

Determining Vulnerability to the Effects of Hurricanes In New Orleans, Louisiana

Background

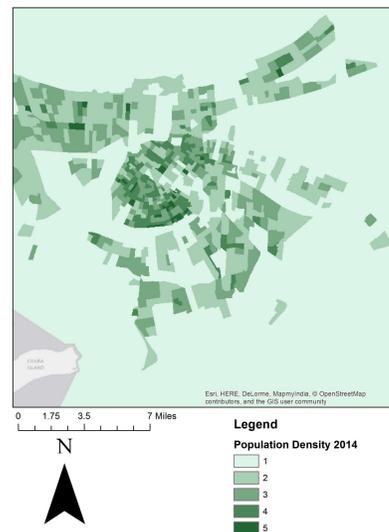
New Orleans, Louisiana has been struck by numerous Hurricanes in recent years. The most notable, Hurricane Katrina, caused major damage throughout the city and resulted in many lives lost. Many criticized the government's response to the storm, which left many people without food, clean water, or shelter. With greater climate change and the city's location off the Gulf of Mexico, New Orleans is a region that is likely to be hit by severe storms in the future. In order to prepare for these future storms, it's important to focus resources such as infrastructure improvements or emergency services on the most vulnerable populations.

Methods

Five factors were analyzed in order to determine which census blocks of the city were the most vulnerable to the effects of storms. These factors were population density, annual household median income, elevation, distance from major highways, and distance from hospitals.

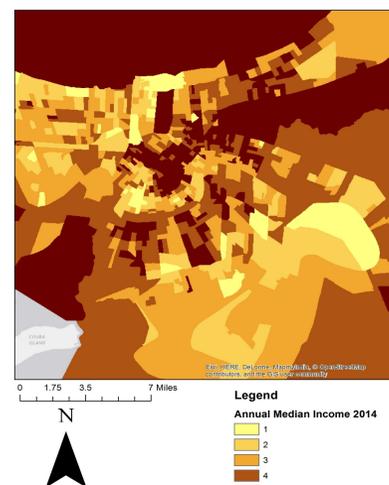
Population Density

Population Density from the American Community Surveys were processed by census block and were reclassified on a scale of 1-5, from low to high, to show which census blocks had the greatest population density. A score of 1 indicated the lowest density 0-2966 people, 2 was 2967 - 6148 people, 3 was 6149 - 9733 people, 4 was 9734 - 15495 people, and 5 was 15496 - 40919 people.



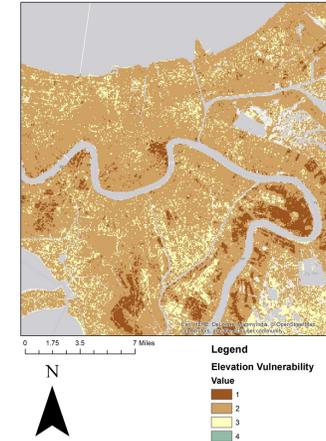
Annual Median Income

Annual Household Median Income from the American Community Surveys 5 year estimate 2014 were processed by census block and were reclassified on a scale of 1-5 from low to high to show which census blocks had the greatest income. A score of 1 indicated the lowest income \$0-24722, 2 was \$24723 - 42813, 3 was 42,814 - 66042, 4 was \$66043-100250, and 5 was \$100251 - 191591.



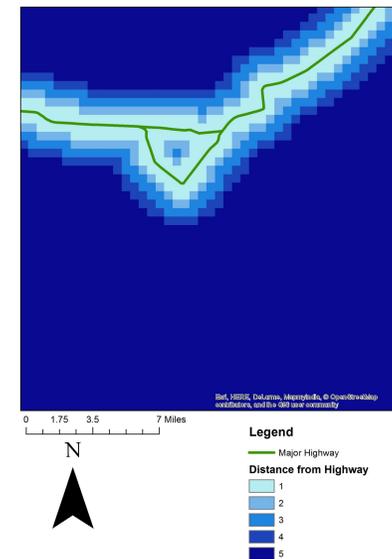
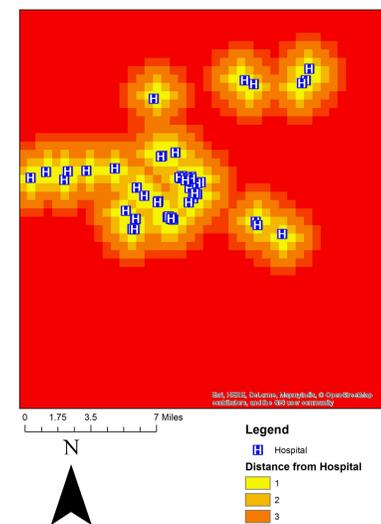
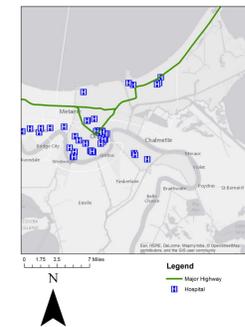
Elevation:

