

Ecosystem Services for Ecologists

North Carolina State University
AE XXX, David Clark Labs 102, T/Th 10:15-11:30 AM
Syllabus, Spring 20XX

COURSE INSTRUCTOR

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COURSE DESCRIPTION

*In the end, we will conserve only what we love,
we will love only what we understand,
and we will understand only what we are taught.
~ Baba Dioum (Senegalese Forester)*

As the quote above so elegantly articulates, people tend to be protective of the things they understand and love. One of the best ways to convince people that something is worth protecting is to show how it relates to their own lives – to convince them why it matters. In this course, we will focus on nature’s contributions to people. We will gain a firm grasp on the concept of the ecosystem services paradigm and its inception, learn how to identify and practice quantifying nature’s benefits, discuss value and valuation, explore implications for conservation and policy making, and delve into communicating ecological concepts to non-scientist audiences. Course content is geared toward ecologists, so while we will touch on economic valuation of ecosystem services, this course is not designed to provide a rigorous focus on economic methods of evaluating ecosystem services. Economics majors are welcome to enroll, but be aware our approach will be primarily ecological.

The course format will be a blend of discussion-based seminar with some lecture. The prepared lecture components will be intended to supplement your readings and discussion, and lecturing at you will not be the primary mode of imparting knowledge for your learning. Primary modes of learning will be through reading assignments before class meetings, class discussion and activities related to readings, and active engagement in the process of defining, quantifying, valuing, mapping, and communicating about ecosystem services through independent and group projects.

LEARNING OUTCOMES

By the end of this course, students will be able to:

- Describe the main categories of ecosystem services and provide several examples of each.
- Summarize direct use value, explain the main categories of indirect use values, and make comparisons between them.
- Consider the motivations and ethics of assigning value to nature (or not doing so), and articulate a defensible argument (with evidence) for your position.
- Design an ecosystem service framework for an organism, ecosystem function or natural system, identifying benefits to people, how they may be valued, and communicate your rationale to a non-technical audience.
- Demonstrate a professional demeanor and proficiency in scientific and non-technical communication on ecosystem services through independent and team-generated written and orally presented work.

COURSE INFORMATION AND REQUIREMENTS

Materials. Required Text: [Daily G. 1997. Nature's Services: Societal Dependence on Natural Ecosystems.](#) Access to additional readings will be provided through the course website and library reserves. You will also need to access to a computer on which you can download and use the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) software (open access and freely available from the [Natural Capital Project website](#)).

Readings. Students are required to complete all readings prior to class. The primary format of class time is discussion-based, and readings will provide the basis for class discussions.

Class Discussions. Participation in class discussions is essential for your success and learning in this course, as they will build on the course materials and foster a deeper understanding of the concepts.

In-Class Assignments. These assignments may include quizzes on the readings, short group activities, independent writing-to-learn prompts, and time for work on your projects. Students are expected to attend classes and complete in-class assignments during the class period in which they are assigned.

Course Projects. Two course projects will provide opportunities to practice your skills in ecosystem services. In an independent project, you will develop a rationale and gather evidence, and make an argument for using an ecosystem service framework for an organism, ecosystem function, or higher ecological unit (e.g., community or ecosystem). You will work on pieces of this project throughout the semester, with the final project culminating in a technical paper and a science communication piece for non-technical audiences. In a group project, you will use a free online ecosystem services mapping tool and publicly available data to estimate the quantity (and economic value, where appropriate) of an ecosystem service in a geographic location. Teams will work together to run the model mapping the ecosystem service. The group project will culminate in a group presentation and individual written briefs. Each project is worth 30% of the final grade. There are no mid-term or final exams in this course.

Group Work. Why must we do group work?! Some people love group work, others loathe it. Regardless of your position, the reality of our profession (and most others) is that you will have to work with others on projects, whether it is providing your expertise in a large collaboration, making management decisions among several agencies, or simply maintaining a professional relationship with immediate colleagues. The group project will allow for more efficient work by taking advantage of each member's expertise and skill set (e.g., some may be proficient with GIS mapping, others better at making presentations or conceiving good plans) and will provide an opportunity to learn from each other. Group work in this course will help you develop interpersonal communication and cooperative skills necessary for success in your future workplace.

Attendance. Students are expected to attend class. Class work and participation make up a substantial proportion of your final grade (see below on grading). If you miss a class, you are expected to complete any missed work and are responsible for obtaining notes, handouts, assignments, etc., from classmates. Please communicate with me about known anticipated absences ahead of time to avoid missing work, and about unanticipated absences as soon as practical. Please see the [official university policy on attendance and excused absences](#).

Communications. Students are expected to monitor their university email accounts for communications about this course. If you need to contact me by email, ensure that your correspondence is professional; this is good practice and a reflection on your professional demeanor. Please allow for a 24-hour response time, Monday – Friday; I do not respond to emails on weekends. For more immediate needs, please take advantage of speaking to me in person before or after class, or make an appointment to visit my office. Notify me of any issues that may affect your performance as soon as possible so that we can work together to find a solution.

Prerequisites. There are no formal prerequisites for this course. However, students are expected to have college-level proficiency in technical writing to be successful in this course.

Restrictions. Enrollment is restricted to undergraduate seniors and graduate students.

LATE WORK POLICY

Late work will not be accepted. Please discuss extenuating circumstances with the instructor.

SCHEDULE

Homework assignments (bold) are due by the beginning of class on the specified date. In-class assignments are listed in plain type and will be completed on the date they are listed. Dates for readings are given for the first few weeks; beyond that, I will assign the reading dates at class meetings or through email announcements based on our pace.

