Conservation Science and Practice
SFS 3800

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Center for Amazon Studies (CAS)

Iquitos, Peru
**Course Overview**

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. Dramatic changes are occurring in almost every corner of the world; many of which are a result of anthropogenic disturbances. Human activities are changing atmospheric gases and contributing to climate change. Humans are overexploiting natural resources, polluting ecosystems, introducing exotic species into ecosystems, and causing habitat destruction at such a high rate that many scientists think that we have entered the sixth mass extinction of life on Earth. The fate of millions of species is dependent on actions that we take in the next few decades.

With a strong focus on the environmental biodiversity, and species conservation, and drawing largely from local examples that students will observe first-hand, this course explores the effect that humans have on nature and the solutions and mitigation that can be applied to protect biological diversity, ecosystems, species, and genetic diversity. By nature an interdisciplinary field, where concepts and research in ecology, environmental science, taxonomy, genetics, and evolution inform the practical applications of social, economic, and behavioral sciences, conservation is as much about managing people as it is about managing biodiversity.

The focus of the course is based largely on field exercises that build on three core themes that will be covered in a series of lectures, videos, and readings:

1. Conservation Science and Ecosystem Services
2. Threats to biodiversity
3. Conservation strategies and Alternative incomes

The conservation issues that students will observe in the Amazonian and Andean regions are highly varied, and many are repeated across the globe. Furthermore, by learning to critically examine and document the threats they see in the field students learn to apply their theoretical knowledge to complex real-world situations. Students will be able to draw parallels between Peruvian conservation strategies, and those used across the globe. The diversity of threats and conservation strategies students observe in Peru will allow an insight into the complexity of conservation biology and the importance of treating every issue within the local context, taking into account biological, environmental, social and political factors.

**Learning Objectives**

Students will draw on observations and evidence to assess threats, evaluate the efficacy of conservation practices and offer resource management strategies and alternative incomes to local communities. Students will be able to:

1. Identify the current questions being addressed by conservation science in both global and local perspectives
2. Define the major threats to biological diversity and identify both direct and indirect drivers of the threats
3. Employ field research methods and analytical tools, including qualitative and quantitative methods, that make up part of a practicing conservationists’ tool kit
4. Design and use wildlife survey techniques to assess wildlife populations, threats and the need for conservation action
5. Design and evaluate conservation strategies and plans aimed at protecting and supporting biodiversity, and promoting the social processes that enable these strategies

Assessments

<table>
<thead>
<tr>
<th>Assessment Item</th>
<th>Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral presentations (3)</td>
<td>15</td>
</tr>
<tr>
<td>Field Exercises (2)</td>
<td>20</td>
</tr>
<tr>
<td>Public dissemination ‘Popular press’ report - Pacaya Samiria</td>
<td>10</td>
</tr>
<tr>
<td>Field Journal (excursion to Cusco)</td>
<td>10</td>
</tr>
<tr>
<td>Participation</td>
<td>10</td>
</tr>
<tr>
<td>Essay responding to Pyron 2017</td>
<td>15</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Assessment Descriptions

A grading rubric will be provided for each assignment.

**Oral presentations (in pairs) (15%)**: Students will deliver an oral summary to the class (10 min). Two presentations will be at SFS center (PowerPoint presentations are optional) and one during a field trip. It is expected that you include your critique to the paper and/or personal opinion about the topic. Detailed instructions will be given at the start of the course.

**Field Exercises (20%)**: Two field exercises will be written up formally in the form of short scientific papers. These assignments should be no more than 3 pages (single space, not including bibliography, tables, or figures). The exercise itself will be done in groups, and the reports will be done in pairs. (Detailed instructions will be given in advance).
- Fisheries at Nauta. Estimation of size of three fish species at Nauta market and comparison to minimum size established by the local regulatory authorities.
- Study on extraction of leaves of “irapay” palms (*Lepidocaryum tenue*) for thatching, by the local community of Cahuide and UCP (Universidad Científica Peruana).

