energy deployment by 2025
- Reduce the waste sent to landfill by 30% by 2030
- At least 20% of schools to be carbon neutral by 2030
- All newly registered cars to be cleaner-energy models from 2030

*At an urban, neighbourhood and street scale*, the Urban Redevelopment Authority (URA)was established in 1974 to oversee spatial development of the city. The URA proposed an urban design plan in 1983 for the city centre. This incorporated mixed use into its plan (Ong, 2020). Living, work, health care, education, leisure, is all within walking distance in a neighbourhood. Harmonising mobility infrastructure with a compact urban fabric reduces usage of vehicles. This in turn reduces pollution, traffic, urban sprawl, enabling a healthy urban living. In 1998, Singapore was one of the first cities to implement Electronic Road Pricing (ERP) System as a way to discourage automobile use. This system is active in the centre of the city to reduce congestion. Heavy toll is collected to travel inside the city core during peak hours. This promotes a walking friendly city and reduces pollution.

*At a neighbourhoodscale,* Singapore has been proactive in creating sustainable and environmentally conscious built forms, incorporating nature into architecture. The city integrates biophilic design into its urban environ, facilitating a sustainable eco system. The Garden by the Bay and the Changi Airport are prominent examples of this practice.

### 2.2.2. Conservation Guidelines 2017

The URA notified the latest Conservation guidelines in 2017. This consolidates the master planning approach at the neighbourhood, street and building scales. Conservation of built heritage is a critical part of urban planning in Singapore and it enhances the unique place identity, integrating history with the streetscapes and public spaces. The guideline mandates the

retention of all original structural and architectural elements. Architectural features, finishes and building facades are strictly controlled. The Conservation Guidelines also prescribe façade control regulations for infill land in heritage districts. Each historic district has separate urban design guidelines.

***At a block and building scale***, Singapore implements codes such as the 'Green Mark' which promote the use of local and sustainable building construction systems.The city-state aims to have 80% of its buildings certified as sustainable under its Green Mark scheme by 2030.

### 3 Indian context

Cities in India, though often witnessing the adverse effects of climate change, rarely have a spatial development framework which includes climate change policies and action.However, in the last five years, there is an overhaul of government policies to include sustainable development. The Government of India, under the Ministry of Housing and Urban Affairs, has launched a number of urban missions - Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Smart Cities Mission, Housing for All (Urban), Swachh Bharat Mission (urban) which address SDG 11 and influence the quality of urban life(Shanti, 2020).

For instance, the objective of the Smart Cities Mission is 'to promote cities that provide core infrastructure, clean and sustainable environment and give a decent quality of life to their citizens through the application ofsmart solutions'. The Mission aims to drive economic growth and improve quality of life through an integrated approach built on the social, economic, physical and institutional pillars of the city(Smart Cities Mission,

2016). The mission stresses on not just making infrastructure 'smart' but also integrates urban renewal and provision of basic infrastructure with digital infrastructure. This would give a leg up to smaller cities where area-based development planning, urban design and architecture go hand in hand to tackle urban challenges. Additionally, the newly launched Climate Smart Cities 2.0 comprises of an assessment framework across five sectors namely, (a) Energy and Green Buildings; (b) Urban Planning, Biodiversity and Green Cover; (c) Mobility and Air; (d) Water Management and (e) Waste Management.

