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Development of a Multi-Criteria Framework for Identifying Intra-Urban Heat Islands in Support of Urban Heat Mitigation in Athens, Greece

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This study develops a novel multi-criteria framework for the identification of intra-urban heat islands by integrating indicators related to three-dimensional urban morphology (e.g., height-to-width ratio and sky view factor), land cover characteristics, satellite-derived land surface temperature, and thermal comfort conditions. The proposed framework practically enables the delineation of urban areas with distinct thermal and morphological profiles, thereby providing a robust basis for targeted, site-specific intervention strategies.

Subsequently, a range of bioclimatic heat mitigation measures is assessed for selected hotspots, including nature-based solutions such as increased tree planting and green roofs, as well as the application of high-albedo (cool) materials. The effectiveness of these measures is evaluated using advanced urban climate simulation models (ENVI-met and UT&C), allowing for a comparative assessment of their performance under varying spatial configurations and microclimatic conditions.

Overall, the study provides evidence-based guidance for urban heat mitigation and supports climate-resilient urban planning in Mediterranean cities, with Athens serving as a representative case study.