GIS Prioritization of Neighborhoods for Green Infrastructure Projects in Phoenix, AZ

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Research Question

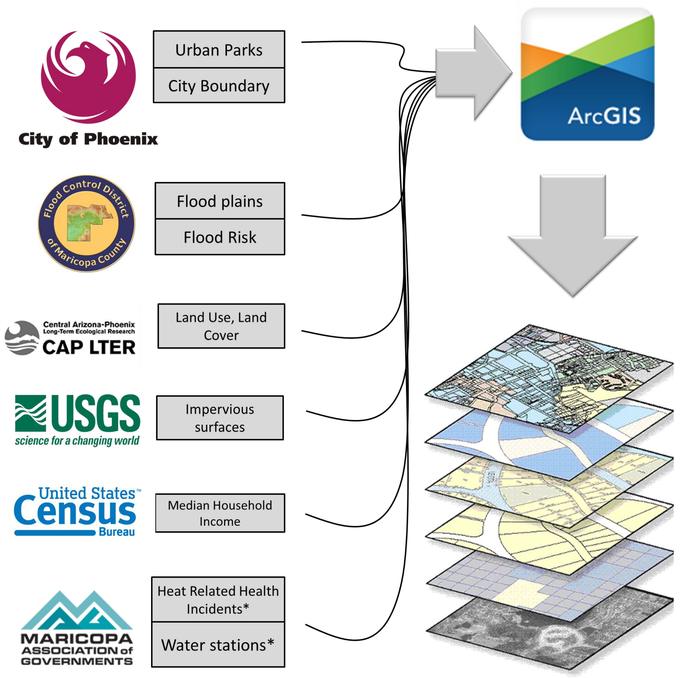
Which areas in the City of Phoenix can be prioritized for a green infrastructure project that serves low-income communities with little access to urban parks and in need of heat-stress mitigation?

Background

Living in the Valley of the Sun, residents of Phoenix, Arizona demand water to assist in mitigating adverse effects of sun exposure and heat. Phoenix is not short of water, but the uncertainty of the future climate of Arizona and the condition of its rivers has resulted in models that show worst-case scenarios of Phoenix's water supply depleting by the year 2035.

People living in impoverished areas of Phoenix, are known to be at risk of facing such issues (Harlan et al., 2006).

Methods



*data not included in this poster's analysis

Results

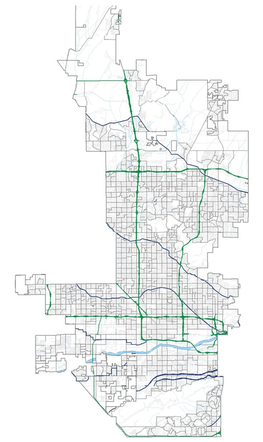


Image 1: The City of Phoenix base layer. Major roads, highways, rivers, canals can be seen

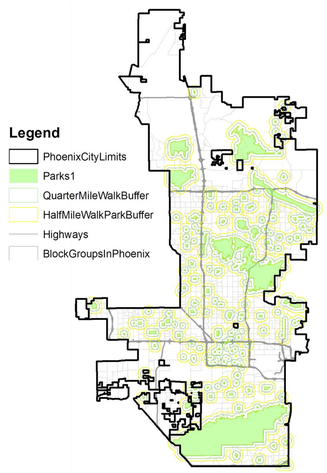


Image 2: Green shows 0.25 miles and yellow shows 0.5 mile walk (5 and 10 minute walk respectively) from all parks in Phoenix

