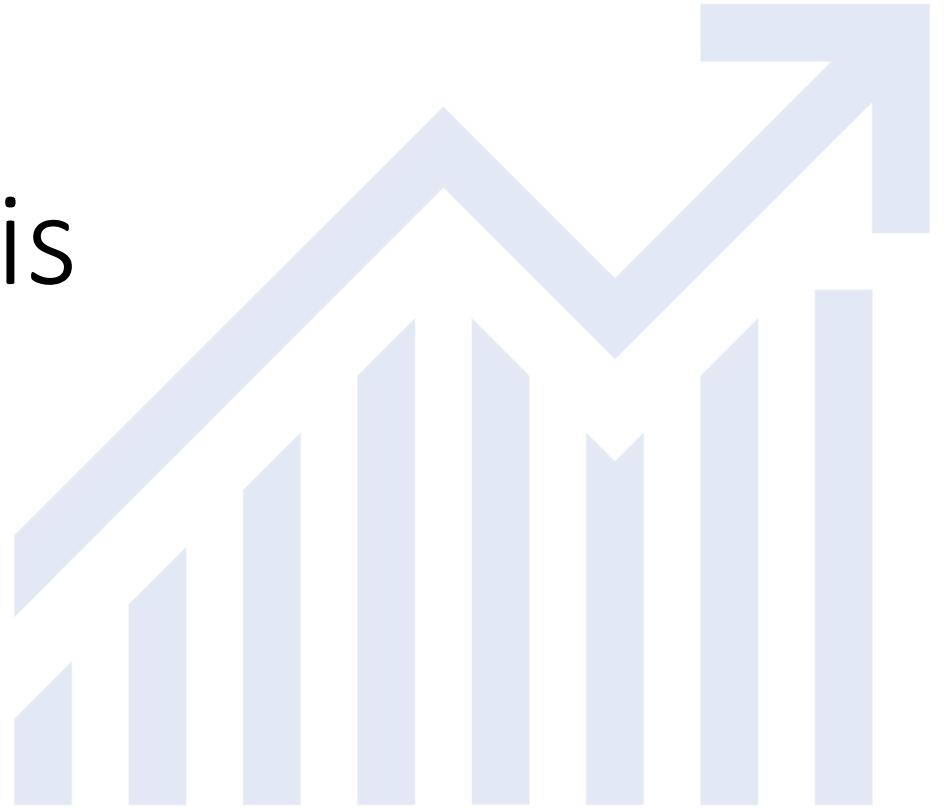# GIS Work Products for Studio Course Fall 2019

Decongestion New York City (Support Help to Upcoming NYC Congestion Pricing Program)
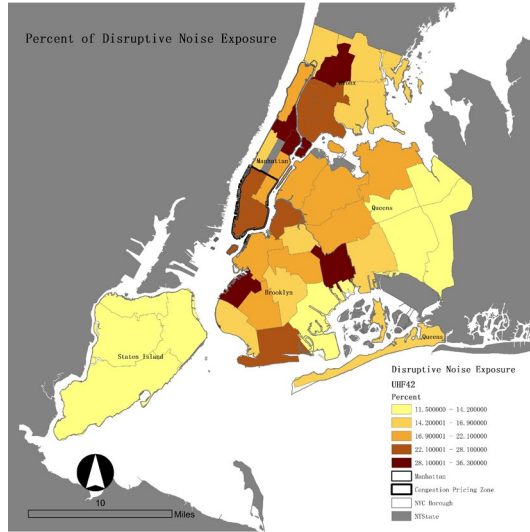
Zizhao He
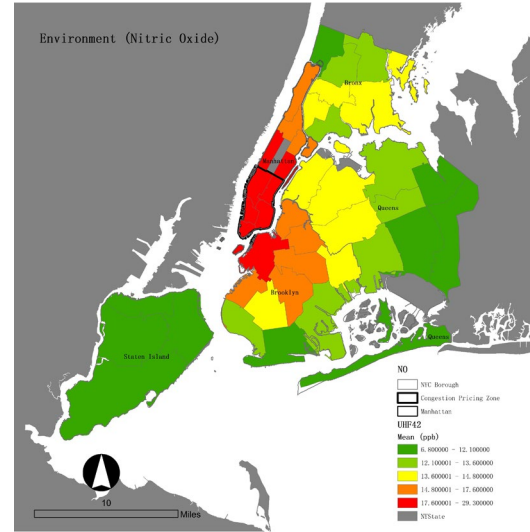
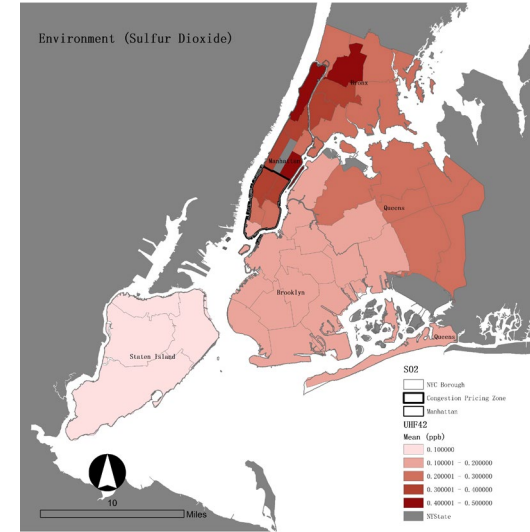Vector GIS Analysis (Environmental Statistics)

