IT'S NOT EASY BEING GREEN
CAN GREEN SPACE PREDICT CRIME RATES IN NEW YORK CITY?

BACKGROUND

Green space can positively impact psychological health on an individual and community level through promoting sense of place, community identity, and social capital. The World Health Organization (WHO) defines human health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." Green space can cultivate social cohesion and individual personal well-being, and provide ecosystem services such as reducing crime and improving individual happiness.

Urban green space can play an important role in offering a safe space for communities to both reconnect to nature and connect with their neighbors. This analysis examines the relationship between green space, socioeconomic factors (SES), and crime incidents in the five boroughs of New York City. The aim of the project is to use a regression model to see how well the presence of green space and socioeconomic status (SES) factors predict crime rates for 2014 data.

METHODS

For this study, an Ordinary Least Squares regression model was run. SES factors and percent green space were chosen as explanatory variables to determine how well they predict the dependent variable, crime rates. Five SES indicators were chosen as predictors for the regression model based on literature: Population density (population), median age (age), unemployment rate (unemployment), percent below poverty level (poverty), and the percent of individuals age 25 and up with a high school or above degree (education). These data sets are projections for 2014 and was obtained from the United States Census Bureau. Percent green space was calculated by merging land use data for each borough, acquired from the New York City government's Planning data. The land use category "open space and recreation" was selected for and created as a new layer (Parks map). The Union tool was used to join census tracts and open space, and lot area was calculated in the resulting layer.

Crime data, downloaded from nyc.gov, represents the incidents of seven major felonies committed all five boroughs of New York City in 2014. This includes assault, burglary, larceny, larceny of a vehicle, murder, rape, and robbery. This XY data was added to the map and kernel density was run for each of the seven major felonies, as well as all felonies together. Results are demonstrated in the following tables and maps.

RESULTS AND CONCLUSIONS

REGRESSION MODEL PREDICTING ALL CRIME INCIDENTS

| Explanatory Variables	AIC	Adjusted R²
Population	22342	0.057
Population, age	22336	0.060
Population, age, unemployment	22321	0.067
Population, age, unemployment, poverty	22286	0.083
Population, age, unemployment, poverty, education	22170	0.13
Population, age, unemployment, poverty, green space	22162	0.13

REGRESSION MODEL PREDICTING ASSAULT INCIDENTS

| Explanatory Variables	AIC	Adjusted R²
Population	17001	0.045
Population, age	16959	0.064
Population, age, unemployment	16782	0.14
Population, age, unemployment, poverty	16678	0.18
Population, age, unemployment, poverty, education	16658	0.19
Population, age, unemployment, poverty, green space	16652	0.19

REGRESSION MODEL PREDICTING MURDER INCIDENTS

Explanatory Variables	AIC	Adjusted R²
Population	2777	0.012
Population, age	2758	0.021
Population, age, unemployment	2656	0.066
Population, age, unemployment, poverty	2606	0.088
Population, age, unemployment, poverty, education	2600	0.091
Population, age, unemployment, poverty, green space	2600	0.090

