

NR 310: Ecosystem Services and Human Wellbeing

Spring Semester 2017, 3 credits
Colorado State University

Date and Time: Tuesdays and Thursdays from 2:00-3:15 PM

Location: Forestry 217

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COURSE OVERVIEW

Throughout history, humans have relied upon ecosystems to provide basic materials to support their lives. With a growing global population and aspirations for improved standards of living, ecosystem changes today are occurring at rates more rapid and extensive than at any point in human history. From multiple perspectives, humans are Earth's dominant species affecting local and global environmental processes. While human actions have contributed critically to improvements in human wellbeing and economic development, there are growing concerns that human actions are prioritizing short-term needs at the expense of the long-term viability of ecosystems and the diverse array of goods and services they provide to people. A transition towards sustainability necessitates a reexamination of the ways we manage ecosystems and their natural capital. An important approach being developed is considering ecosystems as capital assets, which, through appropriate management, can provide a stream of benefits supporting human wellbeing into the future. The challenges of implementing this approach are complex and inherently interdisciplinary. In this course, we will examine the current state-of-knowledge and practice in this emerging field. We will place a strong emphasis on learning from the many pioneering efforts across the globe that are developing the scientific, economic, and institutional capacities to incorporate the values of nature into our economic and societal systems.

COURSE OBJECTIVES:

- Describe and critically evaluate the connection between ecosystems and human wellbeing.
- Examine the contributions of ecology, economics, geography, and other disciplines to the interdisciplinary field of ecosystem services.
- Apply an interdisciplinary approach to learning, problem diagnosis, and problem solving, as pertains to the ecosystem services context.
- Evaluate the strengths and drawbacks of market-based policy tools for aligning private and social values in natural resource, land use, and policy decisions to restore and protect ecosystem services.
- Improve students' written and oral skills for communicating information learned in class to policy leaders, the general public, their peers, and other audiences.

CANVAS AND COURSE MATERIALS:

All course readings, lecture slides, assignments, and other course materials are available through CANVAS. Lecture slides will be available by 5 PM the day before each class period, and often earlier than that.

COURSE ASSIGNMENTS AND GRADING

Your evaluation in this course will be based upon the following assignments. Instructions for the Group Project will be provided in a separate handout.

	Title	# of Points Each	Due Date
1	Problem Set #1: Ecosystem Service Concepts	50	Feb. 7
2	Problem Set #2: Mapping & Valuing Assignment	75	Feb. 16
3	Exam I (ES approach, Mapping ES, Valuing ES)	100	March 2
4	Payment for Ecosystem Services Assignment (group project)	150	April 13 (proposal) April 27 & May 2 (presentations) May 5 (final report)
5	Exam II (Exam I material + Payment for ecosystem services)	100	April 20
6	Attendance & Participation	25	
	TOTAL POSSIBLE POINTS	500	

Attendance and Participation: Attendance is essential to learning the course material. Attendance will be taken daily, and after more than two unexcused absences, points will be deducted from the student's final grade. Excused absences will be issued for CSU-affiliated functions, with an email or written letter detailing the event, and for illness, with a doctor's note. Other requests for excused absences for family or work related events will be considered on a per request basis, and may require written verification.

Active participation is expected in this course. Each student is expected to arrive to class on time, and to be mindful of the professor and other students during the full duration of the class. Participation entails having completed the readings prior to class, and arriving ready to learn. The professor can issue pop quizzes at any time on readings and course material at her discretion. These will be graded pass/fail and be reflected in the overall course grade.

Attendance and participation also covers responsible use of technology in the classroom. Cell phones should be silenced and out of sight during class time. If a student is observed texting or using their phone in a non-approved way during class, it will count against their final grade. This applies even if you are waiting for others to finish a task! Laptops may be used to take notes and view course materials. However, if a student is observed using their laptop for non-course activities, it will be deducted from the final grade.

COURSE SCHEDULE

*****IMPORTANT:** Readings and assignments are *due* on the day listed in the schedule. In most cases, focus on the big picture ideas of the papers, and don't worry as much about methods or technical details. There will be several in-class activities that draw directly on the readings; taking notes and or bringing the readings with you to class is strongly encouraged!