Elevation data from the M Drive was clipped to the area of New Orleans and then reclassified on a scale of 1-5, with 1 as the highest elevation and 5 being the lowest. 1 was anywhere between 10 - 134 feet, 2 was 0 - 10 feet, 3 was -10 - 0 feet, 4 was -20 - -10 feet, and 5 was -20 feet and below. The elevation data was not displayed in equal intervals because the majority of the elevation data hovered around sea level. Therefore, I manually chose the intervals so that greater variation would be displayed. Elevation is important to vulnerability in terms of flooding. Level 3 is the elevation closest to sea level and immediately below sea level.



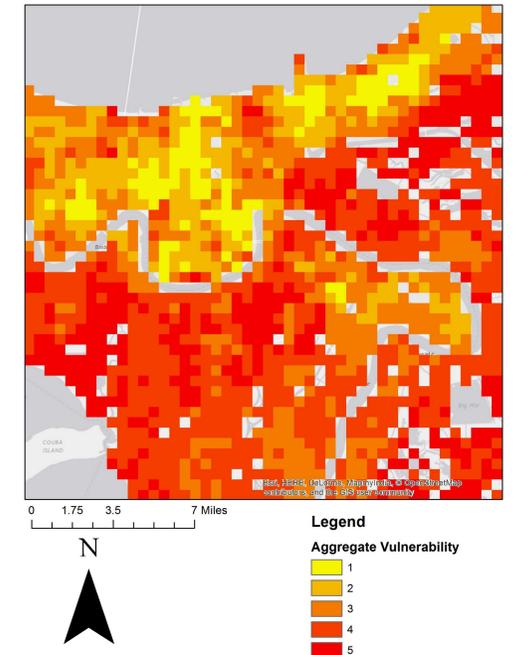
Distance from Hospitals & Major Highways.

I chose distance from highways and hospitals as a variable for vulnerability because highways represent both an access point to evacuate the city as well as a way for emergency resources to enter and be distributed throughout the city. I used Euclidean Distance and reclassified the distances on a scale of 1-5 in intervals of 0.5 mile, with 1 being the closest distance and 5 being the furthest. 1 was 0-0.5 mile, 2 was 0.5 - 1 mile, 3 was 1 - 1.5 mile, 4 was 1.5-2 miles and 5 was greater than 2 miles.



Results

The aggregate map was created using the Raster calculator to add up the different layers of vulnerability using the scale of 1-5, with 1 being the least vulnerable, and 5 being the most vulnerable. It appears as if the greatest vulnerability is on the outskirts of the city. There are also a few red spots on the aggregate map that demonstrate greater vulnerability closer to the center of the city. The outskirts are furthest from both the major highways and hospitals as well as are closer to the bodies of water that surround the city, i.e Lake Pontchartrain, and the Mississippi River, indicating greater vulnerability to the effects of a large storm. The most vulnerable parts of the city that aren't on the outskirts of the city, appear to be those that have lower income levels or greater population density.



Conclusions

The aggregate vulnerability map identifies the areas of the city that are the most densely populated, lowest income, lowest elevation, and furthest distance from highways and hospitals. The most vulnerable areas of the city indicate where improvements and natural disaster preparedness measures should take place in the coming years. It's important to focus efforts on vulnerable populations that will suffer the most from the effects of a large storm.

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Intro to GIS—GIS 101

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Data: American Community Surveys 2014, Reference USA, M:\ Drive, ArcGIS Tiger File 2006, US Bureau of the Census

Coordinate System: NAD_1983_StatePlane_Louisiana_FIPS_1702 Feet