APPLIED BIODIVERSITY SCIENCE I
GEOG 689/WFSC 689
(Fall 2011) T, R 11:10-12:25 pm, Nagle 207

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"Conservation cannot be achieved without the soundest information from the natural and social sciences."
Jose Sarukhan, Institute of Ecology, National University of Mexico

OVERVIEW

Efforts to halt the loss of biodiversity must be based on integration between science and practice. Linking theory with conservation requires the engagement of many different actors, including biologists and social scientists, universities and museums, governments and nongovernmental organizations, industries, interest groups, and communities. Such collaboration is critical for establishing conservation priorities, developing ecologically and socially acceptable management plans, building local capacity for stewardship, and guiding effective policy. Currently, a great deal of conservation research is based in universities with few linkages between scientists and practitioners, or between theory and on-the-ground work. Moreover, research on patterns and processes that underlie the loss of biodiversity are often conceptual and discipline specific, with few lessons shared among researchers from diverse disciplines.

Our goal in this course is to build cross-disciplinary understanding of biodiversity science. We ask:

1) What is biodiversity? How is it perceived, valued, measured, monitored, and protected?
2) What are the main concerns surrounding biodiversity? Who voices these concerns and why?
3) What are current perspectives about biodiversity conservation from evolutionary and community ecology, conservation biology, environmental anthropology, and political ecology?
4) What can we learn from popular and academic case studies?

REQUIREMENTS

Participation (*20 points*): The class is a seminar, facilitated by a geographer and a biologist. We will draw on our disciplinary backgrounds as we discuss various conservation issues and paradigms. We are relative beginners in each other's field. Each of you too will be a novice in some things, an expert in others. This is the nature of multidisciplinary collaboration. We encourage you to speak up about what you know well and listen carefully to the things that are new. Please prepare for each class by reading the assigned articles, taking notes, and bringing questions, analyses, and critiques.

Facilitation of discussion (*30 points)*: Each of you will be responsible for facilitating one of the weekly topics. You will work in pairs. Preparation will include reading and synthesizing the main messages from that week's readings, building a discussion plan, and guiding our conversation.

Team Project (*50 points)*: We will assemble groups of 3-4 people to carry out a team project. The aim is to provide an academic response to a recent popular media piece on conservation. The project has three parts: a) White Paper, b) Presentation, and c) Reading Selection.

a) White Paper

- Please address the following questions in relation to the popular media piece:
  - What is the conservation concern or challenge?
  - What are the proposed solutions?
  - What is your informed perspective?
  - What theoretical frameworks, scientific research, empirical data, and/or case studies can you bring to bear on this topic? You may include a conceptual framework, a literature review, data tables, and so forth.
  - What are the implications of your perspective for policy?
- Limited to 10 pages, double-spaced, not including literature cited.

- The series of "Working Papers" produced by the Wildlife Conservation Society may serve as a model for what you will write (http://archive.wcs.org/wcspubs/science.html)The first half of the following example may be especially useful: *Casting for Conservation actors: people, partnerships and wildlife* (http://archive.wcs.org/media/file/wcswp28.pdf)

b)Presentation

Each team has two class periods to cover the topic. You may devote some of the time to teaching the class about your conservation issue or presenting the topic generally. Be sure to allow enough time for seminar discussion as well.

c)Reading Selection

Two weeks before your team's presentation, please provide the class with 2-3 articles we should read in preparation for the discussion.

Grading: A=90-100 points, B=80-89 points, C=70-79 points, D=60-69 points, F=below 60 points

BOOKS: Contrasting perspectives on biodiversity conservation

- We will select and read two books that discuss biodiversity conservation from a social science perspective and from an ecological science perspective. In the past we've read Song of the Dodo, by Quammen and Conservation Refugees by Dowie.

SCHEDULE

INTRODUCTION		
	Applied Biodiversity Science	
	Defining and Measuring Biodiversity	
STUDENT-LED SEMINARS		
	Cultural Diversity	
	Assessment and Monitoring of Biological and Cultural Diversity	
	Political Ecology	
	Crisis of Loss	
	Questioning the Commons	
SYNTHESIS		
Setting Priorities		
TEAM PANELS AND DISCUSSIONS		
Conservation: Popular and Academic		*Paying Farmers for Conservation*
		African Mammals in North America
		Black Markets for Wildlife
GUEST LECTURE		
Conservation and Citizen Science		
BOOK FORUM		
Contrasting viewpoints from two books		
EVALUATION		
Insights, lessons, new questions		

TOPICS and READINGS

Aug. 30, Sept. 1: APPLIED BIODIVERSITY SCIENCE In the first week, we set the stage for our discussions about biodiversity, culture, ecology, governance, and conservation. We will discuss the intersections between ecosystems and social systems, and we will define as a group what we mean by Applied Biodiversity Science.
Readings:

- Friedman, T. 2009 Connecting Nature's Dots. The New York Times, August 23, 2009. http://www.nytimes.com/2009/08/23/opinion/23friedman.html
- Schwartz, M. 2008. The importance of stupidity in scientific research
- Sutherland, W.J., et al. One Hundred Questions of Importance to the Conservation of Global Biological Diversity.
- Fitzgerald, L. and Stronza, A.2009. Applied Biodiversity Science: Integrating Ecology, Culture, and Governance for Effective Conservation, *Interciencia* 34(8):563-570.

