Term Project

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How Contaminated Sites Affect Social Disparities in Montreal

Contaminated sites have become a major concern for the health and well-being of communities due to exposing nearby residents to dangerous chemicals, and creating areas of economic and health disparities. On the island of Montreal, numerous sites have been contaminated due to industrialization, development, and agriculture, potentially negatively impacting the health and social disparities of neighborhoods. Social disparities may include unequal access to healthcare, limited economic opportunities, and issues of environmental justice due to pollution in neighborhoods and the resulting adverse effects.

To determine which areas were impacted by the 2086 total contaminated sites in Montreal, I first found the Quebec Open Data file containing published contaminated sites. I used Montreal as the geography restraint and was given a CSV file of the sites. I also found the Social and Material Deprivation index created by the Institut national de santé publique du Québec, which demonstrates and illustrates deprivation on a small geographic scale. The material index measures deprivation of material goods and conveniences (income, education, employment, etc.) and is more directly related to the adverse effects of pollution in neighborhoods (INSPQ, 2023). I will use the material deprivation in this research, but refer to it as social deprivation.

I clipped the deprivation data to the island of Montreal and exported it as a GeoJSON file. I also used the CSLC limits to better understand the effects of contaminated sites on larger areas and clipped and exported that into a GeoJSON file. For use in python, I first imported the data and projected it in WGS84 to not run into issues due to the contamination data having errors in an MTM projection. The contamination sites were only displayed in longitude and latitude, so I had to split the column of this data into two new ones that had only the longitude and only the latitude. From these columns I was able to figure out how to create a new geometry column from these using the GeoPandas manual and lots of hours of work. Then, I overlayed and joined the contamination data to the DA and CLSC data. From this join, I was able to count the amount of sites in each polygon and map the density of sites per DA and CLSC.

In all, I created maps of the DA’s and their Material Deprivation Indexes, mapped the contamination sites, mapped the density of contaminated sites in DA’s, and mapped the density of contaminated sites in CLSC’s. These are all in the Jupyter Lab for this project.

From these maps, I found that most contaminated sites are located in the east and central portions of the island, primarily in dense or industrial areas. The density of sites in DA’s and CLSC’s is generally small but appears mostly in the central and east island as well. The areas surrounding Autoroute 13 had the largest area of density of contaminated sites, which is also an area of large industrial land use. There is also a great number of these contaminated sites located along the Lachine Canal and in Old Port due to many historic industrial uses. These pollutants have contaminated the bottom sediment of the canal that will linger until we remove the contamination (Bureau d'audiences publiques sur l'environnement, 1999). These CLSC areas were the 3 largest in terms of pollution, but still only accounted for 4.5% of the total sites, showcasing that the sites are widely distributed. Most CLSC’s had about 50-75 contaminated sites in their borders, and these CLSC’s were mostly in the central and east island.

The relationship of pollution and the Material Deprivation index aligned in many of the same trends, but there are many other factors that also affect income, the environment, and health of these neighborhoods. Through more data and personal resources given to the project, I would have been able to further link economic, health, and historical effects to pollution from the Quebec inventory.

The pollutants researched in this project are of recorded sites and come from a single source, but many other pollutants come from non-point sources such as the salt used in winter, rainwater runoff, and residential and industrial byproducts put down the drains (Frosi et al., 2019). This shows that pollution exists all around us, and we should research the effects further to find the effects that urban areas in general contribute.

In conclusion, there are many correlations and trends in this data, but also many areas of high deprivation in the deprivation index that are likely caused by other factors. This, along with the low density of these sites, points to other sources of pollution, income, environment, and health playing a role in the existing conditions of neighborhoods on the island. These should be researched further, and this will create a better understanding of the role pollution has in the social deprivation of Montreal.

Bibliography

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