**Public dissemination ‘Popular press’ report on conservation research in Pacaya Samiria (10%)**: Wider dissemination – an article, blog, film or ‘popular press’ or social media piece on the value, threats, monitoring and conservation action in PSNR. This assignment is by nature ‘open’, but concise works are favored. Assignments will be assessed on the content of their story, but also the style and originality of
the final product. Assignments may be ‘published’ on social media, online, in university newspapers or elsewhere, but an offline version must be submitted for grading. (Products in Spanish are optional).

Field Journal (10%): A field journal will be kept during the excursion to Cusco and the surrounding area. Here you will record conservation issues that you observe, identifying what you think should be conserved and why, who the stakeholders are, what the threats are, and what conservation actions are currently in place. A field journal is different to your notes, it is produced to be read, understood and used by other researchers. Keeping the journal will help focus your observations and record them in a way that can be accessed and used in years to come. It can include maps, diagrams, illustrations and photographs or exclusively text. It can be submitted digitally or handwritten if legible. Students should seek guidance and feedback on their journal during the week in Cusco.

Participation (10%). Participation in all activities relating to the Conservation Science and Practice course is graded. Good participation can include asking questions and interacting with local experts during field excursions, expressing opinions during class discussions, and peer teaching. Your participation and interaction with community and project members is an important part of the course. Note that participation is scored particularly highly during guest lectures. Students can ask about their participation grading at any time of the semester.

Essay responding to Pyron (2017) (15%): Concise essay that integrates lectures, readings, videos, and/or field activities, focusing on the question “Why biological conservation matters” This assignment will be submitted one day after the last class is delivered. It is expected that you use at least ten scientific references (you may consider the course bibliography, as well as the one on Tropical Ecology of the Amazon and Political Ecology of Developing Landscapes courses). These assignments should be no more than 5 pages (single space, not including bibliography, tables, or figures).

Final Exam (20%): One final exam, which includes short answer and essay questions.

Grading Written Assignments
All assignments should be written and/or presented in grammatically correct English, using proper sentences, paragraphs, punctuation, etc. Writing should be succinct. An incoherent narrative will be considered an expression of faulty scientific reasoning. The evaluation of written work is holistic, with quality levels and criteria as stated below. Numbers are listed in parentheses beside each quality level, based on a grading scale of 100 points. A more-detailed grading rubric will be supplied in class.

Exceptional (95 to 100 points). The work goes well beyond the task assigned. It is impressive, unusually complete, and imaginative. Excellent use is made of the reference material cited within the paper or of examples cited. The scientific conclusions are clearly supported by data presented and there is evidence of originality in analysis. Reference material shows excellence with respect to both breadth and depth. Only outstanding submissions will be designated as Exceptional.

Strong (85 to 95 points). The work fully engages the major scientific principles embodied in the topic. Data are good and/ or well-chosen to convey information. The scientific analysis makes good use of the
data presented. The writing demonstrates a clear understanding of the fundamental issues of the topic being explored. Reference material is appropriate for the topic being discussed.

**Respectable (75 to 84 points).** A sensible approach to addressing the issues contained in the topic being explored is shown. The writing engages most of the appropriate scientific issues and principles. Some problems are evident: the choice of data or examples is correct, but incomplete; the scientific analysis, though generally correct, shows gaps; pertinent information may be missing. These omissions do not seriously hinder the usefulness of the work. Reference material is good but incomplete.

**Marginal (70 to 74 points).** The work partially engages the major scientific principles embodied in the topic being explored. The work generally relates to the assigned task, but gaps and problems are prominent and interfere with its effectiveness. Data or examples are poorly chosen and do not contribute substantially to the scientific analysis. The analysis has serious gaps. Reference material is shallow or only marginally appropriate.

**Weak (60-69 points).** The work shows little depth. The effort is spotty with only fragmentary evidence of understanding the data, examples, and reference material in reporting on the subject. The analysis is grossly incomplete, and reference material is absent or inappropriate. Minimal (less than 60 points). There is little or no meaningful effort in evidence. The approach taken is devoid of knowledge of the principles embodied in the topic being explored. Analysis is absent or shallow. No appropriate references are cited.

