THE SCHOOL FOR FIELD STUDIES

Conservation Science & Practice
SFS 3800

Megan English, Ph.D.
Resident Lecturer

The School for Field Studies (SFS)
Center for Conservation and Development
Siem Reap, Cambodia

This syllabus may develop or change over time based on local conditions, learning opportunities, and faculty expertise. Course content may vary from semester to semester.

Course Overview

The field of conservation is focused on protecting biological diversity, including ecosystems, species, and genes, through promoting processes, both ecological and social, that support biodiversity. Conservation science is by nature an interdisciplinary field, where concepts and research in ecology, environmental science, taxonomy, and evolution inform the practical applications of social, economic, and political sciences. Conservation is as much about managing wildlife as it is about managing people. Dramatic changes are occurring in almost every corner of the world; many changes are anthropogenic – caused by 'us'. Our activities are changing atmospheric gases and contributing to climate change. We are overexploiting natural resources, polluting ecosystems, and causing habitat destruction at such a high rate that many scientists believe that we have entered the sixth mass extinction of life on Earth. The overarching goal of this course is to make students aware of the enormous responsibility humans have as stewards of the natural environment, and to provide them with the concepts, tools, and incentives to affect conservation of the natural environment.

While Cambodia and Vietnam are developing rapidly, their biodiversity is being degraded at an alarming rate. Even though these countries support tremendous biodiversity, biological data are very limited. This biodiversity cannot be effectively conserved without understanding current environmental status and fundamental ecological relationships as well as the effectiveness of conservation approaches. This kind of knowledge is urgently needed for sustainable biodiversity conservation in this region. There are numerous conservation initiatives and efforts, however, very often these efforts are short term and their outcomes have never been evaluated.

This course will provide background information on the current status and trends of biodiversity, knowledge on ecological concepts, and tools to assess conservation approaches. While the course will expose students to broad issues that face the entire planet, we will focus on practical aspects of the course on local case studies. Students will learn concepts in conservation science both theoretical and practical from lectures and field trips. Throughout the semester, students will be exposed to a wide range of local conservation practices through discussions, direct observations, and assessments of various conservation programs that are being implemented and co-managed by diverse stakeholders including: government agencies, private companies, local and international organizations, and local villagers. The course will provide students with a background to engage in the 'conservation conversation'. By undertaking field trips to various conservation project sites, students gain first-hand information about different conservation challenges and approaches from diverse stakeholders such as decision makers; park rangers; educators; and conservation activists who are active in the conservation field in both Cambodia and Vietnam.

Learning Objectives

Students will draw on observations and scientific evidence to make decisions about the efficacy of conservation practices. Students will be able to:

1. Relate the major principles of ecology and evolution in conceptualizing and practically applying the science of conservation biology;
2. Identify the current questions being addressed by conservation research in both global and local perspectives;
3. Define the major threats to biological diversity and identify both direct and indirect drivers of the threats;
4. Identify the current political and economic concerns of conservation, the actors involved, and their roles and methods in policy formation; and
5. Employ field research methods and analytical tools, including qualitative and quantitative methods to address ongoing conservation issues.

Assessment

Assessment Item	Value (%)
Class participation	5
Interpreting a scientific paper and writing an Abstract	5
Field work participation	5
Field exercise assignment	
Citizen Science-Bat Behavior	10
Elephant Health & Welfare	10
Mid-term exam	20
Conservation project grant proposal	15
Grant proposal presentation	5
Final exam	25
Total	100

Assessment Descriptions

Interpreting a scientific paper and writing an abstract (5%): This assignment aims to provide the training required to understand and critique a scientific paper. Students will learn to understand and articulate the qualities that produce a high quality publication, such as content, structure, use of appropriate language and compelling or practical findings. Students will be divided into six small groups and will be given a scientific paper, with no Abstract, and asked to discuss the content and structure of the paper to the class. Each group will then be given one hour to write a concise abstract of the paper (around 250-300 words) ensuring that they meet the criteria discussed in class.

Conservation project grant proposal (15%): For this project you will be working in four groups (three groups of four students and one group of five students). You will be required to conceptualize a conservation plan for a local area in Cambodia. Each group will visit and choose from one of the local conservation initiatives including: BeTreed Ecotourism Site, Mekong Centre for Turtle Conservation (MTCC), Irrawaddy dolphin protection (WWF) and conservation strategies in high deforestation zones (WCS). Students will focus on grant proposals aimed at specific species, entire ecosystems, particular habitats, environmental education or the human-wildlife interface. At each location, you will meet and interview representatives from these conservation organizations. This assignment requires each student

group to write a grant proposal to submit for funding for the project implementation. The proposal will include a detailed physical description of the area, a list of conservation objectives (saving a species, preventing habitat degradation etc.), a plan to implement measures that fulfill the objectives, a method to monitor and evaluate the project implementation and its outcomes, and a plan to involve stakeholders. The primary goal is for you to understand the processes of grant proposal writing as well as to learn how to coordinate the many kinds of actors and conditions that conservationists often face when implementing a plan or writing a grant proposal. Teamwork will be essential for this project. Each group will make a 20 minute oral and visual presentation to their classmates about their respective conservation project.