Note: the course schedule is subject to change.

Week (Dates)	Topic	Readings	Assignments
Week 1 (Jan 8, 10)	1/8: Misconceptions 1/10: What are Ecosystem Services?	For 1/8: none For 1/10: Daily: preface and perspectives (p. xv-xx) and Ch. 1 (p. 1-10)	1/10: syllabus quiz
Week 2 (Jan 15, 17)	History and Ethics of Ecosystem Services	For 1/15: Daily Ch 2: ES, A Fragmentary History For 1/17: Levin VI: ES, and VI.1: Issues of Scale and Trade-offs Costanza et al. 1997 Daily Ch 3: p 23-28 only	1/17: Brainstorm project topics
Week 3 (Jan 22, 24)	Biodiversity and Ecosystem Functioning	Daily Ch 6: Biodiversity and Ecosystem Functioning Levin VI.2 & VI.3	Jan 22: Initial research topic
Week 4 (Jan 29, 31)	Categorizing Ecosystem Services Regulating & Provisioning ES	MEA 2000. General Synthesis, selected excerpts Levin VI.9	Jan 29: Forum post and response on reading Jan 31: Peer feedback on research topic
Week 5 (Feb 5, 7)	Cultural & Supporting ES	Karieva Ch 12: Cultural Services & non-use values Sanna & Eja 2017 Daily Ch 7 & 8: ES supplied by Soil, Pollinators Levin VI.10	Feb 7: Research Statement
Week 6 (Feb 12, 14)	What is value?		
Week 7 (Feb 19, 21)	Value and Valuation	Daily Ch 3: p28-end Daily Ch 4 (bring in economist approaches, Fisher et al. 2014 excerpts?) Levin VI.11 Bellver-Domingo et al. 2017	Feb 21: Draft technical communication

Week (Dates)	Topic	Readings	Assignments
Week 8 (Feb 26, 28)	Mapping ES	Natural Capital Project website	Feb 26: Forum post on InVEST website exploration
Week 9 (Mar 5, 7)	Mapping ES		Mar 7: InVEST Presentations and Written Briefs
Week 10 (Mar 12, 14)	No Class, Spring Break!		
Week 11 (Mar 19, 21)	Strategies for Communicating with Non-Scientists	Baron. 2016 Baron Ch 8 American Geophysical Union website Alda 2017. excerpts	3/19: work on messaging Mar 21: Message Box
Week 12 (Mar 26, 28)	Focus: Forest and Grasslands Focus: Aquatic Ecosystem Services	Levin VI.5 & VI.6 Levin VI.7 & VI.8 Vaughn. 2018	Mar 26: Draft non-scientist communication
Week 13 (Apr 2, 4)	Focus: ES in Human-Dominated Systems (agriculture, urban)	Levin VI.4 Yvonne et al. 2017	Apr 4: Draft full project
Week 14 (Apr 9, 11)	ES, Land Management, and Conservation	Eastwood et al. 2017 Levin VI.12?	Apr 11: Peer review
Week 15 (Apr 16, 18)	Using ES to inform Policy Decisions	Karieva Ch 19: Incorporating ES in Decisions	
Week 16 (Apr 23, 25)	Final Thoughts	Costanza et al. 2017 Olander et al. 2017	Apr 25: Final project

GRADING

Final grades will be based on course projects, in-class assignments, and participation in class discussions and activities, using the weights listed below. Participation includes arriving prepared by reading assigned work, completing in-class assignments, engaging in discussions and other course activities (e.g., in-class writing prompts, online forum posts, etc.)

Participation:	40%
InVEST Modeling Group Project:	30%
Independent Project:	30%

Grade Distribution

A+ = 97%	B+ = 87-89.9%	C+ = 77-79.9%	D+ = 67-69.9%
A = 94-96.9%	B = 84-86.9%	C = 74-76.9%	D = 64-66.9%
A- = 90-93.9%	B- = 80-83.9%	C- = 70-73.9%	D- = 60-63.9%
			F = 59.9% and below

CREDIT ONLY/AUDIT

Students taking the course for credit only (S/U) must complete all assignments and achieve a final average of at least 69.5% to receive a grade of "S".

ACADEMIC INTEGRITY

Students are expected to be familiar with and honor the [NC State Code of Student Conduct](#).

ADVERSE WEATHER POLICY

Students are expected to be familiar with the official [adverse weather policy](#) of the university.

STATEMENT FOR STUDENTS WITH DISABILITIES

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the [Academic Accommodations for Students with Disabilities Regulation](#).

SUPPORTING STUDENTS IN DISTRESS

As members of the NC State Wolfpack community, we each share a personal responsibility to express concern for one another and to ensure that this classroom and the campus as a whole remains a healthy and safe environment for learning. Occasionally, you may come across a fellow classmate whose personal behavior concerns or worries you, either for the classmate's well-being or yours. When this is the case, I would encourage you to report this behavior to the NC State's Students of Concern website: <http://go.ncsu.edu/NCSUcares>. Although you can report anonymously, it is preferred that you share your contact information so they can follow-up with you personally.

N.C. STATE UNIVERSITY POLICES, REGULATIONS, AND RULES (PRR)

Students are responsible for reviewing the PRRs, which pertain to their course rights and responsibilities. These include the [Equal Opportunity and Non-Discrimination Policy Statement](#), the [Office for Institutional Equity and Diversity](#), [Code of Student Conduct](#), and [Grades and Grade Point Average](#).