

Geography of the Baltimore Drug Trade

Mapping Urban Youth Vulnerability and its Relationship to Crime and Environmental Inf uences

Study Background

Research Question •

What is the spatial social vulnerability of Baltimore's youth to employment in the open-street drug market, and how does vulnerability correlate to crime and/or suggested positive and negative environmental inf uences?

Project Motivation •

Having grown up and lived in the Baltimore area my entire life, I've gained an appreciation for the city and a personal concern for it's problems. In order to ef ectively tackle the city's drug and poverty backed decay, a new, spatially aware approach must be implemented. Ef ective analysis results can assist with policymaking, policing tactics, and community revitalization. For example, by locating vulnerable, high crime and/or decaying edge regions, targeted funding can help prevent the spread of problems and possibly promote rejuvenation.

Literature Review •

Studies on troubled youth and youth substance abuse suggest that social factors including peers and family composition are heavily inf uential for vulnerability. Economic factors such as household income and property value, and education factors such as chronic absence and employment are indirect but also valuable.

Studies on crime suggest a high correlation to social vulnerability, and that community ownership greatly reduces social and environmental decay. Illegal drug market growth generates other direct crime such as vandalism and illegal possession and use of weapons. Markets are usually f xed with access to high traf c.

Methodology

Social Vulnerability •

Demographic and housing data is gathered and cleaned. Linear regression and spatial autocorrelation tools remove redundant variables. Using myStat, a principal component factor analysis is run to generate variable weights.

