THE SCHOOL FOR FIELD STUDIES

Conservation Science and Practice in Peru
SFS 3800

Syllabus
4 credits

The School for Field Studies (SFS)
Center for Amazon Studies (CAS)
Tarapoto, Peru

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 they may present. In other words, this is a field program, and the field can change.

Course Overview

The overarching goal of this course is to make students aware of the enormous responsibility and challenges humans have as stewards of the natural environment, and to provide them with the concepts, tools, and incentives for conservation of natural environment. Dramatic changes are occurring in almost every corner of the world, many of which are a result of anthropogenic disturbances. Human activities release many greenhouse gases that contribute 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.

Adopting an integrative view of the relationship between biodiversity and people, this course explores the concepts and strategies currently used to mitigate, restore, or conserve ecosystems, species, and genetic diversity. Using the Peruvian Amazon and Andean Highlands as our classroom, the course will draw largely from local examples that students will be able to observe first-hand. Furthermore, it will challenge students to integrate and apply their tropical and political ecology knowledge in conservation in order to respond creatively to real-world cases.

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

1. What is Conservation Science?
2. What are the challenges in conservation science?
3. What are the current tools and strategies used in the practice of conservation science?

The conservation challenges that students will observe in the Amazonian and Andean regions are highly varied and many are repeated across the globe. Therefore, students will be encouraged to critically examine and document a wide variety of threats and learn to apply their theoretical knowledge to resolve complex real-world issues. Moreover, students will be able to draw parallels between Peruvian conservation strategies and those used globally by international agencies. The diversity of challenges and conservation strategies students observe in Peru will provide insight into the complexity of Conservation Science and the importance of treating these challenges within their own context by considering biological, environmental, social, economic and political factors.

Learning Objectives

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

Students will be able to:

1. Use the concepts of conservation science and analyze socio-environmental relationships that form the bases of conservation science practices at local, regional and global scales.
2. Illustrate current challenges in conservation science and practice in different contexts.
3. Associate major threats to biological diversity and their direct and indirect drivers.
4. Compare traditional and current conservation methods and analytical tools that make up part of local and global conservation initiatives, including qualitative and quantitative methods.

Assessment

The evaluation breakdown for the course is as follows. Full rubrics for each assessment are at the end of this syllabus.

Assessment Item	Value (%)
Participation	10
Essay and discussion	10
Field Exercise 1	10
Field Exercise 2	10
Midterm Exam	20
Presentation	10
Final Exam	30
TOTAL	**100**

Participation (10%)

Everybody should be prepared for each academic session. This implies reading the materials for each session with enough detail to be able to ask relevant questions and to participate in analytical discussions about the key issues. Active participation during classes, discussions, assignments, and hikes is expected.

Essay and discussion (10%)

Subject: What is Conservation Science?
Objective: Understanding what Conservation Science entails
Methods: This course is the link between the Tropical ecology and Political ecology course, therefore, observing the diversity of natural resources used by local people is key to understand the interdependence that exist between them. We will visit a local market, a perfect example of where biodiversity, people, and economy interconnect via complex dynamics. Later, in a discussion session, student group will present pictures from our visit and discuss about what conservation science means for them. Finally, students will need to present an individual essay where they discuss two main things they learned during the visit and how their initial understanding of conservation science have changed.

Field Exercise 1 (10%)

Subject: Developing a monitoring program for species conservation
Methods: Quantifying population changes is key to assessing if different conservation efforts are contributing to saving a target species. In this FEX, we will visit the habitat of Santa Elena Conservation Concession and develop a monitoring program for the conservation of a threatened species. The underlying questions of this FEX are (1) what type of data should be collected? (2) how do we account for the temporal and spatial variability and (3) how should we correct by detectability? By responding these questions, students are expected to have a better understanding of the challenges of wildlife monitoring and how to deal with those. The report will look like a research proposal and will require students' attention in preparation for Directed Research.

Field Exercise 2 (10%)

Subject: Planning a conservation project
Methods: Students will learn how to plan a participatory conservation project. After talking with local communities, conservation biologists, and local authorities, students will play as different actors and develop a conservation plan for a species or habitat of interest. Using the CMP Open Standards tool

students will work together to define the scope, vision, and targets, assess threats, and develop operational and monitoring plans. The instructions will be given in a workshop style. At the end, students will present their results and learn what the different stages of a conservation project entails.