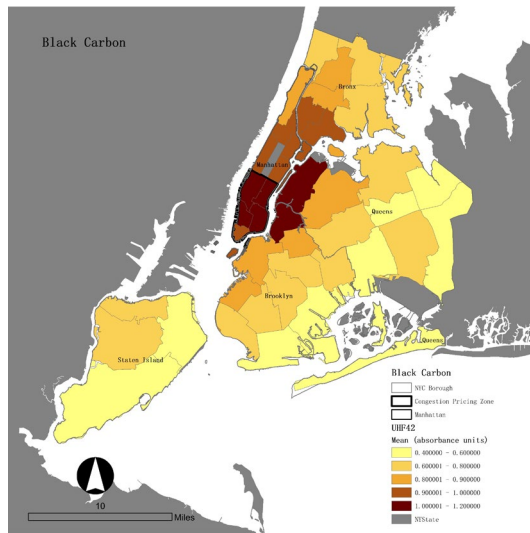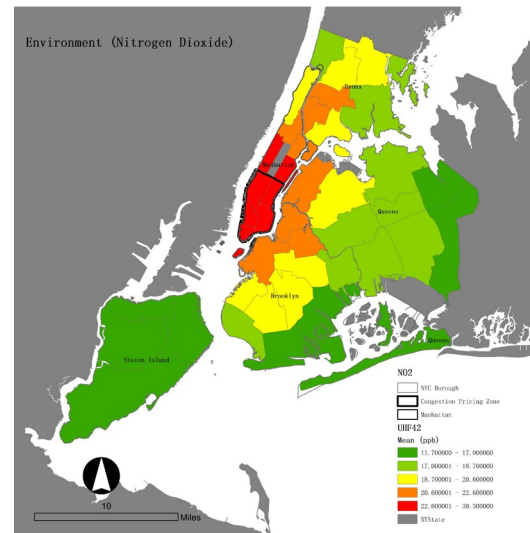## Noise

Percent of Disruptive Noise Exposure

Disruptive Noise Exposure
UHF42
Percent
- 11.500000 – 14.200000
- 14.200001 – 16.900000
- 16.900001 – 22.100000
- 22.100001 – 28.100000
- 28.100001 – 36.300000
- Manhattan
- Congestion Pricing Zone
- NYC Borough
- NYState

Nitric Oxide

Environment (Nitric Oxide)

NO
- NYC Borough
- Congestion Pricing Zone
- Manhattan
UHF42
Mean (ppb)
- 6.900000 – 12.100000
- 12.100001 – 13.600000
- 13.600001 – 14.800000
- 14.800001 – 17.600000
- 17.600001 – 29.300000
- NYState

Sulfur Dioxide

Environment (Sulfur Dioxide)

SO2
- NYC Borough
- Congestion Pricing Zone
- Manhattan
UHF42
Mean (ppb)
- 0.100000
- 0.100001 – 0.200000
- 0.200001 – 0.300000
- 0.300001 – 0.000000
- 0.400001 – 0.500000
- NYState

