

Principles of Natural Resource Management 2016

11:216:217

Credits: 3

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Office hours: Monday 2-4 pm

Offered: Tuesdays Period 2-3 (10:55am-1:55pm)

Prerequisites: None

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.

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 management plans, consult with experts concerning these plans and implement them.

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:

Week1 (9/6) Introduction to Course

- Lecture: *The Big Picture - Preservation vs. Conservation* → *Ecosystem Values*
Readings: DeVall, Leopold; Muir, Pinchot; Optional: Meyer, Nash
- Techniques Workshop –
 - Intro to RUEP: Geomatics Computer Lab
 - Basics of GPS/Collector App

Week 2 (9/13) Field trip to RU EcoPreserve (meet at RUEP Parking Lot)

- Techniques Workshops – Orientation to the EcoPreserve
 - Tree ID key
- Service Learning Opportunity: RU Muddy Friday Sept 16 10am-6 pm
assist in RU Muddy Run, must sign-up ahead of time with Livingston RU Recreation

Week 3 (9/20) Lecture: *Key Concepts of Ecological Integrity*

- Readings: Sodhi & Ehrlich Chapter 2; Davis et al. 2011
- Techniques Workshop –Vegetation Inventory Data Collection & Management
- Service Learning Opportunity: Sandy Hook BioBlitz Friday-Saturday Sept 23-24

Week 4 (9/27) Field trip to RU EcoPreserve (meet at RUEP Parking Lot)

- Forest Plot Sampling Lab
 - Readings: NETN Protocol Tierney 2009

Week 5 (10/4) Lecture: *the 3RS - Resistance, Resiliency, Restoration*

- Readings: Walker et al. 2004
- Techniques Workshop – *Watershed/Stream Assessment*

Week 6 (10/11) Field trip to RU EcoPreserve (meet at RUEP Parking Lot)

- Stream Assessment Lab
- Readings: EPA Stream Protocol; USDA Stream assessment;
headwater stream papers (2)

Week 7 (10/18) Lecture: *Key concepts of wildlife and forestry management*

- Guest Lecture: NJDEP rep- Deer Management
- Guest Lecture: Don Donnelly – Forest Stewardship
- Workshop – Define project goals, objectives, methods; library research
Readings: Cote et al. 2004; Urbanek 2012; VanClef, Whigham 2004
- Service Learning opportunity: Trail Work Sunday Oct 22 2pm-4pm

Week 8 (10/25) Field trip to RU EcoPreserve (meet at RUEP Parking Lot)

- Recon and planning for projects
- Workshop – Present management plan goals, objectives, methods
Readings: Sodhi & Ehrlich Chapter 2

Week 9 (11/1)

-Field Work Day

Service Learning opportunity: Sunday Nov 8, 8am-2pm DVOA Orienteering Meet, assist in course set up & registration

Week 10 (11/8) Lecture: *Managing for Natural Resources vs. Ecosystem Services*

- Quiz on Ecosystem Services: read up and be prepared
- Case Study: RU EcoPreserve Ecosystem Services
- Lab Work Day: Data Management and Communicating your project
Readings: Costanza et al. 1997, 2014; Liu et al. 2010; Sodhi & Ehrlich Chapter 3

Week 11 (11/15) Lecture: *NRM – Bringing in the human element*

- Quiz on Human element: read up and be prepared
- Case study: Delaware Bay: Balancing Aquaculture and Shorebird Conservation
- Lab Work Day: Mental modeling socio-ecological systems
<http://www.mentalmodeler.org/>
Readings: Hardin 1968; Dietz et al. 2003; NOAA CSC 2007; Louv 2008;
Case Study Readings: Fisheries and aquaculture_journal;
Red_knot_aquaculturemeetings; Slow Struggle to Bring Back Oyster;
Review_Nearshore_interitidal_aquaculture;

