Conservation and Sustainability of Neotropical Ecosystems
ENVS 345 E/ BIO 349 E
Spring Semester 2020
Loyola University Chicago

Instructor: Fr. Stephen Mitten SJ
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Credit: 3
Class Schedule: Wed 7:00pm-8:15 with trip to Peru @ Feb 28 – March 7.
Office Hours: Office Hours: TBD and by appointment

Pre-requisite:
Biology (with ecology emphasis) - BIO 102, 112 and BIO 265
Environmental Science majors/minors – ENVS 137 and ENVS 237 and ENVS 280

This course fulfills the following academic requirements:
- ENVS Major/Minor Elective
- BIO Major/ Minor Elective for ecology emphasis
- Engaged Learning

Main Texts:

There will be additional readings (Articles and PowerPoint lectures)’s posted on Sakai.

Recommended Texts:

Course Site: Loyola University Chicago and Inkaterra Guide Field Station Madre de Dios – Peru.

Course Description: This course provides a comprehensive introduction to conservation ecology as it is applied in a variety of Neotropical ecosystems by way of classroom lectures prior to trip and experiential learning activities in Peru. The Amazon rainforest covers more than half of the Peruvian territory, an area rich in wildlife, indigenous culture and isolated indigenous communities. Student will be first introduced to the ecology of the major Neotropical terrestrial and aquatic (both fresh and marine) ecosystems, learn about the key environmental threats to these ecosystems, will review the conservation status of the biodiversity within each of these ecosystem, and then examine the principles of conservation management that are applied to their
protection and sustainability. Student will also be provided with some practical experience with basic environmental monitoring and biological survey methods while in the Amazonian rainforest. Ecosystems studied include gallery forests, tropical rain and dry forests, savannas, rivers, lagoons and wetlands. Most emphasis will be on the Amazonian rainforest of Peru.

**Introduction and Rational:** Local actions influence global environments! Neotropical biodiversity is under threat by human’s exploitation of these regions and its natural resources for the provision of food products and raw materials primarily for the developed world. Biodiversity in the Neotropical region is of enormous importance and the loss of Neotropical ecosystems will represent the loss of processes, economic values and ecosystem services. The more we learn the value and the importance of these ecosystems, and understand how our immediate actions and behaviors influences the long term sustainability of these ecosystems, the more likely theses ecosystems can be maintained.