Sept. 6, 8: DEFINING AND MEASURING BIODIVERSITY Here we learn and discuss definitions of biodiversity, species diversity, and patterns of biological diversity (including species-area relationship, island biogeography, latitudinal gradient in species richness, local and regional richness, species-elevation relationship, and macroecological rules).
Readings:

- Hunter Jr., M. L. (1996) What is Biodiversity? pp. 19-31 *In* Fundamentals of Conservation Biology. Blackwell.
- Purvis and Hector (2000) Getting the measure of biodiversity. *Nature* 405:212-219.
- Gaston KJ (2000) Global patterns in biodiversity. *Nature* 405:220-227.
- Rodda, G (1993) How to lie with Biodiversity. *Conservation Biology* 7 (4):959-960
- Escobar, Arturo (1998) Whose Knowledge, Whose nature? Biodiversity, Conservation, and the Political Ecology of Social Movements *Journal of Political Ecology* Vol.5: 53-82.
- Petchey et al. 2004. How do different measures of functional diversity perform? Ecology 85: 847-857.

Sept. 13, 15: CULTURAL DIVERSITY Relationships between humans and nature vary cross-culturally, over time, in different social and economic settings, and by ecosystem. This week, we explore the interface between human populations and ecosystems, viewing culture as something that influences the natural environment and is, in turn, shaped by it.
Readings:

- Cronon, William (1995) The Trouble with Wilderness; or, Getting Back to the Wrong Nature *In* Uncommon Ground: Rethinking the Human Place in Nature. New York: W.W. Norton & Co., William Cronon, Ed., pp 69-90.
- Holling CS. (2001) Understanding the Complexity of Economic, Ecological and Social Systems. *Ecosystems* 4: 390-405.
- Jelinski, Douglas (2005). There is No Mother Nature—There is No Balance of Nature: Culture, Ecology and Conservation. *Human Ecology,* Vol. 33 (2), pp. 271-288.

Sept. 20, 22: ASSESSMENT AND MONITORING OF BIOLOGICAL AND CULTURAL DIVERSITY: Given operational definitions of aspects of biological and cultural diversity, conservationists must focus on mapping patterns and evaluating trends over time. The assessment and monitoring of diversity are both essential to setting conservation priorities, yet these aspects of conservation science are often challenging to carry out and difficult to finance. This week we review challenges in determining patterns and trends in biodiversity.
Readings:

- De Fries R, Rovero F, Wright P, Ahumada J, Andelman S, et al. (2010) From plot to landscape scale: linking tropical biodiversity measurements across spatial scales. Front Ecol Environ 8: 153-160.
- Pereira HM, Cooper HD. (2006) Towards the global monitoring of biodiversity change. Trends Ecol Evol 21: 123-129.
- Scholes RJ, Mace GM, Turner W, Geller GN, Jurgens N, et al. (2008) Toward a global biodiversity observing system. Science 321: 1044-1045.
- Walpole M, Almond REA, Besançon C, Butchart SHM, Campbell-Lendrum D, et al. (2009) Tracking progress toward the 2010 biodiversity target and beyond. Science 325: 1503-1504.

- Butchert SHM, Walpole M, Collen B, van Strien A, Scharlemann JPW et al. (2010) Global biodiversity: indicators of recent declines. Science 328: 1164-1168.
- Sachs JD, Baillie J, Sutherland WJ, Armsworth PR, Ash N, et al. (2009) Biodiversity and the Millennium Development Goals. Science 325: 1502-1503.

Sept. 27, 29: POLITICAL ECOLOGY People make decisions about their environment in the context of many factors. These include policies and institutions, economic incentives, and social relations of power at different scales, from the local to the regional and the global. This week, we examine these dimensions of biodiversity loss and conservation with the help of an analytical framework known as political ecology.
Readings:

- Sherbinin, A. de, Carr, D., Cassels, S., Jiang, L. 2007. Population and Environment Annual Review of Environment and Resources, Vol. 32: 345-373.
- The Bigger Picture pp. 156-180 In Borgerhoff Mulder, M. and Coppolillo, P. 2005. Conservation: Linking Ecology, Economics, and Culture. Princeton, NJ: Princeton University.
- Stonich, S., and DeWalt, B. 2006. The Political Ecology of Deforestation in Honduras. pp. 284-301. In Haenn, N. and Wilk, R. The Environment in Anthropology. New York, NY: New York University Press.
- Robbins, P. F., A. K. Chhangani, J. Rice, E. Trigosa & S. M. Mohnot (2007) Enforcement Authority and Vegetation Change at Kumbhalgarh Wildlife Sanctuary, Rajasthan, India. *Environmental Management,* 40**,** 365-78.