Week 12 (11/22) No Class

Week 13 (11/29) Lecture: Conservation Lands and Public vs. Private Open Space

- Case Study: Does New Jersey need more public open space? How to pay for it?
- Lab Work Day: work on projects
Readings: Schmitt and Suffling 2006; Gartner et al. 2014
Case Study: Lee 2009;
<http://www.anjec.org/pdfs/PublicFinancingOpenSpace.pdf>;
<http://www.wsj.com/articles/new-jersey-squeezes-funding-for-open-space-1427075942>; <http://www.forbes.com/sites/beltway/2015/04/07/one-solution-to-californias-drought-tax-water/>;
<http://www.pwconserve.org/issues/watersheds/newyorkcity/>;
http://www.nj.com/warrenreporter/index.ssf/2014/01/pohatcong_highlands_water_tax.html;
- Volunteer opportunity: EcoPreserve Orienteering Meet 8am-noon

Week 14 (12/6) *Adaptive Resource Management and Land Conservation*

- Case Study: Scenario planning for climate change
Readings: Stankey et al., 2005; USDOJ Adaptive management;
Case Study: NWF 2011; Robinson; Moore et al. 2013;

Week 15 (12/13)

- Present results of management plan implementation to outside guests
- Final Project Due

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

Expectations:

- Class readings/discussion/essay: Each student will read the assigned readings and participate in class discussion and write a short essay.
- Threaded discussion: Each student will participate in an online threaded discussion concerning a selected topic related to natural resource management.
- Field Study Reports (2): each student will be responsible for writing up a report on the 2 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 a report. Each team is responsible for archiving the data in the pre-approved format on the class RUEP database.
- Annotated bibliography with synthesis: each student will be responsible for researching the scientific literature for papers relevant to their resource management project. The bibliography should include the publications' authors, date, title, journal or book, volume, page numbers, etc., followed by 1 paragraph abstract detailing the paper's key points. A minimum of 6 papers should be reviewed with a 2-3 page synthesis of the papers in composite.
- Individual project paper: each student will be responsible for writing up a report on their resource management project. The goals, objectives and methods of the plan should be discussed in light of the relevant scientific literature. The report should be written up in the form of a research paper (with abstract, introduction, objectives, literature review, methods, results, discussion, conclusions, references). While the data may have been collected as part of a team, each student will be responsible for submitting a report. Each team is responsible for archiving the data in the pre-approved format on the class RUEP database.
- Final Exam: a written exam on the entire semester's material with an emphasis on the lectures, field exercises and readings.
- Extra Credit: there will be opportunities to earn extra credit through participation in several service learning events at the RUEP and/or attending outside lectures.

Grading:	25% Field study reports	50 pts each = 100 points total
	10% Annotated bibliography & project proposal	40 pts
	25% Individual final project paper	100 pts
	6% Essay	25 pts
	2.5% Quiz	10 pts
	4% Threaded discussion	15 pts
	25% Final exam	100 pts

2.5% Overall class participation 10 pts.
+5% Extra Credit for service learning

Transportation: students will be responsible for getting to and from the RUEP; accessible via RU Campus bus. Field Trips meet at the RUEP Parking Lot on Road 3, Livingston Campus.

Gear: 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. You will use these same boots for a number of other ecology & natural resources management courses. Field trips will go rain or shine, so always bring rain gear. Water and bag lunch also recommended.

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

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.

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/rs/bioassessment/index.cfm>

Gartner, T., G.T. Mehan, J. Mulligan, J.A. Roberson, P. Stangel, and Y. Qin. 2014. Protecting forested watersheds is smart economics for water utilities. *AWWA Journal*. 106(9):54-64.

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.

Thomas Lee, The Water Excise Tax: Preserving a Necessary Resource, 4 *Nw. J. L. & Soc. Pol'y.* 171 (2009). <http://scholarlycommons.law.northwestern.edu/njls/vol4/iss1/10>

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/>

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](http://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>

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

Walker et 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)