**Grading Scheme**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>95.00 – 100.00%</td>
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<tr>
<td>A-</td>
<td>90.00 – 94.99%</td>
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<tr>
<td>B+</td>
<td>86.00 – 89.99%</td>
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<tr>
<td>B</td>
<td>83.00 – 85.99%</td>
</tr>
<tr>
<td>B-</td>
<td>80.00 – 82.99%</td>
</tr>
<tr>
<td>C+</td>
<td>76.00 – 79.99%</td>
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<tr>
<td>C</td>
<td>73.00 – 75.99%</td>
</tr>
<tr>
<td>C-</td>
<td>70.00 – 72.99%</td>
</tr>
<tr>
<td>D</td>
<td>60.00 – 69.99%</td>
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<tr>
<td>F</td>
<td>0.00 – 59.99%</td>
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</tbody>
</table>

**General Reminders**

**Readings and Lecture Videos** - You are expected to have read any required articles and textbook readings prior to each class, as well as listen and watch all lecture videos. In order to encourage reading and watching lecture videos before coming to class or going to the field, discussions will reference readings and lecture videos for that particular day. All readings and lecture videos will be given to each student at the beginning 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** - Deadlines for written and oral assignments are stated 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 activities, bring the necessary equipment for field exercises and directed research, and simply get involved.

**Course Content**

Type: L- Lecture, FL- Field Lecture, FEX- Field Exercise, GL- Guest lecture

(Schedule may change due to unexpected circumstances).

