Principles of Natural Resource Management 11:216:217 **Credits:** 4
Lectures: CDL 103 Recitations: Env Nat Res Sci 237

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Offered: Lectures	Wednesdays Period 2-3 (10:20am-1:30pm)
Field Trips	Wednesdays Period 2-3 (10:20am-1:30pm)
Workshops	Section 1: Wednesday 2:00 PM - 3:20 (MM)
	Section 2: Wednesday 3:50 PM - 5:10 (MM)
	Section 3: Thursday 2:00 PM – 3:20 (JRG)
	Section 4: Thursday 3:50 PM – 5:10 (JRG)

Software: Students will need a laptop or desktop with reasonable Internet bandwidth to access Canvas as well as Google Earth.

Synopsis: This 200 level course will introduce students to the applied discipline of natural resource management. This course required as part of the major in Ecology, Evolution, & Natural (EENR) and is designed bring together 2nd-3rd year undergraduate majors across the various Ecology, Evolution, & Natural Resources tracks. Course requirements include readings, short paper, individual and team projects, final exam.

Case Study discussions are a critical component of the course. We will break into smaller groups to discuss the topic at hand. While I expect there to be rigorous discussion and even disagreement in the course of our class discussions, I ask that you engage in discussion with care and empathy for the other members in the classroom. Aim to disagree without becoming disagreeable. Each group will be responsible for compiling and synthesizing additional material on the assigned topic, uploading the material to the shared site, and presenting the results to the entire class. Each session the group will select a spokesperson to present the results. Everyone will be expected to serve as spokesperson at least once during the semester.

It is our intention that students of all backgrounds will be well served by this course. We will work to create an environment of inclusion which respects and affirms the inherent dignity, value, and uniqueness of all individuals, communities and perspectives. We are lucky to have a diverse university. Diverse voices and life experiences enhance the learning process and we welcome students to share their personal experiences. We will not tolerate disrespectful language or behavior against any individual or group. If you feel as though you have been disrespected or treated unfairly by the instructors or any other individual please let us know. You may speak with the instructors in person, over email or report anonymously via the Office of Academic Programs. In addition, you may

also report bias to the Rutgers Diversity and Inclusion initiative using this link: http://inclusion.rutgers.edu/report-bias-incident/.

Course Objectives:

- This course will examine the principles of natural resource management through the lens of applying science and values to real world issues.
- After building on a foundation of key concepts, the course will use the Rutgers University Ecological Preserve (RUEP) as a real-life hands-on case study.
- Students will undertake field surveys/monitoring and be responsible for data collection, analysis and archiving.
- Students will investigate various aspects of natural resources management as it applies to RUEP, develop a hands-on project in the RUEP, consult with the scientific literature and outside experts concerning these plans and implement the project.

Course Learning Goals:

1) To recognize and understand basic terms and concepts in natural resource management.
2) To understand the ecological and environmental scientific underpinnings of natural resource management.
3) To be able to use scientific and technical information to evaluate the potential effectiveness of proposed natural resource management policies or actions.
4) Be able to collect, summarize and interpret data; think critically, and solve problems based on evidence-based reasoning.
5) Understand the basics of working with GIS/GPS and apply as an aid to field data collection efforts.
6) To be able to write in scientific language appropriate to the field of Natural Resource Management and to be able to evaluate peer-reviewed scientific articles for their scientific merit as well as essays/opinion pieces for their viewpoints and be able to summarize conclusions effectively.
7) To be able to write a scientific report and cite tables/graphics and references appropriately.

Syllabus:

Week 1 (9/4) Lecture: *The Big Picture – Conflicting/Evolving Viewpoints*
-- *Case Study: IMPACT: a foresight game*
Readings: Original Writings: Carson, DuBois, Leopold, Muir, Pinchot;
Critical Interpretation: Arnold, DeVall, McCammack, Meyer, Nash
Assignment Big Picture Essay: Due 9/15
-Techniques Workshop: Landscape Mapping & Navigating Google Docs/Sheets Lab report Due 9/12

Week 2 (9/11) RU EcoPreserve Field Trip
- No lecture or Case Study Discussions
– meet at RU EcoPreserve Parking Lot, Livingston Campus
- Techniques Workshop - Web Soil Survey Lab report Due 9/19

Week 3 (9/18) Lecture: *Basics of Forest Ecology & Management*

- Case Study: Tree Identification game
- Techniques Workshop - Forest Data Management
- Readings: NETN Protocol Tierney 2009

Week 4 (9/25) *Forest Inventory Field Trip*

- No lecture or Case Study Discussions; meet at RU EcoPreserve Parking Lot
- Forest Inventory Lab Forest Inventory Project Report Due 10/9
-- Techniques Workshop: Compile and Organize Forest Inventory Data

Week 5 (10/2) Lecture: *Key Concepts of Ecological Integrity*

-- *Case Study: Managing Invasive Species: Is it Worth it?*
- Techniques Workshop – Forest Inventory Lab Data Analysis Consulting
- Readings: Sodhi & Ehrlich Chapters 2 & 7; Davis et al. 2011

