



	<b>Instructor</b>	<b>Teaching Assistant</b>
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<b>Office</b>		
<b>Hours:</b>	1-3 pm, W and F	3:00-4:00pm, Tu and Th

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<b>Term:</b>	Spring 2019
<b>Class Meeting Days:</b>	Tu, Th
<b>Class Meeting Hours:</b>	Lecture: 9:30-10:45 Lab: Tu-1:00-2:40 W -3:00-4:30
<b>Class Location:</b>	Clark C 142
<b>Lab Location:</b>	Clark C 142
<b>Course Credits:</b>	4

### Course Overview

This is the capstone course for the Natural Resource Management (NRM) majors, and may also be taken by other NR disciplines. This course familiarizes students with the biological, political, and social complexities of ecosystem management and centers on team-based, student-led ecosystem planning that incorporates: (1) extraction of geospatially referenced ecological data; (2) analysis of current conditions of natural resources and assessment of critical resources, habitat, and ecosystem services within management units; (3) development of rational goals and implementation plans express to some management objective; and (4) development of quantitative decision support and consideration of multiple scenarios and stakeholders. The course integrates lecture and laboratory sessions to guide students in developing technical skills needed to synthesize available information for making sound and defensible ecosystem management decisions using basic principles.

### Course Goals and Objectives

During this course, students will:

- Develop a basic understanding of the concepts of natural range of variation, ecosystem resistance and resilience, current and desired future conditions, and socioecological dynamics

- Learn how to access, acquire, and process ecological datasets to generate analyzable information
- Learn basic methods for quantifying biodiversity and structural characteristics of ecosystems
- Make projections about ecosystem structure, function, and composition
- Develop ecosystem management objectives based on ecological and social constructs
- Apply simple statistical techniques as decision support tools
- Make natural resource management recommendations to achieve desired ecosystem conditions

### **Course Prerequisites**

LAND220/LIFE220 - Fundamentals of Ecology; or LIFE320 - Ecology  
 NR220 - Natural Resource Ecology  
 NR319 - Geospatial Applications in Natural Resources; **or**  
 NR322 - Introduction to Geographic Information Systems  
 NR320 - Natural Resources History and Policy

### **Required Texts and Materials**

#### Required software:

ARC GIS 10.0 or better; Esri. Software licenses are available from the RAMTECH store for \$18 for a one-year subscription.

#### Instructor-provided texts:

*Excerpts from:* Conservation Planning: Informed Decisions for a Healthier Planet. 2016. Craig R Groves & Edward T Game, Editors. Roberts and Company Publishers, Inc., Greenwood Village, CO. 580 p. ISBN: 9781936221516.

*Excerpts from:* Ecosystem Management: Adaptive, Community-Based Conservation. 2002. Meffe GK, Nielsen LA, Knight RL, Schenborn DA, Editors. Island Press, Washington, DC. 313 p. ISBN: 1-55963-824-9.

*Excerpts from:* Principles of Terrestrial Ecosystem Ecology, 2<sup>nd</sup> Edition. 2013. F. Stuart Chapin III, Pamela A Matson, Peter M Vitousek, Editors. Springer Science & Business Media, New York, NY. 529 p. ISBN 978-1-4419-9503-2.

Journal articles: *As senior-level college students, you are expected to locate and access journal articles on your own.*

Costanza R, et al. 1997. The value of the worlds ecosystem services and natural capital. *Nature*, 387: 253-260.

Daily GC, et al. 2009. Ecosystem services in decision making: time to deliver. *Frontiers in Ecology and Environment*, 7:21-28.

Raffa KF, et al. 2009. A literal use of "forest health" safeguards against misuse and misapplication. *Journal of Forestry*, 107:276-277.

Sutherland WJ, et al. 2004. The need for evidence-based conservation. *Trends in Ecology and Environment*, 19:305-308.

Ellison AM, et al. 2005. Loss of foundation species: consequences for the structure and dynamics of forested ecosystems. *Frontiers in Ecology and Environment*, 3:479-486.

