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SPATIO-TEMPORAL DYNAMICS OF URBAN ECOSYSTEM SERVICES SUPPLY-DEMAND (MIS)MATCHES

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The importance of local ecosystem services for residents' wellbeing is increasingly recognized. However, few studies address the balance between ecosystem service supply and demand at the local level at which they are consumed because it is difficult to accurately quantify both aspects comparably with high resolution. The main objective of this paper is to propose a way to quantify the spatio-temporal dynamics in the supply-demand mismatches of two local ecosystem services. Considering different types of ecosystem services, we selected one regulation service, temperature regulation, and one cultural service, recreation (no provisioning services due to the fact they are barely supplied by urban green spaces). Both are necessary services for people's physical and mental welfare and spatial overlap between supply and demand is required to ensure the local consumption. Furthermore, their supply mostly relies on urban green spaces which decreased in urban areas and may become less due to the potential occupation by new houses.

To accomplish our goal, we quantified both supply and demand of temperature regulation service and recreational service in the case study area Amsterdam in the year 2000 and 2015. The temperature regulation demand is assessed based on health risk associated with the local urban heat island effect and the related supply is measured based on the mitigated urban heat island effect through the presence of urban green spaces. As for recreation service, we adopted 9 m² per person from the world health organization as a local minimum and applied it accordingly as the demand for recreational service in each 500m×500m pixel. Recreational service supply was mapped as the accessible green space area per pixel. We made a temporal comparison of the (mis)match of these two ecosystem services between the year 2000 and 2015 as well as a spatial comparison in an urban-rural gradient.

Our results show the assessment is useful for (1) identifying current spatial mismatches between ecosystem service supply and demand, and (2) analyzing temporal dynamics of ecosystem service mismatch resulting from urbanization. The results are also helpful to identify priority areas for conservation based on maximizing ecosystem service provision and will be useful in detecting potential conflicts associated with new management and planning practices in future urbanization. We found the mismatch situation is more severe in urban centers compare to rural areas where residents tending to access higher ecosystem services from their backyards, indicating small green spaces such as backyards play an important role to balance ecosystem services and should be paid more attention in the sustainable urban planning.

BIO (50-word maximum): Yujing Ma is a PhD candidate at VU University Amsterdam. Her current research focuses on Urban Ecosystem Services and implications for Urban Planning and Design. She finished her master's degree in Landscape Architecture at Peking University, specializing in Urban Planning, Landscape Architecture and Ecosystem Services.