Black Carbon

Black Carbon

Black Carbon
UHF42
Mean (absorbance units)
- 0.400000 – 0.600000
- 0.600001 – 0.800000
- 0.800001 – 0.900000
- 0.900001 – 1.000000
- 1.000001 – 1.200000
- NYC Borough
- Congestion Pricing Zone
- Manhattan
- NYState

Nitrogen Dioxide

Environment (Nitrogen Dioxide)

NO2
- NYC Borough
- Congestion Pricing Zone
- Manhattan
UHF42
Mean (ppb)
- 11.700000 – 17.000000
- 17.000001 – 18.700000
- 18.700001 – 20.600000
- 20.600001 – 22.600000
- 22.600001 – 30.300000
- NYState

PM 2.5

Environment (PM2.5)

PM2.5
- NYC Borough
- Congestion Pricing Zone
- Manhattan
UHF42
Mean (mcg per cubic meter)
- 6 – 7
- 6 – 7
- 8
- 8 – 9
- 9 – 10
- NYState
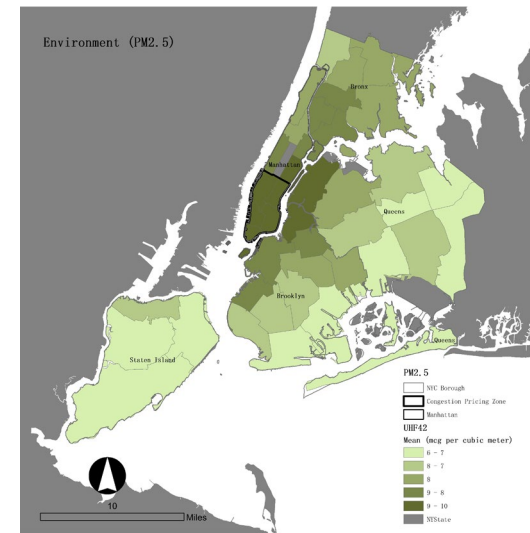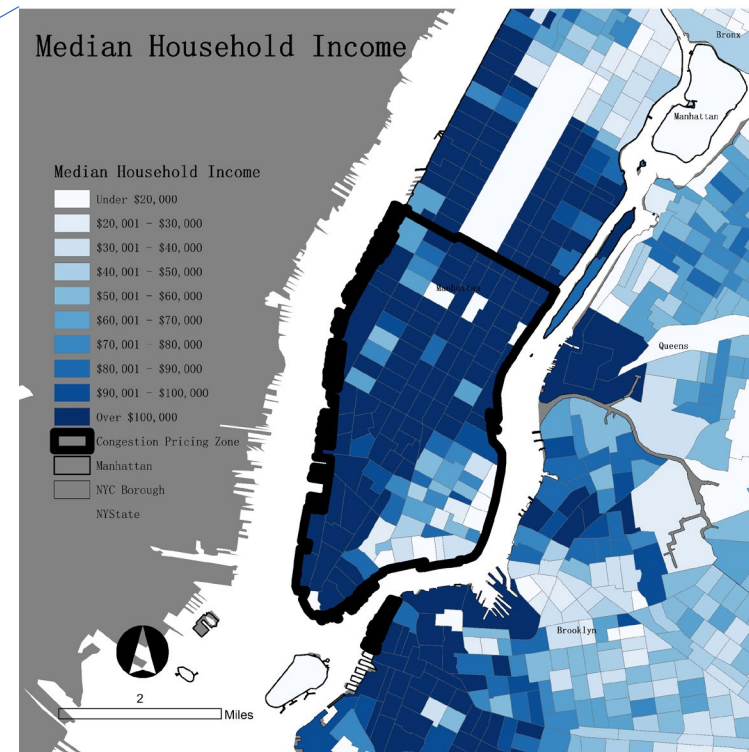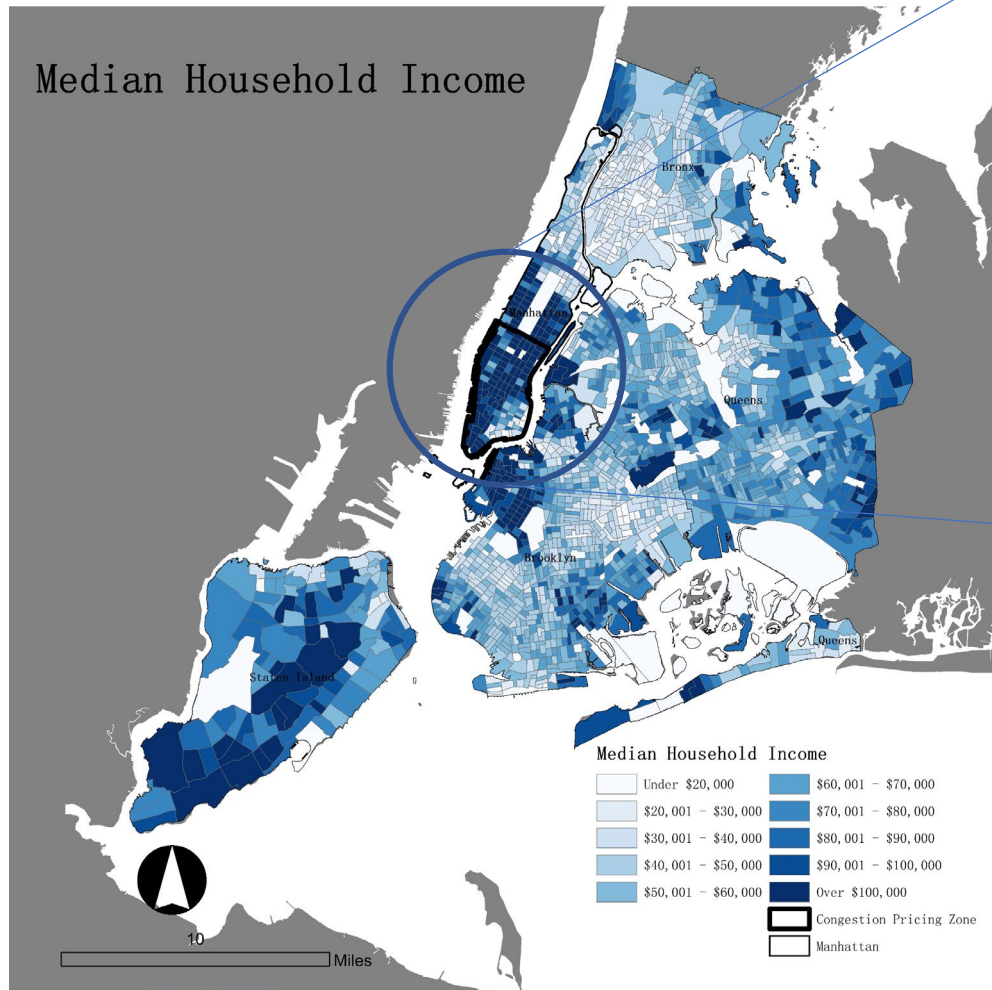
From the graphics, we can see that the Congestion Pricing Zone (CP Zone) has the highest quantity of these environmental pollutants, which means that the Zone would have the potential of most serious environmental problems. So, the introduction of the CP Program would be necessary for solving these problems.