This spring course coupled with a nine-day program during spring break immerses the student in the Amazonian tropical rainforest of Peru. Students will be stationed at the Inkaterra Guide Field Station, located in the Amazonian rainforest at Madre de Dios – Peru, one of the most biodiverse areas in the world. Since its creation in 2005, the Station has been a meeting point for researchers, students and volunteers that wish to experience nature in an intense and different way. Inkaterra Guide Station is located in a high terrace, 180 meters above sea level, and is surrounded by a primary rainforest with amazing trees 35 meters high, where birds, frogs, monkeys and other fantastic animals can be seen night and day. The Peruvian organization Inkaterra, the organization that operates the guide station is a pioneer in sustainable tourism, promoting Scientific Research for the Conservation of Ecosystems and Natural Resources funded by Ecotourism, as a role model for local communities.
Inkaterra offers an authentic experience of the nature and captures and educates about Peru’s culture and nature. Inkaterra Reserva Amazonica offers a variety of excursions on challenging jungle treks to explore the Peruvian jungle and experience an authentic rainforest adventure. Rainforests are fragile ecosystems and, in order to preserve them, involvement of the private sector is required. This was demonstrated by Albergue Cusco Amazonico S.A., when it established the first Private Ecological Reserve in Peru, which was later replicated in the concessions system. Inkaterra has promoted commercial activities in Tambopata since 1975, with the implementation of the ‘Albergue Turistico Cusco Amazónico’ lodge (currently named Inkaterra Reserva Amazonica). Since then, it has encouraged scientific research and biodiversity conservation in the Amazon ecosystems. In 1979, the Peruvian government gave 10,000 hectares to be used for a period of ten years. Located 15 km from Puerto Maldonado, by the left margin of Bajo Madre de Dios River, these lands were next to the lodge. This area was named ‘Reserva Ecológica Privada Cusco Amazónico (REPCA)’, and its main objective was to maintain the biodiversity and ecological processes at REPCA throughout research, conservation and ecotourism. By 2004, the government gave the concession of ecotourism named ‘Reserva Ecológica Inkaterra’ a surface of 10,000 hectares for a 40-year period, with the mission of generating new ecotourism products. These products should improve life quality in local communities of Madre de Dios region. The Bioconservation concession Amaru Mayo was established on February 20, 2006, via the Administrative Decree N° 044-2006-INRENA. 3552.84 hectares were given for a 40-year renewable period, to ‘Empresa Estación Ecológica Turistica Amaru Mayo’. It is through this cooperation agreement between INKATERRA ASOCIACIÓN (ITA) and Estación Ecológica Turistica Amaru Mayo, that ITA was able to develop and implement conservation activities, and to manage the natural resources within this concession. The Amaru Mayo concession is located in the left margin of the Madre de Dios river, and reaches the Peru-Bolivia border. It is about 4 hours of navigation from Puerto Maldonado, in a vessel with an outboard motor of 60hp. This concession looks for the conservation of ecosystems, biodiversity and biological processes, and to protect natural resources avoiding its depredation. It is achieved through monitoring, research, diffusion and training. This concession facilitates protection activities, ecological restoration and scientific tourism as a self-financing means for the programs execution. It is intended for a near future the complementation of this area with Reserva Nacional de Vida Silvestre Amazónica Manuripi, in Bolivia.
Ecological and economical knowledge of these tropical ecosystems and their function, the examination of the array of biodiversity within these ecosystems and the models of conservation to sustain them are explored in this course. With a strong foundation obtained from their readings and class discussion on Neotropical ecology and conservation prior to the field course, students will then experience and study a number of these Neotropical ecosystems, learn various tropical ecology field techniques, examine a number of conservation sites that are under governmental, private, NGO’s and local community conservation management authorities and engage in a citizen science project of their choice.
Both terrestrial and aquatic ecosystem conservation areas will be visited. Academic excursions into the Amazonia Rainforest with day field trips, investigative field exercises, environmental monitoring, coupled with both classroom and in the field lectures from local experts provide the students with a dynamic learning opportunity. Course activities focus on human influences, threats, conservation difficulties and management solutions within the ecological and social context of each site. The course focuses on experiential learning through many exciting activities: Rainforest walks on various nature trails. Learn about primary and secondary rainforest, its components, uses and transformations by the humans, and its relevance for the world. See the cacao plantation, bread fruit trees, rubber trees, etc. At dusk, take a ride by outboard motorized canoe on the Madre de Dios River to discover caiman and capybaras. Learn about the river ecosystems, Amazonian creeks, nocturnal animals’ behavior, and the southern constellations. Explore the Amazon rainforest at night and encounter nocturnal animals with intriguing behavior patterns and enhanced senses. Observe the nocturnal sounds of the rainforest, and get a first-hand look inside this hidden world. Walk through a botanical garden and discover the immense variety of medicinal plants that can be found in the Amazon region. Compare the medicinal uses of local plants with traditional remedies.

Take a 20-minute walk to the Inkaterra Canopy Walkway Interpretation Center to observe parrots and toucans. Learn about its construction and the conservation projects of ITA-Inkaterra Asociación (NGO). Ascend one of the 98-foot towers (30 m.) and cross the 7 hanging bridges that connect the treetops at 91 ft. high (28 m.) Take a dugout canoe ride on lake Sandoval, an oxbow lake to see giant river otters and hoatzins.