Week 6 (10/9) Lecture: *Watershed Ecology & Management*

- *Case Study: Dam Removal – Pros and Cons*
- Techniques Workshop: Review Stream Assessment Protocol
- Discuss Independent Project. 1 page concept due 10/21
- Readings: EPA Stream Protocol; USDA Stream assessment; headwater stream papers (2)

Week 7 (10/16) *Stream Assessment Field Trip*

- No lecture or Case Study Discussions
– Stream Assessment Lab Stream Assessment Lab Report due 10/25
-- Techniques Workshop: Compile and Organize Stream Assessment data

Week 8 (10/23) Lecture: *the 3RS - Resistance, Resiliency, Restoration*

- *Case Study: Ecosystem Based Management case studies*
-Techniques workshop: Consult Independent Project proposal. Proposal due 11/1
- Readings: Walker et al. 2004

Week 9 (10/30) *Managing for Natural Resources vs. Ecosystem Services*

- *Case Study: RU Campus Ecosystem Services*
- Techniques *Workshop:* TA's choice ***TBA***
- Readings: Sodhi & Ehrlich Ch 3; Costanza et al. 1997, 2014; Liu et al. 2010;

Week 10 (11/6) Lecture: *Key concepts of wildlife management*

- *Case Study: Black Bear Management in New Jersey*
- Techniques Workshop: USWFS Information for Planning and Consultation tool
- Readings: Cote et al. 2004; Urbanek 2012
- https://www.nj.gov/dep/fgw/bears/black-bear-management.html

Week 11 (11/13) Lecture: *NRM – Bringing in the human element*

- *Case study: MidAtlantic Offshore Wind farms*
- Readings: Hardin 1968; Mace 2014; Dietz et al. 2003; NOAA CSC 2007; https://www.energy.gov/eere/wind/articles/top-10-things-you-didnt-know-about-offshore-wind-energy; https://www.njcleanenergy.com/nj-offshore-wind; https://www.nytimes.com/interactive/2023/08/12/climate/clean-energy-us-fossil-fuels.html
  Techniques workshops: Mental modeling socio-ecological systems
  http://www.mentalmodeler.org/

Week 12 (11/20) *Adaptive Resource Management and Land Conservation*

- *Case Study: Scenario planning for climate change*
  Readings: Stankey et al., 2005; USDOI Adaptive management;
  Case Study: NWF 2011; Robinson; Moore et al. 2013;
- Techniques Workshop: *consultation session/work on independent project*
- Readings: Schmitt and Suffling 2006; Gartner et al. 2014

Week 13 (11/27) No Class this week

Week 14 (12/4) Lecture: *Open Space and Conservation Lands*

- *Case Study: Funding New Jersey's Open Spaces*
- Techniques *Workshop – consultation session/work on project poster*

Week 15 (12/11) *Field Trip to EcoPreserve to show results of Final Project*

- Final take-home exam released on Canvas
- Final project report due 12/13

Final Exam (take home exam due 12/19 5PM)

Expectations:

- Lectures: Each student should read the assigned readings, attend the lecture and complete the assigned Quiz questions.
- Case Studies: Each student will read the assigned readings, participate in the class discussion on each of the nine Case Studies. Attendance will be taken.
- Essay: Each student will read the assigned readings and write a short reflective essay.
- Workshop lab reports (2): each student will be responsible for completing the lab assignment.
- Field Study Reports (2): each student will be responsible for writing up a report on the two field studies. The report should include objectives, methods, results, discussion and summary. While the data may have been collected as part of a team, each student will be responsible for submitting an individual report with the discussion and summary sections the product of independent effort. Each team is responsible for archiving the data in the pre-approved format on the class RUEP database.
- Independent Project: A proposal will be developed and submitted for feedback. A final report describing a management plan for a selected natural area of interest.

Recommendations on best management practices will be made based on the site reconnaissance, proposed management goals and review of scientific/NRM literature. Though this project may be undertaken with 1-2 other students, the proposal and final report should be independent efforts.

-Final Exam: a written exam on the entire semester's material with an emphasis on the lectures, field exercises and readings.

-**Attendance**: **attendance will be taken for each Lecture and Workshop. If for any reason you can not make Lecture/Workshop, Recitation you should alert Prof Lathrop and your TA by email ahead of time. If the absence is backed up by a proper note and the Case Study is completed (as an individual effort), then attendance will be counted.**

-Lateness: Lab, Field Study and Independent Project report assignments will be docked 5% of the point total for each day late. If for any reason you are requesting an extension on an assignment, you should make the request to your TA and Prof Lathrop by email two days ahead of the due date. If the request is backed up by a proper note, then the extension will be considered.

Grading:	10%	Lecture Quizzes (11)	5 pts each = 50 points total
	2%	Tech Workshop labs (2)	5 pts each = 10 points total
	19.4%	Field study reports (2)	50 pts each = 100 points total
	4.8%	Essay	25 pts
	7.8%	Attendance (Lecture & Case Studies)	40pts
	11.6%	Attendance (Workshops)	60pts
	7.8%	Independent Project Proposal	40 pts
	19.4%	Independent Project Report	100 pts
	17.4%	Final exam	90 pts
			Total: 515 points

Gear: Long pants and long sleeve shirt recommended as protection against poison ivy and ticks. I recommend that students wear calf-length rubber boots for working in the field: 1) can be muddy out there and you won't ruin your street shoes; 2) can easily tuck in your pants legs and provides better protection from ticks. Spray your clothes with insect repellant to deter ticks. You will use these same boots for a number of other ecology & natural resources management courses. Water and rain gear also recommended.

