## Assessing Outdoor Thermal Comfort through Microclimatic Modeling: A Case Study in Lecce (Italy)

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This study aims to analyze thermal comfort in a selected area of Lecce, a typical Mediterranean city, using a modelling approach to evaluate the microclimatic mitigation effects of urban greenery. The study involves the use of ENVI-met, a CFD (Computational Fluid Dynamics) microclimatic model to reproduce the physical and thermal behavior of urban spaces. It accounts for surface characteristics, vegetation, and atmosphere interactions, allowing for a detailed assessment of thermal comfort conditions. The methodology involved three microclimatic simulations based on distinct scenarios: (1) the current urban configuration; (2) an identical scenario to the current one but without vegetation; and (3) a future scenario featuring the replacement of impervious surfaces with permeable materials, the substitution of some existing vegetation with more shading species, an increase in overall vegetation density, and the addition of a fountain as a water feature. The three microclimatic simulations were performed in ENVI-met for a typical summer day in Lecce. Thermal comfort is evaluated through UTCI (Universal Thermal Climate Index), which shows an improvement during the day in scenario (3) compared to (1), especially in the central hours of the day, with a peak reduction of the "*very strong thermal stress*" of 30%. These results highlight the crucial role of urban greenery in enhancing thermal comfort and underscore the importance of incorporating sustainability principles into urban planning through the identification of effective microclimate mitigation strategies. Future analyses using the same methodology are intended to be conducted in other areas of Lecce and other Mediterranean cities, investigating the beneficial effects of more suitable mitigation solutions to improve thermal comfort for residents.

**Keywords: thermal comfort, ENVI-met, UTCI**