DATE	TOPIC (Tentative) & READINGS (To be completed for class that day)
Jan. 17 (Tuesday)	Course Introduction
Jan. 19 (Thursday)	What are Ecosystem Services?
	<ul style="list-style-type: none"> • Bouma & Van Beukering (2015) Chapter 1: Ecosystem services: from concept to practice, through end of section 1.7. • Danielsen et al. 2005 <i>Science</i> – The Asian Tsunami • Greenberg (2012) “An oyster in the storm” <i>The New York Times</i> • WRI “Definitions of Ecosystem Services” • [Optional for those that want to read one of the foundational papers on the topic] Daily, G. et al. 1997. Ecosystem services: benefits supplied to human societies by natural ecosystems. <i>Issues in Ecology</i>
Jan. 24 (Tuesday)	How Did We Get to Ecosystem Services?
	<ul style="list-style-type: none"> • Read through summary (Level 1) of Millennium Ecosystem Assessment here: http://www.greenfacts.org/en/ecosystems/index.htm#1 • Armsworth et al. (2007) Ecosystem-service science and the way forward for conservation. <i>Conservation Biology</i> • Mace (2014) “Whose conservation?” <i>Science</i>
Jan. 26 (Thursday)	What is the Ecosystem Services Approach?
	<ul style="list-style-type: none"> • Bennett et al. (2015) “Linking biodiversity, ecosystem services, and human well-being: three challenges for designing research for sustainability.” <i>Current Opinion in Env Sust</i> [Focus on big picture ideas] • Ricketts et al. (2004) “Economic value of tropical forest to coffee production” <i>Proc. Natl. Acad. Sciences</i> [Bring a copy to class or take good notes]
Jan. 31 (Tuesday)	Key Concepts in the Ecosystem Services Approach
	<ul style="list-style-type: none"> • Foley et al. 2005 “Global Consequences of Land Use Change” <i>Science</i>
Feb. 2 (Thursday)	Key Concepts in the Ecosystem Services Approach
	<ul style="list-style-type: none"> • Chichilnisky and Heal (1998) “Economic returns from the biosphere.” <i>Nature</i> • Gelling, P. “Forest loss in Sumatra becomes a global issue.” <i>The New York Times</i> 6 Dec. 2007 • [Optional for those that want a more in-depth primer on economics] Heal, G. 2000. Chapter 2: Basic Economics. <i>Natures Marketplace</i>.
Feb. 7 (Tuesday)	Mapping Ecosystem Services
	<ul style="list-style-type: none"> • Bouma & Van Beukering (2015) Chapter 4: Mapping ecosystem services. In: Ecosystem Services: from Concept to Practice.
	DUE: ASSIGNMENT #1 by midnight
Feb. 9 (Thursday)	Economic Valuation of Ecosystem Services

	<ul style="list-style-type: none"> Millennium Ecosystem Assessment (2005), Chapter 6: Value and Valuation Approaches.
Feb. 14 (Tuesday)	Monetary Valuation Methods (Part 1) – Revealed Preferences
	<ul style="list-style-type: none"> Cleveland et al. (2006) “Economic value of the pest control service provided by Brazilian free-tailed bats in south-central Texas” <i>Frontiers in Ecology and the Environment</i> [Bring a copy to class or take good notes]
Feb. 16 (Thursday)	Monetary Valuation Methods (Part 2) – Stated Preferences
	<ul style="list-style-type: none"> Diffendorfer et al (2014) “National valuation of monarch butterflies indicates an untapped potential for incentive-based conservation.” <i>Cons Letters</i> Listen to Planet Money Podcast “Tallying up the pelican bill”, 22 minutes, (Available online): http://www.npr.org/sections/money/2010/07/30/128880374/the-friday-podcast-tallying-up-the-pelican-bill
	DUE: ASSIGNMENT #2 by midnight
Feb. 21 (Tuesday)	Non monetary valuation methods (Part 1) <i>Guest Speaker: Dr. Matt Luizza, AAAS Science and Technology Policy Fellow, U.S. Fish & Wildlife Service’s Division of International Conservation-Africa Branch</i>
	<ul style="list-style-type: none"> Ramirez-Gomez et al. 2015. “Analysis of ecosystem services provision in the Colombian Amazon using participatory research mapping techniques.” <i>Ecosystem Services</i> [Focus on big picture ideas]
Feb. 23 (Thursday)	Measuring Cultural Ecosystem Service Values **Bring a photo to class (on your phone) representing the Value of Water to you
	<ul style="list-style-type: none"> Satz et al. (2013) “The challenges of incorporating cultural ecosystem services into environmental assessment.” <i>AMBIO</i>
Feb. 28 (Tuesday)	Non monetary valuation methods (Part 2)
	<ul style="list-style-type: none"> Armatas et al. (2014) “Applying Q Methodology to select and define attributes for non-market valuation: A case study from Northwest Wyoming, United States.” <i>Ecological Economics</i> [Focus on big picture ideas]
March 2 (Thursday)	***IN CLASS EXAM I***
March 7 (Tuesday)	Payments for Ecosystem Services (PES): An Introduction
	<ul style="list-style-type: none"> Jack et al. (2008) “Designing payments for ecosystem services: lessons learned from previous experience with incentive-based mechanisms.” <i>Proc. Natl. Academy Sciences</i> Read about the US Conservation Reserve Program online: http://sustainableagriculture.net/publications/grassrootsguide/conservation-environment/conservation-reserve-program/
March 9 (Thursday)	PES Contract Design
	<ul style="list-style-type: none"> Land Conservation Game Instructions (Word Document)
March 14 (Tuesday)	Spring Break
March 16 (Thursday)	Spring Break
March 21 (Tuesday)	NO CLASS
March 23 (Thursday)	PES In Action: Payments for Watershed Services, Examples from the US and

