**Toxic Release Inventory (TRI) and Social Vulnerability Analysis**

**Srinivas Konreddy**

**Project Overview**

This lab explored environmental justice through spatial analysis of chemical release data from the EPA’s Toxic Release Inventory (TRI) and social vulnerability indicators from the SoVI dataset. The objective was to identify potential disparities in chemical exposure by overlaying chemical emissions with demographic vulnerability data. Students created summary statistics, distance-based analyses, and integrated charts and maps to reveal patterns of chemical releases in relation to socially vulnerable populations.

This project emphasized key GIS techniques such as composite index analysis, buffer-based population exposure modeling, proportional symbol mapping, and ordinal classification of vulnerability categories. Students also practiced subjective modeling decisions to simulate realistic environmental justice scenarios.

**Graphic 1: Top 10 Chemicals Released in Georgia (2018)**

**Description:**  
This bar chart shows the top 10 chemicals released in Georgia in 2018, ranked by total pounds released. The data was summarized from facility-level TRI records. Axis labels clearly indicate chemical names and total release quantities in pounds. The chart visualizes which substances are most prevalent in industrial emissions and helps prioritize monitoring and policy action.

A graph of chemical substances

AI-generated content may be incorrect.

**Graphic 2: TRI Chemical Releases and SoVI Map**

**Description:**  
This map overlays SoVI social vulnerability data with TRI release quantities for two selected chemicals, using graduated symbols to show release volume at each facility. Census tracts are shaded by ordinal vulnerability categories. Facilities are labeled by name, and symbol transparency ensures visibility of background data. This integrated visualization highlights geographic overlap between high chemical release sites and socially vulnerable communities.

A map of the state of georgia

AI-generated content may be incorrect.

**Graphic 3: Distance to TRI Facilities by SoVI Category**

**Description:**  
This box-and-whisker plot compares the distance from each census tract to the nearest TRI facility, grouped by SoVI vulnerability category. The analysis reveals that tracts with higher vulnerability scores often lie closer to high-emission facilities, suggesting spatial injustice. This type of visualization is critical for revealing non-obvious proximity-related disparities in environmental exposure.

A graph of a number of red squares

AI-generated content may be incorrect.

**Table 1: Social Vulnerability by Distance from TRI Facilities**

**Description:**  
This table summarizes population and social vulnerability index (SoVI) statistics at various distances from TRI facilities in Georgia. It shows how vulnerability metrics vary depending on proximity, indicating that even small buffer changes can influence environmental justice assessments. The table helps quantify exposure risk at multiple scales, from within a tract to statewide.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Distance from TRI** | **Total Population (P0010001)** | **Minimum SoVI (SOVI0610GA)** | **Average SoVI (SOVI0610GA)** | **Maximum SoVI (SOVI0610GA)** |
| Within tract (1 m) | 1461873 | -9.576 | 0.706 | 8.156 |
| 3 KM | 5137755 | -12.687 | 0.161 | 12.870 |
| 10 KM | 8892194 | -12.687 | -0.045 | 12.870 |
| All of Georgia (Use original SOVI table) | 9687651 | -12.687 | 0 | 12.870 |