<table>
<thead>
<tr>
<th>No. and Type</th>
<th>Time (hrs)</th>
<th>Location</th>
<th>Lecture / Activity</th>
<th>Readings and videos</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1 (L)</td>
<td>1</td>
<td>CAS</td>
<td>Course overview</td>
<td>Overview and introduction to the course.</td>
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<tr>
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<tr>
<td>CS2 (L)</td>
<td>2</td>
<td>CAS</td>
<td>What is conservation science?</td>
<td>Students will discuss Pyron’s paper (2017). Overview lecture on conservation biology and conservation science. (Briefing Belen Market visit)</td>
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<tr>
<td>CS3 (FL)</td>
<td>3</td>
<td>Iquitos</td>
<td>Belen Market Iquitos - Non-timber forest products</td>
<td>Students to find products from a set list. By interacting with vendors, they will try to find out where the products come from and how they are produced or extracted. The next week we will score the teams results competitively as part of a class discussion.</td>
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<tr>
<td>CS4 (L)</td>
<td>0.5</td>
<td>CAS</td>
<td>Briefing Nauta Market visit</td>
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<tr>
<td>CS5 (FEx1)</td>
<td>2</td>
<td>Nauta</td>
<td>Fisheries at Nauta. Estimation of size of three fish species at Nauta market and comparison to minimum size established by the local regulatory authorities.</td>
<td>Week 2</td>
</tr>
<tr>
<td>CS6 (L)</td>
<td>2</td>
<td>CAS</td>
<td>Ecosystem Services Peer teaching – students are required to deliver a 10 -minute oral presentation on specific ecosystem service paper, previously assigned (watershed protection, pollination, soil protection, carbon sequestration, biodiversity protection, etc.).</td>
<td>Week 2</td>
</tr>
<tr>
<td>CS8 (FEx1)</td>
<td>1</td>
<td>CAS</td>
<td>FEx1 review and data analysis</td>
<td>Week 2</td>
</tr>
<tr>
<td>CS9 (FL)</td>
<td>1</td>
<td>Allpahuayo-Mishana</td>
<td>Visit to white-sand forest (“bosques de varillales”) Threats to white-sand forests in Allpahuayo-Mishana National Reserve. Conservation of endangered ecosystems.</td>
<td>Week 2</td>
</tr>
<tr>
<td>CS10 (GL)</td>
<td>1</td>
<td>CAS</td>
<td>Conservation and Public Health in Iquitos Program on conservation, public health and education in local communities in Iquitos; Japan International Cooperation Agency – Universidad Nacional de la Amazonía Peruana (guest lecture – Lisa Karasawa)</td>
<td>Week 2</td>
</tr>
<tr>
<td>CS11 (L)</td>
<td>2</td>
<td>CAS</td>
<td>Threats to biodiversity I Peer teaching – students are required to deliver a 10 -minute oral presentation on specific threats to biodiversity, previously assigned (logging, non-timber forest products, agriculture, climate change, road ecology, overfishing, mining, etc.)</td>
<td>Week 2</td>
</tr>
<tr>
<td>Course</td>
<td>Credits</td>
<td>Core</td>
<td>Description</td>
<td>Week</td>
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</table>
| CS12     | 1       | CAS  | **Threats to biodiversity II**  
Lecture summarizing threats to biodiversity on neotropical forests.  
Invasive species, drug trafficking, habitat change and fragmentation, etc.  
Tragedy of the commons | Week 2 | Video: What Ever Happened To Saving The Rainforest  
Video: Peru’s dirty gold – TechKnow  
Video: Sand Wars Trailer  
Optional Gardin (1968) |
| CS13     | 6       | PACAYA-SAMIRIA | **Long-term wildlife monitoring in practice – Climate change**  
**a)** Introduction to wildlife monitoring techniques  
**b)** Students will spend one week working within a long-term wildlife monitoring project that investigates the effects of climate change on mammals.  
**c)** Conservation in Pacaya-Samiria National Reserve | Week 3 | Bodmer et al. (2017)  
Gonzalez et al. (2016). |
|          |         |      | **Conservation Strategies and Alternative Incomes**                                                                                                       |       |                                                                                               |
| CS14     | 1       | CAS  | **Policy responses to ecosystem degradation**  
International conservation agreements  
Conservation priorities  
Endangered Species Act  
IUCN red list | Week 4 | Video: The IUCN Red List A Barometer of Life  
Video: The IUCN Red List Guiding Conservation for 50 years |
| CS15     | 1       | CAS  | **Protected areas as a conservation strategy**  
Concept and design of protected areas – Single large or several small?  
Protected areas in practice  
Biological corridors and associated risks. | Week 4 | Peres and Zimmerman (2001)  
Rosenthal et al. (2012) |
| CS16     | 1       | CAS  | **Protected Areas in Peru**  
Protected areas in Peru and the role of the Peruvian Ministry of the Environment (guest lecture – (María Teresa Torres, Servicio Nacional de Áreas Naturales Protegidas, SERNAMP) | Week 4 | Rodríguez and Young (2000)  
Video: Creating new protected areas in Peru - Amazon Conservation Association |
<table>
<thead>
<tr>
<th>Code</th>
<th>Credits</th>
<th>Location</th>
<th>Activity</th>
<th>Week</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS17</td>
<td>2</td>
<td>CAS</td>
<td><strong>The Maijuna – community conservation</strong>&lt;br&gt;Lecture on the Maijuna community, threats and conservation strategies.&lt;br&gt;Trip overview and academic briefing for the trip to Sucusari</td>