Vector GIS Analysis (Socio-economic Statistics: Median Household Income as an example)

Median Household Income

Median Household Income

	Under $20,000
	$20,001 – $30,000
	$30,001 – $40,000
	$40,001 – $50,000
	$50,001 – $60,000
	$60,001 – $70,000
	$70,001 – $80,000
	$80,001 – $90,000
	$90,001 – $100,000
	Over $100,000
	Congestion Pricing Zone
	Manhattan
	NYC Borough
	NYState

Median Household Income

	Under $20,000		$60,001 – $70,000
	$20,001 – $30,000		$70,001 – $80,000
	$30,001 – $40,000		$80,001 – $90,000
	$40,001 – $50,000		$90,001 – $100,000
	$50,001 – $60,000		Over $100,000
			Congestion Pricing Zone
			Manhattan

According to the graphs, in general, the CP Zone has the highest median household income level among the whole city. However, it's interesting that a large part the lower southeast corner has an obviously relatively low median income level.

Brief Introduction of NYBPM Data

NYMTC's NYBPM (New York Best Practice Model) predicts changes in future travel patterns in response to changes in the demographic profiles and transportation systems in the region. It incorporates transportation behavior and relationships with an extensive set of data that includes a major travel survey of households in the region, land-use inventories, socioeconomic data, traffic and transit counts, and travel times.

