Abstract

This project is a GIS analysis examining the distribution of toxic sites in Alaska, including Superfund sites, Toxics Release Inventory sites, mining waste sites, and Formerly Used Defense Sites, in relation to populated areas. Our goal was to determine whether these hazardous sites are located disproportionately near indigenous communities, whose populations may be particularly vulnerable to toxins due to their subsistence lifestyles. Our statistical analysis found that, in census tracts with at least one identified toxic site, the percentage of the population identifying as Alaska Native is 59% higher than in those census tracts without any toxic sites. Further analysis reveals a strong linear correlation between placement of toxic sites and Native populations, indicating a need to consider race and ethnicity in prioritizing remediation of these sites.

Introduction

Alaska, long regarded as the last great wilderness in the United States, is in fact heavily polluted (Kirsten, 2006). Scattered throughout the coast and interior are thousands of hazardous sites, including superfund sites, Toxics Release Inventory releases, mining waste sites, and formerly used defense sites (FUDS). The hazardous materials contained at these sites may be released into the environment, causing harm to both local ecosystems and the people who live in and rely on these systems (Johnson, 1997).

In many cases, these hazardous sites are located in or near indigenous communities, which means that Native Alaskans may be at risk. Furthermore, these communities may have low incomes and education, and residents’ reliance on subsistence foods may further increase their exposure. Numerous health complaints have been made by native villages, many of which argue that the siting of toxic sites is a breach of environmental justice because of its disproportionate impact on racial minorities (Sherwonit, 2003). This project examines the distribution of toxic sites in relation to Native villages, and asks whether Natives, or other minorities, live in closer proximity to toxic sites than do the general population.

Results

An initial correlation analysis revealed that in those census tracts with at least one identified toxic site, the percentage of the population identifying as Alaska Native is 59% higher than in those census tracts without any toxic sites. This test resulted in a $r = 3.787$ at a significance value of $p < .01$, which indicates a very high statistical significance. This same test—between tracts with and without toxic sites—did not reveal significant differences within any other tested category of demographic data, including median age of males and females and average family size. It is worth noting, however, that percentage of Native residents and population per square mile (data from 2007) are also directly related, with a correlation of $r = .94$, which is significant at the 0.01 level in a $t$-tailed test—so that as the population of a census tract increases, the greater the percentage of Alaska Natives.

Conclusion

The results indicate that in Alaska, toxic sites, and FUDS in particular, are disproportionately located near Native populations. The distribution of toxic sites is also geographically determined, with a higher density of sites in urban areas. The greatest overall number of sites are located in rural areas, which also have the highest percentage of Native residents. Although pollutants may not have specifically targeted Alaska Natives, the distribution of sites means many Native populations may ultimately bear the cost of toxic releases into the environment.