

Urban Parks and Social Inequalities in the Access to Ecosystem Services in Santiago, Chile

Barrera F.D.L.

Henriquez C.

Ruiz V.

Inostroza L.

In emergent economies, severe social inequalities can produce high exposure to deprived environmental conditions, affecting people's wellbeing. Urban parks can greatly help to increase the urban environmental quality by providing fundamental ecosystem services, such as local climate regulation, recreation and sense of place. Urban parks are, therefore, key elements for urban sustainability. This is particularly important in urban settings where investment in green spaces is deficient. In this work, we monitor the relationships between socio-economic features and the provision of local climate regulation. To look at the potential mitigation of air temperatures we analysed a sample of seven parks and their surroundings in Santiago de Chile. Three physical variables were measured: land surface temperature (LST) as a proxy of air temperature, and vegetation cover and soil imperviousness as predictors. These variables were obtained from calculations based on Landsat imagery (2015), using the thermal bands, and estimated through normalised differences of vegetation (NDVI) and built-up (NDBI) indices. We used socio-economic as another predictor variable. Data used classifies households in five groups according to the family income and education level. The socio-economic data was obtained at census track level and served to explore the relationship between physical variables (LST, NDVI and NDBI) relate to socio-economic data. In addition, we measure air temperature using 8 in-situ sensors inside and outside of each park measuring each 150 seconds during two days of high temperatures (over 25°C). Results showed that LST correlated significantly with vegetation cover and imperviousness ($r_{\text{spearman}} = -0.706$ and 0.645 , respectively). Socio-economic variables correlated with the same variables, where wealthier neighbourhoods correlated negatively to LST and NDBI but positively to

NDVI, while poorer neighbourhoods had higher values of LST and NDBI and correlated negatively to NDVI. Differences between air temperature inside and outside parks were higher in poorer than in wealthier neighbourhoods with an average difference of 2.5°C with a maximum observed difference of 7.1°C. Our results highlight the importance of implementing urban parks in deprived urban settings, to contribute to reduce shortages and inequalities in the access to ecosystem services. ©

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