Mapping Storm Surge By Using ArcGIS Pro in Tampa, FL

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Introduction/Background

Storm surge is one of the most harmful result from a tropical system. The water from the storm surge can rise above sea level and cause major flooding to large areas. Tampa, Florida is a coastal area that have been affected negatively by severe storm surge. Many vulnerable groups such as children, lower income families, and the elderly can be impacted the most by storm surge flooding.

Objective

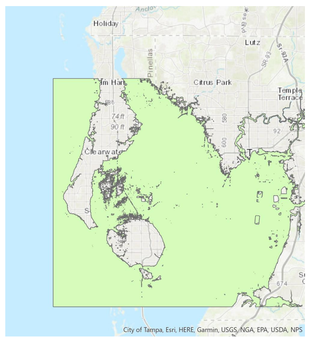
The software ArcGIS is utilized to study flooding in an area that was impacted by the storm that was chosen (Hurricane Ian). The data on the software shows which areas in Tampa is under water/flooding at six different heights. The main objective is to study how many disadvantaged individuals and businesses reside in the areas that are at great threat. The other objective is to predict the best option to prepare the citizens located in the Tampa, Florida area for the next potential storm.

Method

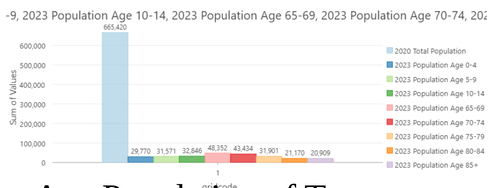
The first step was starting by locating Tampa, Florida and adding the Terrain layer to the data on ArcGIS. 2. The "Con" tool is used to create a raster for the flooding map. The Terrain layer is used for the input conditional raster. 3. The input true raster (1) and the input false raster (0) determines whether the storm surge water is above ground level. The areas that are above the studied elevation will be the color of 1/input true raster. The areas that are not flooded will be the color of 0/input false raster. Example: Green/Input True Raster is above 6m of water and Blue/Input False Raster is below 6m of water. 4. After the Con layer is created, I used the Aggregated Points feature to create the official/final polygon for the flood map.

Results

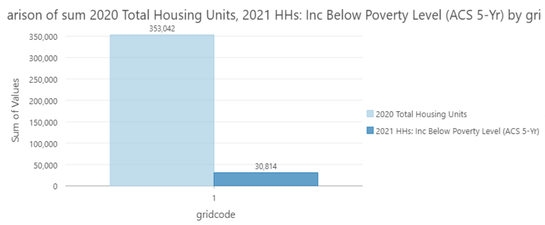
The recorded data from the 1ft, 2ft, 1m, 3m, and 5m flooding maps shows that citizens in the age groups of 65-69 years old are likely to be at risk at all flooding levels. The data in all the age population chart shows that both groups 65-69 and 70-74 out populated the other vulnerable age groups. Households with the income of less than $15,000, would have the most affected citizens amongst the other recorded households. The 1ft, 2ft, 1m, 3m, and 5m maps shows that the manufacturing and transportation businesses are the most populated in the area. These businesses are likely to be affected by the flooding in this area.



5m Flood Map



Age Population of Tampa citizens affected by 5-meter storm surge flooding



Data for Tampa citizens that could be affected by 5-m storm surge flooding

Conclusion

Based on the results, there are several precautions that can be taken to help disadvantaged groups during flooding events during hurricane season. According to the number of polygons from the flood maps, a great number of citizens would be in a flood zone from minor (1ft) to major flooding (5m) Elderly citizens (65-69 years old) should be prioritized for evacuation plans and emergency assistance. Special attention should be given to their specific needs. Adequate support systems should be put in place for both the 65-69 and 70-74 age groups, considering their higher population numbers. Low-income households (earning less than $15,000) should receive targeted assistance and resources to help them cope with the impact of flooding. This could involve providing financial aid, temporary housing, or access to essential supplies. Manufacturing and transportation businesses, being the most populated in the area, should have robust disaster preparedness plans in place. This may include implementing flood-resistant construction, developing emergency plans, and ensuring employee safety protocols. There should be evacuation centers that are equipped to cater to the specific needs of vulnerable groups and generally affected citizens. These centers should have facilities for medical assistance, comfortable sleeping arrangements, and accessible amenities.

Acknowledgements

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