

# **Preface**

The urban landscape of Hyderabad and Secunderabad, two bustling cities in the heart of Telangana, India, presents a captivating yet complex tapestry of growth and environmental challenges. With a combined population exceeding ten million, these cities have emerged as economic powerhouses, cultural epicentres, and administrative hubs, attracting migrants and investments from far and wide. However, this rapid urbanization has given rise to the Urban Heat Island (UHI) effect, a phenomenon characterized by higher ambient temperatures in urban areas compared to their rural surroundings. Exacerbated by urban sprawl, industrialization, and changing land-use patterns, the UHI effect has become a pressing concern for sustainable urban development. This research endeavour aims to unravel the spatial and temporal manifestations of the UHI effect across Hyderabad and Secunderabad, and explore its impact on the critical environmental factor of evapotranspiration (ET), the combined process of evaporation from land and water surfaces and transpiration from vegetation.

The influence of the UHI effect on ET, a crucial component of the water cycle, can significantly alter local climate conditions, exacerbating water scarcity and affecting ecosystem health. By unravelling the drivers behind rising temperatures and delineating vulnerable hotspots, this project seeks to empower policymakers, urban planners, and local communities with actionable insights to mitigate the adverse impacts of UHI on ET and foster resilience in the face of climate change. Through a collaborative and interdisciplinary approach, this study leverages remote sensing techniques, ground-based observations, and numerical modelling to quantify the UHI effect and its influence on ET across the study area. By integrating these data sources, we aim to develop a comprehensive understanding of the complex interplay between urban morphology, land surface characteristics, and microclimatic conditions, ultimately informing targeted mitigation strategies and urban planning policies. This research endeavour is a testament to our commitment to advancing knowledge on urban climate and its implications for water resources management, ecosystem preservation, and human well-being in rapidly urbanizing regions like Hyderabad and Secunderabad. By fostering collaboration among stakeholders, including local authorities, academic institutions, and community organizations, we envision a future where these vibrant urban agglomerations can thrive while embracing sustainable development principles and maintaining a harmonious balance between urban growth and environmental stewardship.

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