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Environmental Justice (Or Injustice?) in Pierce County

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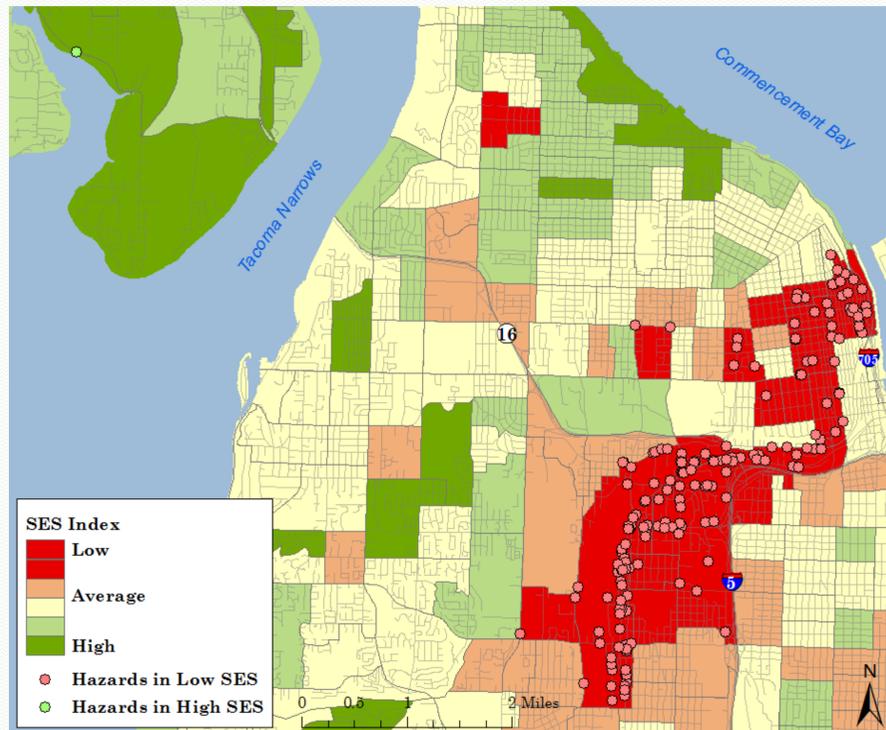
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Figure 1. The focus of the above map is on the high and low SES areas in Pierce County. In all of the high SES areas, there is only 1 hazard site, while in the low SES areas, there is an abundance of hazard sites.

Methods

❖ Department of Ecology (DOE) hazard sites from tables of 10 different facility types were combined and geocoded
❖ Each site was given a score based on the number of times it appeared in a table; the worst hazards were isolated
❖ Collected Census data from the ACS 2006-2010 5-year estimates for Pierce County block groups for 7 variables— Educational Attainment, Employment Status, Linguistic Isolation, Median Income, Poverty, Race, and Tenure
❖ Standardized, classified and indexed the variables to create an SES Index for Pierce County
❖ Hot spot analysis of hazard sites; zonal statistics on the hot spots to identify the worst cluster of hazards in Pierce County
❖ Locations where the elderly and children are often present, such as schools, daycares, nursing homes and parks, were given identified and given a 400 m buffer because that is a recommended safe distance from toxic sites (ICF 2005) (Fig. 2)
❖ The areal density, or the number of hazards per square mile within the buffer, were calculated for high and low SES areas
❖ Median income, poverty and race were individually analyzed with hazards to calculate the number of hazard sites per square mile within the identified high and low communities for each variable (Table 1)
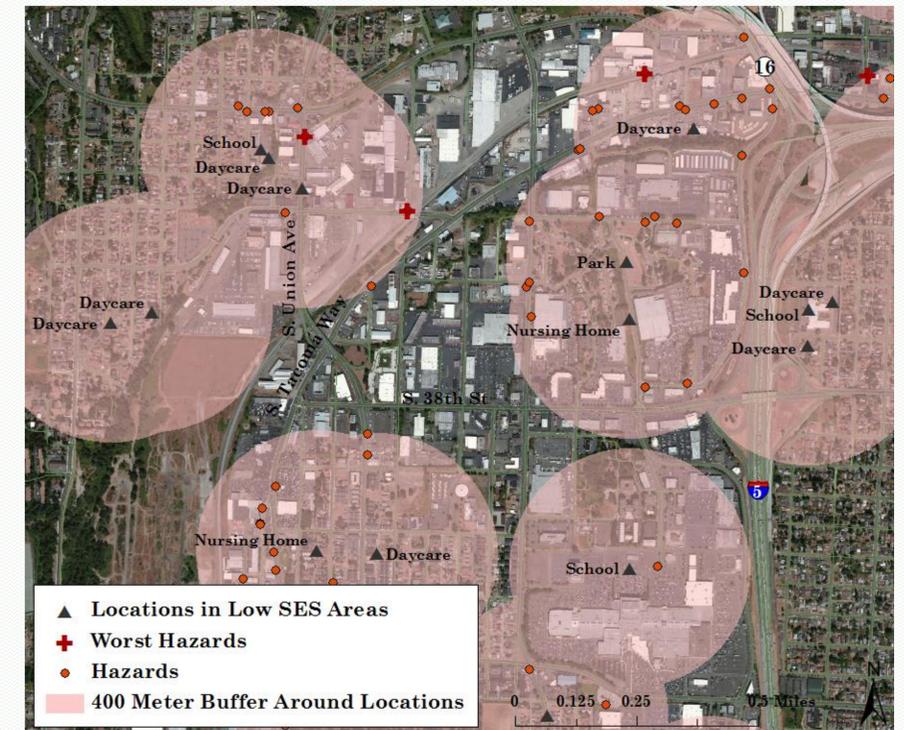