REGRESSION MODEL PREDICTING ROBBERY INCIDENTS

Explanatory Variables	AIC	Adjusted R²
Population	14777	0.089
Population, age	14708	0.12
Population, age, unemployment	14509	0.20
Population, age, unemployment, poverty	14347	0.25
Population, age, unemployment, poverty, education	14341	0.26
Population, age, unemployment, poverty, green space	14337	0.26
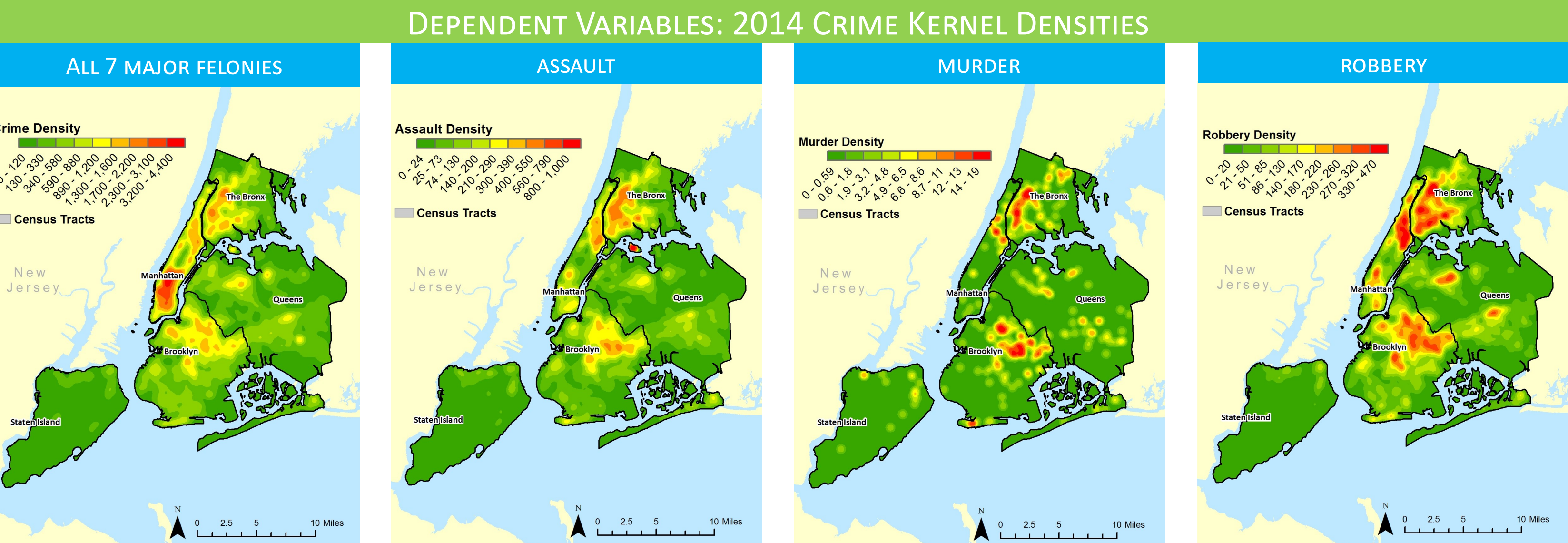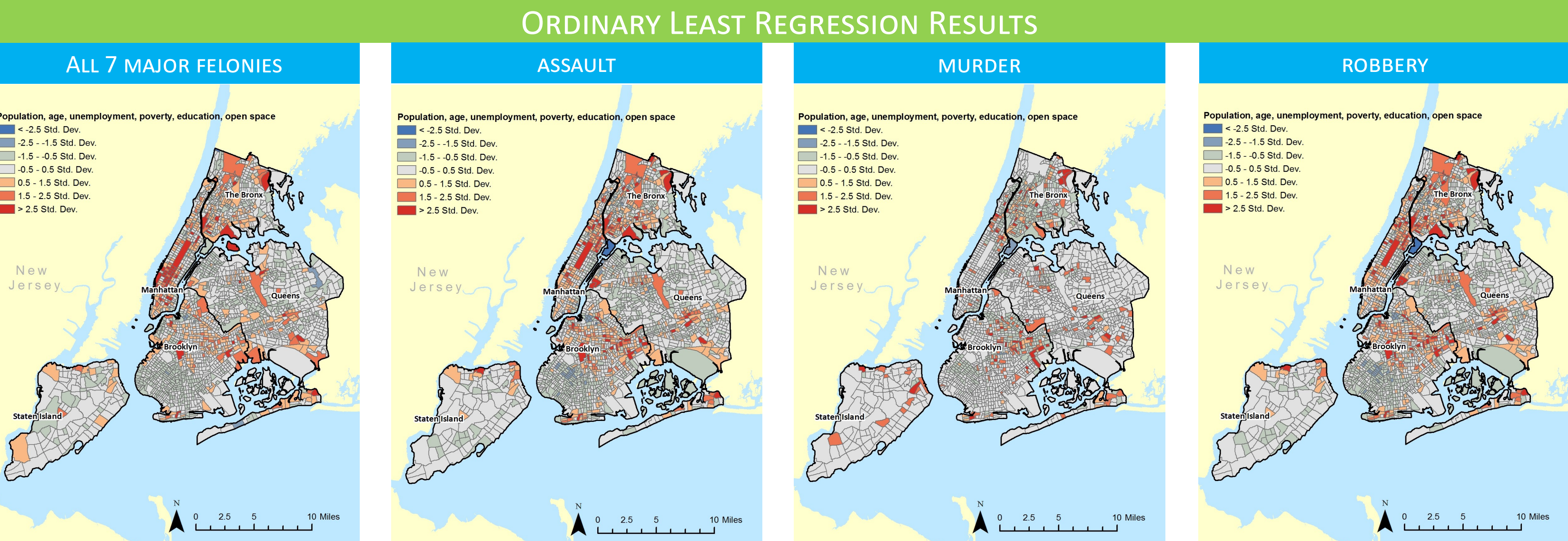
A properly specified model would have an adjusted R² value of 0.80 (80%) or higher. This value indicates that the model explains 80% or more of crime incidents. Based on the regression analysis, green space and socioeconomic status factors are not efficient predictors of crime rates, with an adjusted R² value of 0.26 or below. This lack of predicting power indicates that another variable is influencing crime. As shown in the kernel density map for all 7 major felonies, there is a concentration of crime in lower Manhattan, which is an area with a high volume of tourism. This may attract criminal activity.
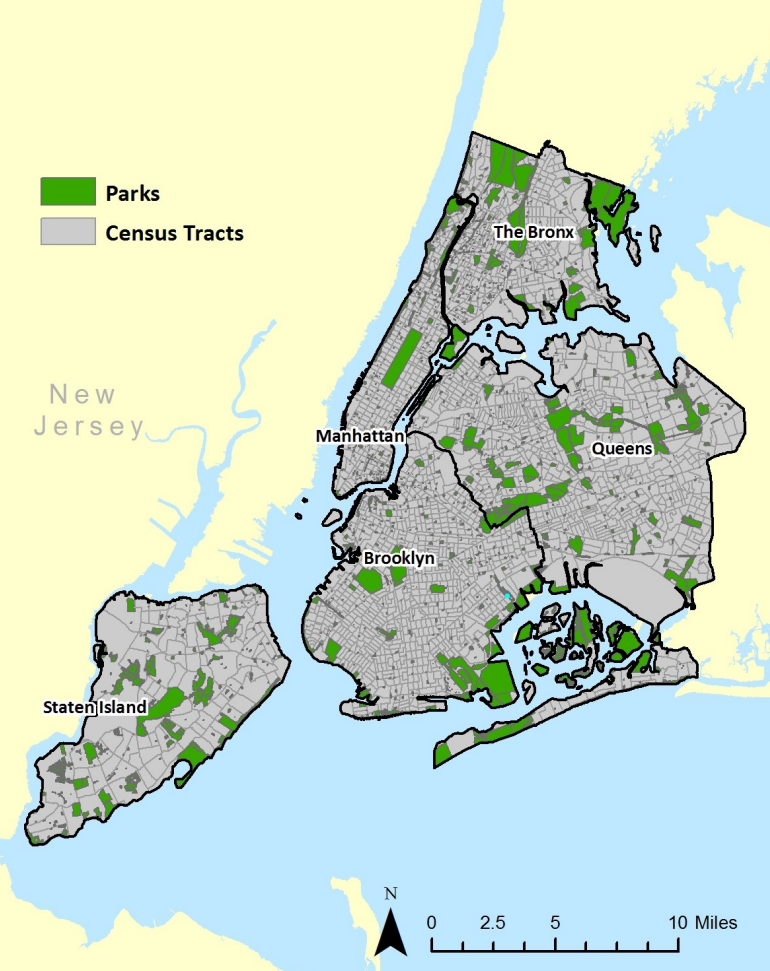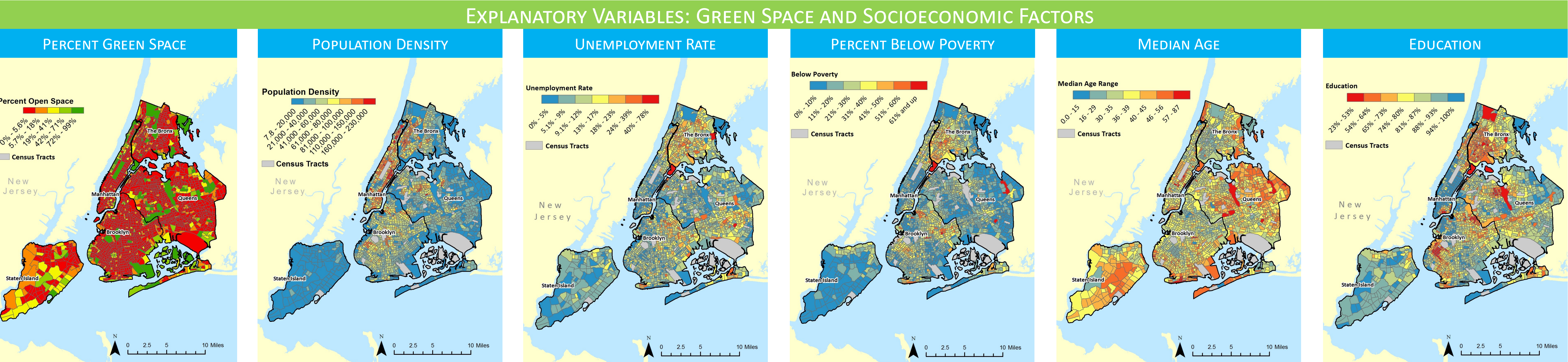
