

ENVIRONMENTAL CONSERVATION IN SOUTHEAST ASIA

COURSE SYLLABUS

Course instructor: Pierre Echaubard, PhD

COURSE OVERVIEW

This course examines trends in biodiversity conservation in Southeast Asia including an overview of grassroots efforts focusing on sustainable natural resource management in the region. Home to an estimated 30% of the world's biodiversity and a number of unique natural environments – including the world's largest archipelago, highest number of islands and longest coastline – the shifting economic situation in Southeast Asia has caused significant changes for the region's demography, agricultural practices and land-use, urbanization trends, biodiversity and social capital. These changes interact in complex ways and, together with the uncertainties associated with climate change, lead to far-reaching systemic consequences impacting livelihoods, social-ecological resilience and health. With this in mind, course themes will include biodiversity and biodiversity conservation, transdisciplinarity, system thinking and sustainability, ecosystem-based natural resources management, agriculture intensification and globalization, and linkages between biodiversity, health and disease. The course will combine open discussions, interviews with local communities, lectures and field research mini-projects to provide students a holistic learning experience while studying in Thailand.

COURSE PRE-REQUISITES

This course strongly touches on components of ecology, tropical forest conservation, mangrove and seagrass ecology, as well as coral reef ecology and restoration, sustainability science and policy related material. It also has a strong transdisciplinary flavor with focus on community engagement and cross-sectorial collaborations. Previous experience in Field Ecology or/and Quantitative Ecology or/and Environmental sciences or/and in social sciences is a prerequisite. A capacity to discuss and grasp concepts and navigate perspectives from across disciplines is an advantage.

COURSE OBJECTIVES

At the end of the course, the student should be able to:

1. Understand and describe principles and conceptual foundations of biodiversity conservation and a sustainable approach to development.
2. Understand and describe key common challenges in biodiversity conservation and sustainable development and differences in political strategies across countries of the Southeast Asian region to address these challenges.
3. Understand and describe community-based biodiversity conservation solutions implemented at local levels.
4. Understand and apply methods in biodiversity assessment and monitoring across the ecosystem continuum Tropical Forest, Mangrove, Seagrass, Coral reefs
5. Critically discuss health and social issues in light of biodiversity loss and environmental degradation
6. Present findings and opinions in a clear and convincing manner, backed up by strong factual evidence.
7. Demonstrate the capacity to link their hands-on biodiversity conservation experience to broader sustainable development considerations, including large scale trade-offs and cross-sectorial collaborations.

COURSE REQUIREMENTS AND EVALUATION

Weekly Quizzes (20%): Assessing understanding of concepts presented and insuring acquisition of proper factual information

Participation (20%):

- “The meaning of biodiversity” interactive assignment: brief casual presentation of student’s original understanding of “biodiversity” (prior to class discussions) at the beginning of Session 2
- Most classes will have set readings to better focus in-class discussions. Students will provide brief commentary and discussion points on set readings before each class. Submitting these contributes to the participation grade.
- Week 2 & 3: Active participation during field studies
- Week 3: Classroom brainstorming after watching the movie “The day after tomorrow,”

Report on Field studies (50%): A 10/12 pages report on field research projects results written as a scientific article. The report should provide a brief introduction of the objectives of the research, describe the methodology used and the type of data collected as well as discuss results in the local socio-economic and cultural context. The main objective of this report is to have the student understand the methodologies used to collect data and why, as well as to reflect on the non-scientific constraints. Template and guidelines will be provided during the course introduction in week 1.

Technical Brief + presentation (10%): One page summarizing key findings and intended to inform field operations presented towards the end of the field studies.

READINGS

All required readings will be provided via Google Drive.

GRADING SCALE

A (90-100)

B (80-89)

C (70-79)

D (60-69)

F (<60)

ACADEMIC INTEGRITY

In this class, students will be held to the highest standards of academic integrity, demonstrating where you have learned something and citing it appropriately. You commit plagiarism when you represent other people's language or ideas without attribution, giving the impression that they are your own. If you use a direct quotation (even only part of a sentence) in your own writing, you must put quotation marks around it and cite the source it came from; if you paraphrase an idea from somewhere else (even if you're not using that author's exact language), you must still cite the source this idea came from.

COURSE POLICIES

Attendance

Class size is small in this course and the teaching method is highly interactive. The absence of a single student impacts the learning process for all. Students are expected to arrive on time and stay throughout the class. If you miss a class, you are responsible for all the information covered. Tardiness and absences carry academic penalty. As this is a short intensive course, missing any classes will make it difficult for you to successfully complete the class. One unexcused absence will result in 50% of your class participation grade being deducted while two unexcused absences will cause you to lose 100% of this grade. Three unexcused absences will result in an automatic failure for the course. Generally, late arrival to two classes equals an absence.

