11.205 – Intro to Spatial Analysis – Fall 2019

Problem Set 2 – Using Data to Argue for a Policy
Due: Before midnight, Thursday of week 6

The Bronx River Alliance is applying for a grant that will allow them to start an outreach campaign targeting possible polluters in the Bronx River Watershed. They want to find the Combined Sewer Overflow (CSO) drainage area that has the most industrial land use in order to target that zone for their industrial outreach campaign. They also want to find the CSO drainage area that has the most people living in it per square mile, for their residential outreach campaign. Finally, they saw a recent study on water use at laundromats and dry cleaners and would like you to provide them with the locations of any laundromats operating within the CSO drainage areas.

Your task is to produce a document that provides the Bronx River Watershed with actionable information on CSO drainage areas prone to contamination due to industrial land uses and laundromat runoff. This document should include all of the deliverables listed below:

Deliverables

1. **Chart** displaying the total area occupied by industrial land use in each CSO zone (10 points).
2. **Map** of land uses within the CSO with the largest area occupied by industrial land uses, including as part of the layout **the total industrial land area** in square meters (11 points).
3. **Pie chart** of land uses in the CSO with the largest area occupied by industrial land uses (14 points).
4. **Population density** of the five CSO's, reported in units of people per square mile (10 points).
5. **Map** of laundromat density in Bronx River-adjacent CSOs (15 points).
6. **Table** depicting the count (not the density) of laundromats in each Bronx-River adjacent CSO (5 points).
7. **Responses** to the four questions listed at the end of the document (25 points).

   Please compile all your charts, maps, graphics and answers to questions into one PDF, rather than submitting several files. There are lots of easy ways to do this. One way would be to compiling everything in a Word Document, then exporting your document using the PDF format. You might also use Adobe Acrobat or Apple Preview to combine several PDFs exported from different software packages. ***DON'T FORGET TO*** *PUT YOUR NAME ON THE ASSIGNMENT!*

Background: Land Use and Combined Sewer Overflows

Combined Sewer Overflow (CSO) sewer-sheds represent areas in the city where both sanitary and storm-water are conveyed in the same sewer pipe. During large rain events, the large quantity of storm water entering the sewer pipes can sometimes cause overflows, allowing both waste and storm water to enter the rivers and streams where the sewer pipes empty. The land uses within a sewer shed can have a significant effect on the quantity and quality of the storm water entering a system.

MAP OBJECTIVES (65 POINTS)

OBJECTIVE 1: Analyzing Industrial Land Use (10 points)

The Bronx River Watershed Alliance wants to know the total area, in square meters, of industrial land use in each CSO that goes into the Bronx River. They want you to identify the Bronx River CSO sewer-shed that contains the most industrial land area. They need both a map and statistics describing this CSO for their final report.

Why do we want a total and not a proportion, given that the CSO areas are so different? Because the reason we're concerned with CSO areas is that these drain to point-polluting CSO outfalls, meaning that the total land area is more important than the density.

Determine the total area (in square meters) of industrial land that is inside each CSO around the Bronx River during the year 2016. The file representing the CSO drainage areas along the Bronx River is in **problemset2/data/bronx_csoArea_2016.shp**. **Create a chart/graph showing the total area of 'Industrial and Manufacturing' land use in each CSO.** Make sure that on the graphic you specify the industrial area as a numeric value. **If you do not put these values your client will not be able to use the chart for their report.** Also make sure you label each CSO with its name (outfall), as given in the attribute table of the bronx_csoArea_2016 file; if you don't label the CSO your client won't be able to use the file for their report. Parcel data is can be found in **problemset2/data/BXMapPLUTO_2018.shp**. *(NOTE: Some parcels may fall into two CSO sewer-sheds, so you will need to determine how to calculate the area for only the part of the parcel that lies within the boundary. Note that you should use the LANDUSE field in the data set to make sure you are getting the correct land use types.)*

You will need to join the Land Use data **(BXMapPLUTO_LU_2018.dbf)** based on the field 'BBL.' Remember that in QGIS you may need to include a field name prefix and/or select only the fields you need to join. Also notice that the LANDUSE field contains numbers rather than text. You will need to use the data dictionary to determine these as we have done in previous weeks. The PLUTO data dictionary has been saved into **problemset2/data/PLUTODD18v1.pdf.**