Figure 2. A hot spot analysis of hazards and zonal statistics identified this region in South Tacoma as the worst location in Pierce County in terms of severity of hazards, which happens to fall in a low SES area. The focus of the above map is on the location buffer within this hazardous region. Locations within high SES areas did not have any hazards located within the applied 400 m buffer, whereas, as this region shows, locations within low SES areas have a high number.

Introduction

❖ According to the EPA, environmental justice is the fair treatment of all people, regardless of demographic characteristics, with respect to enviromental issues (2012)
❖ However, environmental *in*justice often occurs
❖ Case studies have shown that minority populations and those living in poverty shoulder a disproportionate burden of environmental problems (Blodgett 2006; Bullard *et al.* 2007; Mennis 2002)
❖ A socioeconomic status (SES) index shows the disparity between advantaged and disadvantaged communities

Objectives

❖ Observe the overall presence of hazard sites in Pierce County by conducting three main analyses using GIS
❖ The first analysis consists of creating an SES index for Pierce County and identifying hazards that occur in high and low SES areas (Fig. 1)
❖ The second analysis involves analyzing three demographic variables—where each variable is a part of the SES index—individually to determine the areal density of hazards within advantaged and disadvantaged areas
❖ The third analysis looks at hazards occurring within a buffer around schools, daycares, nursing homes and parks in high and low SES areas to see if there is a disproportionate environmental burden on low SES areas
❖ I expect to find that people living in low SES areas in Pierce County are disproportionately affected by proximity to hazards

Number of sites per square mile

The Worst Hazards	
Low Poverty	High Poverty
0.00002	0.000092
Low Minorities	High Minorities
0.000013	0.000174
Low Median Income	High Median Income
0.000009	0
All Hazards	
Low Poverty	High Poverty
0.000125	0.001207
Low Minorities	High Minorities
0.000072	0.001659
Low Median Income	High Median Income
0.0001	0.000037

Above image (Tacoma Public Utilities) is an example of a hazard site with a low score, whereas the image at left (Birds Eye Foods) is an example of a hazard site with a high score.
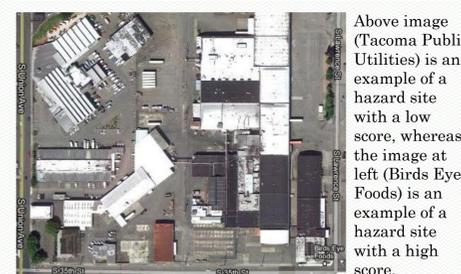
Table 1. A comparison of the areal densities of hazard points between areas with: high and low number of people living below the poverty line; high and low rate of minorities in the community; and high and low median income. Areal density is the number of hazard sites occurring per square mile. Numbers highlighted in red indicate the value that shows a higher areal density between the two options. For all variables, the disadvantaged option shows a higher number of hazards per square mile.

Results

❖ Pierce County shows a pattern of environmental injustice in regards to hazard and SES
❖ Those living in areas of low SES in Pierce County have a much higher chance of living near a hazard site than those living in high SES areas (Fig. 1)
❖ Poverty, race and median income individually show a pattern of more hazard sites in disadvantaged areas (Table 1)
❖ Schools, daycares, nursing homes and parks in low SES areas were found to be in closer proximity to hazard sites than similar locations in high SES areas; in fact, there were no hazard sites found within the buffer of locations in high SES areas (Fig. 2)
❖ The worst area identified by GIS analysis of environmental injustice in Pierce County is South Tacoma

Blodgett. 2006. An analysis of pollution and community advocacy.

Bullard *et al.* 2007. Toxic wastes and race at twenty: 1987-2007.

ICF. 2005. Air quality issues in school site selection.

Mennis. 2002. Using geographic information systems to create and analyze statistical surfaces of population and risk for environmental justice analysis.

EPA. 2012. Environmental justice. Retrieved from: http://www.epa.gov/environmentaljustice/.

Images retrieved from Flickr and Google Maps.