The Urban Heat Island: Environmental Change and the Human Condition in Detroit Michigan

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The Urban Heat Island is a term used to describe a relative warming of the surface and atmosphere in the urban core relative to the surrounding non-urban natural or “rural” areas. This increase in temperature of the urban area results from the transformation of the former natural landscape dominated by trees, shrubs, and grasses, to a landscape dominated by concrete and asphalt that proves very effective at absorbing the daytime energy from the sun and then re-radiates that energy during the night, leading to increases in temperatures. Typical for cities in the United States, this change in landscape cover is connected to changes in the make-up and distribution of population living within this landscape.

This current project seeks to assess the degree to which changes in the natural environment of Detroit, Michigan is related to the make-up of the socio-economic of the population living within the area. Environmental change is evaluated using the normalized difference vegetation index (NDVI) and land surface temperatures (LST) and each is derived from the moderate resolution imaging spectro-radiometer (MODIS) for 2000 to 2017. Socio-economic measures of population density, income, race, and age structures are derived from the 2016 American Community Survey (ACS) at the census tract level. Preliminary results show that rates of vegetation are decreasing overall and spatially correlate with increases in LST (R2 ≈ 0.80), though the socio-economic variables are less conclusive. Understanding the relationship between environmental change and the associated demographic makeup will help urban planners better prepare for the future conditions.