Prioritizing conservation and management actions with Marxan – WATS 6340

Instructor
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Office Hours: By appointment

Class Meetings: Tuesday and Thursday, 1:30 – 2.45 (Health Phys Ed & Recreation 114A)

Pre-requisites – The course will involve the use of GIS software (either ArcMap or QGIS), and some use of the R cran statistical software package. While an advanced knowledge of these packages is not essential, some experience would prove useful.

Course Goals:

1) Understand the utility of systematic conservation and management planning.
2) Gain a working knowledge of the conservation planning software Marxan.
3) Understand when systematic conservation planning works, and when it fails.
4) Be able to formulate landscape management problems and analyses.

Course Description – The identification of novel areas for protection, restoration and management remains at the heart of conservation efforts. However, resources allocated to conservation and ecosystem management tend to be limited. This paucity of resources means conservation and management efforts must be strategically prioritized in order to maximize outcomes. The Marxan suite of software packages are the most widely adopted tools used to prioritize conservation and management efforts, and have been used to guide landscape management decisions for 10% of the surface are of the earth. The Marxan packages have built a reputation for reliability and impartiality, and been used to map some of the world's foremost protected areas including the Great Barrier Reef Marine Protected Area and the California Channel Islands Reserve.

In this course you will be introduced to the concepts of systematic landscape planning, and be provided them with the tools necessary to conduct your own landscape analyses. You will answer questions such as "Which land packages should be added to a protected area network to ensure protection for the highest number of species?", "How should restoration efforts be conducted to boost both species numbers and ecosystem services?", "How should fire risk be incorporated in landscape management practices?". Initially, you will be provided with existing data sets and shown how to use Marxan to conduct landscape planning analyses, including setting up the file structure and illustrating results. From here you shall use your own data (either publically available or part of your research) to conduct a Marxan analysis relating to your own interests.

Grading – There are no exams in this course. Instead you will graded on three small assignments (40%) and your final project. The grading for the final project will consist of a

written report in the form of a manuscript for submission to biology letters (40%) and an oral presentation (15%). Your participation in class is a crucial component of the course and will contribute up to 5% of your grade.

Grading Scale

A	100-93%	C	76-73	
A-	92-90	C-	72-70	(Note: This grading scale is strict—for
B+	89-87	D+	69-67	example: 89.4% is a B+ NOT an A-)
B	86-83	D	66-63	
B-	82-80	D-	62-60	
C+	79-77	F	59 and below	

Note on Assignments: All assignments must be turned in for full credit. Failure to hand in one assignment may result in a failure to complete course. All assignments must be completed individually. For assignment 4, you will work directly with me (Edd Hammill) to ensure that the project you are proposing is feasible within the time frame, and that adequate data are available.

Note on computing: All students are recommended to use their own personal computers. This will allow you to keep the files, etc to use as templates in the future.

Course Objectives:

	Objective	**Outcome**
	Basic cognitive background	
1.		Students learn the basic principles behind systematic landscape management
2.		Students are introduced to multiple-objective problems
3.		The course will introduce how risk of failure can be incorporated, and how this affects management
	Application of learning	
1.		Students are introduced to state of the art systematic landscape management software
2.		Students will apply course concepts to a project of their choosing
1.	*Lifelong learning*	Students will be provided with a novel skill set to conduct future landscape analyses
		The course will increase quantitative skills and problem formulation

Schedule

Week	Day	Topic
1	**Tu**	Introduction to systematic landscape management (SLM) (Lecture/Discussion)
	Thu	Successes and failures of SLM (Lecture/Discussion)
2	**Tu**	Basic Marxan, what is it? What does it do? (Lecture/Discussion) **(*Pre-reading, Ball et al 2004*)**
	Thu	Introduction to Marxan's file structure and properties (Lecture) **(Hand in assignment 1 – Critique of existing conservation action)**
3	**Tu**	Using Marxan 1a – Mammal conservation in Utah (Computer lab)
	Thu	Using Marxan 1b – Mammal conservation in Utah (Computer lab)
4	**Tu**	Using Marxan 1c – Mammal conservation in Utah (Computer lab)
	Thu	The risk of failure - Introducing Marxan with Probability (Lecture/Discussion) **(*Pre-reading, Hammill et al 2016*)**
5	**Tu**	Using Marxan 2a – Wetland restoration incorporating drought and fire risk (Computer lab)
	Thu	Using Marxan 2b – Wetland restoration incorporating drought and fire risk (Computer lab)
6	**Tu**	Using Marxan 2c – Wetland restoration incorporating drought and fire risk (Computer lab) **(Hand in assignment 2 – short report on Utah mammal conservation)**
	Thu	Formulating Marxan analyses (Lecture/Discussion) **(Pre-reading, Adame *et al 2014*)**
7	**Tu**	Guided design of individual Marxan analyses (Discussion)
	Thu	Using Marxan 3a – Individual analyses (computer lab) **(Hand in assignment 3 – short report on wetland restoration)**
8	**Tu**	Using Marxan 3b – Individual analyses (computer lab)
	Thu	Using Marxan 3c – Individual analyses (computer lab)
9	**Tu**	Using Marxan 3d – Individual analyses (computer lab)
	Thu	Using Marxan 3e – Individual analyses (computer lab)
10	**Tu**	Oral presentation of individual analyses and critique
	Thu	**Final project (Assignment 4) Due 1 week after final class meeting**

Academic Dishonesty

This course follows the University rules on civility and honesty. These can be found at http://www.usu.edu/policies/PDF/Acad-Integrity.pdf.

USU defines **cheating** as "intentionally: (1) using or attempting to use or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity; (2) depending upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; (3) substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work; (4) acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission; and (5) engaging in any form of research fraud." **Falsification**, "includes the intentional and unauthorized altering or inventing of any information or citation in an academic exercise or activity." **Plagiarism**, "includes knowingly representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials." (This includes internet sources.) The penalty for cheating in this class will be a zero grade for the exam or assignment in question. In addition, the offense will be reported to the Office of Student Conduct for inclusion in the student's permanent record.

THIS SYLLABUS IS NOT A CONTRACT
Aspects of the lectures, discussions, computer labs and assignments may be changed depending on progressions.