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Flood Hazard Map for Portions of Southeast Louisiana

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PURPOSE:

In August 2005, Hurricane Katrina landed onshore slightly east of New Orleans. Many locations in the New Orleans metropolitan area experienced severe flooding. In an attempt to lessen the loss of lives and property from future hurricanes, GIS is utilized to identify and rank flood risk areas in southeast Louisiana. Hopefully, this flood hazard map will assist government officials and local inhabitants in planning mitigation efforts for future hurricanes.

OBJECTIVE:

The goal of this research project is to produce a flood hazard map based on societal and infrastructure elements that rank flood areas according to risk for eight southeast Louisiana parishes: Jefferson, Lafourche, Orleans, Plaquemines, St. Bernard, St. Charles, St. John the Baptist and St. Tammany.

METHODS:

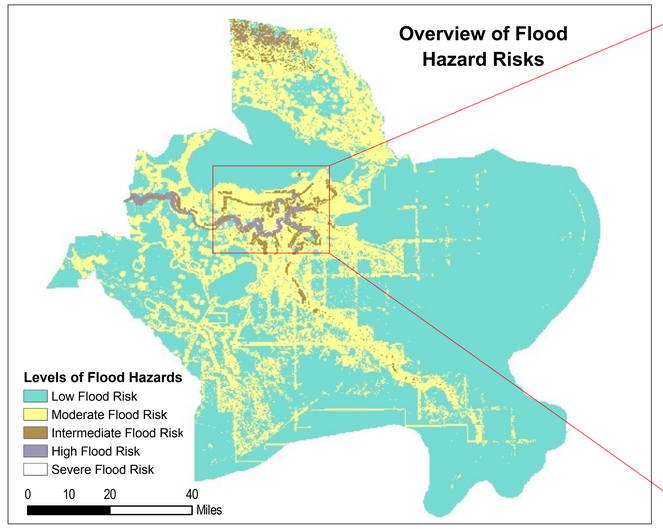
Demographic and parish boundaries data are obtained, projected, and clipped to the extent of the study area. The demographic data on population densities of elderly people (65 years old +), disabled people (physically and mentally), and single guardians of children (<18 years old) need to be converted from polygons to points before they can be interpolated. Each population density is interpolated (using the IDW method), reclassified into three classes, and then symbolized using the equal interval classification method. The raster layers representing the three reclassified population densities are entered into the "raster calculator" to produce a single raster layer of demographic risk, *Demographic Flood Risk*.

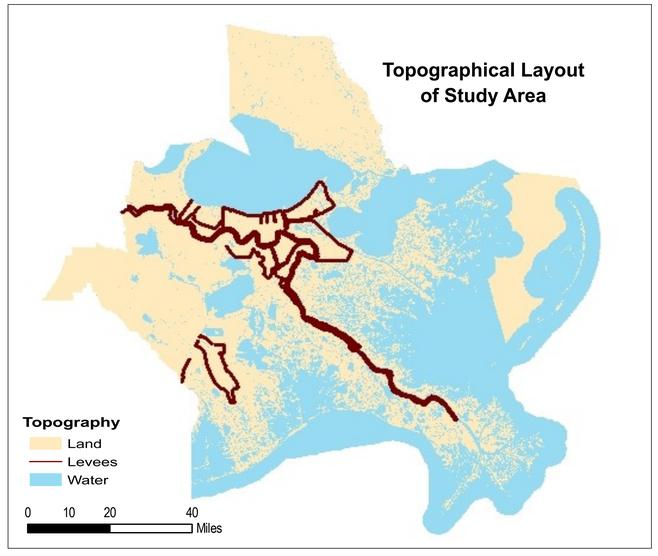
Infrastructure data on the parishes' levees, elevation, and bodies of water are obtained, projected and clipped to the extent of the study area. Half mile buffers are added to both the levees and bodies of water. Zonal Statistics are run on the buffered levees and on the buffered bodies of water in association with land elevation. The resulting raster layers are reclassified into three classes then symbolized using the equal interval classification method.

