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Effects of Sea Level Rise on Displacement and Health in the Pacific Northwest

Sea level in Washington and Oregon is projected to rise between one and five feet by the year 2100.[1] Rising sea levels may result in displacement of populations in areas that may become inundated. Increased flooding associated with sea level rise may have a negative effect on both physical and mental health.The purpose of this project is to explore the relationship between sea level rise, displacement and health in coastal communities in Washington and Oregon. The project will also examine specifically how Native Americans in the area of study are affected in terms of health and displacement. The products of this research would be maps of communities most at risk of displacement and an analysis of health effects associated with flooding in the Pacific Northwest.

The research that would be conducted is valuable as it can help decision-makers determine which communities are most risk, how much funding should be allotted for aid and relief, and if funding for better infrastructure is needed. The nature of this research would inform communities about their risk of flooding which can allow them to better prepare for health effects commonly associated with flooding, such as water borne illnesses, tetanus, rashes, infections, and mental disorders.[2] Many Native Americans have a deep, spiritual connection with the land in which they reside, so much so, that nature is a part of their individual and cultural identity. The state of their environment can impact the mental health of Native Americans; thus, flooding and potential relocation could lead to a higher risk of stress, depression, anxiety, PTSD when compared to non-indigenous people.[3]

First, data will be collected. Population and Native American population data as well as geographical boundaries will be accessed from the US Census Bureau. Information on health will be obtained from the Centers for Disease Control. NOAA's Sea Level Rise viewer and the USGS Coastal Change Hazards Portal will identify areas that are predicted to be inundated due to sea level rise.

Next, one foot, two feet, and five feet sea level rise scenarios will be compared to see the extent of inundation. The number of people that may be displaced in each scenario will be calculated. Then, the number of Native Americans that may be displaced will be calculated for each scenario. Maps will be created using Geographic Information Systems (GIS) to highlight areas that will be inundated under different sea level rise scenarios, from which people would need to relocate. The maps will also pinpoint Native American communities in or near potential future inundated areas.

Through literature analysis of past flooding events in the Pacifc Northwest, diseases and disorders that are prevalent during and post-flooding will be determined. Specific diseases or mental disorders that disproportionately affect Native Americans will be identified. Using GIS, maps will be created to show which areas will be most at risk of diseases or mental disorders during and post-flooding. Correlation between the amount of past flooding events in the study areas and the incidence of each disease and mental health disorder within the same time spans will be tested. The relationship between flooding events and health will be demonstrated using the correlation coefficient and displayed in graphs. This relationship can be used to make predictions about what areas may have issues with diseases due to sea level rise.

The coastal areas of Washington and Oregon are at serious risk of inundation due to sea level rise in the coming years, which will cause displacement of communities and increased mental and physical health risks.[4] This project, that will take place from May 20th to July 27th, will identify areas that are at the highest risk, so that efforts can be aimed towards these locations and vulnerable populations to lessen the negative impacts associated with sea level rise.

1 "Sea-Level Change Curve Calculator." *US Army Corps of Engineers*, US Army Corps of Engineers, corpsmapu.usace.army.mil/rccinfo/slc/slcc_calc.html.

2 "Flood Waters or Standing Waters." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 15 Oct. 2019, www.cdc.gov/healthywater/emergency/extreme-weather/floods-standingwater.html.

3 Norton-Smith, Kathryn, et al. "Climate change and indigenous peoples: a synthesis of current impacts and experiences." *Gen. Tech. Rep. PNW-GTR-944. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station. 136 p.* 944 (2016).

4 "Surging Seas Sea Level Rise Analysis by Climate Central." *California, Oregon, Washington and the Surging Sea | Surging Seas: Sea Level Rise Analysis by Climate Central*, 2014, sealevel.climatecentral.org/research/reports/california-oregon-washington-and-the-surging-sea.