



Relations between nature-based solutions of green-blue area accessibility and socio-economic-ethnic patterns in the urban Stockholm region

Romain Goldenberg, Zahra Kalantari, and Georgia Destouni

Department of Physical Geography & Bolin Center for Climate Research, Stockholm University, SE-10691 Stockholm, Sweden

More than half of the world's population lives in cities, a proportion expected to increase to two thirds by 2050 (United Nations (UN), 2015). In this study, we investigate the spatial relationships that may exist between income and/or nationality homogeneity/heterogeneity levels of urban populations and their accessibility to local green-blue areas as possible nature-based solutions for sustainable urban design. For this investigation, we consider as a concrete case study the urban region of Stockholm, Sweden, for which we compile and use available land-cover and vegetation density data (the latter in terms of Normalised Difference Vegetation Index, NDVI) in order to identify and assess the spatial distributions of various green-blue area types and aspects. We further combine this data with spatial distribution data for population density, income and nationality, as well as with road-network data for assessing population travel times to nearby green-blue areas within the region.

The present study results converge with those of other recent studies in showing large socio-economic-ethnic segregation in the Stockholm region. Moreover, the present data combination and analysis also show large spatial differences in and important socio-economic-ethnic correlations with accessibility to local green areas and nearby water bodies. Specifically, population income and share of Swedish nationals are well correlated in this region, with increases in both of these variables implying greater possibility to choose where to live within the region. The living choices of richer and more homogeneous (primarily Swedish) population parts are then found to be areas with greater local vegetation density (local green areas as identified by high-resolution NDVI data) and greater area extent of nearby water bodies (blue areas). For comparison, no such correlation is found between increased income or Swedish nationality homogeneity and accessibility to nearby forest areas (overall green area extent) or built facilities for recreation and sports. The found living choice correlations point at the importance of green-blue area parts as possible nature-based solutions in urban design and planning, with potential to improve wellbeing and social sustainability for the whole urban population and not just its rich component.