Map making Practice (EDS223-HW1)

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0.1 Exploring environmental (in)justice

Air quality plays a crucial role in human health and often reflects patterns of environmental injustice, especially in communities exposed to high levels of airborne toxins. In this activity, we will explore air toxic cancer risk and the distribution of air toxins across Los Angeles County.

Objective: Practice using `tmap` package to create two maps that communicant an environmental justice issue in California and Los Angeles County.

0.1.0.1 Load packages and read in geodatabase

```
library(tidyverse)
library(sf)
library(stars)
library(tmap)
library(here)
library(tinytex)
```

```
# read in geodatabase of EJScreen data at the Census Block Group level
ejscreen <- sf::st_read(here::here(
  "data", "ejscreen","EJSCREEN_2023_BG_StatePct_with_AS_CNMI_GU_VI.gdb"))
```

```
Reading layer `EJSCREEN_StatePctiles_with_AS_CNMI_GU_VI' from data source
  `C:\Users\Donaji\Documents\MEDS\EDS-223\HomeWork\EDS223-HW1\data\ejscreen\EJSCREEN_2023_BG_St
  using driver `OpenFileGDB'
```

```
Simple feature collection with 243021 features and 223 fields
Geometry type: MULTIPOLYGON
Dimension:     XY
Bounding box:  xmin: -19951910 ymin: -1617130 xmax: 16259830 ymax: 11554350
Projected CRS: WGS 84 / Pseudo-Mercator
```

```
# filter to a state you are interested in
california <- ejscreen %>%
  dplyr::filter(ST_ABBREV == "CA")

# filter to a county you are interested in
Los_Angeles <- ejscreen %>%
  dplyr::filter(CNTY_NAME %in% c("Los Angeles County"))

# find the average values for all variables within counties
california_counties <- aggregate(
  california, by = list(california$CNTY_NAME), FUN = mean)
```

0.1.1 Visualize data

The folowing variables where used to create the two maps: - P_D2_RSEI_AIR - Percentile for Toxic Releases to Air EJ Index - P_D2_CANCER - Percentile for Air toxics cancer risk EJ Index

0.2 Map one displays the precentile for Toxic Release to Air EJ Index in LA County.

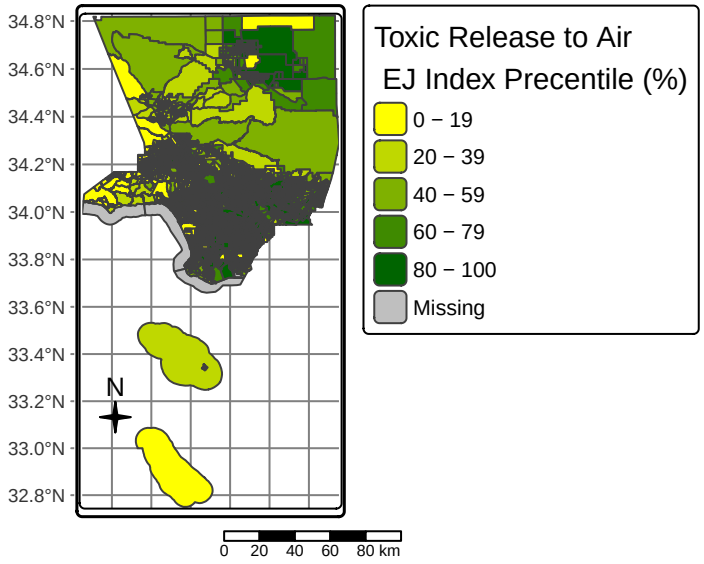
```
# Map one
tm_shape(Los_Angeles) +
  tm_graticules() +
  tm_polygons("P_D2_RSEI_AIR",
              fill.legend = tm_legend("Toxic Release to Air\n EJ Index Precentile (%)"),
              fill.scale = tm_scale(values = c("yellow", "darkgreen"))) +

tm_compass(type = "4star", size = 1, position = c(-0, 0.3)) +

tm_scalebar(position = c(0.5,0)) +

tm_title("Precentile of Toxic Release across LA county", size = 1) +
  tm_layout(component.autoscale = FALSE, frame.double_line = TRUE)
```

Precentile of Toxic Release across LA county



Map two: Looks at the precential for Air toxic cancer risk

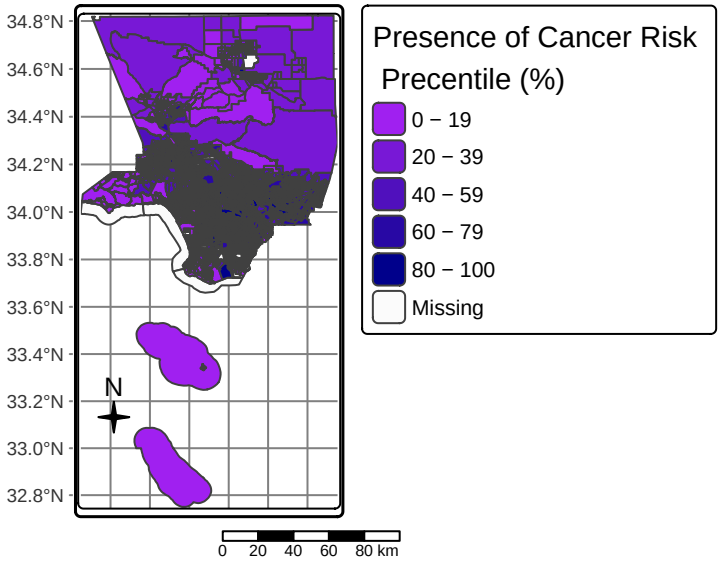
```
# Map 2
tmap_mode("plot") +
tm_shape(Los_Angeles) +
  tm_graticules() +
  tm_polygons(fill = "P_D2_CANCER",
              fill.scale = tm_scale(values = c("purple", "darkblue")),
              fill.legend = tm_legend(title = "Presence of Cancer Risk \n Precentile (%)")) +

tm_compass(type = "4star", size = 1, position = c(-0, 0.3)) +

tm_scalebar(position = c(0.5,0)) +

tm_title("Where the Air is Most Toxic: Cancer Risk Across LA County", size = 1) +
  tm_layout(component.autoscale = FALSE, frame.double_line = TRUE)
```

ere the Air is Most Toxic: Cancer Risk Across LA County



0.2.1 Map Interpretation

The firs map illustrates the percentile of toxic air releases across Los Angeles County. Areas with higher percentiles indicate block groups experiencing greater potential exposure to air toxins.

The second map shows air toxic cancer risk percentiles, highlighting communities potentially more affected by long-term exposure to hazardous air pollutants.

Together, these maps reveal environmental justice patterns: communities with higher exposure to toxic releases also tend to face higher cancer risk, underscoring disparities in environmental burden across Los Angeles County.

0.2.2 Data Citations

United States Environmental Protection Agency. 2015. EJSCREEN. Retrieved: October, 06, 2025, from url(www.epa.gov/ejscreen)