Correlation between Superfund Sites and Socially Vulnerable Communities in Hidalgo and Cameron County

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Abstract

In recent times there has been more awareness on how often socially vulnerable individuals often live close to polluted sites. In South Texas City of Donna there is a designated Superfund site which covers the Donna River and Reservoir canal which is close in proximity to colonias, “which are rural neighborhoods with poor infrastructure inhabited by the Mexican American working poor” (Adelita Cantu, 2016). This research aims to see correlations between social vulnerability and superfund sites in Hidalgo and Cameron County to bring awareness that often pollution affects those who are most vulnerable. This type of analysis is helpful as it brings awareness of Environmental Contamination to a local level and also it might encourage better community communication when it comes to environmental issues. The data will be downloaded from the Texas Commission of Environmental Quality and the CDC Social Vulnerability website. This data will initially be looked at in ArcGIS and then converted to a csv based on distance to superfund site.

Background

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) is informally known as Superfund and allows the Environmental Protection Agency (EPA) to clean contaminated sites (US EPA, 2017).

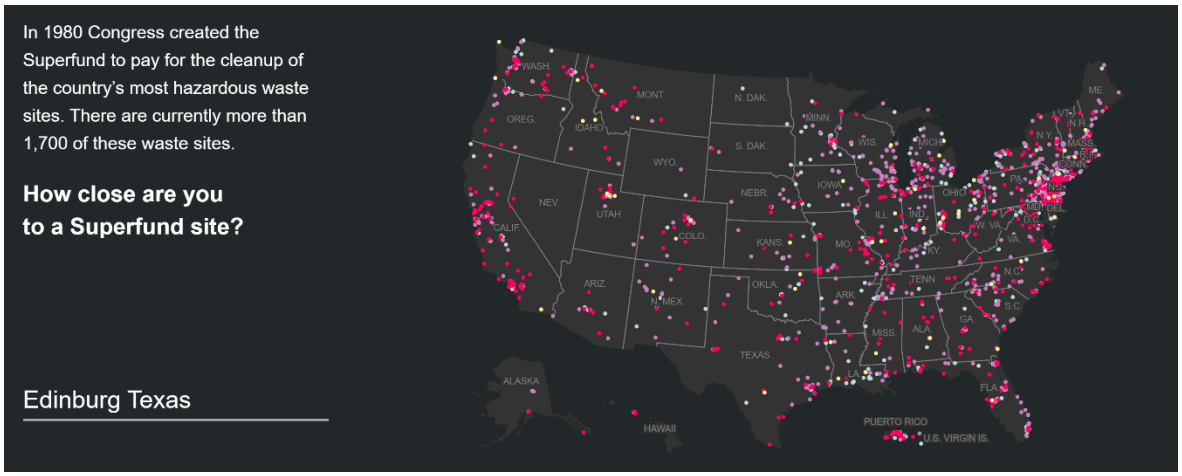


Figure 1: US Superfund Sites (How Close Are You to a Superfund Site?, 2021)

In Hidalgo and Cameron County combined there are a total of four Superfund sites, three in which remediation has been completed and one which is still active. The sites are as follows (Superfund Sites by County , 2021):

1. Site Name: Niagara Chemical
   It's located near downtown Harlingen occupying 2 acres west, initially, this location was a plant producing dry and liquid pesticides from 1946 to 1962, and storage of these pesticides continue up until 1968. Soil and groundwater were found to be contaminated with arsenic and organochlorine pesticides during the remedial investigation. The current status of this site is considered complete as of 2013 and there have been no additional environmental response actions. Latitude and Longitude 26.196256, -97.701806

2. Site Name: Donna Reservoir and Canal System Donna TX
   It's located south of the City of Donna, it includes 400-acres of the Donna Reservoir and extends north from the Rio Grande River 17 miles with lateral canals that extend 5.6 miles east and west. The suspected source of contamination is a concrete siphon constructed under the Arroyo Colorado River. Remediation actions began in March 2020, but contamination identification was identified in 1993 when PCBs were detected from the fish. Street Address: South Texas, North of Rio Grande River Donna, TX 78537

3. Site name: Hayes-Sammons Warehouse
   It's located at Miller Avenue and Eighth Street, in downtown Mission. Contaminants were released from the contents of the warehouse building into the soil. These warehouses stored commercial-grade pesticides from 1945 to 1968. All remediation actions were completed in October 1998. Latitude and Longitude: 26.213549, -98.323194

4. Site name: Munoz Borrow Pits
   It's located 0.1 mile south of U.S 83, on the east side of Texas 1016 in the city of Mission. Contaminated soil was used as fill in the late 1950s. Groundwater, Soil, Sediment, and Surface water where contaminated with Arsenic and Pesticides. The cleanup for this location has been completed. Latitude and Longitude: 26.11'15"N, -98.20'02"W

The CDC social vulnerability index is composed of multiple factors such as poverty, lack of access to transportation, housing and similar factors (CDC's Social Vulnerability Index (SVI), 2021). There is a database called CDC SVI created to help emergency responders identify where there is more socially vulnerable individuals. Figure 2 shows how the CDC SVI can help communities better prepare.