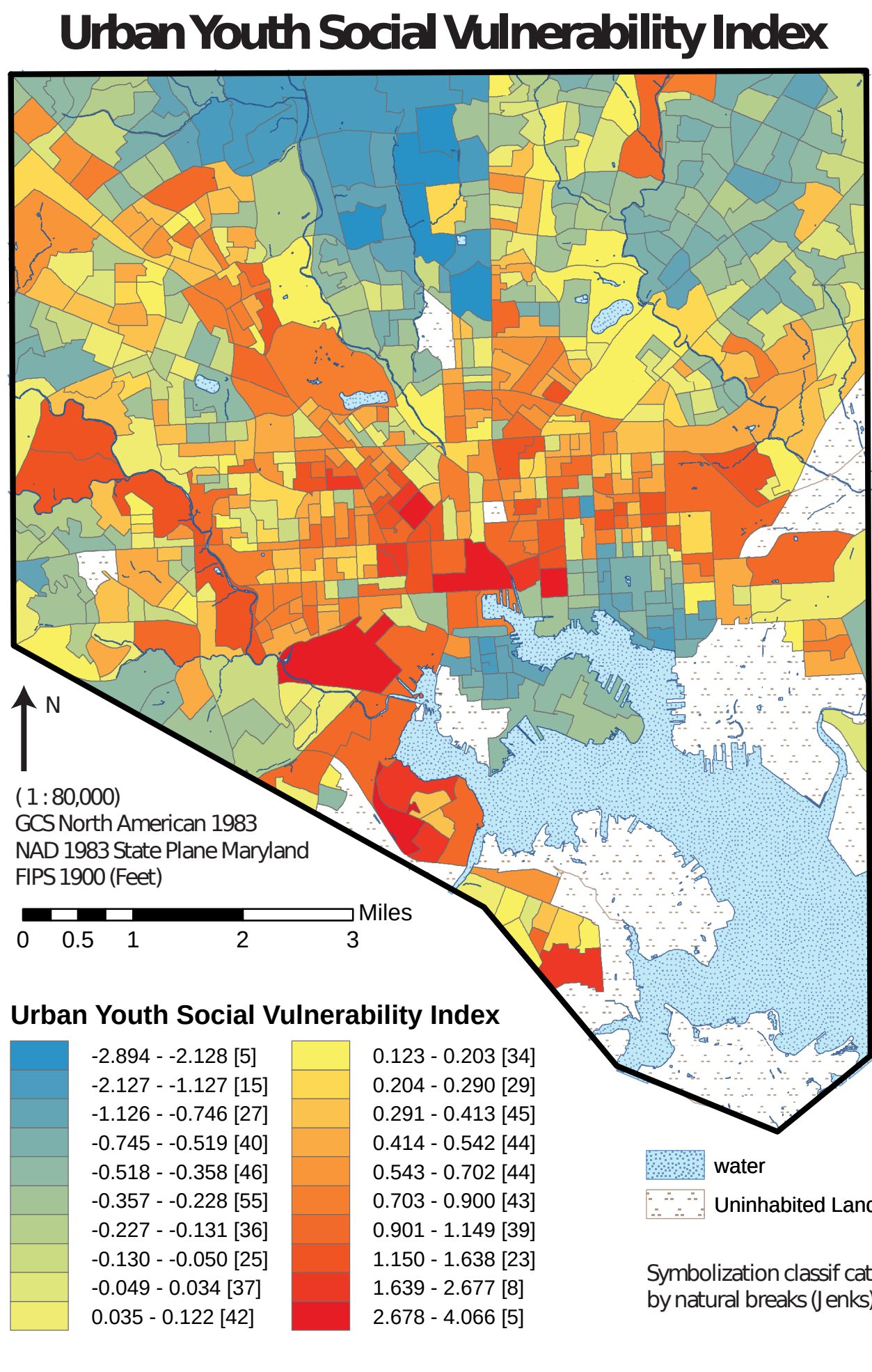
Crime Analysis •

2012 and 2013 narcotics and violent of ense* arrest data, and victim-based crime data is gathered, cleaned and normalized by area and population. Using spatial autocorrelation, based on z-values, hot spot