DAT 494: Exploration and Analysis of Environmental Data

Instructor: Steffen Eikenberry
Email: seikenbe@asu.edu
Logistics: TTh 1:30 PM - 2:45 PM

Course Description and Topics: This course will survey data science tools applied to environmental topics including climate change, agriculture, and ecology, using both Python and R. Course will introduce fundamentals of climate science, carbon accounting, and environmental footprint analysis, using datasets available through the US EPA, USDA, Energy Information Administration, and Intergovernmental Panel on Climate Change. Data acquisition using RESTful APIs and Python is emphasized. We will also emphasize visualization and exploration of geospatial data, including both vector and raster datasets. That is, we will make pretty maps of environmental datasets and explore them!

Suggested Prerequisites: DAT 301, or MAT 420, or GIS 222.

Textbook: No textbook is required. Lecture notes, relevant scholarly papers, and supplemental texts will form basis of course.

Core Objectives:

- Introduce fundamentals of modern climate science, major publicly available datasets, and future climate projections.
- Understand concept of carbon accounting, relevant datasets, and implement scripted carbon footprint analysis; obtain data from RESTful APIs. Effectively visualize results.
- Fundamentals of geospatial data analysis and visualization in both Python and R, with a special emphasis on raster datasets.
- Develop a high-level understanding of how energy is used in the US, and explore detailed energy consumption data available via the US Energy Information Administration (EIA).
- Understand the connections between environmental conditions and agricultural production; use predictive modeling/machine learning to relate these and predict changes under climate change.