Field exercises (10% each): Two field exercises (FEXs) will be assigned during the semester. For the first FEX, you will be conducting a study of bats in the Siem Reap Botanical Gardens as part of your urban conservation and citizen science section of the syllabus. The focus of this report will be to critique two different count methods and design a monitoring program that would yield reliable/comparable data over time (including methods, sampling effort and frequency). For the second FEX you will be divided into four groups with each group tasked with writing a report on the health and welfare of elephant's in captivity in Asia as well as assess the health of an individual elephant at Elephant Valley Project. You will also be asked to discuss the role of captive elephants in Bunong culture, an indigenous people.

Exams (20% / 25%): You will have two written exams and you will be given time to study for these exams; a class period will be designated as 'review' session to recap the semesters lessons and give students a chance to gain feedback from their professor. You will be examined on what you have been exposed to in class (lectures, discussions, and readings) and during field trips.

Grading Scheme

A	95.00 – 100.00%	B+	86.00 – 89.99%	C+	76.00 – 79.99%	D	60.00 – 69.00%
A-	90.00 – 94.99%	B	83.00 – 85.99%	C	73.00 – 75.99%	F	0.00 – 59.99%
		B-	80.00 – 82.99%	C-	70.00 – 72.99%		

General Reminders

Readings: You are expected to have read all the required articles / book chapters prior to each class. Information from required readings will be part of the course assessments. All readings are available as PDFs on the Student Drive or from a common laptop. It is encouraged that 'optional readings' be reviewed by students. The reading list might be updated or changed during the course of the semester and some readings that are initially listed as 'optional' may be changed to 'required'.

Plagiarism: Using the ideas and material of others without giving due credit, is cheating and will not be tolerated. A grade of zero will be assigned if anyone is caught cheating or aiding another person to cheat actively or passively (e.g., allowing someone to look at your exam). All assignments unless specifically stated should be individual pieces of work.

Deadlines for written and oral assignments are instated for several reasons: They are a part of working life to which students need to become accustomed and promote equity among students, and deadlines allow faculty time to review and return assignments before others are due.

Assignments will be handed back to students after a one-week grading period. Late assignments will incur a 10% penalty for each day that they are late. No assignment will be accepted after three days.

Participation: Since we offer a program that is likely more intensive than you might be used to at your home institution, missing even one lecture can have a proportionally greater effect on your final grade simply because there is little room to make up for lost time. Participation in all components of the program is mandatory because your actions can significantly affect the experience you and your classmates have while at SFS. Therefore, it is important that you are prompt for all land and water based activities, bring the necessary equipment for field exercises and directed research, and simply get involved.

Course Content

Key: **L** = lecture, **FC** = field component

Lecture Title and Description	*Type*	*Time (Hours)*	*Readings*	*Field Trips/ Assignments*
Course introduction Nature in an era of global change Anthropocene	L	1.5		
Introduction to conservation perspectives What is conservation science? Why is conservation needed? Conservation stakeholders in Cambodia	L	1.5	Kareiva and Marvier (2012)	
Introduction to Biodiversity Definition of biological diversity Values of biodiversity Threats to biodiversity Endangered species	L	3.5	Sodhi (2004)	Ankor Centre for Conservation and Biodiversity (ACCB)
Protected Areas Categories & purposes of Protected Areas International agreements Community Protected Areas	L/FC	1.5	Sunderland et al. (2013) (Introduction chapter) Souter et al. (2016)	
Deciphering a scientific paper Understand & critique a scientific paper Develop understanding of content, organization, first disclosure, valid publication and appropriate language Methods for writing a concise Abstract	L	2.5		Writing an Abstract
Urban Conservation & Citizen science What is urban conservation? Why is urban conservation needed? Conservation stakeholders in Cambodia	L/FC	7	McIntyre et al. (2000)	Botanical garden bat survey, Siem Reap FEX 1- Bat survey techniques