### **Library & Research Help**

The CSU Libraries Help Desk provides research and technical assistance either in person at Morgan Library or by phone at 970-491-1841. Jocelyn Boice is the librarian supporting this course. Contact her by email at [jocelyn.boice@colostate.edu](mailto:jocelyn.boice@colostate.edu) or by phone at 970-491-3882 to ask questions or set up an appointment for in-depth research help

**Tentative lecture schedule:**

We will attempt to follow this general schedule, but exact dates and material may vary depending on the pace of the class and at the discretion of the instructor.

<b>Week</b>	<b>Date and Time</b>	<b>Lecture Topic</b>	<b>Reading</b>	<b>Assignments due</b>
1	Tu JAN 22 – 9:30-10:45  Th JAN 24 – 9:30-10:45	Syllabus, introduction to course and expectations  Introduction to class projects: Colorado State Forest Service		
2	Tu JAN 29 – 9:30-10:45  Th JAN 31 – 9:30-10:45	Introduction to class projects: Colorado State Forest Service, continued  Principles of the ‘ecosystem approach’ and evolution of natural resource management toward ecosystem management	Chapin III et al., Chapter 1 “The ecosystem concept”	
3	Tu FEB 5 – 9:30-10:45  Th FEB 7 – 9:30-10:45	The adaptive management framework  Analyzing the components of an ecosystem management plan	Meffe et al., Chapter 11 “Strategic approaches to ecosystem management”  Example plan(s)	Q1: Components of a plan (2%)
4	Tu FEB 12– 9:30-10:45  Th FEB 14– 9:30-10:45	Ecosystem health: the natural range of variation as a guiding management principle  Foundation species and genetic diversity	Raffa et al. 2009, “A literal use of ‘forest health’ safeguards against misuse and misapplication”  Meffe et al., Chapter 5 “Genetic diversity in ecosystem management”	Q2: Defining ecosystem health (2%)
5	Tu FEB 19 – 9:30-10:45  Th FEB 21 – 9:30-10:45	Species as management targets  Managing populations and communities at the landscape level: habitat considerations	Meffe et al., Chapter 6 “Issues regarding populations and species”	Draft plan 1: Unit introduction and inventory (5%)
6	Tu FEB 26 – 9:30-10:45  Th FEB 28 – 9:30-10:45	Landscape level conservation: theory and practice  Making objectives measurable: indicators and surrogates	Meffe et al., Chapter 9 “Managing biodiversity across landscapes: a manager’s dilemma”	
7	Tu MAR 5 – 9:30-10:45	Methods for quantifying biodiversity I	Ellison et al. 2005, “Loss of foundation species: consequences	

			for the structure and dynamics of forested ecosystems”	
	Th MAR 7 – 9:30-10:45	Methods for quantifying biodiversity II		
8	Tu MAR 12– 9:30-10:45	The components of a useful presentation and guidelines for peer reviews		Q3: Biodiversity (2%)
	Th MAR 14 – 9:30-10:45	Plan development; peer analysis, feedback, and synthesis		Peer reviews and response 1 (5%)
9	Tu MAR 19 – 9:30-10:45	SPRING BREAK, NO CLASS		
	Th MAR 21 – 9:30-10:45			
10	Tu MAR 26– 9:30-10:45	Ecosystem management across spatial scales: the species-area curve		
	Th MAR 28 – 9:30-10:45	Using metrics for evidence-based decision support	Sutherland WJ, et al. 2004. “The need for evidence-based conservation”	
11	Tu APR 2 – 9:30-10:45	Stakeholder identification and assessment ( <i>Mattor</i> )	Meffe et al. Chapter 10 “Working in human communities”	
	Th APR 4 – 9:30-10:45	Stakeholder analysis ( <i>Mattor</i> )		
12	Tu APR 9 – 9:30-10:45	Valuation of ecosystem services I ( <i>Bayham</i> )	Costanza et al., 1997 “The value of the worlds ecosystem services and natural capital”	
	Th APR 11 – 9:30-10:45	Valuation of ecosystem services II ( <i>Bayham</i> )	Daily et al., 2009, “Ecosystem services in decision making: time to deliver”	Draft plan 2: Unit introduction, inventory, survey, alternative actions and recommendations, stakeholders, and valuation (5%)
13	Tu APR 16 – 9:30-10:45	Risk management and uncertainty in ecosystem planning		
	Th APR 18 – 9:30-10:45	Developing a project budget and justification		Q4: Valuation of services (2%)
14	Tu APR 23 – 9:30-10:45	A case study in ecosystem management part I, carbon management ( <i>Cannon</i> )	Hurteau et al. 2011, “The carbon costs of mitigating high-severity wildfire in southwestern ponderosa pine”	
	Th APR 25 – 9:30-10:45	Case study, part II ( <i>Cannon</i> )		