Midterm Exam (20%)
The midterm exam will be based on material covered in lectures, readings, and field experiences of the first two sections of the course. Will consist of short essay and case analysis questions about: What is conservation science? And What are the challenges in conservation science?

Presentation (10%)
Understanding that scientific knowledge is dynamic, and that people may hold differing positions with regards to different subjects is important to developing our own position as scientists and citizens. Here, students will present and facilitate the discussion about controversial topics of Conservation Science based on classic rebuttal papers. Students are encouraged to develop "creative ways" to facilitate the class discussion. Grading will be based on clarity and accuracy of content (4 pts.), audiovisual delivery (3), and Q&A/discussion (3).

Final Exam (30%)
The final exam will be given based on material covered in lectures, readings, and field experiences of the whole course. It will contain short essay and case analysis questions.

Grading Scheme

A	95.00 - 100.00%	B+	86.00 - 89.99%	C+	76.00 - 79.99%	D	60.00 - 69.99%
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

Honor Code/Plagiarism – SFS places high expectations on their students and we hold students accountable for their behaviors. SFS students are held to the honor code below. SFS has a zero-tolerance policy towards student cheating, plagiarism, data falsification, and any other form of dishonest academic and/or research practice or behavior. Using the ideas or material of others without giving due credit is cheating and will not be tolerated. Any SFS student found to have engaged in or facilitated academic and/or research dishonesty will receive no credit (0%) for that activity.

> *"SFS does not tolerate cheating or plagiarism in any form. While participating in an SFS program, students are expected to refrain from cheating, plagiarism and any other behavior which would result in a student receiving credit for work which they did not accomplish on their own. Students are expected to report any instance of cheating or plagiarism by others."*

Deadlines – Deadlines for written and oral assignments are instated to promote equity among students and to allow faculty ample time to review and return assignments before others are due. As such, deadlines are firm; extensions will only be considered under extreme circumstances. Late assignments will incur a penalty of 10% of your grade for each day you are late. After two days past the deadline,

assignments will no longer be accepted. Assignments will be handed back to students after a one-week grading period. Grade corrections for any assessment item should be requested in writing at least 24 hours after assignments are returned. No corrections will be considered afterwards.

Content Statement – Every student comes to SFS with unique life experiences, which contribute to the way various information is processed. Some of the content in this course may be intellectually or emotionally challenging but has been intentionally selected to achieve certain learning goals and/or showcase the complexity of many modern issues. If you anticipate a challenge engaging with a certain topic or find that you are struggling with certain discussions, we encourage you to talk about it with faculty, friends, family, the HWM, or access available mental health resources.

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 course is mandatory, it is important that you are prompt for all activities, bring the necessary equipment for field exercises and class activities, and simply get involved.

Course Content

Type: D: Discussion, **FL:** Field Lecture, **GL:** Guest Lecture, **L**: Lecture, **O**: Orientation

No	*Title and outline*	*Type*	*Time (hrs)*	*Required Readings*
CS 01	**Course overview** Overview and introduction to the course.	O	0.8	
CS 02	**What is Conservation Science?** Understand what conservation science is with global and local examples, and how it has evolved.	L	1.7	Soulé (1985) Kareiva & Marvier (2012)
CS 03	**Traditional Knowledge** Visit to Lamas Students will explore how traditional knowledge and intercultural education help nature conservation.	FL; GL	1.7	León & Marcial (2023)
CS 04	**Coupling of natural and social systems** Visit to Chirikyacu By observing and interacting with a native community, students will identify how natural and social systems are intertwined in community-based conservation.	FL	1.7	Berkes (2004)
CS 05	**Essay and Discussion** Discussion about our visit to Lamas and Chirikyacu.	D	0.8	Mace (2014) Petriello & Wallen (2015)
CS 06	**Current trends in Conservation Science** Introduction to the current trends in Conservation Science and examples. Discussion of different points of view and current controversies.	L	1.7	Soulé (2013) Kareiva (2014) Doak et al. (2015)