analysis is conducted with an appropriate distance band of 450ft.

Environmental Analysis •

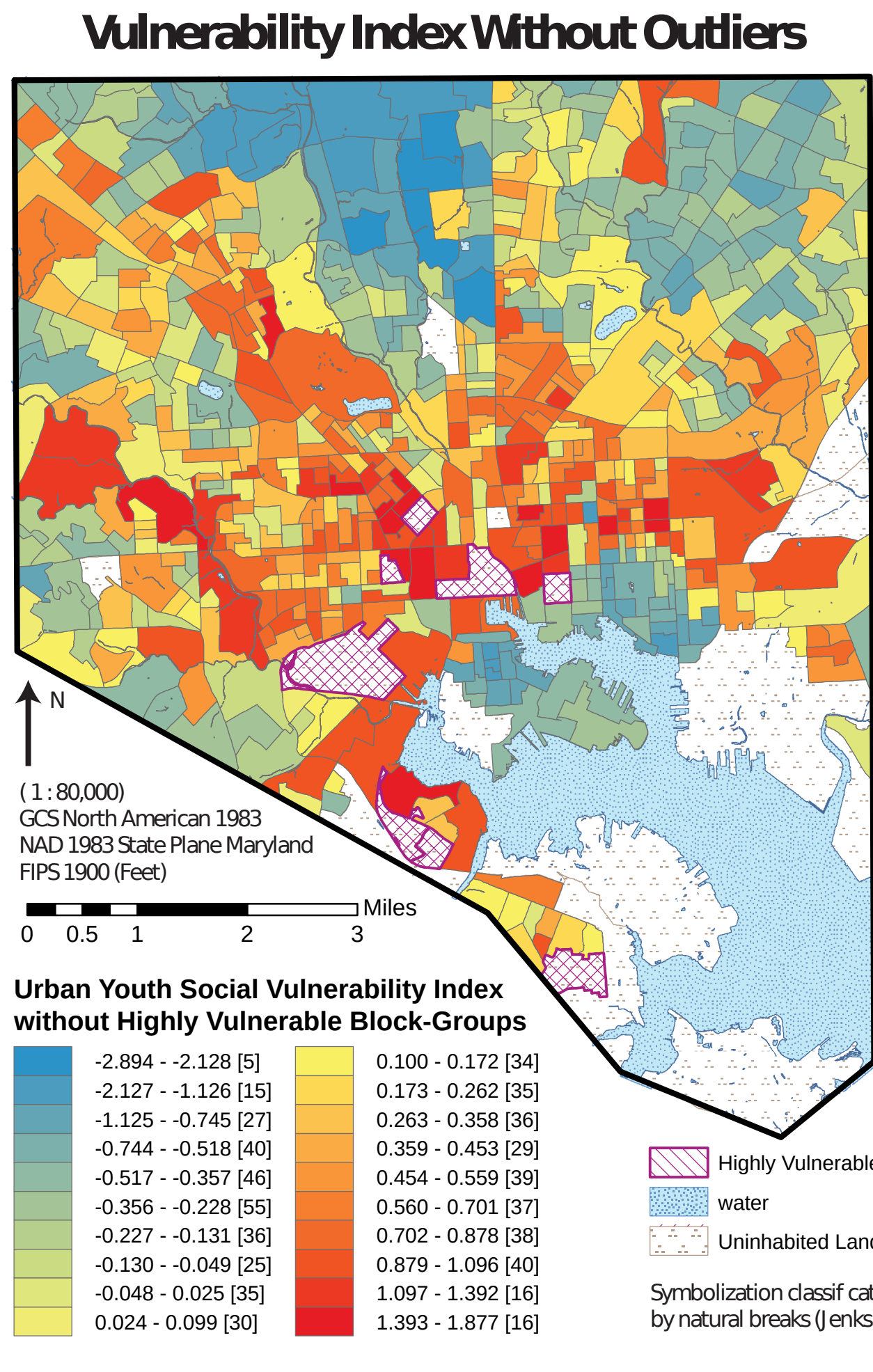
Positive and negative environmental factor data gathered, cleaned and aggregated to the block-group level by raw count and density.*