15	Tu APR 30 – 9:30-10:45	Peer analysis, feedback, and synthesis		Peer reviews and response 2 (5%)
	Th MAY 2 – 9:30-10:45	Group presentations, 1		Final presentations (10%)
16	Tu MAY 7 – 9:30-10:45	Group presentations, 2		
	Th MAY 9 – 9:30-10:45	Group presentations, 3		Q5: Course feedback (2%)
Finals week	Tu MAY 14 – 9:40 am	SUBMIT RESOURCE MANAGEMENT RECOMMENDATION		Final draft of plan due to instructor MAY 14, 11:40 am (30%)

## Tentative lab schedule

Week	Date and Time	Lab activity	Work product
1	Tu JAN 22 – 1:00-2:40 W JAN 23 – 3:00-4:40	Identifying interests, skillsets, and forming into groups	Lab 01) In-class activity: skills and interest survey; group assignments, and written description of group member roles (3%)
2	Tu JAN 29 – 1:00-2:40 W JAN 30 – 3:00-4:40	Identifying management unit boundaries	Lab 02) Acquire and project relevant GIS layers for management unit (3%)
3	Tu FEB 5 – 1:00-2:40 W FEB 6 – 3:00-4:40	Identifying your purpose: goals, objectives, and projects	Lab 03) Introduction to the problem and description of the planning goals (3%)
4	Tu FEB 12 – 1:00-2:40 W FEB 13 – 3:00-4:40	Unit description and inventory	Lab 04) Unit inventory [remote or actual] (3%)
5	Tu FEB 19 – 1:00-2:40 W FEB 20 – 3:00-4:40	Insect and diseases and weeds	Lab 05) Accessing survey data to assess potential threats (3%)
6	Tu FEB 26 – 1:00-2:40 W FEB 27 – 3:00-4:40	System modelling exercise	Lab 06) System diagram: what are the important components of your system? (3%)
7	Tu MAR 5– 1:00-2:40 W MAR 6– 3:00-4:40	Plan evaluation: indicators, monitoring, and measurable outcomes	Lab 07) Action alternatives and outline of monitoring plan (3%)
8	Tu MAR 12 – 1:00-2:40 W MAR 13 – 3:00-4:40	Presentations and peer feedback	Lab 08) Proposal presentation (3%)
9	Tu MAR 19 – 9:30-10:45 W MAR 20 – 9:30-10:45	SPRING BREAK, NO CLASS	
10	Tu MAR 26 – 1:00-2:40 W MAR 27 – 3:00-4:40	Evidence-based management recommendation	Lab 09) Resource management recommendation and 10-year work plan (3%)
11	Tu APR 2 – 1:00-2:40 W APR 3 – 3:00-4:40	Stakeholder analysis (Guest lecturer, <i>Mattor</i> )	Lab 10) Stakeholder analysis (3%)
12	Tu APR 9 – 1:00-2:40 W APR 10 – 3:00-4:40	Valuation of action alternatives (Guest lecturer, <i>Bayham</i> )	Lab 11) Modelling economic impacts (3%)
13	Tu APR 16 – 1:00-2:40 W APR 17 – 3:00-4:40	Budgeting and estimating expenses	Lab 12) Project budget and contracts (3%)
14	Tu APR 23 – 1:00-2:40 W APR 24 – 3:00-4:40	Compiling a references list: (Guest lecturer, <i>Boice</i> , Clark C 143)	Lab 13) References list, formatted (3%)
15	Tu APR 30 – 1:00-2:40 W MAY 1 – 3:00-4:40	Appendices and attachments	Lab 14) Appendices and other additional supporting documents (3%)
16	Tu MAY 7 – 1:00-2:40 W MAY 8 – 3:00-4:40	Self-evaluations	Lab 15) Performance assessments (3%)