No	Title and outline	Type	Time (hrs)	Required Readings
CS 07	**Ecosystem Services** Analyze the importance of ecosystem benefits to people and how they shape current aspects of conservation science.	L	1.7	Lele et al. (2013) Pearson (2016)
CS 08	**Valuing Direct Ecosystem Services** Visit to Bosque de la Nuwas Discover how a group of women is protecting a forest patch, obtaining benefits and revaluing their heritage.	FL	1.7	Lazarou (2022)
CS 09	**Valuing Indirect Ecosystem Services** Visit to Santa Elena Students will investigate what ecosystem services are perceived by the community and how this motivates conservation.	FL	1.7	AMPA (2019)
CS 10	**Principles of Data Collection** In preparation for FEX1, we will learn how to account for temporal and spatial variability and detectability in wildlife surveys.	L	1.7	Iknayan et al. (2013)
CS 11	**Working on FEX 1** Students will design a monitoring plan for a threatened species.	WS	1.7	
CS 12	**Challenges in Conservation** Visit to Cordillera Escalera Analyze different challenges of traditional conservation and possible conflicts in a regional protected area.	FL	1.7	
CS 13	**Eco business and green economy** Visit to San Jose de Sisa How to increase the value of traditional knowledge and biodiversity and promote conservation?	FL	0.8	Medina et al. (2022)
CS 14	**Introduction to Monitoring Technics** Rio Amazonas Research Station During a multi-day field excursion, students will learn monitoring techniques for aquatic and terrestrial animals.	FL	6.7	
CS 15	**Sustainable use studies** Rio Amazonas Research Station Can hunting, fishing, and fruit collection be sustainable in the Amazon?	GL	0.8	Kirkland et al. (2020)
CS 16	**Amazon Conservation** Rio Amazonas Research Station What works and what does not at the Tamshiyacu-Tahuayo Conservation Area?	GL	0.8	

No	Title and outline	Type	Time (hrs)	Required Readings
CS 17	**Ex-situ Conservation** Students will have a hands-on experience at CREA rescue center and discuss the difficulties of ex-situ conservation.	FL	1.7	
CS 18	**Threats to Biodiversity: Overexploitation** Documentary and discussion on illegal gold mining in Peru.	D	0.8	Caballero et al. (2018)
CS 19	**Habitat loss and fragmentation** Is fragmentation bad or good for biodiversity? **Led by group 1**	L; D	0.8	Fletcher et al. (2018) Fahrig et al. (2019) Haddad et al. (2015) Fahrig (2017) Fahrig (2019)
CS 20	**Corruption and the Economy of Conservation** Present the impacts of corruption on biodiversity, especially in the Amazon. How this affect conservation and it´s finance. **Led by group 2**	L; D	0.8	Smith et al. (2003) Laurance et al. (2004) Smith & Walpole (2005) Ferraro (2005) Katzner (2005) Walpole & Smith (2005)
CS 21	**Climate Change** Present the evidence, perceptions, and impacts of changes on climate in biodiversity. Solutions and challenges. **Led by group 3**	L; D	0.8	Brodie et al. (2012) Bellard et al. (2012) Malhi et al. (2020)
CS 22	**Tracking climate change in the Andes** Wayqecha Cloud Forest Research Station How can we track species response to Climate Change?	FL	1.7	Lutz et al. (2013)
CS 23	**Andean Bear Conservation** Visit to the Ukuku Center where we will explore the efforts to conserve the Andean Bear. Discuss it with Nat Geo Explorer, Ruthmery Pillco.	FL; GL	1.7	Rojas-VeraPinto et al. (2022)
CS 24	**Agrobiodiversity Conservation** Visit to Potato Park Learn how five Andean communities preserve over 1300 varieties of potatoes using their traditional knowledge. Students discuss how human perception of nature shape our actions.	FL; GL	1.7	Tito et al. (2018)
CS 25	**Restoration** Visit to Abra Malaga Analize the nuances of embarking in a restoration project to plant three million *Polylepis* saplings.	FL; GL	0.8	