The model includes 28 counties in New York, New Jersey, and Connecticut, which compose the metropolitan area surrounding NYC. The data shows the information of each trip (mode choice, origination & destination TAZ numbers, etc) within the metropolitan area.

Total number of vehicles to Brooklyn from the whole metropolitan area (in TAZ)
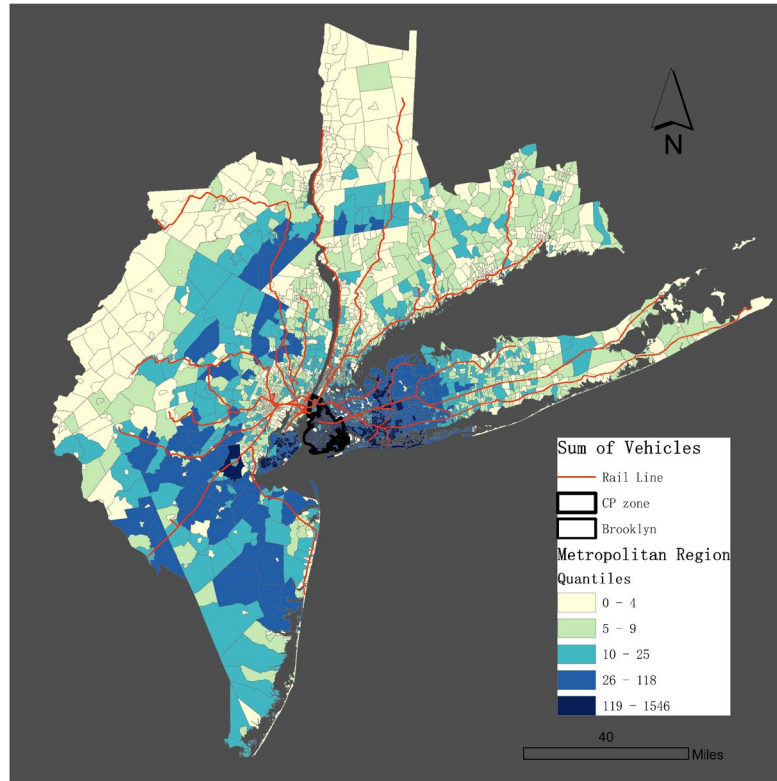
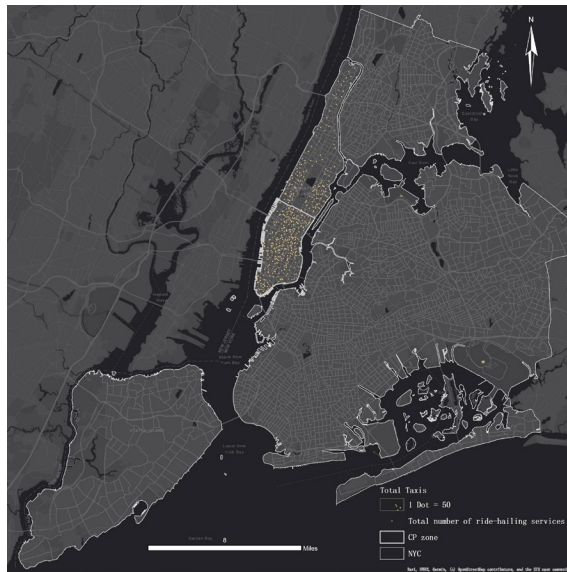Total number of transit riders to Brooklyn from the whole metropolitan area (in TAZ)
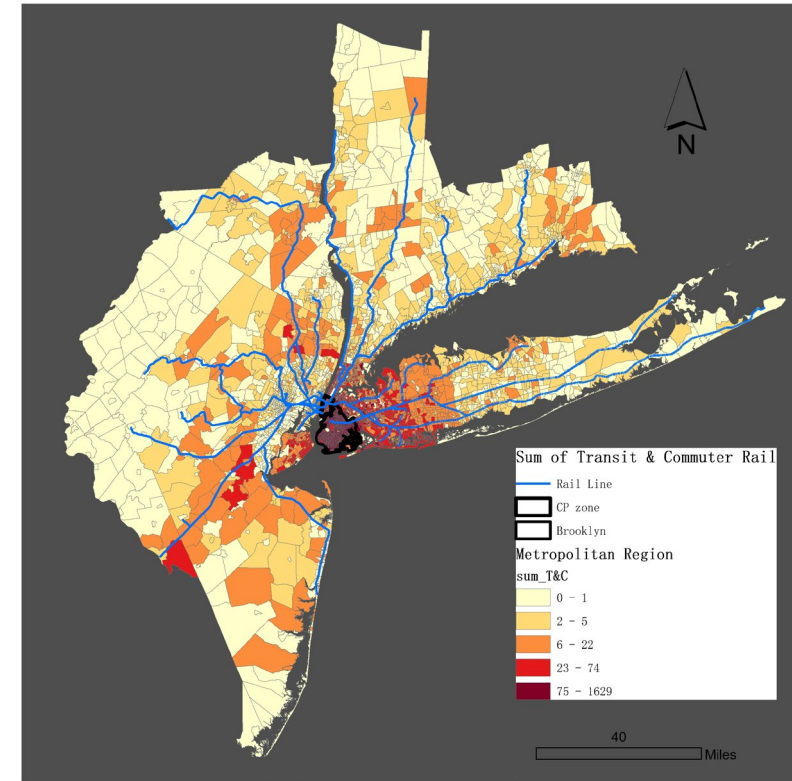
Since the congestion pricing program may not only influence the traffic to the CP zone but also influence those driving through the zone to the surrounding area, I looked at people's travel behavior (driving, taking transit) to surrounding area (Brooklyn). According to the graphs, people from south New Jersey and Long Island City would be most possible to drive or take transit to Brooklyn.

