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TGIS #506, Lab #2

Link to the map: https://arcg.is/1ezn8i1

For this lab, I decided to study the flood risk and social vulnerability for the City of Longview and surrounding areas in Cowlitz County, Washington. In particular, I chose to focus on three specific types of infrastructure that would be affected by flooding: schools, electrical substations, and cell towers. Schools are important to consider as school closures impact not only children but their families as well. In addition, schools are often the source of at least two meals a day for children of lower income families. School buildings in lower risk areas could also be used as shelters for those more effected by the flood. Electrical substations are important because they could be severely damaged by flooding. Substations that are swamped and thus, inoperable would result in blackouts which would impede communication as well as emergency response. Plus, the presence of water in a facility that deals with high voltage electricity could potentially be very dangerous. Cell towers being damaged by flooding could also potentially disrupt alternate forms of communication, which may not only impact emergency response, but also impact those who are trying to contact loved ones during the disaster. The data for schools was obtained from the Washington State Open-Data Portal, while data for cell towers and substations came from the Homeland Infrastructure Foundation-Level Database.

From the map of social vulnerability indexes by census tracts, we can see that the more vulnerable populations, as represented by the darker areas, seem to be more heavily concentrated around the Cowlitz and Columbia Rivers. Under natural conditions, these areas would be much

more susceptible to flooding, but are largely protected by levees. However, if the levees failed, these areas would be the most severely impacted. We can see that many of the schools in the city of Longview are clustered together, which is concerning as they could all be impacted by flooding in that area. Furthermore, the most vulnerable area along the banks of the Columbia River do not seem to have as many schools in close proximity, which may add to its vulnerability. There is one area in the center of Longview that appears to be less vulnerable than the rest of the city that has four schools in it. While it is still within the levee zone, it is also furthest away from the Columbia and Cowlitz Rivers.

The area near the banks of the Columbia also has a larger number of electrical substations which may suggest that it is used more by industry and businesses. If the levees were to fail, there would be a great risk to the local economy if business and industry were negatively impacted. However, most of the cell towers are spread apart and are in the areas that are the least susceptible to flooding. This is good because this means that it is less likely that cellular communication will be knocked out.

It also appears that areas that have a lower social vulnerability index score tend to be on higher ground and thus, at lower flood risk. The hilly areas that are naturally the least prone to flooding appear to have fewer pieces of infrastructure such as schools, substations, and roads. This suggests to me that these areas are less heavily populated, and that those that live there may have a higher income due to the lower vulnerability index score.

There is also an area along the Cowlitz River flood plain between Castle Rock and Longview that is not protected by levees and thus is shown to be more vulnerable to floods. However, this area also does not have much infrastructure or a vulnerable population according

to the SVI map. I suspect that this is because there must be few people living there outside of the major settlements.

Overall, I would say that Longview and surrounding communities within Cowlitz County, particularly the vulnerable populations, are largely protected by levees, but would be in danger if they were to fail.

For flood preparedness, the ideal evacuation routes would probably be to Interstate-5. Another possibility would be to cross the Lewis & Clark Bridge into Oregon. The people living within the Cowlitz River flood plain would ideally evacuate along the highways bordering the edges of the flood plain to higher ground or to the areas protected by levees, assuming they did not fail. But, if the connecting roads are flooded, then it would be better to take local roads to the highlands. The schools in the safer, less flood-prone areas could serve as shelters for evacuees. The substations in the most flood prone areas should have systems in place for protection against breach of water and/or water damage. The best defense against flooding, as shown by the flood risk map, would be the levees themselves. Thus, extra care should be taken to ensure that they do not fail, such as through regular maintenance and inspections.