No	*Title and outline*	*Type*	*Time (hrs)*	*Required Readings*
CS 26	**Payment for Ecosystem Services Scheme** Visit to Piuray Lake Evaluate how Payment for Ecosystem Services Scheme work in Peru.	FL; GL	0.8	Sincere (2022)
CS 27	**Ecotourism** Visit to Machu Picchu Pueblo Hotel After visiting several ecotourism initiatives, students will compare different aspects and judge their effectiveness in conservation.	FL	0.8	Kirkby et al. (2011)
CS 28	**Introduction to Conservation tools: Natural Protected Areas in Peru** Protected areas in Peru and the role of the Peruvian Ministry of the Environment.	L	1.7	Rodríguez & Young (2000)
CS 29	**Reserve design** Theorical/practical lecture about how to design a reserve system using different criteria.	L	1.7	Cabeza & Moilanen (2001)
CS 30	**International approach to Conservation** Visit to Cordillera Azul Analyze how the international market of carbon credits impacts a protected area in Peru.	FL	1.7	Montoya-Zumaeta et al. (2021)
CS 31	**FEX 2: Open Standards as a tool to develop conservation projects** Working in three groups, we aim to develop a conservation project of a species or ecosystem through the OS framework.	WS	3.3	
CS 32	**Course review** We will review the main concepts of conservation science using dynamics and examples seen during the course.	L	1.7	
	Total		**50.2**	
	UMN Instructional Hours		**60.2**	

**UMN defines an instructional hour as a 50-minute block. SFS syllabi are written in full 60-minute hours for programming purposes. Therefore 50 full hours = 60 UMN instructional hours (for four credit courses) and 25 full hours = 30 UMN instructional hours (for two credit courses).*

Reading List

1. Almeida, R. M., Lovejoy, T. E., & Roland, F. (2016). Brazil's Amazon conservation in peril. *Science*, *353*(6296), 228-229.
2. Bailey, L. L., MacKenzie, D. I., & Nichols, J. D. (2014). Advances and applications of occupancy models. *Methods in Ecology and Evolution*, *5*(12), 1269-1279.
3. Berkes, F. (2004). Rethinking community-based conservation. *Conservation biology*, *18*(3), 621-630.
4. Brodie, J., Post, E., & Laurance, W. F. (2012). Climate change and tropical biodiversity: a new focus. *Trends in ecology & evolution*, *27*(3), 145-150.
5. Cabeza, M., & Moilanen, A. (2001). Design of reserve networks and the persistence of biodiversity. *Trends in ecology & evolution*, *16*(5), 242-248.
6. Corlett, R. T. (2011). Impacts of warming on tropical lowland rainforests. *Trends in ecology & evolution*, *26*(11), 606-613.
7. de Area Leão Pereira, E. J., Ferreira, S., Jorge, P., de Santana Ribeiro, L. C., Sabadini Carvalho, T., & de Barros Pereira, H. B. (2019). Policy in Brazil (2016–2019) threaten conservation of the Amazon rainforest.
8. 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, Washington, DC.
9. Fahrig, L. (2013). Rethinking patch size and isolation effects: the habitat amount hypothesis. *Journal of Biogeography*, *40*(9), 1649-1663.
10. Fahrig, L. (2017). Ecological responses to habitat fragmentation per se. *Annual Review of Ecology, Evolution, and Systematics*, *48*, 1-23.
11. Fahrig, L., Arroyo-Rodríguez, V., Bennett, J. R., Boucher-Lalonde, V., Cazetta, E., Currie, D. J., ... & Koper, N. (2019). Is habitat fragmentation bad for biodiversity?. *Biological conservation*, *230*, 179-186.
12. Fabiano, E., Schulz, C., & Branas, M. M. (2021). Wetland spirits and indigenous knowledge: Implications for the conservation of wetlands in the Peruvian Amazon. Current Research in Environmental Sustainability, 3, 100107.
13. Ferraro, P. (2005). Corruption and conservation: the need for empirical analyses. A response to Smith & Walpole. *Oryx*, *39*(3), 257-259.
14. Fletcher Jr, R. J., Didham, R. K., Banks-Leite, C., Barlow, J., Ewers, R. M., Rosindell, J., ... & Melo, F. P. (2018). Is habitat fragmentation good for biodiversity?. *Biological conservation*, *226*, 9-15.
15. Guillera-Arroita, G. (2017). Modelling of species distributions, range dynamics and communities under imperfect detection: advances, challenges and opportunities. *Ecography*, *40*(2), 281-295.
16. Iknayan, K. J., Tingley, M. W., Furnas, B. J., & Beissinger, S. R. (2014). Detecting diversity: emerging methods to estimate species diversity. *Trends in ecology & evolution*, *29*(2), 97-106.
17. Kareiva, P. (2014). New conservation: setting the record straight and finding common ground. *Conservation Biology*, *28*(3), 634-636.
18. Kareiva, P., & Marvier, M. (2012). What is conservation science?. *BioScience*, *62*(11), 962-969.