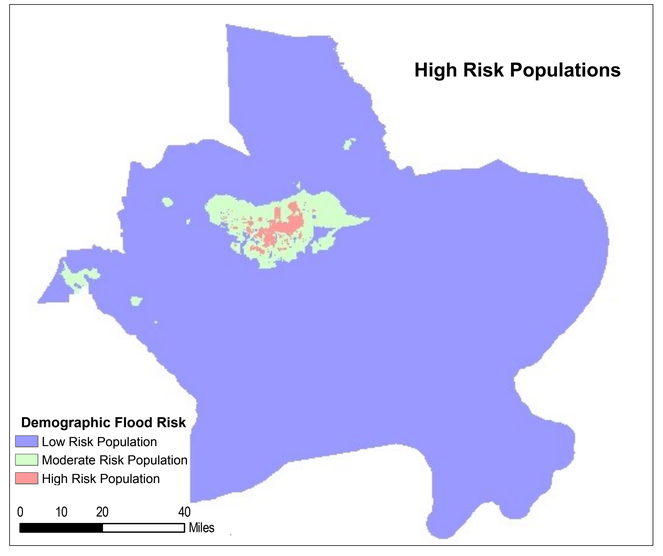
The directional flow of water for the study area is determined using Spatial Analysis' focal flow and aggregate tools. The output of this analysis is reclassified into three classes then symbolized using the equal interval classification method. The areas with high water flow are more likely to flood.

The raster layers representing the four reclassified flood risk factors (demographics, levees, bodies of water, and water flow direction) are entered into the "raster calculator" to produce a single raster layer of flood risk. The resulting *Levels of Flood Hazards* data are symbolized as low flood risk, moderate flood risk, intermediate flood risk, high flood risk, or severe flood risk.

To further analyze the populations located within the "severe flood risk" category, the *Levels of Flood Hazards* data are converted from a raster into polygons. Using the "select by attributes" and "select by location" applications, one can intersect the demographic block groups with the severe flood risk areas to determine density population percentages of elderly, disabled people, and single guardians residing in the "severe flood risk" areas.







RESULTS:

The low and moderate flood risk areas are the two largest categories and span most of southeastern Louisiana. The low risk category is the largest category because it includes the portions of Lake Pontchartrain and the Gulf of Mexico that lie within the parish boundaries being analyzed. The intermediate and high flood risk areas are located along levees and the Mississippi River boundaries. The severe flood risk areas appear to be located slightly west of downtown New Orleans, along the Mississippi River.

Table 1 displays the total population densities for the high risk populations in relation to the overall population density for the study area. The population density of disabled people comprises almost half of the total population density within the study area. The population densities of elderly people and single guardians comprise approximately twelve percent and six percent, respectively. Other than the disabled populations, the other two high risk populations have small percentages of people living within the study area.

Table 2 displays the total population densities for the high risk populations living within the severe flood risk areas in relation to the overall population density for the study area. The population densities for the high risk populations are smaller in the severe risk category than they are in the overall study area. The percentages of the population densities for the elderly, disabled, and single guardians living within severe flood risk zones are approximately eight percent, 3 percent and 1 percent, respectively.

Table 1

"High Risk" Population Densities within Study Area		
Demographic	Population Density per Square Mile	Percentage of Total Population Density
Total Population Density for Study Area	*7,403,727*	-
Disabled Populations	2,991,536	40.41
Elderly (65+) Populations	908,082	12.27
Single Guardian Populations	444,098	6.00

Table 2

"High Risk" Populations living within Severe Flood Risk Areas		
Demographic	Population Density per Square Mile	Percentage of Total Population Density
Total Population Density for Study Area	*7,403,727*	-
Disabled Populations	614,511	8.30
Elderly (65+) Populations	190,586	2.57
Single Guardian Populations	82,187	1.11

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DATA SOURCES:

- Bodies of Water (http://map.la.gov/)
- Demographics/Block Groups (www.census.gov)
- Elevation (http://seamless.usgs.gov/)
- Levees (http://lagic.lsu.edu/datacatalog/)
- Parish Boundaries (http://lagic.lsu.edu/datacatalog/)

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