Lecture Title and Description	*Type*	*Time (Hours)*	*Readings*	*Field Trips/ Assignments*
Conservation Planning and Priorities Global geographic priorities Ecoregions for conservation planning Conservation efforts in Cambodia Conservation challenges and opportunities Grant proposal writing workshop	L/FC	6	Brooks et al. (2006)	 MTCC WWF WCS Conservation project proposal Proposal presentation
Field research techniques Why do we monitor? Monitoring techniques Issues faced in the field Elephant health & welfare	L/FC	11.5	Buchholz (2007) Optional - Silvera et al. (2003)	BeTreed, EVP FEX 2 - Elephant Health and Welfare
Conservation Strategies Payment for Ecosystem Services Protected Area Management In situ vs. ex situ conservation approaches	L/FC	8.5	Spiteri & Nepalz (2006)	MTCC WWF WCS
Wetland Ecology Ecosystem services in a wetland ecosystem Research methodologies	L/FC	8.5		Banteay Srei Wetland Site
Tonle Sap Biodiversity Species richness and abundance Morphological diversity Morphological analyses Fishing-down-the-food-web model Tragedy of the Commons	L/FC	7.5	Campbell et al. (2006) Pauly et al. (1998)	Prek Toal Bird Sanctuary – Bird monitoring
Statistics lecture for fish morphology	L	1.5		
Ecological engineers & keystone species What role do they play? Importance for biodiversity Ecological engineers and keystone species in Cambodia	L	1.5	Jones et al. (1994)	

Lecture Title and Description	*Type*	*Time (Hours)*	*Readings*	*Field Trips/ Assignments*
The illegal wildlife trade in South-East Asia Corruption in conservation Hindering conservation efforts Biodiversity loss What species are targeted? Influence of socioeconomics Impact on ecosystems	L	1.5	Robbins et al. (2005) Optional -Ngoc et al. (2013)	
The Future of Conservation Re-wilding Coupling human-nature systems	L	1.5	Doak et al. (2015) Ceballos et al. (2017)	
Total Contact Hours (plus 3 hours of review sessions)		**65.5**		

Primary Readings

Brooks, T.M., Mittermeier, R.A., de Fonseca, G.A.B., Gerlach, J., Hoffman., M., Lamoreux, J.F., Mittermeier, C.G., Pilgrim, J.D. & Rodrigues, A.S.L (2006). Global Biodiversity Conservation Priorities. *Science,* 313, p 58.

Buchholz, R. (2007). Behavioural biology: an effective and relevant conservation tool. *Trends in Ecology & Evolution*, *22*(8), 401-407.

Campbell, I. C., Poole, C., Giesen, W., & Valbo-Jorgensen, J. (2006). Species diversity and ecology of Tonle Sap Great Lake, Cambodia. *Aquatic Sciences*, *68*(3), 355-373.

Ceballos, G., Ehrlich, P.R. & Dirzo, R. (2017). Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines, *PNAS, 201704949*

Doak, D. F., Bakker, V. J., Goldstein, B. E., & Hale, B. (2015). What is the future of conservation? In *Protecting the Wild* (pp. 27-35). Island Press/Center for Resource Economics.

Jones, C. G., Lawton, J. H., & Shachak, M. (1994). Organisms as ecosystem engineers. In *Ecosystem management* (pp. 130-147). Springer New York.

Kareiva, P., & Marvier, M. (2012). What is conservation science? *BioScience*, *62*(11), 962-969.

McIntyre, N. E., Knowles-Yánez, K., & Hope, D. (2008). Urban ecology as an interdisciplinary field: differences in the use of "urban" between the social and natural sciences. *Urban Ecology*, 49-65.

Ngoc, A. C., & Wyatt, T. (2013). A green criminological exploration of illegal wildlife trade in Vietnam. *Asian Journal of Criminology*, *8*(2), 129-142.

Pauly, D., Christensen, V., Dalsgaard, J., Froese, R., & Torres, F. (1998). Fishing down marine food webs. *Science*, *279*(5352), 860-863.

Robbins, P., McSweeney, K., Waite, T., & Rice, J. (2006). Even conservation rules are made to be broken: implications for biodiversity. *Environmental Management*, *37*(2), 162-169.

Silvera, L., Jácomo, A. T., & Diniz-Filho, J. A. F. (2003). Camera trap, line transect census and track surveys: a comparative evaluation. *Biological Conservation*, *114*(3), 351-355.

Sodhi, N. S., Koh, L. P., Brook, B. W., & Ng, P. K. (2004). Southeast Asian biodiversity: an impending disaster. *Trends in Ecology & Evolution*, *19*(12), 654-660.

Spiteri, A., & Nepalz, S. K. (2006). Incentive-based conservation programs in developing countries: a review of some key issues and suggestions for improvements. *Environmental Management*, *37*(1), 1-14.

Souter, V. et al, (2016). Will the recent changes in protected area management and the creation of five new protected areas improve biodiversity conservation in Cambodia? *Cambodian Journal of Natural History* (1), 1-5.

Sunderland et al. (2013). Doi: http://www.cifor.org/publications/pdf_files/Books/BSunderland1301.pdf