19. Katzner, T. E. (2005). Corruption–a double-edged sword for conservation? A response to Smith & Walpole. *Oryx*, *39*(3), 260-262.

20. Laurance, W. F. (2004). The perils of payoff: corruption as a threat to global biodiversity. *Trends in Ecology & Evolution*, *19*(8), 399-401.

21. Mace, G. M. (2014). Whose conservation?. *Science*, *345*(6204), 1558-1560.

22. Malhi, Y., Janet Franklin , Nathalie Seddon , Martin Solan , Monica G. Turner , Christopher B. Field and Nancy Knowlton. Climate change and ecosystems: threats, opportunities and solutions. 375Phil. Trans. R. Soc. B. http://doi.org/10.1098/rstb.2019.0104

23. Martin, A., Coolsaet, B., Corbera, E., Dawson, N. M., Fraser, J. A., Lehmann, I., & Rodriguez, I. (2016). Justice and conservation: the need to incorporate recognition. Biological Conservation, 197, 254-261.

24. Miller, T. R., Minteer, B. A., & Malan, L. C. (2011). The new conservation debate: the view from practical ethics. *Biological Conservation*, *144*(3), 948-957.

25. Minteer, B. A., & Miller, T. R. (2011). The New Conservation Debate: ethical foundations, strategic trade-offs, and policy opportunities. *Biological Conservation*, *144*(3), 945-947.

26. Petriello, M. A., & Wallen, K. E. (2015). Integrative reflections on the new conservation science debate. *Biodiversity and Conservation*, *24*(6), 1549-1551.

27. Rodríguez, L. O., & Young, K. R. (2000). Biological diversity of Peru: determining priority areas for conservation. *AMBIO: A Journal of the Human Environment*, *29*(6), 329-338.

28. Senior, R. A., Hill, J. K., & Edwards, D. P. (2019). Global loss of climate connectivity in tropical forests. *Nature Climate Change*, 1.

29. Smith, R. J., & Walpole, M. J. (2005). Should conservationists pay more attention to corruption?. *Oryx*, *39*(3), 251-256.

30. Smith, R. J., Muir, R. D., Walpole, M. J., Balmford, A., & Leader-Williams, N. (2003). Governance and the loss of biodiversity. *Nature*, *426*(6962), 67.

31. Soares-Filho, B. S., Nepstad, D. C., Curran, L. M., Cerqueira, G. C., Garcia, R. A., Ramos, C. A., ... & Schlesinger, P. (2006). Modelling conservation in the Amazon basin. *Nature*, *440*(7083), 520.

32. Soulé, M. (2014). The "new conservation". In *Keeping the wild* (pp. 66-80). Island Press, Washington, DC.

33. Soulé, M. E. (1985). What is conservation biology?. *BioScience*, *35*(11), 727-734.

34. Tito, R., Vasconcelos, H. L., & Feeley, K. J. (2018). Global climate change increases risk of crop yield losses and food insecurity in the tropical Andes. *Global change biology*, *24*(2), e592-e602.

35. Walpole, M. J., & Smith, R. J. (2005). Focusing on corruption: a reply to Ferraro and Katzner. *Oryx*, *39*(3), 263-264.

36. Wilson, M. C., Chen, X. Y., Corlett, R. T., Didham, R. K., Ding, P., Holt, R. D., ... & Laurance, W. F. (2016). Habitat fragmentation and biodiversity conservation: key findings and future challenges.