Median Household Income and Proximity to Green Spaces in Baltimore City

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GES 381

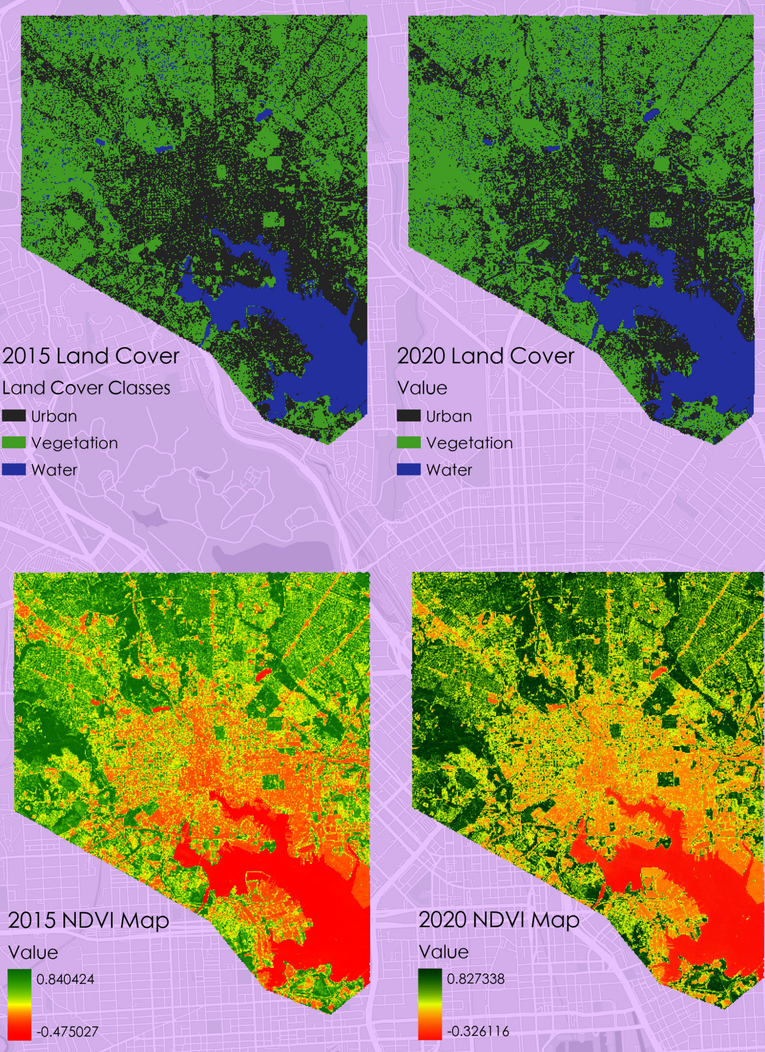
Introduction

-Our project investigates how median household income and property data correlate with access to parks and green spaces.
-We utilize GIS and satellite imagery to uncover spatial trends and potential inequities in public green space accessibility.
-Green spaces—comprising parks, gardens, grass, trees, and shrubs—play crucial roles in recreation, biodiversity, air quality, and urban beauty.
-The study spans from 2015 to 2020 so that we can observe potential urban changes while maintaining consistent satellite data sources.