Course Objectives:

1) Give students an opportunity to study abroad.
2) Have students participate in an experiential learning course in a topic of global concern.
3) Engage in a service learning project
4) Learn conventions of writing both non-scientific and scientific papers.
5) **And** upon completion of this course all student should have a working understanding of 1) tropical climates, 2) both neotropical terrestrial and aquatic ecosystems and 3) various applied conservation and environmental practices such as nature reserve design and management, in-situ and ex-situ conservation, community-based resource management, and ecotourism, 4) some applied environmental monitoring techniques, and 4) In addition to the above mentioned objectives, other goals for this course will be:

- to understand the many social justice dimensions of environmental issues
- to appreciate our own responsibility as citizens of our planet
- to transform our current unsustainable practices to those that are more life-giving.
- collect data to be supplied to both local community-based conservation organizations and global conservation initiatives.
- to get professional training: learn valuable field skills for career or degree
- to get enormous satisfaction of knowing that you're contributing to a worthwhile and necessary conservation project aimed at protecting and preserving our world for future generations.
- to obtain new skills, more confidence, a greater understanding of a different culture,
  invaluable personal and professional development.
- to add an entry on your CV or résumé that will put you head and shoulders above most others in the job market.
- to have An exciting, never-to-be-forgotten overseas expedition into South America and the Peruvian culture.

**Engaged Learning Requirement**

Loyola University Chicago’s mission statement:
“We are Chicago's Jesuit Catholic university- a diverse community seeking God in all things and working to expand knowledge in the service of humanity through learning, justice, and faith.”

In an effort to assess the Engaged Learning University requirement, we ask all students enrolled in an Engaged Learning course to complete this reflection.

Referencing Loyola’s mission statement above, compose a written reflection (at least 2 pages, double-spaced) that connects your in-class and out-of-class experience responding to the following:
- How did your Engaged Learning experience help you to connect to the mission?
- How did the Engaged Learning experience in this course impact your personal, intellectual, civic, and/or professional development?

Please submit your completed reflection in Taskstream.
Please find a tutorial on how to submit the assignment here.
http://www.luc.edu/experiential/eportfolio/engagedlearningassessment/

Students in an Engaged Learning class have the opportunity to earn their Loyola Experience Engagement Key. For students to receive an Engagement Key, they must complete the Engagement Key reflection (otherwise known as the Engaged Learning reflection) during or after their Engaged Learning course that asks them to critically reflect and connect Loyola’s Jesuit mission to the Engaged Learning experience through the use of their learning portfolio.
The Center for Experiential Learning Portfolio Program coordinates the distribution of the Engagement Key and evaluation of the reflections each fall and spring semester. *Spring semester Engagement Key reflection submissions are due March 24, 2019.* Students are presented with their Engagement Key during the Undergraduate Research and Engagement Symposium Awards Ceremony on Saturday, April 20. For more information on the Engagement Key program and submission process, please see or refer students to our [website](http://www.luc.edu/engagedlearning/).

If you have any questions about the reflection assignment, or about Loyola’s EL requirement in general, please don’t hesitate to send us an e-mail at engagedlearning@luc.edu. Information about the EL Requirement is posted at [http://www.luc.edu/engagedlearning/](http://www.luc.edu/engagedlearning/).

**Course Content:**

Tropical Climate and weather patterns (rainfall)
Tropical Soil Formation and Classification

Conservation Ecology
- What is Neotropical conservation?
- In-situ conservation
- Ex-situ conservation
- Ethics and values
- Conservation priorities

Conservation, Preservation and Natural Resource Management in Peru
- Types of Protected Areas
- Management
- Most ecologically important areas in the country
- Other Major Conservation Organizations in developing countries
- Socio-Economics of Conservation in Peru

Design
- Biological Corridor
- Methods of Conservation ecology
- Landscape Scale Conservation
- Buffer zones

Conservation and Management applied to the following ecosystems/ species:

**Neotropical Marine Ecosystems and Conservation**

1. Coral
   - Coral formation
   - Coral structure and zonation
   - Major types of Caribbean Coral
   - Ecological and economic significance
   - Reef macro-organism and biodiversity
   - Threats and disturbance
   - Conservation, Management and Restoration
   - Fishing Industry

2. Seagrass ecosystems- ecological function and major species
➢ Manatee conservation
➢ Turtle conservation

3. Mangrove ecosystems
➢ Major flora and fauna
➢ Plant adaptations
➢ Soil ecology
➢ Ecological and economic value
➢ Biodiversity
➢ Threats and disturbance
➢ Conservation, Management and Restoration

Freshwater Aquatic Ecosystems and Conservation
1. Tropical river ecology
➢ Watersheds (Madre de Dios River)
➢ Tropical River Continuum Theory – aquatic indicator species
➢ Cultural eutrophication (gravel extraction, agriculture, aquaculture)
➢ Water monitoring and testing

