

# **GEOG 491/891: Special Topics - Spatial Analysis in R**

**Week 05.02: more spatial functions and oddities**

**Dr. Bitterman**

# Today's schedule

- Open discussion
- Some more basic spatial operations
- Activity

**Anything to discuss? Questions?**

**This week is SUPPOSED to be "point pattern analysis", but we're going to be flexible**

**(Chapters 5 & 6 are extensive)**

**This week's focus: simple geospatial operations and getting comfortable with them**

- Continue from your datasets from last time

## today's setup

```
library(tidyverse)
library(sf)
library(GISTools)
library(tmap)

# data:
streams <- sf::read_sf("./data/Streams_303_d.shp")
counties <- sf::read_sf("./data/County_Boundaries-Census.shp")
parks <- sf::read_sf("./data/State_Park_Locations.shp")

lc <- counties %>% dplyr::filter(., NAME10 == "Lancaster")
lc_303ds <- sf::st_intersection(streams, lc)
lc_parks <- sf::st_intersection(parks, lc)
```

# Intersection vs. a clip

What's the difference?

**We used `sf::st_intersection` as an example:**

```
lc_303ds <- sf::st_intersection(streams, lc)
```

**Your book offers an alternative shortcut:**

```
allegedly.a.clip <- streams[lc,]
```

**this is supposed to be a "clip", but it is NOT (as of 2021-09-21)**

**How might you know?**

**What does this discrepancy tell us about our methods?**



**Your book also provides some useful functions as part of the `GISTools` package**

```
poly_areas(counties)
```

**What happened?**

## Beware mixing and matching data types

```
counties %>% as_Spatial() %>% poly_areas()
```

But might there be problems with this as well?

# **Always know your projection**

**(who can remind me what a projection is...)**

# **sf** uses "well known text" (WKT) to def. projections

(see: <https://epsg.io>)

reproject the data, or in **sf** parlance, "transform" it

```
parks_p <- sf::st_transform(parks, 26914)
counties_p <- sf::st_transform(counties, 26914)
```

then calculate areas

```
counties %>% as_Spatial() %>% poly.areas()
# or
counties %>% sf::st_transform(., 26914) %>% sf::st_area()
```

How would you calculate the difference in area due to a projection? why/when might it matter?

## it matters in distance calculations as well

Who wants to breakdown this code?

```
lc_303ds_p <- sf::st_transform(lc_303ds, 26914)  
lc_parks_p <- sf::st_transform(lc_parks, 26914)  
  
sf::st_distance(lc_303ds_p, lc_parks_p)
```

What's the output?

# Your final task

## Today's task

- Calculate the distance between parks and 303d streams in Lancaster County
- Then, calculate the *difference* between projected and unprojected distances
- Then, make a histogram of those differences (better termed "errors")

## If you have time, continue from Monday

- find all of the state parks within 0.5 miles of a 303d stream
- plot just those points WITH the corresponding stream segment
- use color to distinguish the points and stream segments

**GO!**

## For this week

- Chapters 5 & 6
- Practice, practice, practice
- Lab 01 due