Technology policy

You may use laptops during class for taking notes or for accessing the readings. Use of your laptop during class for other purposes (emailing, social media) will result in a 50% reduction in your participation grade for the day. Other devices, including cell phones, music players, etc. must be turned off.

SCHEDULE

DAY1 – Course introduction

Description: Overview of the course objectives, content and field study schedule. Briefing on course assignments including the “field study” research report.

First introductory lecture: “What is Southeast Asia: Biogeography and Political Boundaries” This lecture scope is matching that of the course by emphasizing the close relationship between cultural components, people’s societies and ecological features of the land.

Location: Spirit Mountain learning and Development Center, Aonang, Krabi

Readings:

- Boomgaard, P., 2016. Environmental histories of Southeast Asia, in: Routledge Handbook of the Environment in Southeast Asia. Routledge, pp. 49–63.

- Hirsch 2016 - Environmental histories of SEA copy.pdf, n.d.
- Ung, V., Zaragueta-Bagils, R., Williams, D.M., 2016. Comparative biogeography of Southeast Asia and the West Pacific region. Biological journal of the Linnean Society 117, 372–385.

Assignments: Brief commentary and discussion points on readings. Each student will send three comments/questions to the course director before the class starts. These pointers will be used at the beginning of the class to start an open discussion.

Morning Activities: Course overview and introductory lecture

DAY 2 - What is Biodiversity and its threats in SEA?

Description: What is biodiversity and what threats does it face in SEA?

Conceptual overview of biodiversity, the status of biodiversity conservation in Southeast Asia, the various meanings of biodiversity for local cultures and challenges towards its conservation. We will use open discussions, short movie projection, concepts and case study presentations to probe student knowledge build understanding and stimulate interest for this central theme. We review the methods that will be used during our field study program (sampling designs, forest rapid site assessments, etc...)

Location: Spirit Mountain learning and Development Center, Aonang, Krabi

Readings:

- Sodhi, N.S., Koh, L.P., Brook, B.W., Ng, P.K.L., 2004. Southeast Asian biodiversity: an impending disaster. Trends in Ecology & Evolution 19, 654–660.
- Sodhi, N.S., Koh, L.P., Clements, R., Wanger, T.C., Hill, J.K., Hamer, K.C., Clough, Y., Tscharntke, T., Posa, M.R.C., Lee, T.M., 2010. Conserving Southeast Asian forest biodiversity in human-modified landscapes. Biological Conservation 143, 2375–2384.
- Hughes 2017 Understanding the drivers of Southeast Asian biodiversity loss.pdf, Ecosphere 8(1) e01624

- Franco, J.L. de A., 2013. The concept of biodiversity and the history of conservation biology: from wilderness preservation to biodiversity conservation. *História (São Paulo)* 32, 21–48.
- Laurance, W.F., Sayer, J., Cassman, K.G., 2014. Agricultural expansion and its impacts on tropical nature. *Trends in Ecology & Evolution* 29, 107–116.
- Schelhas, J., Pfeffer, M.J., 2009. When global environmentalism meets local livelihoods: policy and management lessons: *Environmentalism and livelihoods. Conservation Letters* 2, 278–285.

Assignments: Brief commentary and discussion points on readings. Each student will send three comments/questions to the course director before the class starts. These pointers will be used at the beginning of the class to start an open discussion.

Morning Activities: Lecture and open discussion about “What is biodiversity and what threats does it face in SEA?”.

DAY 3 - Forest Ecology field visit

Description: Day field trip to offer students an introduction to tropical forest restoration focusing on the framework species method led by the Forest Restoration Unit of Chiang Mai university. The day focuses on framework species plot establishment and biodiversity recovery, how to survey restoration with a drone (flying and mapping demonstration), community tree nursery (practical aspects, Socio-economic and community aspects).

Location: Klong Tom, Krabi

Readings:

Elliott , S. D., D. Blakesley and K. Hardwick , 2013. Restoring Tropical Forests: a practical guide. Royal Botanic Gardens, Kew; 344 pp.

Assignments: N/A

Morning Activities: Workshops and open discussions

Afternoon Activities: Workshops and open discussions

DAY 4 – Drones for Forest conservation

Description: Workshop to process drone images into 3D forest models for biomass assessment (Pix4D) in order to showcase applications complementary to forest restoration project with management and policy implications.