Results

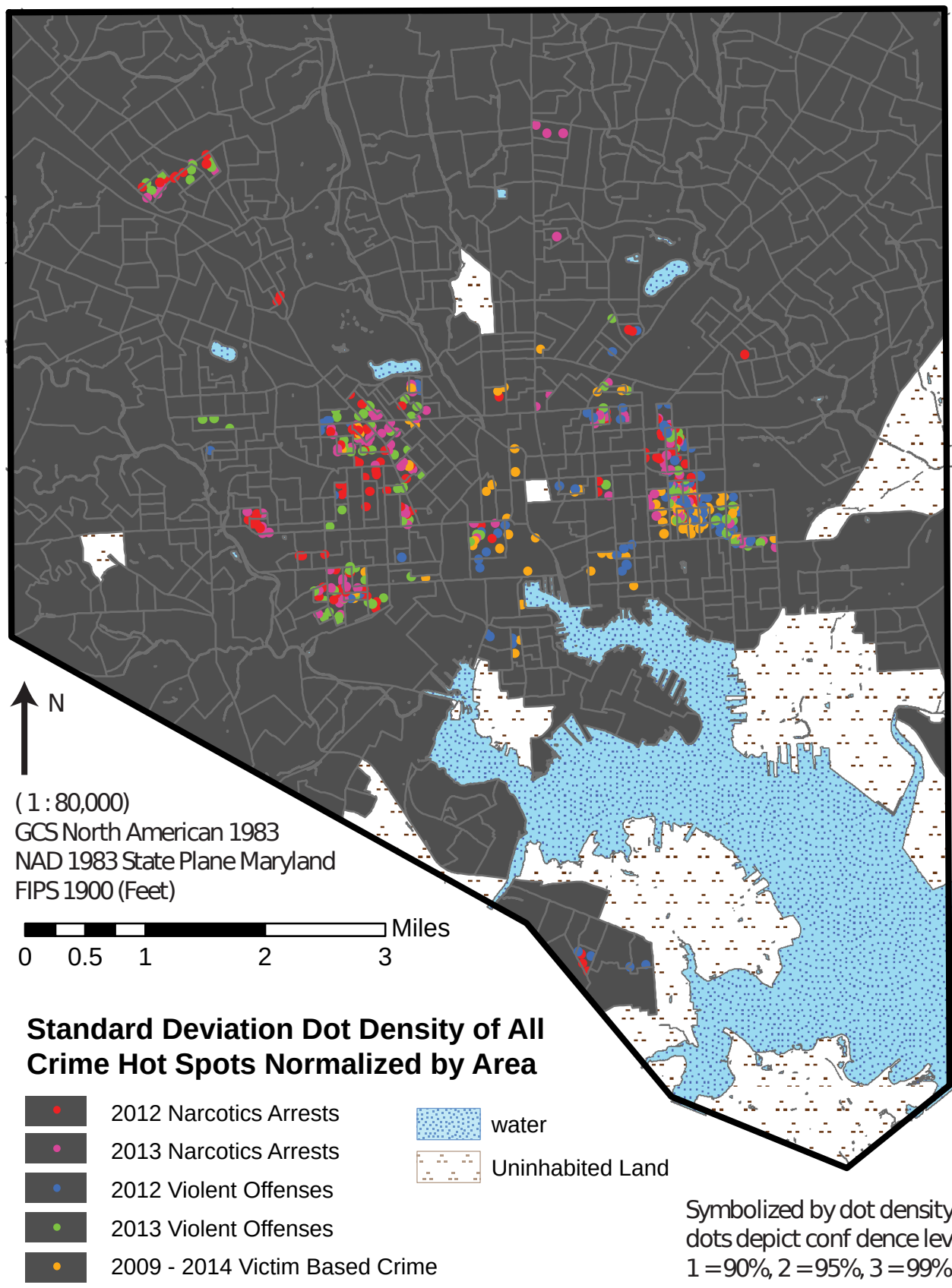


Social Vulnerability Variables

Description	Weight
<i>Census Block-Group Level</i>	
Population not living in a family	-0.034
% Commuters Without Own Vehicle	0.33
% of Families Living in Poverty	0.388
Median Household Income	-0.309
% Households Receiving SNAP	0.397
% Households with Member on Disability	0.148
% of Labor Force that is Unemployed	0.205
% Overcrowding (1.5+pp/room) in Rented Units	0.046
% Households Lacking Complete Kitchen Facilities	0.015
Gross Rent as % of Total Income	0.455
Median Household Value	-0.184
% Population Over 25 that has Graduated High School	0.295
<i>Aggregated Community Statistical Area</i>	
Liquor Outlet Density (1,000 residents)	0.628
Teen birth Rate (1,000 females)	0.767
High School Chronically Absent Rate	0.423
Property Crime Rate (1,000 residents)	0.749
Juvenile Arrests (1,000 juveniles)	0.918
Juvenile Violent Offenses (1,000 juveniles)	0.843
Juvenile Drug Charges (1,000 juveniles)	0.843
Domestic Violence Charges (1,000 residents)	0.824