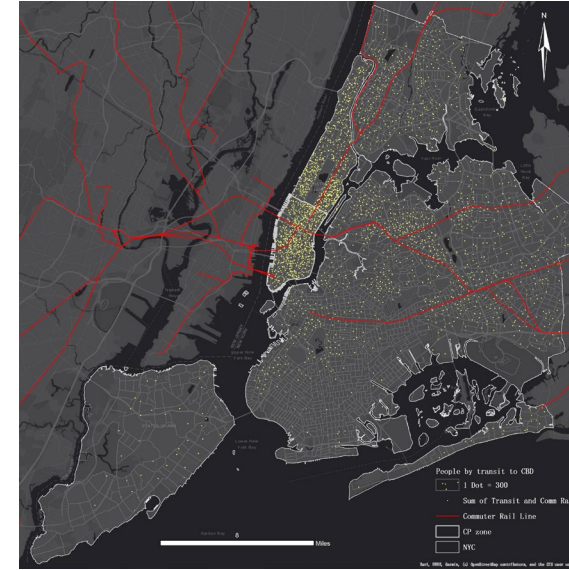## Total Number of Vehicles from the city to CP Zone (in thousands)
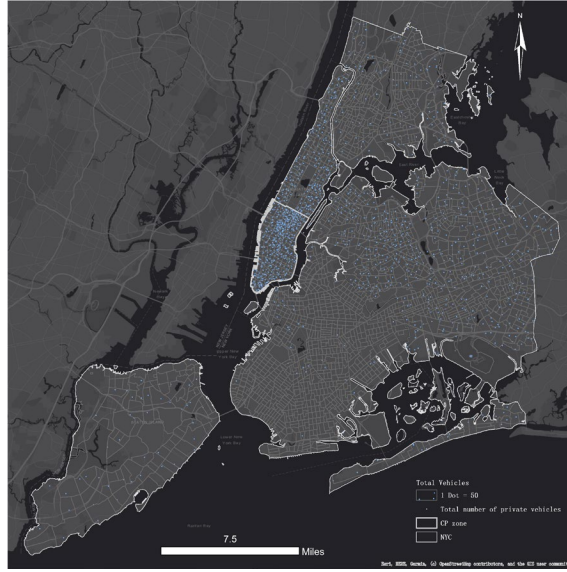
According to the graph, most drivers come to the CP Zone from Upper Manhattan and Queens Borough.

Total Number of Taxis from the city to CP Zone (in thousands)


According to the graph, most ride-hailing services come to the CP Zone from Manhattan Borough.

