THE SCHOOL FOR FIELD STUDIES

# Conservation Science & Practice
# SFS 3800

**Syllabus**

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.

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## COURSE CONTENT SUBJECT TO CHANGE

***Please note that this is a copy of a recent syllabus. A final syllabus will be provided to students on the first day of academic programming.***

SFS programs are different from other travel or study abroad programs. Each iteration of a program is unique and often cannot be implemented exactly as planned for a variety of reasons. There are factors which, although monitored closely, are beyond our control. For example:

- Changes in access to or expiration or change in terms of permits to the highly regulated and sensitive environments in which we work;
- Changes in social/political conditions or tenuous weather situations/natural disasters may require changes to sites or plans, often with little notice;
- Some aspects of programs depend on the current faculty team as well as the goodwill and generosity of individuals, communities, and institutions which lend support.

Please be advised that these or other variables may require changes before or during the program. Part of the SFS experience is adapting to changing conditions and overcoming the obstacles that may be present. In other words, the elephants are not always where we want them to be, so be flexible!

## 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 is developing rapidly, its biodiversity is being degraded at an alarming rate. Even though this country supports tremendous biodiversity, biological data is 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 Cambodia.

## 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 Census | 10 |
| Elephant ecosystem engineers | 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:** 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 five groups of two and one group of three 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**: For this project you will be working in five groups (three groups of three and two groups of two). 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: Angkor Centre for Conservation and Biodiversity (ACCB), BeTreed Ecotourism Site, Elephant Valley Project (EVP), Irrawaddy dolphin protection or Urban ecology and citizen science. Students will focus on grant proposals aimed at specific species, entire ecosystems, particular habitats, ecotourism,

environmental education or the human-wildlife interface. Throughout the semester you will meet and interview representatives involved in these conservation initiatives. This assignment requires each student group to write a grant proposal to submit for funding for the project implementation (US$15,000). The proposal will include a detailed physical description of the area, a list of conservation objectives (saving a species, preventing habitat degradation, improving facilities 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 15 minute oral and visual presentation to their classmates about their respective conservation project.

**Field exercises:** 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 tasked with writing a report on the important role that elephants play in ecosystem health, specifically as ecosystem engineers. You will spend a day observing elephants foraging in the forest at Elephant Valley Project to guide you with this essay-style report.

**Exams**: 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**: Each student will select one reading from the list that they will summarize and share with the class before each relevant lecture. All students are expected to make notes on the paper being presented, for reference during exams, and where possible one question will be proposed to the class for a 5-minute discussion to begin each lecture. All readings are available as PDFs on the Student Drive or from a common laptop. The reading list might be updated or changed during the course of the semester.

**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

| *Lecture Title and Description* | *Time (hrs) and Type* | *Readings* | *Field Trips/ Assignments* |
|---|---|---|---|
| Course introduction<br>Nature in an era of global change<br>• Anthropocene | Lecture (1.5) | | |
| Introduction to conservation perspectives & Grant proposals assignment<br>• What is conservation science?<br>• Why is conservation needed?<br>• Conservation stakeholders in Cambodia<br>• Grant proposal assignment | Lecture (2) | Kareiva and Marvier (2012) | Grant proposal<br>Proposal presentation |
| Introduction to Biodiversity<br>• Definition of biological diversity<br>• Values of biodiversity<br>• Threats to biodiversity<br>• Endangered species | Lecture + field component (4.5) | Sodhi (2004) | Angkor Centre for Conservation and Biodiversity (ACCB) |
| Deciphering a scientific paper<br>• Understand & critique a scientific paper<br>• Develop understanding of content, organization, first disclosure, valid publication and appropriate language<br>• Methods for writing a concise Abstract | Lecture (2.5) | | Writing an Abstract |
| Conservation Planning and Priorities<br>• Global geographic priorities<br>• Ecoregions for conservation planning<br>• Conservation efforts in Cambodia<br>• Conservation challenges and opportunities | Lecture + Field component (4.5) | Brooks et al. (2006) | Wildlife Conservation Society<br>BeTreed |

| *Lecture Title and Description* | *Time (hrs) and Type* | *Readings* | *Field Trips/ Assignments* |
|---|---|---|---|
| Urban Conservation & Citizen science<br>• What is urban conservation?<br>• Why is urban conservation needed?<br>• Conservation stakeholders in Cambodia | Lecture + Field component (7) | McIntyre et al. (2000)<br>(Separate readings for FEX will be given) | Royal Palace Gardens bat survey, Siem Reap<br><br>FEX 1- Bat survey techniques |
| Protected Areas<br>• Categories & purposes of Protected Areas<br>• International agreements<br>• Community Protected Areas | Lecture (1.5) | Sunderland et al. (2013) (Introduction chapter)<br>Souter et al. (2016) | |
| Field research techniques<br>• Why do we monitor?<br>• Monitoring techniques<br>• Issues faced in the field | Lecture + Field Component (15) | Buchholz (2007) | BeTreed<br>Elephant Valley Project |
| Conservation Strategies<br>• Payment for Ecosystem Services<br>• Protected Area Management<br>• In situ vs. ex situ conservation approaches | Lecture (1.5) | Spiteri & Nepalz (2006) | |
| Ecological engineers & keystone species<br>• What role do they play?<br>• Importance for biodiversity<br>• Ecological engineers and keystone species in Cambodia | Lecture (1.5) | Jones et al. (1994) (separate Reading Will be given for FEX 2) | FEX 2- Elephants as ecosystem engineers |
| Elephant Health and Welfare | Lecture (1) | | |
| Wetland Ecology & Forest Restoration<br>• Ecosystem services in a wetland<br>• Forest restoration research methodologies | Lecture + Field component (5.5) | | Khun Ream/ Prey Krognong restoration site |

| *Lecture Title and Description* | *Time (hrs) and Type* | *Readings* | *Field Trips/ Assignments* |
|---|---|---|---|
| Tonle Sap Biodiversity<br>• Species richness and abundance<br>• Morphological diversity<br>• Fishing-down-the-food-web model<br>• Tragedy of the Commons | Lecture + Field component (6) | Campbell et al. (2006)<br>Pauly et al. (1998) | Prek Toal Bird Sanctuary – Bird monitoring |
| The illegal wildlife trade in South-East Asia<br>• Corruption in conservation<br>• Hindering conservation efforts<br>• Biodiversity loss<br>• What species are targeted?<br>• Influence of socioeconomics<br>• Impact on ecosystems | Lecture (1.5) | Robbins et al. (2005) | |
| The Future of Conservation<br>• Coupling human-nature systems<br>• Discussion and survey | Lecture (1.5) | Doak et al. (2015) | |
| Total Hours (plus 3 hours of review sessions) | 60 | | |

## Reading List


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.

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.

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.

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. Simpson, A. Mould, J.C. Eames, T.N.E., Gray, R. Sinclair, T. Farrell, J., Jurgens A. & Billingsley, A. (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, T.C.H., Sayer, J.A. & Hoang, M.H. (2013). Introduction: evidence-based conservation from the Lower Mekong. *Evidence-based Conservation Lessons from the Lower Mekong.* Center for International Forestry Research p 3-14.