SOC 4650/5650: Lab-04 - Tornado Sirens in Jefferson City, MO

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Directions

Using data from the `DataLibrary/CourseData/JeffCity.gdb` geodatabase and the `MO_DEMOS_JeffCityRegion` data available on Github (see Slack's `#_news` channel), several maps using both `R` and ArcGIS. Your entire project folder system, including data, notebook output, ArcGIS map document, and map images, should be uploaded to GitHub by Monday, February 26th at 4:15pm.

Analysis Development (Review from Lectures 01 and 02)

The goal of this section is to create a self contained project directory with all of the data, code, map documents, results, and documentation a project needs. Make sure you delete feature classes before making a commit! Otherwise you will bloat the size of your repository with unneeded data.

1. In your course folder system, find the `Labs/Lab-04` subdirectory and add all necessary subfolders.
2. Open ArcCatalog and then:
   (a) Copy and paste the geodatabase `JeffCity.gdb` from the course `DataLibrary` folder into `Labs/Lab-04/data`.
   (b) In the **copy** of `JeffCity.gdb` stored in `Labs/Lab-04/data`, delete feature classes that you will not need for this assignment (make this decision after reading through the lab and formulating a plan).
   (c) Copy and paste the shapefile `MO_DEMOS_JeffCityRegion.shp` from your download into `Labs/Lab-04/data`.
3. Open RStudio and then:
   (a) Add an R Project to the `Labs/Lab-04` subdirectory and add a properly formatted R Notebook to the appropriate subdirectory.
   (b) Create a `README.md` file for the assignment.[1]
4. Open ArcGIS and then create a new, blank map document. Make sure that it is saved in the `maps` folder you created above.

[1] *Hint:* See previous week's assignments if you need a process or content reminder!

Create a County Population Map in R

The goal of this section is to be able to create a thematic map plotting population density of the two counties that Jefferson City, MO is located in - Cole and Callaway.

5. In your `R` notebook, import the `MO_DEMOS_JeffCityRegion.shp` data into a new simple features object.
6. Using the `measurements` package, add a square miles variable to your simple features object based on the existing square kilometers variable.
7. Using `ggplot2` and either `RColorBrewer` or `viridis` as well as your new square miles variable and the total population variable, map the population density for the area.[2]
8. Export the map as a `png` file at 300 dpi.

[2] *Hint:* Use the "estimate" variable that ends with an "E" and not the "margin of error" variable that ends with an "M"

Create a County Population Map in ArcGIS

The goal of this section is to replicate the process you completed in `R`: create a thematic map plotting population density of the two counties that Jefferson City, MO is located in - Cole and Callaway.

9. In the map document you created above, add the `MO_DEMOS_JeffCityRegion.shp` data into the "Layers" data frame.
10. Map the population density of these census tracts using the total population variable and the square kilometers variable.[3] Make sure these are symbolized using either a ColorBrewer or viridis color ramp.
11. Export the map as a `pdf` file at 300 dpi.

[3] *Hint:* Use the "estimate" variable that ends with an "E" and not the "margin of error" variable that ends with an "M"

Map Tornado Warning Sirens in Jefferson City, MO

12. In a new data frame, add the city boundary feature class from `JeffCity.gdb`. Select the largest area of the city (the northeastern most area) and create a new layer symbolizing only that section of the city.[4]
13. Rename your new selection layer as `JeffCity Main` and rename the original city layer as `JeffCity Ground`. Make sure `JeffCity Main` is positioned above `JeffCity Ground` in your Table of Contents.

[4] *Hint:* Select the polygon, right click on the layer in the Table of Contents, and choose Selection ▷ Create Layer from Selected Features.

14. Symbolize `JeffCity Ground` as a ground layer by using a light gray fill.

15. Symbolize `JeffCity Main` as a feature layer by using white, which will offer high contrast to the data we will add next.

16. Add the streets feature class *on top* of the city boundary layers.

17. Select the streets within `JeffCity Main` and create a new layer of just those streets. Name this layer `JeffCity MainStreets`.

18. Rename the citywide streets layer `JeffCity GroundStreets`.

19. Make sure that both of the city streets layers are above the city layers and that `JeffCity MainStreets` is above `JeffCity GroundStreets` in the Table of Contents.

20. Symbolize `JeffCity MainStreets` with a black line that has a width of 0.8.

21. Symbolize `JeffCity GroundStreets` with a line that has a width of 0.4. The color of this line should have the RGB values of 104,104,104.

22. Add the warning sirens feature class on to of the streets layers in the Table of Contents.

23. Select the warning sirens that are in the main part of Jefferson City (within the `JeffCity Main` layer) and create a new layer for these sirens. Symbolize these sires as points sized 8. The fill color of these points should have the RGB values of 225,0,0.

24. The other warning sires in the city should be symbolized as a ground layer. They should be size 4 points with a fill color that has the RGB values of 78,78,78.

25. Make sure that the final order of your layers is as follows:

    (a) tornado warning sirens in `JeffCity Main`

    (b) other tornado warning sirens

    (c) `JeffCity MainStreets`

    (d) `JeffCity GroundStreets`

    (e) `JeffCity Main`

    (f) `JeffCity Ground`

26. Zoom to the `JeffCity Main` layer.

27. Export the map as a `pdf` file at 300 dpi.