2. Wetlands and lagoons—swamps, marshes
➢ Ecological importance - Flood plains

Terrestrial Ecosystems and Conservation
1. Tropical Cayes—types and formation
➢ Protection and Restoration

2. Palmetto Palm Savannahs
➢ Aquaculture (tilapia and shrimp)

3. Pine Savannahs (upland and lowland)
➢ Succession – fire management
➢ Soil ecology – soil tests
➢ Ecological and economic value
➢ Restoration
➢ Indicator species

4. Riverine (Gallery) forest ecology

5. Tropical Forest Ecology
➢ Soil ecology – soil tests
➢ Plant adaptations
➢ Biodiversity – flora and fauna
➢ Ecological and economic value -- ethnobotany
➢ Biodiversity
➢ Threats and disturbance
➢ Conservation, Management and Restoration
➢ Endangered species – parrots, raptors, big cats, monkeys, tapirs,
➢ Ecoagriculture and Native American Forest Gardens

Course Elements: Will include but are not limited to the following:
Lectures
Lectures will be delivered in the classroom and in the field throughout the course by the instructor and guest lecturers covering various major content areas related to our topics. Those enrolled in the spring semester will meet for class once a week for an one hour period prior to departing to Peru during spring break. There will be only a few class sessions after the formal course in Peru.

Field trips and Activities
Activities will take place in the field throughout the course. These activities will include field observations, field labs, environmental monitoring, and other activities that are to be included in your field journal. The data we collect will be given to ITA - Inkaterra Association – based conservation well as national and global citizen-science organizations such as e-bird (Cornell Laboratory of Ornithology).

Methods of Evaluation and Grading Procedures:

Evaluation will be based on but not limited to the following:
1) Participation, cooperation, punctuality, and class project in field
2) Exam over topics covered in the course.
4) Six 2-3 page essays that summarize the chapter readings. Will count the best five.
5) Journals: During the field course students will be required to keep a daily journal regarding their experiences and impressions (See below). These journals will be collected at the end of the time in Peru. The marking scheme for the Journal is for 7 entries x 10 points an entry for each of the 10 days. Points were allotted thusly:
   Detailed account of day’s events with major learning’s -  4 points
   Documentation from the text books-  2 points
   Quality and entry of questions with possible hypothesis – 2 points
   Quality of the personal reflection on the day’s activities - 2 points
   You must document your journal entry with page numbers from the texts that covered topics that you were seeing, experiencing or learning about. If you don’t you will not get maximum points. Your final 7 day journal entry must summarizing your total experience of the course.
6) Field research proposal on biodiversity/conservation (see below).
7) Engaged Learning Summary
8) Poster for Weekend of Excellence

You will be graded out of 450 points, distributed as follows:
Course Exam 100  
Dailey Journal reflections 70  
Research Proposal 100
Journal / Field Notebook.

You will each keep a journal, similar to a diary, in which you record the events of the day and your personal reflections. The journal should be detailed and meaningful; it will be the final scientific record of your trip, to which you will likely refer back on many occasions. The journal is for daily documentation of student activities, thoughts, and observations. Journals should include the following: participation in field sampling, lab analysis, presentations, and group discussions; reflections on field observations and data interpretation from the context of topics covered in lecture; lists and sketches to document personal sightings of amphibians, reptiles, birds, mammals, and invertebrates; and a list of plant species with sketches if not identified. In addition, I am asking that you include at the end of your entries, one or two questions that you might have with possible hypothesis as to an answer. Bio/Environmental Science majors will take one of these hypotheses for their research proposal. Part of your writing should be done alone, where you sit in the forest or on the beach, reflect, and write. This will isolate you from the group and give you a chance to interact with habitats on your own terms. These will be quiet, reflective times, not hectic "I have to write a paper" times. Journals should include habitats and identifications of species observed and relevant natural history observations. Journal entries MUST be made DAILY, while the information is fresh in your mind. Journals will be collected and read by instructors at the end of the course. The journal is a relatively easy component to complete, but you must allocate time for writing daily. In brief, the journal should be a detailed account of the day’s events with major learning’s; it should be documented with page numbers from the text book that corresponds to the day’s learning’s, it should include a personal reflection on the day’s events, (i.e. thoughts and feelings) and questions with possible hypotheses to an answer to that question. The last day of the trip should be a summary of one’s feelings and thoughts about the course coupled with major things learned.