Oct. 4, 6: CRISIS OF LOSS: Throughout your careers you have been led to believe that our planet is experiencing the 6th major extinction event, equal in magnitude to the mass extinctions in the geologic past. The 6th extinction is caused by human activities. To understand something so important at a scientific level, we will review the processes that result in the generation of biodiversity and some causes of extinction. We will take a scientific look at the logic and evidence for the extinction crisis.
Readings:

- Pimm et al. 1995. The Future of Biodiversity. Science. 269:347-350
- Jablonski et al. 2004. Extinction risk from climate change. Nature 427:145-148. Hooper et al. 2005. Effects of biodiversity on ecosystem functioning: A consensus of current knowledge. Ecological Monographs 75(1):3-35.
- Stuart et al. 2004. Status and trends of amphibian declines and extinctions worldwide. Science 306:1783-1786.
- Dunn et al. 2009. The sixth mass coextinction: are most endangered species parasites and mutualists? Proceedings of the Royal Society B-Biological Sciences 276:3037-3045.

Oct. 11, 13: QUESTIONING THE COMMONS: How should society manage resources like water, air, wildlife, and fish that belong to everyone? In 1968, Garrett Hardin addressed this question in an essay that became one of *Science*'s most popular articles. Hardin argued that humans seek to maximize their individual gains and thus deplete the common resources on which everyone depends. He called this the "tragedy of the commons." Hardin's article spawned a great deal of policy, controversy, new theory, and research on "common property resource management." This week, we read the original essay and ideas that emerged in subsequent years about sustainable governance of common resources.
Readings:

- Hardin, G. (1968) The Tragedy of the Commons *Science* 162:1243-1248.
- Ostrom, E., Burger, J., Field, C.B., Norgaard, R.B., Policansky, D. (1999) Revisiting the commons: local lessons, global challenges. *Science* 284:278–82
- Agrawal, A. (2001) Common Property Institutions and Sustainable Governance of Resources. *World Development* 29(10):1649-1672.
- Berkes, F. (2003). "Rethinking Community-Based Conservation" *Conservation Biology*, 18(3): 621-630.

Oct. 18, 20: SETTING PRIORITIES Ideally, conservationists would have the wherewithal to protect all biodiversity everywhere effectively and with high levels of investment and effort. Of course, this is impossible as political, economic, and social capital for conservation is limited. Thus priorities must be established to determine where to focus first and most intensively. The identification of biodiversity "hotspots" has been one approach to

prioritization. This week, we examine how "hotspots" have been defined and critiqued, and we discuss the implications for conservation.

Readings:

- Jepson and Canney 2001. Hot for what?
- Kareiva and Marvier. 2003. Conserving Biodiversity Coldspots. *Am. Sci.* (Includes letter to editor and replies.)
- Orme et al. 2005. …hotspots not congruent with endemism or threat. *Nature.* (includes news and views feature by Possingham and Wilson)
- Brooks et al. 2006. Global biodiversity conservation priorities. Science 313: 58-61.

CONSERVATION: POPULAR AND ACADEMIC

Oct. 25, 27	*New York Times* **In Brazil, Paying Farmers to Let the Trees Stand** by Elisabeth Rosenthal http://www.nytimes.com/2009/08/22/science/earth/22degrees.html
Nov. 1, 3	*MediaStorm.com* **Project: Black Market** by Patrick Brown http://www.mediastorm.com/0015.htm

Nov. 15, 17: CONSERVATION AND CITIZEN SCIENCE (Guest Lecture, Leslie Ruyle)

Readings:

- TBA

Nov. 22: Review
THANKSGIVING HOLIDAY

Nov. 29, Dec. 1: BOOK FORUM

Dec. 6: EVALUATION

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Americans with Disabilities Act (ADA) Policy Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Room 126 of the Koldus Building or call 845-1637.

Academic Integrity

"An Aggie does not lie, cheat, or steal or tolerate those who do."
Know the Aggie Honor Code: http://www.tamu.edu/aggiehonor/.

Academic Misconduct

Texas A&M University student rules Section 20 outlines official policies on scholastic dishonesty and academic misconduct (http://www.tamu.edu/aggiehonor/). Section 20 declares, "It is the responsibility of students and instructors to help maintain scholastic integrity at the University by refusing to participate in or tolerate scholastic dishonesty." Further, Section 20 defines a variety of categories of academic misconduct. I strongly encourage you to read the rules and definitions; they are a good resource of critical information (http://www.tamu.edu/aggiehonor/Student%20Rules/definitions.html). You are responsible for complying with them; ignorance of these rules is not an acceptable excuse for not doing so.