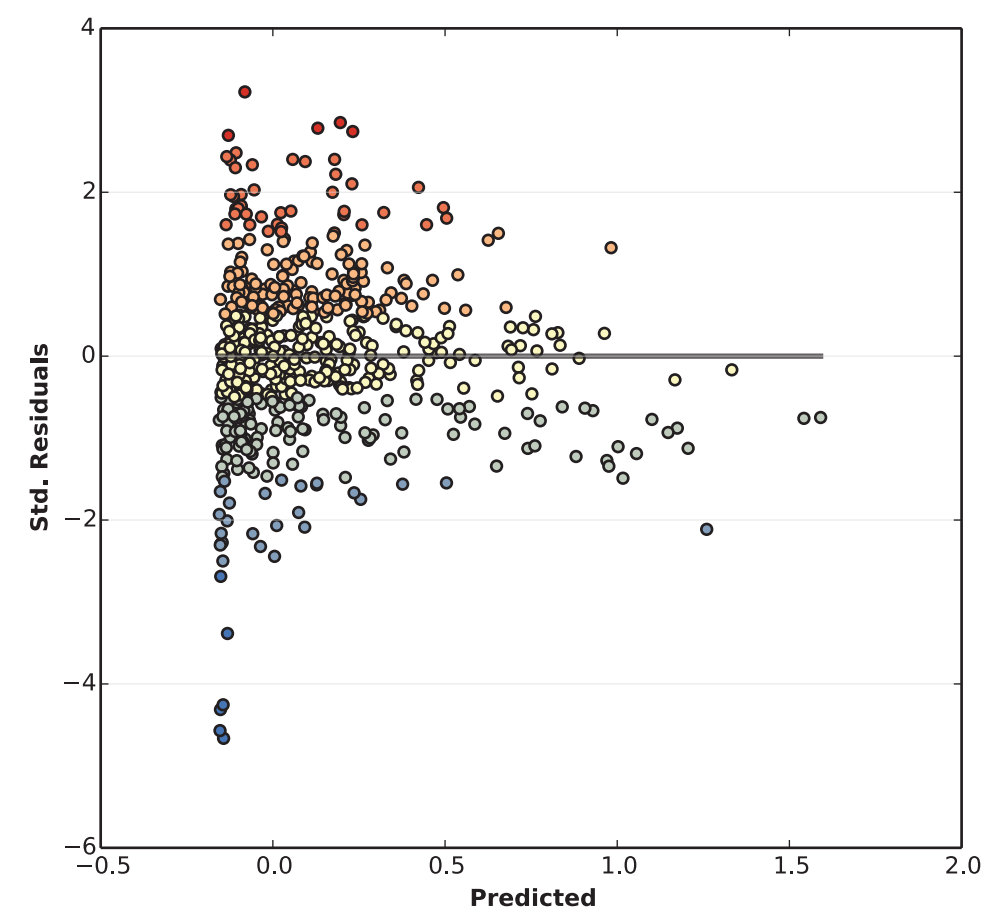
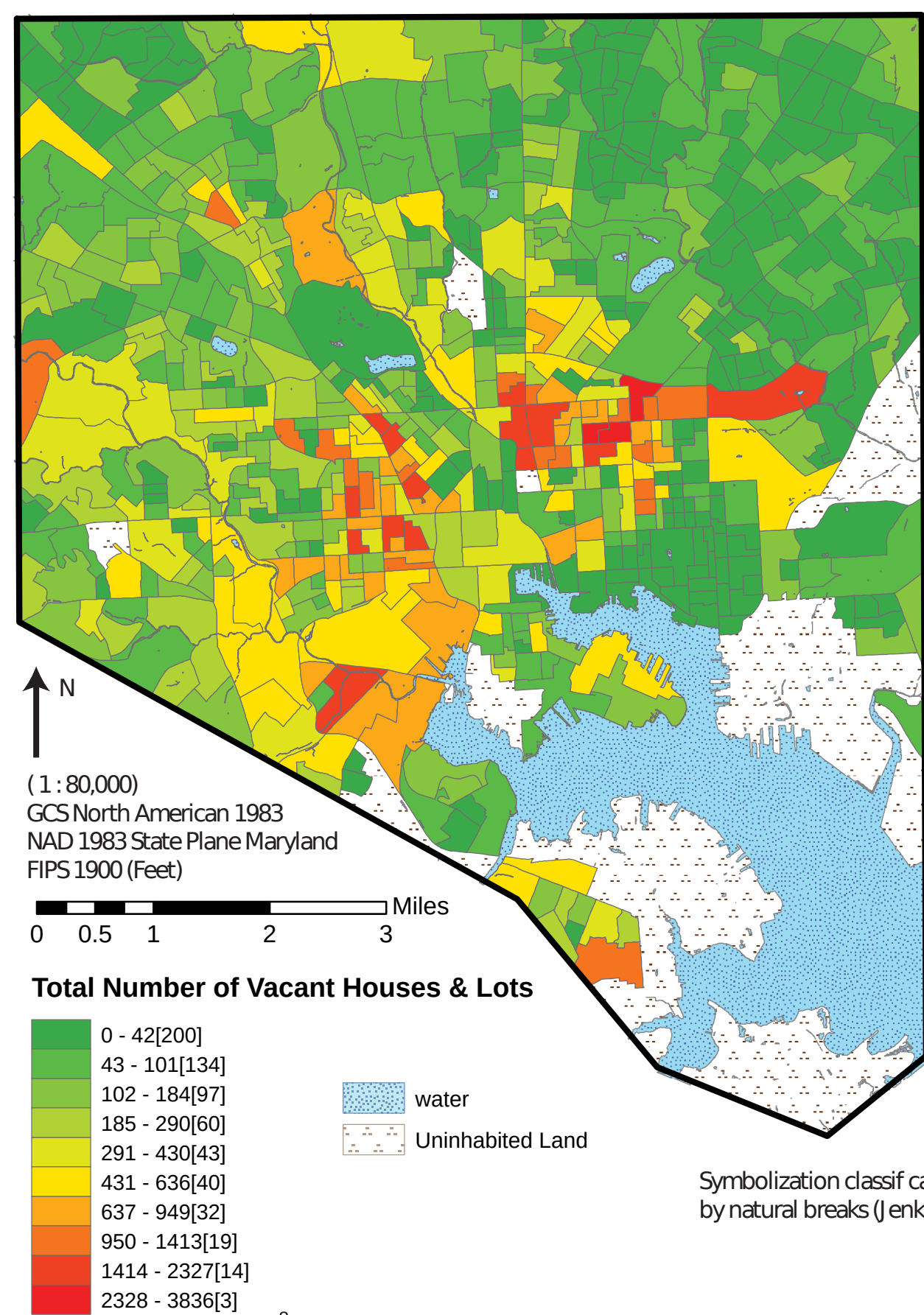
Crime Hot Spots by Standard Deviation



