# ENVIRONMENTAL DATA ANALYTICS:
# M7 – CRAFTING REPORTS
## *(R Markdown, Knitting, & Interactive docs)*

Spring 2023

Nicholas School of the Environment - Duke University

# Course Projects…

- Import, explore, wrangle, analyze, & present using a dataset of your choice (or one we've provided).

- Work in groups (3-4 students).

- Present your progress in last week of classes (April 18th/19th).

- Deliver your report (knitted doc) by 5pm on May 1st.

# Course Projects…

## *Past topics…*

- Evaluating temperature trends at US Army basic training sites

- Soil Moisture & Precipitation Trends in Coweeta Basin LTER Site

- Is air pollution correlated to inter-state migration in the US?

- An Analysis of the Drivers of Harmful Algal Blooms in Lake Erie

- Analysis of Large Wildland Fires in California, Nevada, and Idaho

- Hurricane Trends Along the East Coast

- Effective Pest Treatment That Protects Pollinators

# Course Projects…

## *On the course website…*

- Choosing a dataset…
- Setting up & using a group GitHub repository
- Report format and requirements
- Project rubric
- Project template

# M7.1- R Markdown

- Basic structure (YAML, text, code)
- The knitting process
- Toggling formatted view in R
- R-Markdown output formats
  - HTML, PDF, Word, presentations, Shiny
- Formatting:
  - Text, Lists, Block quotes, tables
- Code chunk settings:
  - Execution, display, warnings & messages, figure size & captions, …

# M7.2a - Interactive R-Markdown

- Using variables in *ggplot*:
  →Tidy eval helpers `!!sym(…)`

- Writing plotting *functions*

- Interactive "Shiny" widgets

  - <u>Inputs</u> (types, labels, values)

  - <u>Renderers</u> (formats, values)

  - Links between inputs & renderers

# M7.2b - Dashboards

- Structure of `app.R` code:
  - `ui` function…
  - `server` function...
  - *fluidpage* object
  - *titlePanel*
  - *sidebarLayout*
- The flow of R/Shiny apps
  - Widgets: input vs output
  - Events and event listeners

# M7 – Lab/Assignment

- Basic Markdown/R code chunk options

- Tables with `kable` (knitr package)

- Managing & captioning plots

- Knitting options: Table of Contents

# A07 - Output

| Item Name | Value |
| --- | --- |
| Source | EPA Air Quality SYstem (AQS) |
| Date | 2018-2019 |
| Filename | EPAair_O3_PM25_NC1819_Processed.csv |

Table 2: Mean Particulates (2.5mm)

| County | $\mu g/m^3$ |
| --- | --- |
| Haywood | 13.98400 |
| New Hanover | 15.60681 |
| Avery | 18.27941 |
| Edgecombe | 26.06503 |
| Pitt | 27.37166 |
| Guilford | 29.14163 |
| Swain | 30.62780 |
| Johnston | 33.02695 |
| Durham | 33.53770 |
| Mecklenburg | 33.63038 |
| Forsyth | 35.09282 |
| Wake | 37.45423 |

`"$\\mu g/m^3$"`

# A07 - Output



Task 3: Plots

Create two separate code chunks that create boxplots of the distribution of Ozone levels by month using, one for only records collected in 2018 and one for records in 2019. Customize the chunk options such that the final figures are displayed but not the code used to generate the figures. In addition, the plots aligned on the left side of the page and set the figure heights so both plots fit on the same page with minimal space remaining. Lastly, add a fig.cap chunk option to add a caption (title) to your plot that will display underneath the figure.
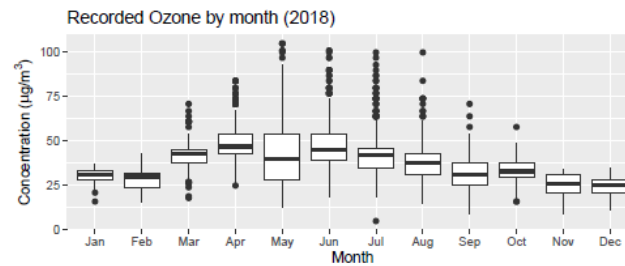
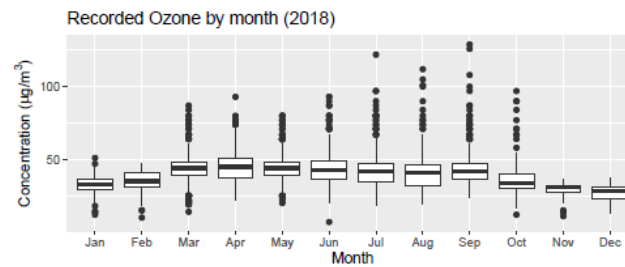Recorded Ozone by month (2018)

Figure 1: Monthly Ozone, 2018

Recorded Ozone by month (2018)

Figure 2: Monthly Ozone, 2019

4