

Inequality of Exposure to Local Restorative Nature in the City of Vancouver

Background

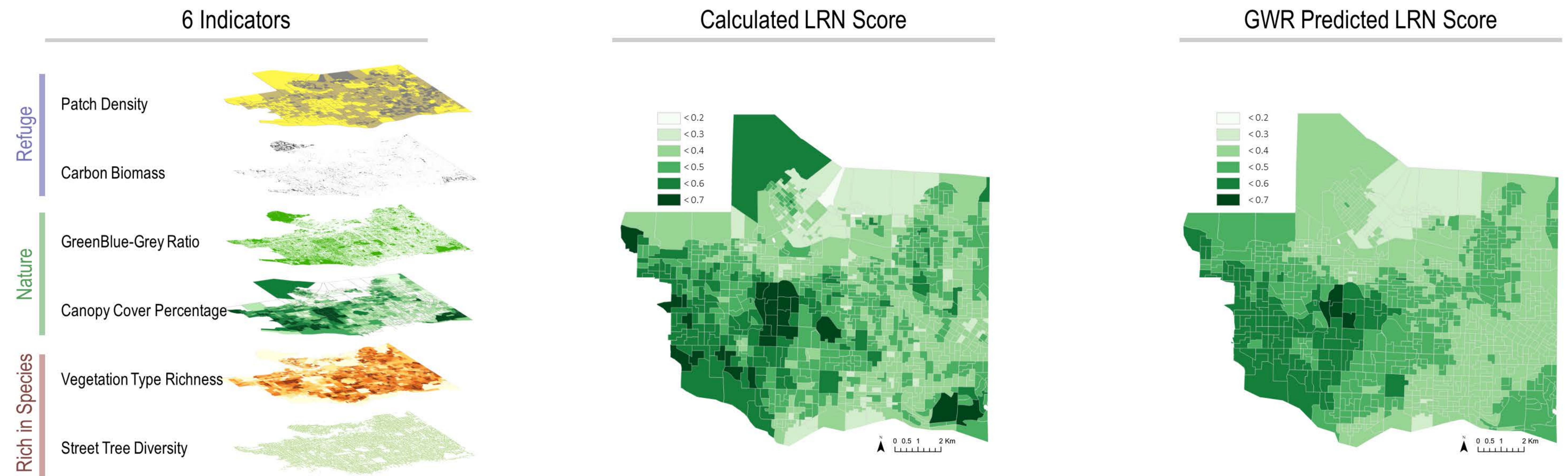
Living in cities can be stressful. While studies have shown that exposure to nature can help reduce stress and promote well-being, literature has recognized that not all nature is the same. Some characteristics of nature provide more psychological support than others depending on one's states of well-being (Bengtsson & Grahn, 2014). This study explored how various marginalized populations are exposed to restorative nature in the City of Vancouver and developed a Local Restorative Nature (LRN) index to assess the quantity of restorative nature in a given area and allow for comparison across a landscape.

Restorative Nature

Restorative nature environments encompass qualities that help reduce stress, alleviate mental fatigue and improve overall well-being. For example, a space with water features, a variety of vegetation, rich canopy covers, and areas away from traffic.

Methodology:

Development of the Local Restorative Nature Index and GWR Analysis



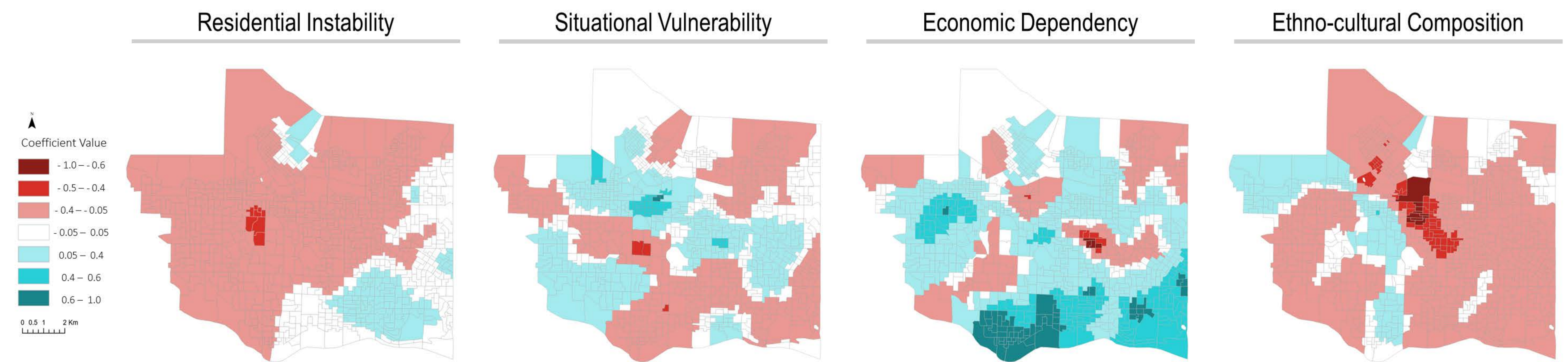
The developed Local Restorative Nature (LRN) index composed of six indicators under three dimensions. The three dimensions: refuge, nature, and rich in species were selected based on Bengtsson & Grahn's triangle of supporting environments which suggests that these nature characteristics provide better support to humans in low well-being states (2014).

The LRN index is calculated for each dissemination area (DA) by equally weighting the six indicators. The computation of the LRN index can also be applied to finer or coarser geographical areas given data availability and thus allow for scalable comparison across a landscape.

The predicted LRN score represents the amount of restorative nature at each DA estimated by the scores of four marginalization dimensions (residential instability, economic dependency, ethno-cultural composition, and situational vulnerability) from the Canadian Index of Multiple Deprivation (CIMD) data. A geographically weighted regression (GWR) analysis was performed using LRN index as the response variable and the marginalized scores as the explanatory variables.

Correlations Vary between Each Marginalized Groups and Exposure to Restorative Nature across the City

Coefficient value represents the explanatory power of the marginalization dimension to the amount of local restorative nature area. Areas in white show minimal correlations between the marginalization score and the LRN index, and the darker colored areas show stronger correlations. Negative value (red) represents a negative correlation between the marginalization score and the LRN index at the DA, and positive value (blue) represents the opposite. Future city planning efforts should focus on areas in red to reduce urban forest inequality and to promote equity in nature-based preventative health services.



The correlations between residential instability (e.g. proportion of person living alone and proportion of dwelling that are in rental) and their exposure to local restorative nature show a visible diagonal gradient from the north-west of the city to the south-east of the city.

There are clear local variations between the correlations of the situational vulnerable population (e.g. indigenous population, low- educational level, and low-come) and the restorative nature at their local area. Situational vulnerable populations at the red areas overall exposed to less restoring nature.

Economic dependency regards to the population that is in the non-labor force (e.g. unemployed, retired). It is evident that in the Marpole neighborhood, areas with higher non-labor force tends to have a higher exposure to restorative nature.

West of Mount Pleasant, the north-eastern corner of Riley Park and a part of West End show the strongest negative correlation, where DAs with a higher proportion of BIPOC population or recent immigrants tend to have less amount of urban nature that support stress-reduction.