Ecosystem services deficits in cross-boundary landscapes: spatial mismatches between green and grey systems

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Quantitative analyses of the influence of boundary lines on ecosystem services distributions remain rare. Approaches towards integrative assessments of green and grey landscape systems, particularly in cross-boundaries contexts, remain underdeveloped. This study aims to close that knowledge gap. This study was carried out in the cross-boundary landscape of the cities of Cieszyn (in Poland) and ?eský T??ín (in the Czech Republic), which form one urban system that is divided by a national boundary. The study proposes a novel quantitative method to (1) assess and analyse the spatial structure of urban green and grey systems and (2) analyse the potential provision of ecosystem services (ES) in cross-boundary landscapes. The methodology could be useful for various types of cross-boundary landscapes. A spatial analysis using technomass (?) and Normalized Difference Vegetation Index (NDVI) indicators was performed and combined with population data. The ratio between technomass and number of inhabitants to NDVI, used as a proxy indicator for the provision of ES, was implemented for the identification of areas of deficits in ecosystem services provision. The study shows significant spatial asymmetries, indicated inter alia by the share of grey and green systems and distribution of ES deficit areas. The spatial asymmetries of the urban cross-boundary landscape indicate the need for environmental governance covering green and grey systems located on both sides of a boundary as a spatial unit. This challenges current planning frameworks based mostly on ?static? Euclidean land-use zones.

Boundary

Green and grey system

NDVI

Spatial indicators

Technomass

Urban landscape