Final Paper: Field research grant proposal: After the completion of the trip, students are to write up a research proposal for a possible field research experiment on some ecological/conservation question that arose while they were on the trip from one of their hypothesis recorded in their journal. The research needs to address explicitly how it will benefit conservation of particular species or ecosystems and how it would be applied by way of community-based conservation practices. Additional information and procedures along with an example of what I am expecting will be distributed prior to the trip. (But see simplified example below)

BIODIVERSITY AND CONSERVATION FOUNDATION GRANT PROPOSAL

PROJECT TITLE:

PRINCIPAL INVESTIGATOR:
PROJECT PERIOD: How long would it take to do the research?

PROJECTED COST WITH BUDGET: How much will it cost?

ABSTRACT: Brief summary of the proposal.

INTRODUCTION: Why is this research important or necessary or significant?

BACKGROUND INFORMATION:

PRIOR RESEARCH AND CONSERVATION ACTION: (on this topic)

PROJECT DESCRIPTION:

1. SPECIFIC RESEARCH OBJECTIVES.
   
   (1) To examine the effects of……
   
   (2) To examine what the current state is of the……
   
   (3) To increase the knowledge on the reproductive ecology of …
   
   (4) To design appropriate management plans for the protection of …
   
   (5) To implement training workshops to transfer the simple and effective ……

2. HYPOTHESES.

3. METHODS. Be specific and detailed.

REFERENCES:

Grading Policy:

Grading scale: (in percentages out of 100%)

A = 100%-93%, A- = 92%-90

B+ = 87%-89%, B = 83%-86%, B- = 80%-82%

C+ = 77%-79%, C = 73%-76%, C- = 70%-72%

D+ = 67%-69%, D = 60%-66%

F < 60%
Course Expectations:

• Students are expected to report to class on time.
• Students are expected to act in a mature manner at all times with an eye out for safety of persons and equipment.
• Assignments are to be typed unless otherwise noted and turned in on the due date.
• Students are expected to consult with the instructor as necessary about individual concerns, progress, and/or any other relevant issues.

Any student behavior that results in the disruption of the schedule or activities of the class, especially those resulting from consumption of alcohol or use of illegal drugs will be sent home and reported to the Office of International Programs, the Office of the Dean for disciplinary action as discussed under University Policies (alcohol) in the Student Handbook.

Participation
Since this program will likely be more intensive than you might be used to at your other courses, 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 in Peru. 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.

Your continued enrollment in this course attests to the fact that you agree to and will abide by the rules, regulations and stated expectations of this course.

Academic Integrity:

You will be held to the University’s standard of academic integrity, which is described at: http://www.luc.edu/academics/catalog/undergrad/reg_academicintegrity.shtml. Please read this statement and do not hesitate to ask me for further information about plagiarism and how to appropriately cite the work of others if you have any questions. The University is a community of learning. A community is based on trust. Any member of this course who violates that trust may receive a zero for a given test or assignment, or, if the violation is particularly egregious, he or she may be asked to leave this course.

Students with Disabilities Policy:

This is a field course that requires a certain level of physical fitness to access the various ecosystems (hike through mangroves, swim, canoe, explore caves and climb mountains). If you have any concerns please see the Office of International Programs. The Office of Services for Students with Disabilities coordinates and ensures services and accommodations for registered students with disabilities. Services for Students with Disabilities (SSWD) must have
documentation of the disability on file to provide academic accommodations. General guidelines about services can be found at: http://www.luc.edu/sswd/index.shtml.

-Working Draft-
Loyola University Chicago
Tropical Biodiversity Conservation
9-Day Spring Itinerary 2020
February 28-March 7

The following itinerary may be changed and other activities and site visitation substituted depending on local environmental conditions.

