AHOUANDJINOU, Enagnon Benoit Olivier PhD/SPS/FT/2021/13000

ABSTRACT

Urbanisation poses significant challenges to biodiversity, climate resilience, and sustainable city planning, especially in the global south. Rapid urbanisation and industrial growth intensify the Urban Heat Island (UHI) effect, driving temperature disparities between urban and rural areas. At the same time, urbanisation reduces carbon stocks and alters urban plant diversity, contributing to biodiversity loss. A common framework for understanding biodiversity in cities is the luxury effect, which suggests that wealthier neighbourhoods support greater biodiversity due to resources and landscaping. However, the applicability of this hypothesis in the global south, where socio-economic and environmental dynamics differ, remains unclear. This thesis examines the relationships between urban climate, residential plant diversity, and socioeconomic factors across two coastal and mainland cities in West Africa. A survey of 1,902 randomly selected households recorded socioeconomic characteristics and catalogued urban plant species in household gardens. These data were used to estimate household-level diversity metrics, including taxonomic and phylogenetic diversity. The study further investigated how residential plant species with varying phylogenetic diversity optimise cooling in urban areas with different levels of greening. Relationships between phylogenetic diversity, alien species, and urban development indices were analysed using linear mixed-effect models and structural equation modelling. Findings show no general support for the luxury effect on phylogenetic diversity. However, rented properties displayed lower taxonomic ($\beta = -0.197$, $p = 0.003$) and phylogenetic diversity ($\beta = -0.176$, $p = 0.009$) than privately owned houses. Results also reveal that wealth alone does not dictate biodiversity distribution; rather, complex interactions between socioeconomic traits and urban plant diversity shape outcomes. Phylogenetic diversity reduced Land Surface Temperature (LST) regionally ($\beta s = -0.002$, $p < 0.048$), though this effect diminished at the city scale due to landscape homogeneity and urban features ($\beta s = 0.069$, $p = 0.036$). Greenery strongly increased neighbourhood phylogenetic diversity ($\beta s = 0.847$, $p < 0.0001$). Alien species decreased taxonomic diversity while increasing lineage diversity ($\beta s = 0$, $p = 0.009$). Longer residence time increased taxonomic diversity ($\beta s = 0.051$, $p = 0.042$) and reduced ambient temperature in greener areas of Benin ($\beta s = -0.043$, $p = 0.045$). This study underscores the need for integrated urban planning that considers the drivers of plant diversity and their role in mitigating the UHI effect and reducing CO_2 emissions. Strategic approaches should prioritise not only phylogenetic diversity but also functional traits essential for heat regulation, potentially through targeted species introduction. Findings offer guidance for biodiversity conservation and climate resilience in rapidly urbanising regions.