Datasets Generated

Dataset	Retrieved From	Source
<i>Youth Vulnerability Index</i>		
Demographic Data	Tiger/Line	2008 - 2012 American Community Survey
Housing Data	Tiger/Line	2008 - 2012 American Community Survey
Community Statistical Areas	BNIA	various sources*
<i>Crime</i>		
2012, 2013 Arrest and Charges	Open Baltimore	Baltimore Police
2009 - 2014 Victim Based Crime	Open Baltimore	Baltimore Police
<i>Environment</i>		
Vacant Houses & Lots	Open Baltimore	Baltimore Dept. of Planning
Land Cover & Land Use	Open Baltimore & Maryland Food System	Baltimore Public Works; JHU
	Open Baltimore & Maryland Food System	Baltimore Public Works; JHU
Community Resources*	Open Baltimore & Maryland Food System	Baltimore Dept. of Planning; JHU

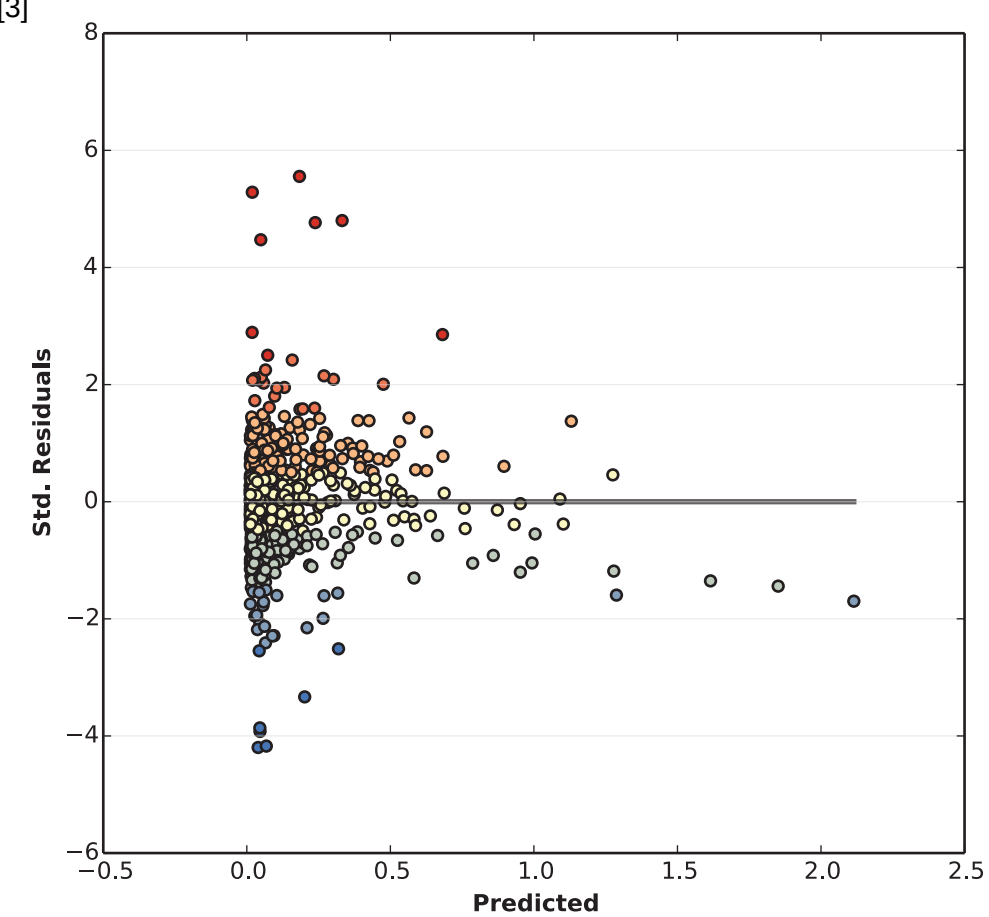
Total Vacant Parcel Houses & Lots



Residual Results for Correlation Tests

Based on the residual results from the crime and environmental OLS linear regression model, the respective correlations to social vulnerability cannot be determined. Spatial autocorrelation suggest missing data or a lack of statistical relevance.

crime model: adjusted R2 value=0.185
Enviromental model: adjusted R2 value= 0.096



Discussion

Analysis of Results •

Visually, moderately high (0.5 - 0.75) to high (0.75 +) social vulnerability can be observed in downtown, directly west and north west of Martin Luther King Jr. Blvd, following Park Heights Ave, and along the west and southwest side of Gwynns Falls. On the east side, high vulnerability occurs in pockets directly southeast and east of I-83, east of Johns Hopkins Medical Campus, and surrounding east North Ave. Crime hot spots occur in similar areas with multiple types havily concentrated northeast of Patterson Park, along Pennsylvania Ave, around Pimlico, and within Pratt Monroe. Vacancies occur most heavily near by including Greenmount and Lexington Terrace.