	<p>Mexico <i>Guest Speaker: Heather Schinkel, Executive Director, Colorado Conservation Exchange, Fort Collins</i></p>
	<ul style="list-style-type: none"> • Pearce (2013) “How beer money can help save a nation’s water supply” <i>Conservation Magazine</i> • Ecosystem Marketplace (2016) “Close to \$25 billion spent to secure green infrastructure worldwide in 2015” • Listen to the TED Talk: Rob Harmon (9 min.) “How the market can keep streams flowing”: http://www.ted.com/talks/rob_harmon_how_the_market_can_keep_streams_flow.html
March 28 (Tuesday)	<p>Additionality & Efficiency in PES PES In Action: Carbon Markets and REDD+</p>
	<ul style="list-style-type: none"> • The New York Times (2015) “Make forests pay: A forest offset market for trees” • The New York Times (2016) “How small forests can help save the planet” • Economist (2010) “Money can grow on trees” • Read online about the “Forest Carbon Portal”: http://www.forestcarbonportal.com/
March 30 (Thursday)	<p>PES In Action: Habitat Exchanges <i>*Introduce Group Project & Assign Groups</i></p>
	<ul style="list-style-type: none"> • Bayon (2008) Banking on Biodiversity. <i>Worldwatch</i> • Read online “Habitat Exchanges: How do they work” and explore example programs: https://www.edf.org/ecosystems/habitat-exchanges-how-do-they-work
April 4 (Tuesday)	<p>Equity & Poverty Impacts of PES <i>In-Class Group time for final PES project work</i> [NOTE: You should do research before this class session and come with ideas for group project; use class to get feedback from instructor and come to a consensus in your group]</p>
	<ul style="list-style-type: none"> • Pascual et al. (2014) “Social equity matters in payments for ecosystem services” <i>Bioscience</i>
April 6 (Thursday)	<p>Evaluating PES and other ES approaches <i>In-Class Group time for final PES project work</i> [NOTE: You should do research before this class session and come with ideas for group project; use class to get feedback from instructor and come to a consensus in your group]</p>
	<ul style="list-style-type: none"> • Margoluis et al (2009) “Design alternatives for evaluating the impact of conservation projects”
April 11 (Tuesday)	<p><i>In-Class Group time for final PES project work</i> [NOTE: You should have a solid proposal for your group project ready by this day; use class to write proposal and start working on final report and presentation]</p>
April 13 (Thursday)	<p><i>In-Class Group time for final PES project work</i> [NOTE: You should have a solid proposal for your group project ready by this day; use class to write proposal and start working on final report and presentation]</p>

	EACH GROUP WILL SUBMIT PES PROPOSAL ON CANVAS BY 5PM
April 18 (Tuesday)	Ecosystem Services in U.S. Decision-Making <i>Guest Speaker: Dr. Rudy Schuster, Branch Chief, Social & Economic Analysis, Fort Collins Science Center, U.S. Geological Survey</i>
	• TBD
April 20 (Thursday)	***IN CLASS EXAM II***
April 25 (Tuesday)	Challenges and Critiques of PES <i>In-Class Group time for final PES project work</i> [NOTE: You should have made significant progress on your group project; use class to finalize presentation and work on final report]
	<ul style="list-style-type: none"> • Redford and Adams (2009) "Payment for ecosystem services and the challenge of saving nature" <i>Conservation Biology</i> • Kinzig et al. (2011) "Paying for ecosystem services: promise or peril?" <i>Science</i>
April 27 (Thursday)	Final Group Presentations (4 groups chosen at random)
May 2 (Tuesday)	Final Group Presentations (4 groups chosen at random)
May 4 (Thursday)	Ecosystem Services Final Reflection Course Evaluation
	DUE FRIDAY MAY 5 by midnight: WRITTEN PES FINAL PROJECT

COURSE POLICIES

Academic Integrity: As required by the CSU Faculty Council – “This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog (<http://www.catalog.colostate.edu/FrontPDF/1.6POLICIES1112f.pdf>) and the Student Conduct Code (<http://www.conflictresolution.colostate.edu/conduct-code>). At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.”

Requests for Assignment Extensions: In fairness to your fellow classmates, extensions on due dates for assignments will not be granted except in cases where extenuating circumstances arise. If this is the case, please let me know at the earliest possible opportunity to request an extension. In the absence of being granted an extension, the policy below applies for late submissions.

Policy on Late Assignments: Late assignments (those not turned in at the specified date and time) will be penalized one letter grade per calendar day (including weekends). After five calendar days have passed, the assignment will receive a grade of zero.

Availability of Student Accommodations: If you have university-approved circumstances, please contact me after the first class so that we can make a plan for accommodations to ensure a productive semester together.

Talk to Me: If you do not understand something I present in class, please let me know – chances are someone else also does not understand. I welcome all questions regarding the course material,

assignments, and the application of the course material to the real world! Don't fall behind or get a poor grade because you are not clear on material or assignment instructions – I am here to help you learn. You can stop by my regular office hours or send me an email with questions or to set up a time to meet.