Future directions would be to look at non-green areas, such as vacant land, as predictor of crime. If this is a good predictor, this could give insight into whether converting these vacant areas into green spaces can decrease crime rates in these areas. Additionally, other key variables such as race and housing could also explain crime rates.

Cartographer: Katie Grassle

ORDINARY LEAST REGRESSION RESULTS

ALL 7 MAJOR FELONIES | ASSAULT | MURDER | ROBBERY

Population, age, unemployment, poverty, education, open space
- < -2.5 Std. Dev.
- -2.5 – -1.5 Std. Dev.
- -1.5 – -0.5 Std. Dev.
- -0.5 – 0.5 Std. Dev.
- 0.5 – 1.5 Std. Dev.
- 1.5 – 2.5 Std. Dev.
- > 2.5 Std. Dev.

DEPENDENT VARIABLES: 2014 CRIME KERNEL DENSITIES

ALL 7 MAJOR FELONIES | ASSAULT | MURDER | ROBBERY

EXPLANATORY VARIABLES: GREEN SPACE AND SOCIOECONOMIC FACTORS

PERCENT GREEN SPACE | POPULATION DENSITY | UNEMPLOYMENT RATE | PERCENT BELOW POVERTY | MEDIAN AGE | EDUCATION

http://images.huffingtonpost.com/2013-03-18-VolunteerDayoverallcopy.jpg

http://bklynr.com/qa-david-vigil-of-east-new-york-farms/

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