### **Basis for Final Grade**

The grading scale is as follows:

A: 100-90%; B: 89-80%; C: 79-70%; D: 69-60%; F: 59% and below.

Instructor reserves the right to assess +'s and - 's to students in accordance with university policy.

Assessment of course performance will be evaluated as follows:

<b>Grade item</b>	<b>Percent (%) of grade</b>
Reading quizzes, x5	2% each, 10% total
Draft plans, x2	5% each, 10% total
Peer feedback and responses, x2	5% each, 10% total
Lab assignments, x15	3% each, 30% total
Project presentation	10% total
Final project	30%
TOTAL	100%

### **Course Policies**

#### **Late Work Policy**

There are no make-ups for in-class writing, quizzes, the midterm, or the final exam. Essays turned in late will be assessed a penalty: a half-letter grade if it is one day late, or a full-letter grade for 2-7 days late. Essays will not be accepted if overdue by more than seven days.

#### **Extra Credit Policy**

There is only one extra credit assignment: writing a synthesis on an article of my choosing. These are typically equivalent to a quiz replacement (2% maximum credit) and cannot be used elevate a class score above 100%.

#### **Grades of "Incomplete"**

Per university policy, an instructor may assign temporary grade of Incomplete to a student who demonstrates that he or she could not complete the requirements of the course due to circumstances beyond the student's control and not reasonably foreseeable. A student must be passing a course at the time that an Incomplete is requested unless the instructor determines that there are extenuating circumstances to assign an Incomplete to a student who is not passing the course. When an instructor assigns an Incomplete, he or she shall specify in writing using the Department Incomplete Grade Form the requirements the student shall fulfill to complete the course as well as the reasons for granting an Incomplete when the student is not passing the course. The instructor shall retain a copy of this statement in his or her grade records and provide copies to the student and the department head or his or her designee. (Section I.6 of the *Academic Faculty and Administrative Professional Manual*)

#### **Disability Access**

Colorado State University is committed to providing reasonable accommodations for all persons with disabilities. Students with disabilities who need accommodations must first contact Resources for Disabled Students before requesting accommodations from the professor. Resources for Disabled Students (RDS; <http://rds.colostate.edu/home>) is located in room 100 of the General Services Building. Their phone is (970) 491-6385 (V/TDD). Students who need accommodations in this course must contact the professor at the beginning of the semester to discuss needed accommodations.

#### **Attendance Policy**

*Instructors and departments are responsible for establishing attendance policies for classes and examinations. These policies must accommodate student participation in University-sanctioned extracurricular/co-curricular activities. Students must inform their instructors prior to the anticipated absence and take the initiative to make up missed work in a timely fashion. Instructors must make reasonable efforts to enable*

students to make up work which must be accomplished under the instructor's supervision (e.g., examinations, laboratories). In the event of a conflict in regard to this policy, individuals may appeal using established University procedures.

For the purposes of this regulation, University-sanctioned activities include competitions, events and professional meetings in which students are officially representing the institution. Appropriate sanctioned activities include:

- a. Intercollegiate athletics;
- b. Collegiate club sports and competitions;
- c. Conferences and workshops recognized by the University not related to academics;
- d. Commitments on behalf of the University (ASCSU, band, etc.); and
- e. Professional activities recognized by the University related to academics.

Department heads or their designated representatives must approve sanctioned professional and departmental activities. Other sanctioned activities must be approved by the appropriate program director on record with the Division of Student Affairs offices or the Department of Athletics.

