5th World Conference on
Climate Change and Global Warming
07 - 09 March 2025 Vienna, Austria

Measuring Urban Compactness: Pathways to Sustainable and Climate Resilient Cities in India

Swarnim Kumar Gautam[1], Sovan Biswas[2], Ankhi Banerjee[3]

[1,2,3]Ranbir and Chitra Gupta School of Infrastructure Design and Management Indian Institute of Technology Kharagpur, West Bengal, India

ABSTRACT

Compact cities are widely acknowledged as sustainable urban designs that might mitigate the effects of climate change in an era of rapid urbanization. This study discusses the necessity of defining features of urban compactness within the specific socioeconomic and environmental circumstances of Indian cities. With cities accounting for more than 70% of global greenhouse gas emissions, adapting compact urban forms is essential for lowering carbon footprints, increasing resource efficiency, and combatting climate change. This study creates an index to measure compactness in Indian cities using critical indicators such as population density, land use diversification, transit accessibility, and proximity to amenities. The study quantifies these criteria using Geographic Information Systems (GIS) and remote sensing data to assess current Indian cities. The calculated Compactness Index provides a paradigm for urban design that prioritizes walkability, diversified land use, and efficient resource allocation. Compact cities can help reduce energy demand, reduce dependence on motorized vehicles, help with climate adaptation and boost urban resilience in the face of rising temperatures and pollution by promoting sustainable growth patterns. This study provides crucial insights for Indian policymakers, urban planners, and climate strategists seeking to link urban growth with climate sustainability goals and lower India's urban carbon footprint.

Keywords: building density; compactness index; sustainable development; transit accessibility; urban growth