Location: Klong Tom, Krabi

Readings: N/A

Assignments: N/A .

Morning Activities: Workshop to process drone images into 3D forest models for biomass assessment

DAY 5 - Ecosystem approaches for sustainability

Description: “Ecosystem approaches for sustainability”. Continue exploring the complexity of environmental conservation and its societal consequences. We focus particularly on integrated approaches to ecosystem management and sustainable development. Themes include ecosystem services for human health and wellbeing, ecosystem approaches to health, resilience and adaptive capacity, participatory processes, cross-sectoral collaborations and transdisciplinarity.

Location: Spirit Mountain learning and Development Center, Aonang, Krabi

Readings:

- Carpenter, S.R., Folke, C., 2006. Ecology for transformation. Trends in Ecology & Evolution 21, 309–315.
- Fath, B.D., Dean, C.A., Katzmair, H., 2015. Navigating the adaptive cycle: an approach to managing the resilience of social systems. Ecology and Society 20.

- Norgaard, R.B., 2010. Ecosystem services: From eye-opening metaphor to complexity blinder. *Ecological Economics* 69, 1219–1227.
- Wilcox, B.A., Aguirre, A.A., De Paula, N., Siritaroonrat, B., Echaubard, P., 2019. Operationalizing One Health Employing Social-Ecological Systems Theory: Lessons From the Greater Mekong Sub-region. *Frontiers in Public Health* 7.

Assignments: Weekly quiz 1, review of conceptual and methodological foundations discussed during the first 5 days of the course.

Morning Activities: Lecture and open discussion about “Ecosystem Approaches for Sustainability” (3 hours)

Day 6

Free day. Optional activities arranged.

Day 7

Free day. Optional activities arranged.

Day 8 - Field program introduction/Forest Restoration Ecology D1

Description: In the morning, we provide an overview of the field studies program and the pedagogic objectives. In particular we provide students with a clear description of the research projects that the students will be conducting and the material and logistic available to them. In the afternoon we will be starting our Forest restoration ecology project with an overview of technical knowledge necessary for students to recognize local trees, sample trees diversity and collect complementary data. Practical information will be given and experienced on tree planting, soil preparation and tree nursery settings, cloning and familiarity with the “framework species” method that entails planting a select assortment of species that are both most suited to the restoration site and functionally important therefore not only contributing to forest cover increase but also to increase the prevalence of functionally important fauna for self-organizing forests.

Location: Spirit Mountain learning and Development Center, Aonang, Krabi

Readings: N/A

Assignments: N/A

Morning Activities: Group presentation of field study objectives, planned activities, research projects and research methods.

Afternoon Activities: Forest restoration ecology activities

Evening Activities: Unstructured time, evening briefing for next day, group dinner

Day 9 - Forest ecology research project D2

Description: Research project implementation using concepts and methods described.

Location: Spirit Mountain learning and development center and surrounding

Readings: Elliott , S. D., D. Blakesley and K. Hardwick , 2013. Restoring Tropical Forests: a practical guide. Royal Botanic Gardens, Kew; 344 pp.

Assignments: research project implementation

Morning Activities: Data collection

Afternoon Activities: Data collection

Evening Activities: Data processing, day's debriefing, next day planning

Day 10 - Tree ecology research project D3 & Bird functional ecology

Description: Tree ecology research project implementation using concepts and methods described. Bird ecology workshop. As the “tree ecology” research project data collection phase ends, we organize Bird ecology workshop to introduce student with elements of information regarding birds and their role in forest regeneration. This introductory workshop initiates a half-days observation survey during which groups of students (2-3 depending on the class size) spend rounds of 2hrs (3 rounds of 2hrs per group) to observe the birds roaming in the conservation area, particularly in relation to what tree species and where the birds spends most of its time. This observational study will inform which tree should be planted and where in order to enhance bird conservation strategies as well as optimize bird-tree synergies and ultimately forest regeneration.

Location: Spirit Mountain learning and development center and surrounding

Readings:

Elliott , S. D., D. Blakesley and K. Hardwick , 2013. Restoring Tropical Forests: a practical guide. Royal Botanic Gardens, Kew; 344 pp.