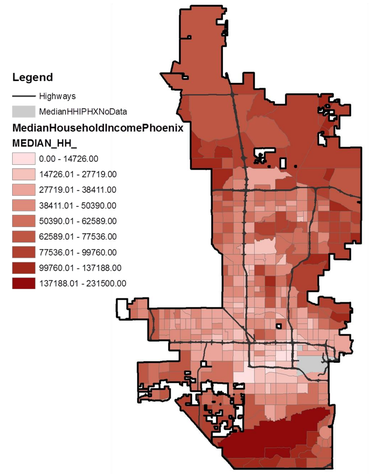


Image 3: Median household income of single families

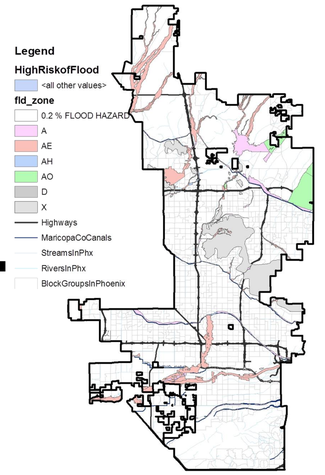


Image 4: Areas of future flood risk

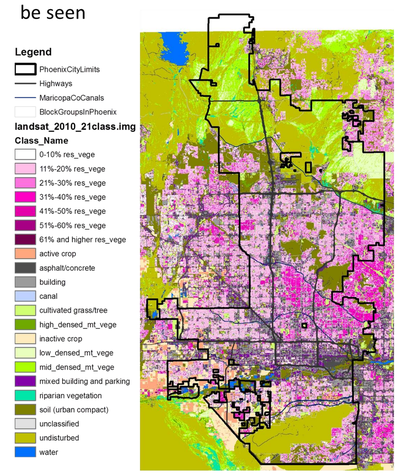


Image 5 Types of land use and land cover such as residential vegetation, asphalt, concrete, vegetation density.

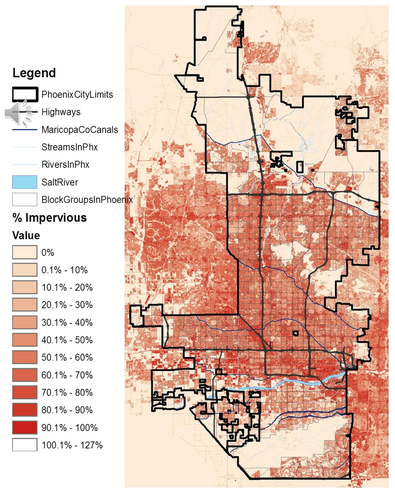
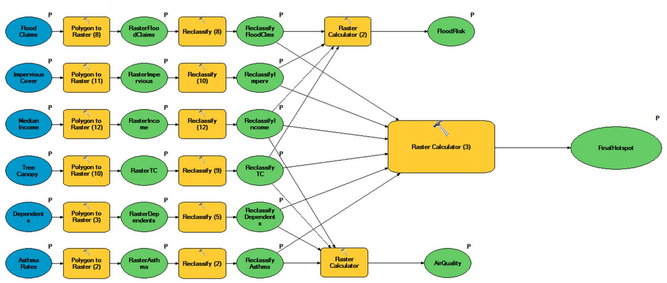


Image 6: Percentage of impervious surfaces across Phoenix



The Model

This is the model in which the layers will be added. The model is titled the "Raster Hotspot Model" by Manon Lefevre of The Nature Conservancy. Layers are converted from polygon, vector data to raster data. Data is then reclassified into 1-9 categories, and gives each categories equal weight. This model provides comparable ranking of block groups across Phoenix.

Findings

The final map that will arise from the model will display the prioritized regions of the City of Phoenix that could be home to an innovative green infrastructure project in neighborhoods that are of low income (of the lower 2 income brackets below $30,000), have low access to urban parks (areas beyond a ½ mile or 10 minute walk of a park), high risk of flooding (regions with a 1% or higher chance of flooding over the next year), land use and land cover (lowly vegetated areas in residential neighborhoods), and have high percentage of impervious surfaces (lowering the percentage can improve natural infiltration of water). Each other these variables acting together provide the ground work for prioritizing neighborhoods for green infrastructure that will serve multiple purposes, such as integrating a storm water collection, improve access to parks and overall livelihood of a neighborhood.

Future Research

Future work on this project, as it is an on-going project in the beginning phases, should include a number of additional spatial layers. These layers include, but are not limited to: Urban Heat Island, Heat-related Health Incidents, Schools, per capita or per single family household water use, light rail green space corridors, etc. A more refined approach to the current layers, such as better defining the parks buffer using a sidewalk layer, should be taken as well.

Acknowledgements

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