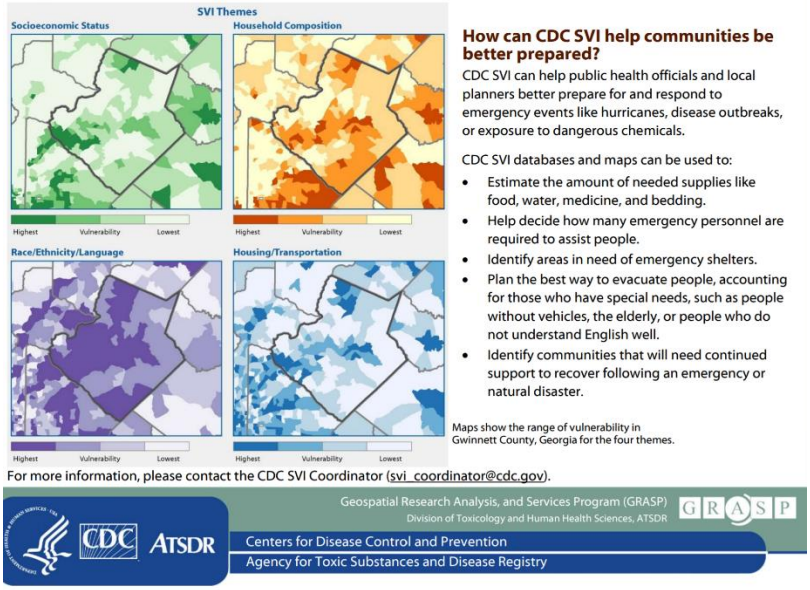


Figure 2: CDC SVI database (CDC's Social Vulnerability Index (SVI), 2021)

Questions

Q: What is the probability based on Social Vulnerability Index to live close to an EPA superfund site in Hidalgo and Cameron County?

- **H1:** The more socially vulnerable the more likely is the proximity to a Superfund site in Hidalgo or Cameron County.

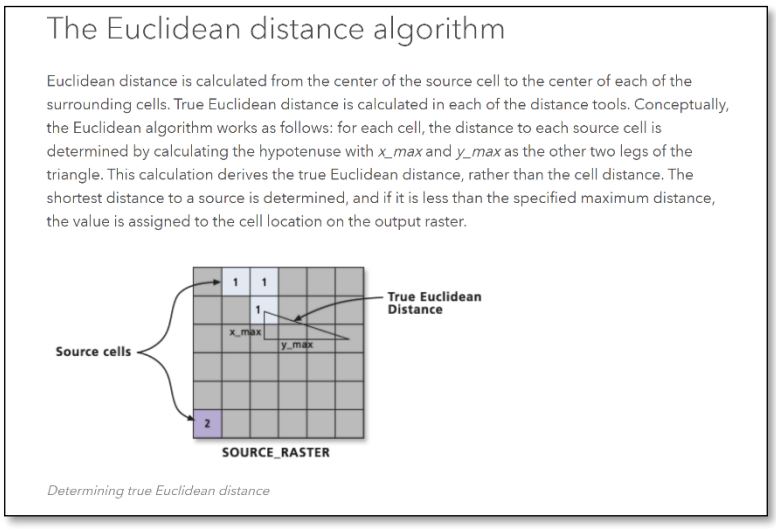
- **H2:** There is no proximity trend based on social vulnerability index and superfund site locations in Hidalgo and Cameron County.

Analysis

For this research, the location of the Superfund sites would be plotted on a ArcGIS map along with shapefiles from the CDC Social Vulnerability Index (SVI) webpage for both Hidalgo and Cameron County. On ArcGIS using the GIS spatial analysis tool the Euclidean Distance can be calculated from demographic clusters to the superfund site: Figure 3 shows how the Euclidean Distance will run the spatial analysis on ArcGIS. Once proximity has been established based on demographics the data will be exported from GIS to CSV. Once as a CSV file it will be turned into a Pandas Data Frame to analyze using python.

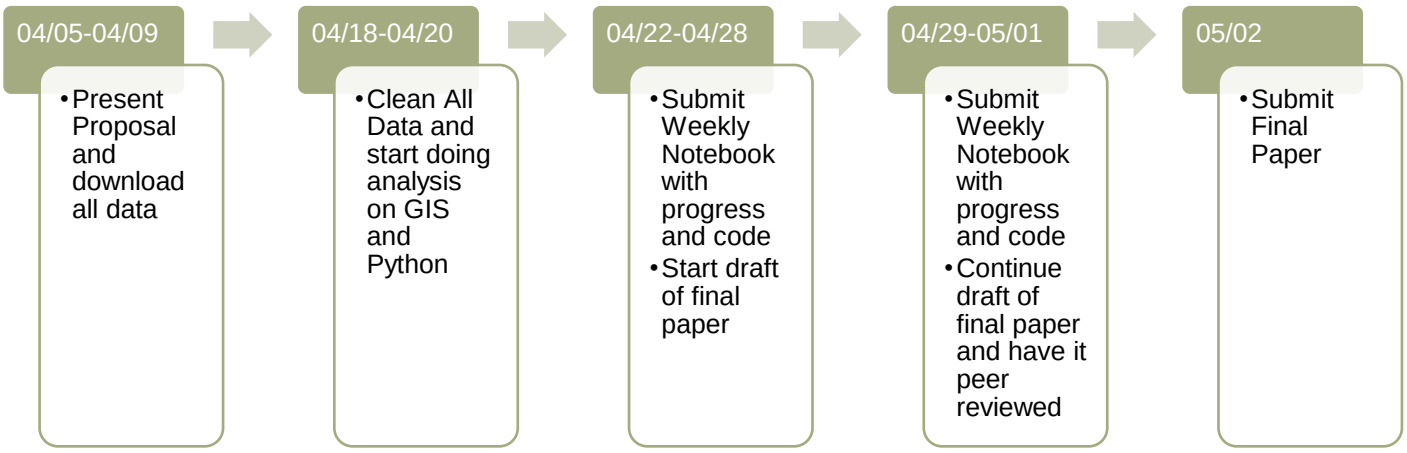
Figure 3: Euclidean Distance

(ArcGIS Pro, 2021)



Coordinates for the sites can be found on the TCEQ Superfund sites by County website. Social vulnerability shapefiles can be downloaded from the CDC SVI Documentation Download.

Timeline



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