After running spatial autocorrelation tests on residuals of several linear regression models to determine correlation between observed factors, high z-scores such as 11.415, 10.986 and 13.526 suggest unreliable results. These scores resulted when testing social vulnerability against crime normalized by area, by population, and against total vacant parcels respectively. Although these results aren't statistically relevant, visually, levels of high correlation are apparent. Low social vulnerability (≥ -1) often occur in low crime and low vancany areas including Federal Hill, Canton, the wedge of wealth, and Upper Hamilton. On the contrary, Greenmount, Broadway East, Upton and Pratt Monroe show high crime, vacancy and vulnerability ($\geq .75$).

Limitations •

Project biases occurred from aggregation and interpolation of missing data gathered from multiple sources including the U.S. Census, Open Baltimore and BNIA. Primary source data biases occurred from unquantif able and subjective values such as the absence of census data on unrecorded illegal drug purchases, and unequal police patrol routes and arrests, respectively. Improper data analysis and/or categorization prevented any statistically relevant results, limiting further analysis.

Conclusion

Project Findings •

Baltimore's urban youth social vulnerability has a normal bell curve distribution with a slight skew right towards higher vulnerability. Many social vulnerability indicators can be applied when observing youth, allowing for fairly simple project adjustments and extensions. However, in order to observe accurate variations, it's essential that social vulnerability data be aggregated to no larger than the block-group level. Based on results, attention should be paid to the neighborhoods along east North Ave, Pennsylvania Ave and the Gwynns Falls corridor from Edmonson Ave to Wilkens Ave.

Future Work •

Statistical analysis was limited due to experience and time restraints. To better examine youth social vulnerability, more youth specif c variables should be tested such as school test scores, after school involvement and community involvement. In addition, crime analysis can be aggregated to street block level, and should be separated by of ense type and age categories. Observing positive environmental factors, like rec / community centers, may show a positive and/or stronger correlation with vulnerability.

References

- Blumstein, A., (2002). The future of Children. Princeton University. Children, Youth, and Gun Violence. 12(2), 38-53.
- Blumstein, A., (1995). Youth Violence, Guns, and the Illicit-Drug Industry. Northwestern University, School of Law. Journal of Criminal Law & Criminology. 86(1&2), 10-36.
- Cavatassi, R., Davis, B., Lipper, L. (2004). Estimating Poverty Over Time and Space: Construction of a time-variant poverty index for Costa Rica. Agriculture and Development Economics Division of the Food and Agriculture Organization of the United Nations (FAO - ESA).Working Papers 04-21.
- Cheung, I., Mason, M., Walker, L., (2004). Substance Use, Social Networks, and the Geography of Urban Adolescents. Georgetown University Medical Center. Substance Use and Misuse. 39(10-12), 1-27.
- Cheung, I., Mason, M., Walker, L., (2009). Creating a Geospatial Database of Risks and Resources to Explore Urban Adolescent Substance Use. Journal of Prevention & Intervention in the Community. 37(1), 21-34.
- Erbstein, E., Erbstein, G., Erbstein, N., Greenfeld, T., (2010). Index of Youth Vulnerability. Healthy Youth/ Healthy Regions Working Paper. Center for Regional Change, UC Davis.
- Harocopos, A., Hough, M., (2010). Drug Dealing in Open-Air Markets. U.S. Department of Justice, Of ce of Community Oriented Policing Services. Problem-Oriented Guides for Police. Problem-Specific Guides Series, 31.
- Hianfeldt, K. (2007). Neighborhood Drug Crime and Young Male's Job Accessibility. DeVoe Moore Center and Department of Economics, Florida State University. The Review of Economics and Statistics. 89(1), 151-164.
- Rhoe, W., Stewart, L., (1996). Homeownership and Neighborhood Stability. University of North Carolina at Chapel Hill, Research Triangle Institute. Housing Policy Debate. 7(1), 37-81.
- Wilson, W., (1998). When Work Disappears: New Implications for Race and Urban Poverty in the Global Economy. Center of Analysis and Social Exclusion, London School of Economics. CASEpaper (17).

* Indicates data that has been altered, or a process that hasn't been completed. Please see written report for further details