OBJECTIVE 2: Mapping and Charting Land Use (25 Points)

Land Use Map

Create **a land use map of the CSO drainage area with the largest area of industrial/manufacturing land use (10 points).** This map will place the CSO in context of the other CSOs, but will only show the land uses in the CSO that has the largest total industrial land area. Pay attention to the graphic style of your maps – we will be taking points off for missing scales and sources... *(Note: Feel free to use data from other weeks to enhance the look and feel of your maps.)*

Total Industrial Land Area

Calculate the total land area that is industrial/manufacturing in square meters for the CSO and include this value in this map layout. **(2 points)**

Hint: There are many ways to come up with the values you need. Some are quicker than others; keep in mind some of the short cuts we learned in class.

Land Use Proportion Pie Chart

Include a **pie chart in your map layout that displays the proportion of land area in each land use category (10 points)** within the CSO with the largest area of industrial/manufacturing land use (the same CSO you used above). Remember to label your pie chart. *(Note: Be sure to refer to this CSO by its name given in the database, or the Bronx River Alliance will not know which CSO you are referring to when you mention it in your report and text. CSOs are labeled HP-001, etc.)*

OBJECTIVE 3: Which CSO is the Densest? (10 points)

The Bronx River Water Alliance would also like to know which CSO has the highest population density. Base this on current estimates (2013-2017 ACS Population Estimates). Please specify which CSO has the highest population density and include this value in units of people per square mile. There are some census boundary files in the following folder: **/problemset2/data/census_data. Part of the assignment is to determine which census file should be used for this assignment – census tracts or block groups.** Which geometry do you think will give you the most accurate information?

Please answer this question in a Word file with the other questions (see below). Do not put it on the CSO land use map as it will be confusing.

QUESTION 4: Laundromats and Dry Cleaners in CSO drainage areas (20 points)

Some recent studies have said that the large numbers of laundromats and dry cleaners in the Bronx are leading to contaminated water runoff during storm events. They Bronx River Alliance would like to see if there is any truth to that theory.

They are therefore interested in seeing whether the density of laundromats and dry cleaners has an effect on pollutant records given outfall locations.

Bronx River Alliance used Reference USA to download an address data file of all the Laundromats and Dry Cleaners in the Bronx (**problemset2\laundromat.csv**). They would like you to:

1. **Make a Map:** Geocode the provided address file and then use GIS to produce a map that represents the density of laundromats and dry cleaners per square mile in each CSO. Don't forget the cartographic elements! You should also manually locate those laundromats that are not correctly geocoded.
2. **Include a Table:** In addition to this map, you should generate a count (i.e., not a density) of how many laundromats and dry cleaners are in each CSO drainage area. This should be included on your map layout as a table.

WRITTEN QUESTIONS (25 points total)

QUESTION 1 (8 points) Million Dollar Blocks
Would you consider the Million Dollar Blocks Project to be "Critical Cartography?" Why? In your answer please describe what makes a map fall into this category of cartographic design. (4 points)

How did the map authors make a map showing the total money spent from a prisoner intake database? Please be specific! Walk us through the process, starting from the raw data with addresses, to the final red block maps. To do so, use the following information:

- The prisoner intake database had a row for each prisoner and included a field for the prisoners' address, as well as an estimated cost of incarceration of that prisoner.
- The final million-dollar blocks map was made using city blocks. (4 points)

QUESTION 2 (8 points) ACS and Census
In class we discussed the fact that the 2020 census wants to include a question about citizenship. The American Community Survey (ACS) already asks people whether they are citizens… so why does it matter if the census asks this question? Please explain. (2 points)

What group or groups object most strongly to change? Why? Please clearly state **at least two reasons.** What group or groups most strongly support the change? Why? Again, include **at least two reasons**. (4 points)

If you were a member of congress would you vote 'yes' or 'no' on including the question? Explain why. (2 points)

QUESTION 3 (6 points) Biases in Data
In several of the case studies we have read this week the authors identified an outside database which they geocoded to generate a final dataset. As we learned in our reading, data is never "neutral" as all information is limited and biased by its collection and categorization.