Total Number of Transit Riders from the city to CP Zone (in thousands)
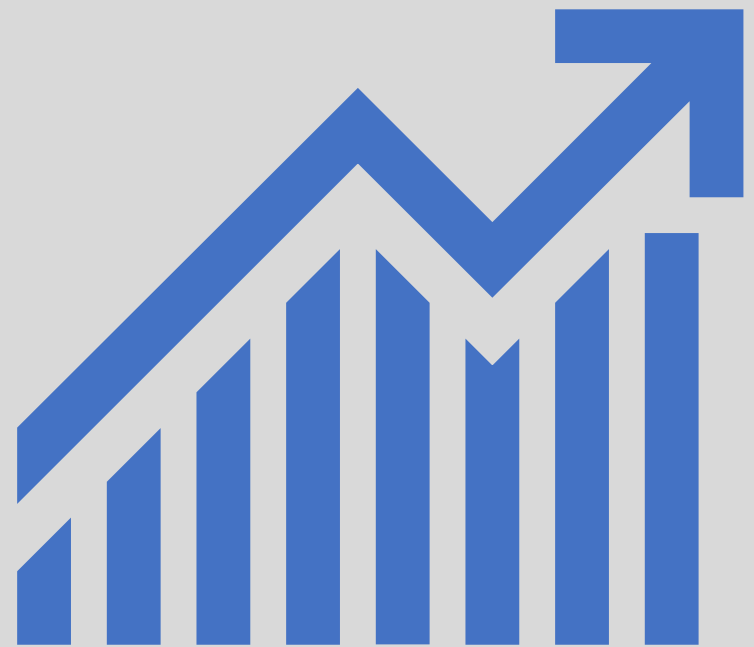

According to the graph, most transit riders come to the CP Zone from Manhattan, Bronx and Queens Borough.