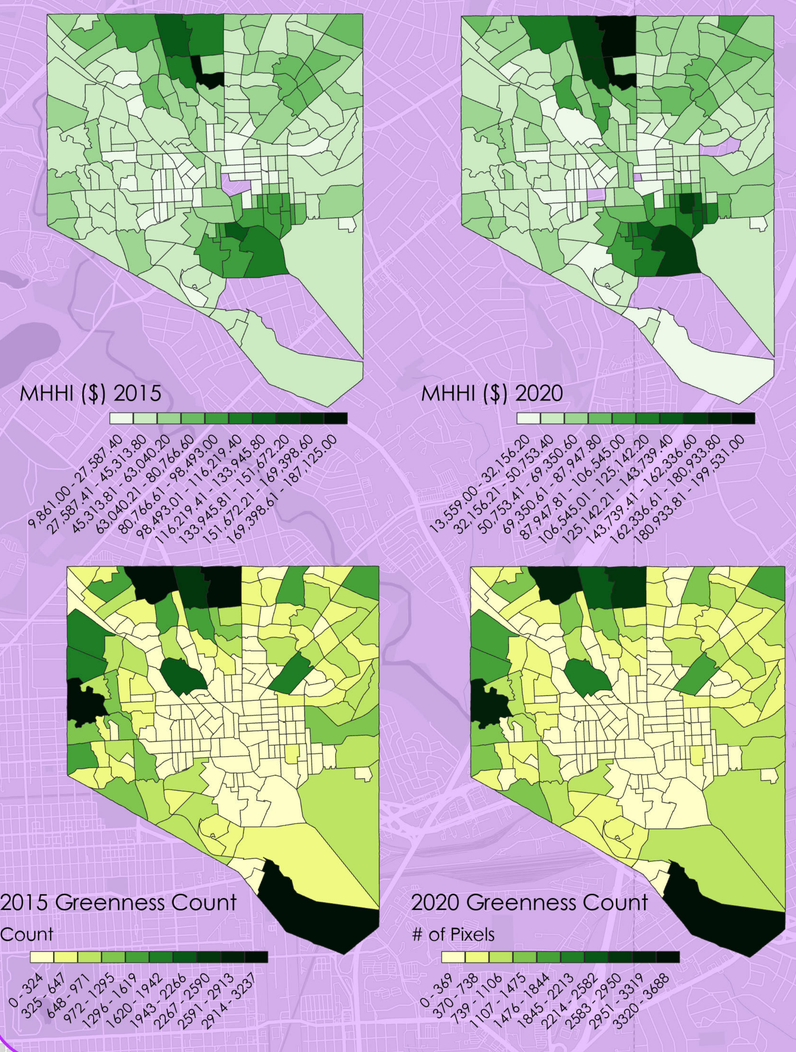
Data & Methods

-Data Sources: Utilized 2015 and 2020 census data, Google Earth Engine's Landsat-8 satellite imagery for NDVI data and for land cover mapping.
-Objective: Aimed to quantify green space in Baltimore's census tracts relative to median household income, to assess whether income correlates with green space access.
-Methodology:
  -Generated Land Cover and NDVI maps using Google Earth Engine.
  -Identified green spaces in Baltimore using NDVI maps in ArcGIS (considering NDVI > 0.6 as green space).
  -Created maps of median household income for 2015 and 2020 from census data to compare against green space distribution.
-Analysis: Conducted two analyses using land cover and NDVI data.
  -Land cover maps highlighted differences between water and urban areas.
  -NDVI provided finer resolution on vegetation health, complementing land cover data but less effective in contrasting with urban spaces.

Land Cover & NDVI Maps



MHHI & Greenness Count by Census Tracts



Map Accuracy Calculation

pivot table	*ground truth*			
map says	urban	veg	water	Grand Total
urban	9	2		11
veg	1	10	1	12
water		1	3	4
Grand Total	**10**	**13**	**4**	**27**
accuracy:	0.8148148148			

pivot table	*ground truth*			
map says	urban	veg	water	Grand Total
urban	9	1	1	11
veg	2	12		14
water			2	2
Grand Total	**11**	**13**	**3**	**27**
accuracy:	0.8518518519			

References

Arenschield, Laura. "Income, Race Are Associated With Disparities in Access to Green Spaces." Phys.org, 23 June 2020, phys.org/news/2020-06-income-disparities-access-green-spaces.html.

Klompmaker, Jochem O., et al. "Racial, Ethnic, and Socioeconomic Disparities in Multiple Measures of Blue and Green Spaces in the United States." Environmental Health Perspectives, vol. 131, no. 1, Environmental Health Perspectives, Jan. 2023. Crossref, https://doi.org/10.1289/ehp11164.

U.S. Census Bureau. "MEDIAN INCOME IN THE PAST 12 MONTHS (IN 2015 INFLATION-ADJUSTED DOLLARS) ." American Community Survey, ACS 5-Year Estimates Subject Tables, Table S1903, 2015, https://data.census.gov/table/ACSST5Y2015.S1903?q=household income&g=050XX00US24510$1400000.

Results & Conclusion

-Research Recap: Explored the impact of median household income on access to green spaces in Baltimore City.
-Findings: Contrary to expectations, our analysis revealed a widespread presence of greenery across most census tracts.
-Observations:
  -Noted that around high-value waterfront properties, while measuring lower in greenspace pixel count per tract, seemed to have more access to manicured parks and recreational spaces.
  -Found that the greenness in areas away from the city center is predominantly forest-like, increasing towards the city limits.
-Future Direction:
  -Plan to expand the analysis to include factors like waterfront views, uninterrupted walkability, and types of greenspaces.
  -Reframed research question: "How does median household income influence access to outdoor spaces that contribute to health and community in Baltimore City?" Future analysis will also consider safety aspects.

City of Baltimore, Baltimore County Government, VGIN, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA