ABSTRACT

Integral to sustainable and livable cities, Urban Green Spaces (UGS) function as green infrastructure that deliver various ecosystem services and solve diverse urban problems. Although UGS provision is aligned primarily with achieving Sustainable Development Goal 11.7, ensuring adequate provision has become a prominent policy challenge for 21st century cities. Rapid urbanization, high densification, persistent land scarcity, competing land uses, lack of sufficient funding, and socio-political complexities collectively hinder UGS development. While World Health Organization recommends a minimum of 9 sq.m accessible UGS per capita, most of the Indian metropolitan cities drastically fail to meet the prescribed standard. Thus, this thesis advocates a paradigm shift in UGS planning from prescriptive to performance-based approach. It highlights the need for a robust, sustainable risk management framework to safeguard the existing UGS stock of the cities from extrinsic risk of encroachment and shrinkage, and frame strategic urban greening interventions to enhance the intrinsic resilience of UGS. Against this backdrop, this thesis proposes a risk-based methodology to develop an extrinsic-intrinsic, risk-coupled taxonomic framework for urban public park management in Indian metropolitan context, choosing Kolkata as the case study. This thesis also intends to explore the wilful blindness of urban local bodies towards UGS management by conducting fiscal assessment of UGS governance. The study further investigates the shrinking public green problem due to high development pressure, indicated by housing price transaction using spatial-aspatial analyses. A method is proposed to estimate Stress of Urbanization (SoU) on each park. *Furthermore, e*mploying Pareto sorting algorithm, this study evaluates Extrinsic Risk (ER) and Intrinsic Risk (IR) of UGS by developing a tri-objective and a bi-objective optimization framework respectively. Parks that experience the largest reduction in size and vegetation loss between two timeframes 2015 and 2023, coupled with greatest exposure to SoU, have the highest ER. Whereas, parks with the lowest usability and ecological functionality exhibit highest IR. Accordingly, this research proposes two methodological frameworks: an entropy-weighted, COPRAS-based Park Usability Value (PUV) index and a biophysical measurement-based Park Natural Service Value (NSV) estimation. Lastly, the research proposes five hierarchical risk archetypes and provides policy recommendations based on the above.

Keywords: Urban Green Spaces (UGS); extrinsic risk; intrinsic risk; Pareto sorting algorithm; hierarchical risk archetypes; UGS governance