Total Number of Vehicles from the whole metropolitan area to surrounding area of CP Zone (in thousands)
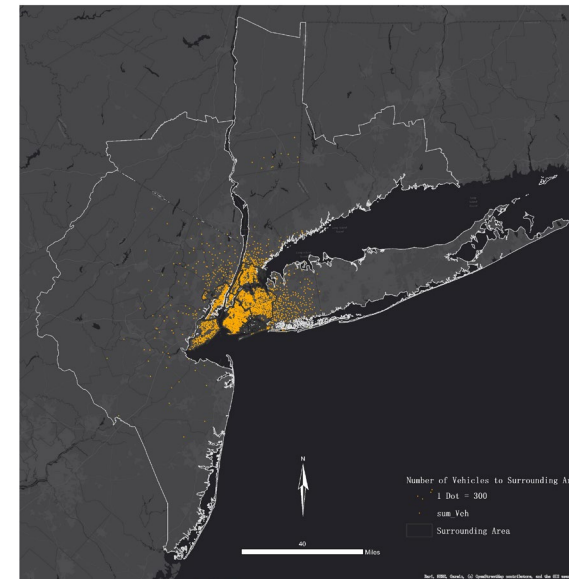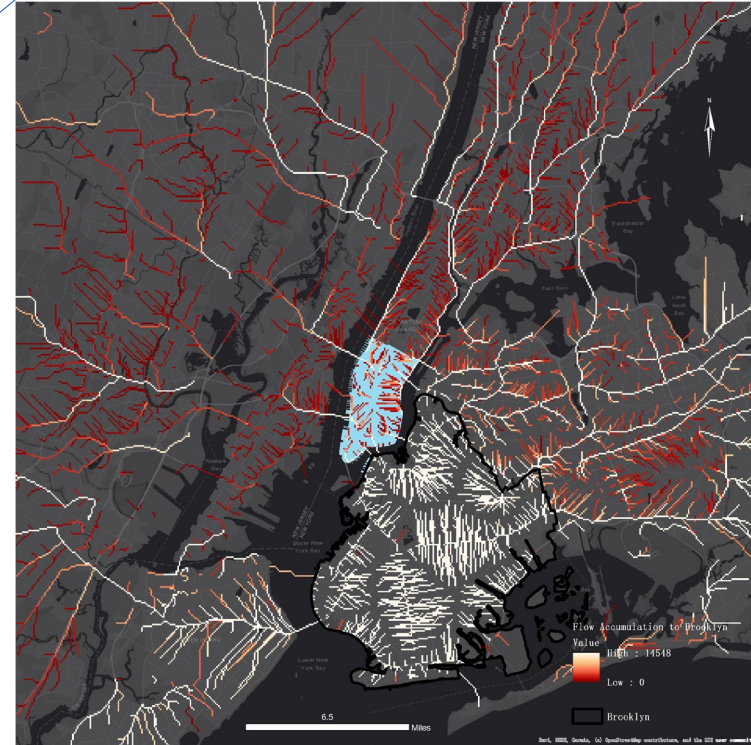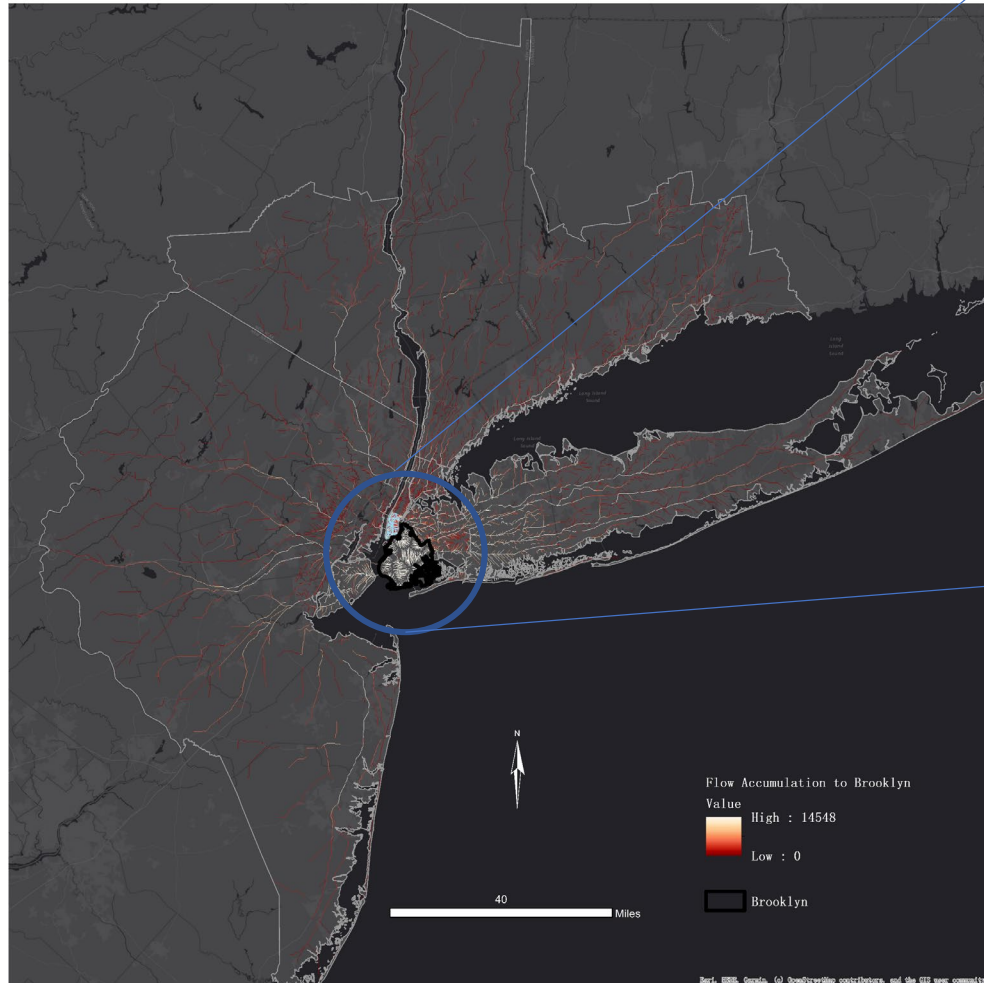

According to the graph, most drivers come to the surrounding area of CP Zone from the NYC area.

Raster GIS Analysis (NYBPM Data Analysis)

Flow Accumulation Analysis

Since I wonder if the congestion pricing program does not only influence the traffic to the CP zone but also influence those driving through the zone to the surrounding area, I made the flow accumulation to show the most possible flow of the vehicle traffic to Brooklyn from the whole metropolitan area. From the graphs, we can see that definitely some drivers to Brooklyn would be affected by the program, so that the policymakers should consider more for these people before introducing the new policies.