Day 1, Friday
Feb 28, 2020
Depart Chicago for Peru- All night flight

Day 2, Sat
Feb 29, 2020
Arrival into Lima Peru with flight to Cusco and then to Puerto Maldonado
- Boat transfer to Inkaterra Field Guide Station --Orientation 4:00PM
- Supper
Day 3, Sunday March 1, 2020

Day of Monitoring TBA

• Breakfast
• Boat ride to Monkey Island
• Lunch noon.
• Palm plantation visit
• Evening Lecture- on Inkaterra Association Conservation projects
• Dinner
• Journal entry of day’s activities---Overnight

Accommodations: Inkaterra Guide Field Station

Day 4, Monday March 2, 2020

Day of Monitoring TBA

• Group divided in half with one half Early Morning Bird survey with mist nets the other half to Inkaterra Canopy Walkway.
• Breakfast
• Activity
• Lunch
• Visit Gamitana Farms and Creek
• Supper
• Possible Guest lecture
• Guided Night Walk headlamps required
• Journal entry of day’s activities---Overnight

Accommodations: Inkaterra Guide Field Station

Day 5, Tuesday March 3, 2020

Day of Monitoring TBA

• Group divided in half with one half Early Morning Bird survey with mist nets the other half to Inkaterra Canopy Walkway.
• Breakfast
• Activity.
• Lunch
• Visit Reserva Ecologica Taricaya
• Afternoon for research projects.
• Night ride down Madre Dios to spot caiman and capybaras
• Supper
• Journal entry of day’s activities.

Accommodations: Inkaterra Guide Field Station

• Night Hike with headlamps.
• Journal entry of day’s activities---Overnight

Accommodations: Inkaterra Guide Field Station
Day 6, Wednesday  
March 4, 2020

Day of Monitoring TBA
  • Early Breakfast
  • Lake Sandoval and Tambopata National Reserve
  • Lunch at site
  • 3:00 PM Return to Guide Station
  • Supper
Accommodations: Inkaterra Guide Field Station

Day 7, Thursday  
March 5, 2020

Day of Activities TBA
  • Early Morning Bird excursion 5:30 for Bird group (optional)
  • Breakfast
  • Time for Individual Research projects
  • Lunch at noon
  • Visit Botanical Garden
  • Supper
  • Herps group excursion (optional)
  • Journal entry of day’s activities ---Overnight
Accommodations: Inkaterra Guide Field Station

Day 8, Friday  
March 6, 2019

Depart for home
  • Breakfast
  • Complete research projects and prepare for departure
  • Visit Butterfly House near Puerto Maldonado Airport
  • Transfer to Lima Intl Airport for departure to home destination.
  - Program Concludes -

Day 9, Saturday  
March 7, 2020

Arrival into Chicago

Field Course Guidelines:
Bring appropriate clothing and equipment as advised. A more detailed list will be given upon enrollment. The following will give you a good idea to as what to bring. A day pack is a must as is a pair of binoculars. Bring necessary items to avoid discomfort such as insect repellant (lots of
it), sun block, special medication (if necessary) and anti-bite medication for insect bites. Place note book and journals in Ziploc bags for protection. Bring limited pocket money. Do not bring much jewelry. Cellular phones and music are only allowed in the bus or in camp, not in the field. For camping and hiking, bring Qt size water bottle that can be hooked onto pack, flashlight and spare batteries, Halogen head lamps are ideal and leave hands free. Bring a small mosquito netting to drape over bed in case it is needed. Lightweight long-sleeved shirts and long trousers – the zip off short types are ideal. Comfortable hiking shoes and strap on sandals for the river and beach. Bring at least 7 pairs of socks; light rain jacket, hat, bandana, sunglasses, bath and swim towel, swimsuits, shorts, t-shirts for swimming. Personal toiletry items; motion sickness tablets. Camera if you have one. Bring an abundance of positive attitudes. Please do not litter. Safeguard the lives of your peers.

**COURSE BIBLIOGRAPHY**


ADVANCE Partnership Adaptation for Development and Conservation (2016): World Wildlife Fund and
Columbia University Center for Climate Systems Research

Wilson, E. O. (2002). The Future of Life. [Available at Amazon Audible with 30 day subscription].