<td>Week 4</td>
<td>Gilmore et al. (2010), pp. 159-165 plus the maps and color plates&lt;br&gt;Video: Guardians of the Forest</td>
</tr>
<tr>
<td>CS18</td>
<td>2</td>
<td>SUCUSARI</td>
<td><strong>Hunting in the Peruvian Amazon and the use of hunting at mammal mineral licks</strong>&lt;br&gt;Students will interact with local hunters from the village of Sucusari and interview them informally about their hunting practices, preferences and experiences.</td>
<td>Week 5</td>
<td>Blake et al. (2012).</td>
</tr>
<tr>
<td>CS19</td>
<td>1</td>
<td>CAS</td>
<td><strong>Importance of palms on Amazonian conservation</strong>&lt;br&gt;Overview lecture on palm diversity, distribution, abundance, cultural and biological importance on Amazonian ecosystems.</td>
<td>Week 5</td>
<td>Paniagua et al. (2007)&lt;br&gt;Optional Gilmore et al. 2013</td>
</tr>
<tr>
<td>CS20</td>
<td>2</td>
<td>Cahuide</td>
<td><strong>Palm leaves extraction for thatching (Part I)</strong>&lt;br&gt;Study on extraction of leaves of “irapay” palms (<em>Lepidocaryum tenue</em>) for thatching, at the local community Cahuide.</td>
<td>Week 5</td>
<td>Navarro et al. (2011).</td>
</tr>
<tr>
<td>CS21</td>
<td>0.5</td>
<td>CAS</td>
<td><strong>Briefing field journal expectations (conservation in the Andes)</strong></td>
<td>Week 5</td>
<td>N/A</td>
</tr>
<tr>
<td>CS22</td>
<td>4</td>
<td>CUSCO</td>
<td><strong>Conservation issues in the Andes</strong>&lt;br&gt;A field journal will be kept during the excursion to Cusco and the surrounding area: Wayqecha, Parque de la Papa, Abra Malaga and Huacarpay. Students will record conservation issues; what should be conserved and why, who the stakeholders are, what the threats are, and what conservation actions are currently in place.</td>
<td>Week 6</td>
<td>Canfield (2011)&lt;br&gt;Video: Removing Cattle from Manu National Park Video: Viva Vicuña&lt;br&gt;Aucca and Ramsay (2005)<em>, Mathez-Stiefe et al. (2017)</em>, Angé et al. (2018)*.</td>
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<tr>
<td>Course Code</td>
<td>Credits</td>
<td>Location</td>
<td>Activity</td>
<td>Description</td>
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<tr>
<td>CS24</td>
<td>2</td>
<td>WAYQECH A</td>
<td>Andean bear tracks</td>
<td>Case study on human-wildlife coexistence. Students will look for Andean bear tracks in Wayqecha Cloud Forest surroundings (Denise Mateo, San Diego Zoo Global). Week 6</td>
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<tr>
<td>CS25</td>
<td>1.5</td>
<td>WAYQECH A</td>
<td>Conservation at Wayqecha Cloud Forest</td>
<td>Research at Wayqecha Cloud Forest Biological Station. Mission of ACCA (Asociación para la Conservación de la Cuenca Amazónica; guest lecture - Javier Farfán) Week 6</td>
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<tr>
<td>CS26</td>
<td>1</td>
<td>CAS</td>
<td>Community conservation, management &amp; sustainability</td>
<td>Overview lecture on community conservation, management and sustainability, ecotourism, alternative incomes. Week 7</td>
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<tr>
<td>CS27</td>
<td>1.5</td>
<td>San Rafael, Iquitos</td>
<td>Visit to Morphosapi butterfly garden and Evergreen Institute.</td>
<td>Local project based on local community empowerment, biological research and environmental education. Week 8</td>
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<tr>
<td>CS28</td>
<td>2</td>
<td>UCP</td>
<td>Palm leaves extraction for thatching (Part II)</td>
<td>Study on extraction of leaves of “irapay” palms (<em>Lepidocaryum tenue</em>) for thatching, at UCP (Universidad Científica Peruana) concession. Week 8</td>
<td></td>
</tr>
<tr>
<td>CS29</td>
<td>1</td>
<td>CAS</td>
<td>FEx review and data analysis</td>
<td>Week 9</td>
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</table>
| CS30 | 2.5 | CREA Manatee rehabilitation center | Wildlife trade, CITES, rescue centers, welfare & reintroductions | a) Briefing on CREA visit  
   b) CREA Rescue center tour and guest talks on i) rescue and reintroduction and ii) conservation education  
   c) Discussion on the role of rescue centers: Wildlife trade, rescue centers, reintroductions, conservation education and conservation funding. Week 9 |
| CS31 | 1.5 | CAS | Alternative incomes - the stingless bee project | Students learn about a traditional sustainable alternative income in Amazonia while learning to manage new hives at CAS (guest lecture - Carlos García) Week 9 |

*Optional* | 
Berkes (2007) | 
Coca-Pérez (2016) | 
Fraser et al. (2006)* | 
N/A | 
Adimey et al. (2012)* | 
Video: Illegal animal trafficking in Peru Unreported World | 
Video: Beekeeping in the Amazon - OnePlanet |
Reforestation and Forest restoration strategies
Discussion on forest restoration strategies
(natural regeneration, active vs. passive restoration).
Visit to a local farm, where students will learn
about an initiative on reforestation.

Biophilia. From the Anthropocene to the Ecozoic.
Lecture summarizing the course contents.
Biophilia hypothesis and Ecozoic era.
Final reflections.

Visit to a local farm, where students will learn
about an initiative on reforestation.

Biophilia hypothesis and Ecozoic era.
Final reflections.

Reading List


https://doi.org/10.1016/j.foreco.2009.09.001