### **Religious Accommodation**

Special religious observances may provide a legitimate reason for an excused absence. The student is responsible for discussing this with the instructor at the beginning of the semester.

### **Professionalism Policy**

Per university policy and classroom etiquette; mobile phones, iPods, etc. **must be silenced** during all classroom and lab lectures. Those not heeding this rule will be asked to leave the classroom/lab immediately so as to not disrupt the learning environment. Please arrive on time for all class meetings. Students who habitually disturb the class by talking, arriving late, etc., and have been warned may suffer a reduction in their final class grade.

When emailing the instructor or TA, please include your full name, CSU ID, and the course number in your email.

### **Academic Integrity**

The Department of Forest and Rangeland Stewardship takes academic integrity seriously. At minimum, academic integrity means that no one will use another's work as their own. The CSU writing center defines plagiarism this way:

Plagiarism is the unauthorized or unacknowledged use of another person's academic or scholarly work. Done on purpose, it is cheating. Done accidentally, it is no less serious. Regardless of how it occurs, plagiarism is a theft of intellectual property and a violation of an ironclad rule demanding "credit be given where credit is due."

Source: (Writing Guides: Understanding Plagiarism.

<http://writing.colostate.edu/guides/guide.cfm?guideid=17>)

If you plagiarize in your work you could lose credit for the plagiarized work, fail the assignment, or fail the course. Each instance of plagiarism, classroom cheating, and other types of academic dishonesty will be addressed according to the principles published in the CSU General Catalog (under "Academic Integrity/Misconduct: <http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/> .)

Of course, academic integrity means more than just avoiding plagiarism. It also involves doing your own reading and studying. It includes regular class attendance, careful consideration of all class materials, and engagement with the class and your fellow students. Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community.

### **Title IX Information**

CSU's Student Sexual Harassment and Violence policy, following national guidance from the Office of Civil Rights, requires that faculty follow CSU policy as a "mandatory reporter"

of any personal disclosure of sexual harassment, abuse, and/or violence related experiences or incidents shared with the faculty member in person, via email, and/or in classroom papers or homework exercises. These disclosures include but are not limited to reports of personal relational abuse, relational/domestic violence, and stalking. While faculty are often able to help students locate appropriate channels of assistance on campus (e.g., see the CSU Health Network link below), disclosure by the student to the faculty member requires that the faculty member inform appropriate CSU channels to help ensure that the student's safety and welfare is being addressed, even if the student requests that the disclosure not be shared.

For counseling support and assistance, please see the CSU Health Network, which includes a variety of counseling services that can be accessed at:

<http://www.health.colostate.edu/>. And, the Sexual Assault Victim Assistance Team is a confidential resource for students that does not have a reporting requirement and that can be of great help to students who have experienced sexual assault. The web address is <http://www.wgac.colostate.edu/need-help-support>.

Source: <http://oeo.colostate.edu/title-ix-sexual-assault>

### **Non-Discrimination Statement**

Colorado State University does not discriminate on the basis of race, age, creed, color, religion, national origin or ancestry, sex, gender, disability, veteran status, genetic information, sexual orientation, gender identity or expression, or pregnancy. The University complies with the Civil Rights Act of 1964, as amended, related Executive Orders 11246 and 11375, Title IX of the Education Amendments Act of 1972, Sections 503 and 504 of the Rehabilitation Act of 1973, Section 402 of the Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended, the Age Discrimination in Employment Act of 1967, as amended, The Pregnancy Discrimination Act of 1978, Americans with Disabilities Act of 1990, the Civil Rights Act of 1991, the ADA Amendments Act of 2008, the Genetic Information Nondiscrimination Act of 2008, and all civil rights laws of the State of Colorado. Accordingly, equal opportunity of employment and admission shall be extended to all persons. The University shall promote equal opportunity and treatment in employment through a positive and continuing affirmative action program for ethnic minorities, women, persons with disabilities, and veterans. The Office of Equal Opportunity is located in 101 Student Services. Source: <http://oeo.colostate.edu/non-discrimination-statement>