Case Study Pedagogy: Practicing Analytical Skills with Environmental Cases

Yen-Chu Weng
yweng@uw.edu

- Students learn principles of the field and gain relevant skills by analyzing real-world examples and problems.
- Commonly practiced in medicine, law, business, and increasingly in science.
- Can we teach socio-environmental synthesis through cases?
Case Study Pedagogy

What is a case in teaching socio-environmental issues?
- Compelling stories, real-world issues, events, controversies, problems …
- Scenarios, storylines, characters/stakeholders, multiple sources of information, competing knowledge claims …

Why using a case in teaching socio-environmental issues?
- Engage students, motivate learning, draw interest
- Provide context for how to practice analytical skills in a real-world situation
- Student-centered learning
- Explore complexity in social-environmental issues

Case Study Pedagogy

Gains
- Context: Why what students are learning matters?
- Real-world application
- Practice problem-solving and analytical skills
- Student-centered learning
- Explore socio-environmental complexity

Challenges
- How to find a relevant case?
- How to guide students to apply the same analytical skills to other cases?
- Too complex and overwhelming?
- Align with learning objectives
- Classroom management, student assessment, fairness in group work
CASE STUDY #1

Globally endangered sea turtles of the Palmyra Atoll National Wildlife Refuge: A Focus on Scientific Analysis

Authors: E. Naro-Maciel, K. Holmes, P.J. Ersts, K. McFadden, N. Bynum, E. Sterling

https://ncep.amnh.org/index.php/Detail/objects/62
Course Context

► ENVIR 250: Research Methods in Environmental Studies

► End-of-Quarter Group Project
   A. Project Introduction & Background: In-class Discussion & Worksheet
   B. Oral Presentation: Literature Review of Two Scientific Articles
   C. Research Project Proposal

The Case Module
A. Background & Worksheet

1) Ask questions about sea turtle research at Palmyra Atoll
2) Identify objectives for sea turtle research at the PANWR
3) Methods and Results: A focus on sea turtle survey at Palmyra Atoll (data interpretation)

---

B. Literature Review (Oral Presentation)

- Introduction: a brief overview of your chosen aspect of the sea turtle conservation project
- Strategies for identifying relevant and high quality articles
- Summary of the two articles
- Comparison and evaluation: in terms of methods, results, and data presentation
- Brief overview of proposal ideas
Example Student Work: Habitat Preferences

Example Student Work: Health & Debris Ingestion
C. Research Project Proposal

- Introduction & background
- Research questions
- Study design and data collection plan:
  - Sampling plan & justification
  - Data collection plan
- Time line and overall feasibility of the project
- Expected results and significance

Example Student Work: Sea Turtle Health
Example Student Work: Threats of Fisheries

Student Feedback

1. Better grasp of how to conduct literature review of scientific articles, including database search

2. Practice critical review of research design, methods, data collection, and interpretation of results

3. Learning research methods through a specific case provides contexts and practical considerations

4. Skills learned are transferable to other cases

5. Challenges: unfamiliar case, remote location, lack of content knowledge about sea turtle biology
CASE STUDY #2
Regulating Carbon Emissions
Authors: Robyn Smyth, Sandra Penny, Curt Gervich, Gautam Sethi, Eric Leibensperger, and Pinar Batur

https://serc.carleton.edu/integrate/teaching_materials/carbon_emissions/index.html
Course Context

- ENVIR 495C: Socio-Environmental Data Analysis

- Data Visualization with Tableau
  A. Visualizing CO2 emissions data with Tableau
     - Bar chart, time-series line chart, proportional symbols map, choropleth map, Tableau dashboard
  B. Practice the same skills with another data set

Tableau: Business Intelligence & Analytics

- Tableau Public: https://public.tableau.com/
Tableau Public - Resources

- World Bank CO2 Emissions Data Set (& many other data sets)
- Step-by-step video tutorials
- Free, users can publish their visualization work on the Tableau Profile webpage
Student Feedback

1. Context/Case → data sources → visualization and data analysis ideas

2. Advance data analysis skills to the next level

3. Let data visualization tell the story

4. Free, intuitive, easy to use, sharable

5. Lots of self-learning resources

6. Another marketable skill to add to the resume in addition to Excel

CASE STUDY #1

Globally endangered sea turtles of the Palmyra Atoll National Wildlife Refuge: A Focus on Scientific Analysis

▶ https://ncep.amnh.org/index.php/Detail/objects/62

Applicable Courses: Research methods, quantitative ecology, measurements and field methods, conservation biology
CASE STUDY #2

Regulating Carbon Emissions


Tableau Public


Applicable Courses: Climate change, carbon regulation, climate policy, data analysis & visualization

ENVIRONMENTAL STUDIES
UNIVERSITY OF WASHINGTON | PROGRAM ON THE ENVIRONMENT

Roundtable Discussion:
Saturday, 10:30-11:10,
Room 206CD

Yen-Chu Weng
yweng@uw.edu
Case Study Collections

- Climate Resilience  
  [https://toolkit.climate.gov/case-studies](https://toolkit.climate.gov/case-studies)

- Climate & Energy  
  [https://cleanet.org/](https://cleanet.org/)

- Earth & Environmental Science  
  [https://serc.carleton.edu/integrate](https://serc.carleton.edu/integrate)

- Socio-Environmental Synthesis  
  [https://www.sesync.org/for-you/educator/case-study-collection](https://www.sesync.org/for-you/educator/case-study-collection)

- Environmental Sciences and Studies  
  [http://cse.ucpress.edu/](http://cse.ucpress.edu/)

- Forestry and Natural Resources  
  [https://environment.yale.edu/academics/case-studies/](https://environment.yale.edu/academics/case-studies/)
Case Study Collections

- Conservation, Ecology, Anthropology
  [https://www.amnh.org/explore/curriculum-collections](https://www.amnh.org/explore/curriculum-collections)

- STEM & Some Social Sciences
  [http://sciencecases.lib.buffalo.edu](http://sciencecases.lib.buffalo.edu)

- Sustainability