While, the above missions are welcome steps towards climate action and sustainable development, Indian cities still lack planning and design mechanisms which see the city as a whole and not as independent sectors. The planning and regulatory framework must be augmented across the board to facilitate easy enforcement and reduce loopholes that are exploited due to the pressures of development.
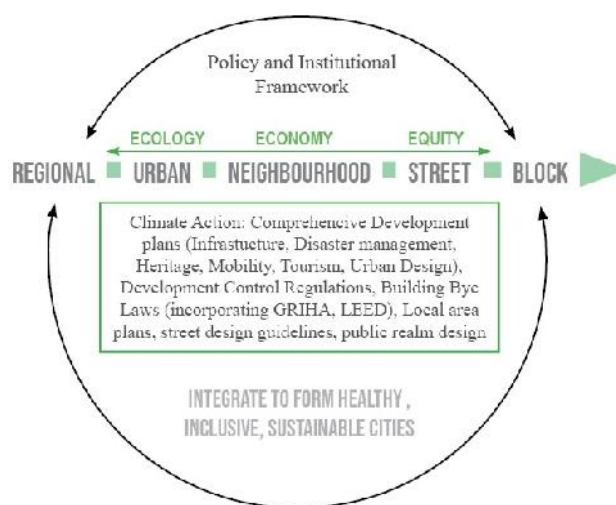
### 4 Way forward



Figure 4  Spatial strategy: multi-scale

**Source:Author**

As seen in the case studies, a city's vision and its master plan must be supplemented with supporting guidelines and regulations, which trickle down to the smallest scale. While this has been attempted in the newer Master Plans such as in Delhi, we need to develop a more robust planning and design frameworkwhich will assess spatial impact and contribute to a comprehensive, sustainable climate action plan. Under the umbrella of a comprehensive climate action plan, it is vital that each scale is addressed in an integrated manner and not remain in silos. *At a regional scale*, cities have to be read as an urban system to understand its networks and dependencies.*At an urban scale*, city development plans must include disaster management plans, infrastructure management plans, urban design plans, addressing environmental, social and economic concerns. *At a neighbourhood scale*, we need design codes and guidelines for public spaces, special areas and heritage precincts. *At a street scale*, the city master plan must include street design guidelines to ensure safety as well as efficiency. *At a block/ building level,* retaining the unique natural and built heritage assets, which are sensitive to the local context and built with sustainable materials, will go a long way in reducing embodied energy consumption and carbon emissions.' (Chepelianskaia O. , 2019).

Indian cities are major drivers of the world economy and cities of the future. *At the policy level*,it is necessary to synergise SDGs with climate action. Spatial development strategies must be augmented with a strong overarching institutional framework. This will enable a multi-disciplinary approach that addresses the three sustainable development principles of Environment, Economy and Equity together, to make cities inclusive, safe, resilient and sustainable.

## 5 References

**Book refrences**

1. Ujoh, F. (2020). Putrajaya: A new green intelligent city. *Urban Design Group Journal*.

2. Mercer. (2019). *Quality of living ranking.*

3. MOSE. (2021). Singapore green plan 2030 charts ambitious targets for next 10 years to catalyse national sustainability movement. *Ministry of Sustainability and the Environment.*

4. Ong, D. (2020). Riding the sands of time: Urban malleability and the legacy of Marina Bay. Urban design group journal.

5. URA. (2017). Conservation guidelines. *Urban Redevelopment Authority*

6. Shanti, G. R. (2020). Importance of spatial planning and sustainable development goals inurban areas. *Institute of town planners, India*.

7. Chepelianskaia, O. (2019). A tangible path to building better cities. IAB, 34-40.

**Web refrences**

1. United Nations. (1999). WhatIs climate Change? Retrieved from United Nations: https://www.un.org/en/climatechange/what-is-climate-change (accessed 02April 2022)

2. IISc. (2015). GHG footprint of Major cities in India. Retrieved from Indian Institute of Sciences:http://wgbis.ces.iisc.ernet.in/energy/paper/GHG_footprint/discussion.html (accessed 02 April 2022)

3. UNEP. (2016). Sustainable development goals. Retrieved from United Nations Environment Programme:https://www.unep.org/explore-topics/sustainable-development-goal (accessed 06 November 2021)

4. BCA. (2015). Green Mark Certification Scheme. Building and construction authority Singapore. Retrieved fromhttps://www1.bca.gov.sg/ (accessed 06 November 2021)

5. Smart Cities Mission. (2016). About Smart cities misssion. Retrieved from Smart cities misssion: https://smartcities.gov.in/ (accessed 06 November 2021)