Readings: Most can be found on the class Canvas site under the Resources section

Arnold, R. Overcoming Ideology. 1996. From *A Wolf in the Garden: The Land Rights Movement and the New Environmental Debate.* Edited by Philip D. Brick and R. McGreggor Cawley, Rowman & Littlefield Publishers, Inc., Lanham, Maryland, 1996 ISBN 0847681858

Carson, R. 1962 Silent Spring. Introduction & A Fable. Houghton Mifflin.
The Sea Around Us. 1950. Introduction & Preface (selected excerpts).

Costanza et al. 1997. The value of the world's ecosystems services and natural capital. Nature 387(6630): 253-260.

Costanza et al. 2014. Changes in the global value of ecosystem services. Global Environmental Change 26:152-158.

Cote, S.D et al. 2004. Ecological Impacts of Deer Overabundance. Annual Review of Ecology, Evolution & Systematics 35:113-147.

Davis, M. et al. 2011. Don't Judge Species on their Origin. Nature 474: 153-154.

Devall, B. 2001. The Deep, Long-Range Ecology Movement: 1960-2000-A Review. Ethics & the Environment 6(1):18-41.

Dietz, T., E. Ostrom, and P.C. Stern. 2003. The Struggle to Govern the Commons. Science 302:1907-1912.

DuBois, W.E.B. 1920. Selection from IX OF BEAUTY AND DEATH. DARKWATER: Voices from within the Veil. Harcourt, Brace and Company, New York.

EPA. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish - Second Edition. http://water.epa.gov/scitech/monitoring/rsl/bioassessment/index.cfm

Hayes, M.A. 2008. Into the Field: naturalistic education and the future of conservation. Conservation Biology 23(50:1075-1079.

Hardin, G. 1968. The Tragedy of the Commons. Science 162(3859):1243-1248.

Leopold, A. 1949. Part III The Upshot, from A Sand County Almanac. Oxford University Press.

Louv, R. 2008. Last Child in the Woods. http://richardlouv.com/books/last-child/excerpt/ also. http://richardlouv.com/books/last-child/children-nature-movement/

McCammack, B. 2019. W.E.B. DuBois and the American Environment EdgeEffects edgeefects.net/w-e-b-du-bois-and-the-american-environment

Meyer, J.M. 1997. Gifford Pinchot, John Muir and the Boundaries of Politics in American Thought. Polity XXX(2): 267-284.

Muir, J. 1918. Wild Wool. From Steep Trails, www.yosemite.ca.us/john_muir_writings/steep_trails/chapter_1.html

Oehler, J., et al. 2006. *Managing Grasslands, Shrublands, and Young Forest Habitats for Wildlife: a Guide for the Northeast*. Published by: The Northeast Upland Habitat Technical Committee Massachusetts Division of Fisheries & Wildlife. pp. 14-20.

Nash, R. 1967. Chapters 6-8, from Wilderness and the American Mind. Yale University Press.

Nelson, M.P and J.A. Vucetich. 2009. On Advocacy by environmental scientists: what, whether, why and how. Conservation Biology 23(5):1090-1101.

NOAA CSC. 2007. Introduction to Stakeholder Participation. http://www.csc.noaa.gov/publications/stakeholder_participation.pdf

Pinchot, G. 1910. The Fight for Conservation. Chapter IV Principles of Conservation. Wps.pearsoncustom.com/wps/meadia/objects/2429/2487430/pdfs/pinchot.pdf

Sodhi, N.S. and P.R. Ehrlich. 2010. Conservation Biology for All. Oxford University press. http://s3.amazonaws.com/mongabay/conservation-biology-for-all/Conservation_Biology_for_All.pdf

Schmitt, D. and R. Suffling. 2006. Managing eastern North American woodlands in a cultural context. Landscape and Urban Planning 78:457-464.

Stankey et al., 2005. Adaptive Management of Natural Resources: Theory, Concepts, and Management Institutions. USDA Forest Service PNW-GTR-54.

Tierney, G. et al. 2009. Long-term Forest Monitoring Protocol: Northeast Temperate Network. http://science.nature.nps.gov/im/units/NETN/monitor/forestveg/forestveg.cfm

USFWS. Remembering Rachel. USFWS Perspectives on Rachel Carson

Williams et al. 2009. Adaptive Management: The US Department of Interior Technical Guide. http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide.pdf

Walker at al. 2004. Resilience, Adaptability and Transformability in Social-ecological systems. Ecology & Society 9(2): http://www.ecologyandsociety.org/vol9/iss2/art5/

Good reference works:

Sauer, L. 1998. The Once and Future Forest, Island Press (in Chang Library)

Wessels, T. 2010. Forest Forensics: A field guide to reading the forested landscape. Countryman Press (in Chang Library)