- What are the biases in the Getty Image data used in the Geography of Buzz? (3 points)
- Do these biases affect the results of the question the authors are trying to address? (3 points)
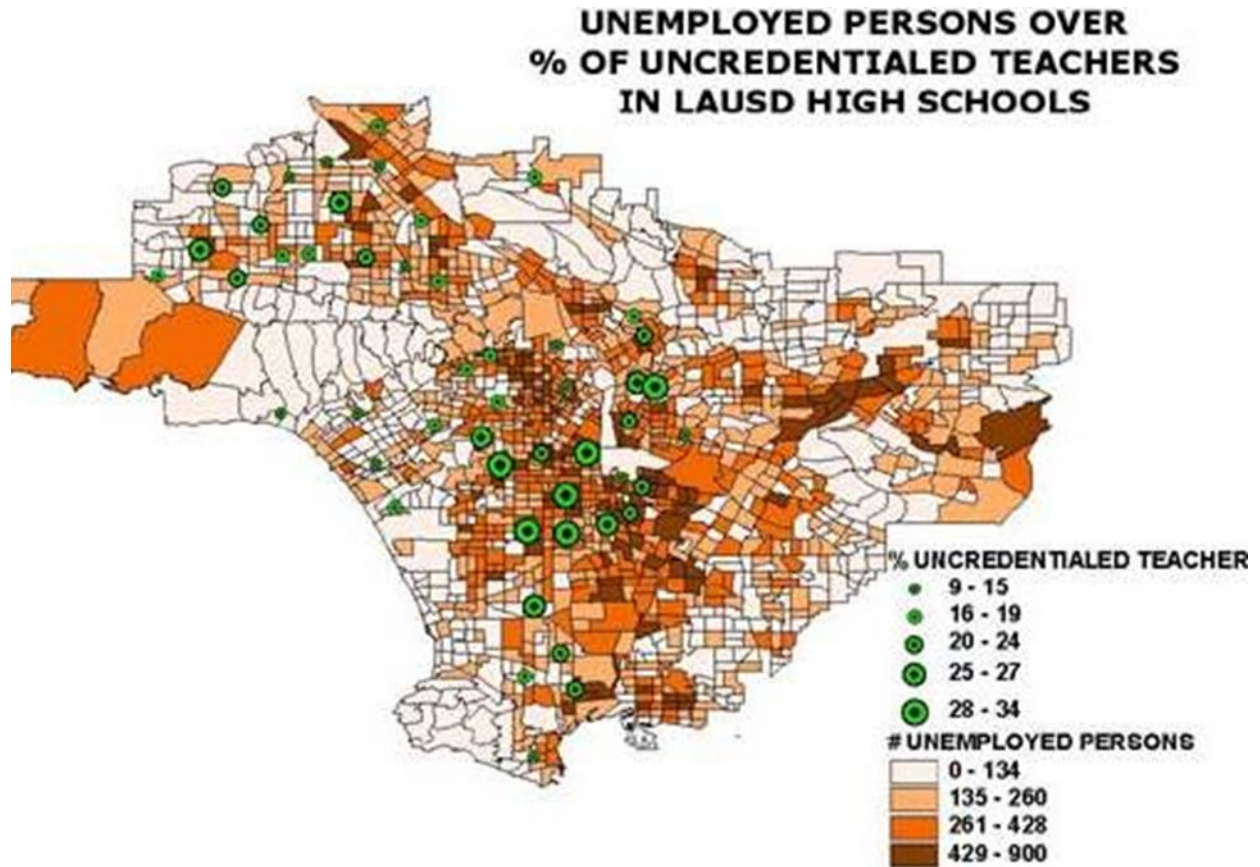
Question 4: (3 points) From the Lectures and Case Study
Our case study readings this week present a range of solutions to the problem of how to estimate travel times, proximity, and distances using GIS. Why is it problematic to rely on a circular buffer approach? List two alternatives presented in the readings or lectures.

EXTRA CREDIT
YOU BE THE MAP CRITIC (4 points)
Attached is a map that I found on the web. Please critique this map. Does it represent the information well? List at least four things you would change on the map to make it more compelling and communicative.