Assignments: research project implementation, Weekly quiz 2

Morning Activities: Data collection

Afternoon Activities: Data collection

Evening Activities: Data processing, day’s debriefing, next day planning

Day 11 - Mangrove Restoration Ecology D1

Description: Following the ecological continuum form land to sea, student will take part in research and monitoring of our mangrove restoration projects as well as work with the team to build nurseries over 2-days. We will hold brief interactive hands-on information workshops about key research and monitoring methods and visit conservation areas to collect data and monitor the status of our restoration sites

Location: Coastal habitats in Aonang Area – koh klang

Readings:

- Lebout and Echaubard, 2021. Mangrove Ecological Restoration in the Andaman: a practical field guide

Assignments: technical class-based workshop and field monitoring

Morning Activities: Mangrove Ecological restoration Workshop

Afternoon Activities: Mangrove field monitoring

Evening Activities: Data processing, day's debriefing, next day planning

Day 12 - Mangrove Restoration Ecology D2

Description: Continuing activities for Mangrove restoration monitoring

Location: Coastal habitats in Aonang Area

Readings:

- Lebout and Echaubard, 2021. Mangrove Ecological Restoration in the Andaman: a practical field guide

Assignments: NA

Morning Activities: Mangrove field monitoring and community visits

Afternoon Activities: Debrief and data uploading

Evening Activities: Data processing, day's debriefing, next day planning

Day 13 - Seagrass and Dugong Conservation D1

Description: Following the ecological continuum from land to sea, student will take part in research and monitoring of our seagrass restoration projects as well as work with collaborating local conservation groups to participate in monitoring of seagrass beds as well as propagation of seagrass species *Enhalus acardoides*, as well as aerial observation of dugongs in restoration area sites. We will hold brief interactive hands-on information workshops about key research and monitoring methods and visit communities and restoration sites.

Location: Aonamao & Koh Sriboya

Readings:

- Short and Coles, 2003. Global Seagrass Research Methods. Elsevier

Assignments: data collection

Morning Activities: unstructured time, process and reflect, intercultural learning

Afternoon Activities: unstructured time, process and reflect, intercultural learning

Evening Activities: unstructured time, process and reflect, intercultural learning, overnight at koh sriboya

Day 14 - Seagrass and Dugong Conservation D2

Description: Continuing our exploration of local communities projects on seagrass propagation and monitoring at koh Sriboya

Location: Koh Sriboya

Readings:

- Short and Coles, 2003. Global Seagrass Research Methods. Elsevier

Assignments: data collection

Morning Activities: Seagrass monitoring and propagation

Afternoon Activities: return to the mainland

Evening Activities: Data processing, day's debriefing, next day planning

Day 15 - Coral reef ecology and restoration D1

Description: We start our 3-days coral reef restoration project, during which students will be learning the fundamentals of coral reef ecology and coral biology, learn methods of coral propagation and monitoring. No pre-requisite in scuba diving is needed as all activities can be done from the beach or snorkeling.

Location: Spirit mountain learning and development center, Railay east

Readings: William F. Precht 2006, Coral Reef restoration handbook, Taylor and Francis

Assignments: data collection

Morning Activities: Coral reef ecology and propagation workshop

Afternoon Activities: Inter-tidal coral reef propagation at Railay east, bat cave sector

Evening Activities: free/report drafting

Day 16 - Coral reef ecology and restoration D2

Description: Monitoring of our coral nursery and restoration site at koh yawassam. Activities will include coral propagation, coral monitoring, reef diversity assessments, snorkeling, island exploration, beach time.

Location: Local islands, Aonang (Koh Yawassam and Koh Poda)

Readings: William F. Precht 2006, Coral Reef restoration handbook, Taylor and Francis

Assignments: data collection

Morning Activities: Coral propagation on site,

Afternoon Activities: Coral propagation and snorkeling

Evening Activities: free/report drafting

Day 17 - Coral reef ecology and restoration D3

Description: Visit and monitoring of our coral nursery at Klong muang beach, activities will include coral propagation, using different technique, coral monitoring in the morning, afternoon coral reef conservation project wrap up.

Location: Klong Muang beach

Readings: William F. Precht 2006, Coral Reef restoration handbook, Taylor and Francis

Assignments: data collection

Morning Activities: Coral propagation on site,

Afternoon Activities: coral project wrap up, rest time

Evening Activities: free/report drafting

Day 18 - Sustainable development international frameworks (morning lecture and free day for presentation and report preparations)

Description: Today we link the research of ecosystem restoration to the context of broader sustainable development frameworks with a lecture and open discussion

analyzing international sustainable development policies and initiative since seminal works and realizations from the 1970s.

Location: Spirit Mountain learning and development center

Readings:

- Ong et al. Biological diversity conservation laws in South East Asia and Singapore: a regional approach in pursuit of the United Nations' Sustainable Development Goals? Asia Pacific Journal of Environmental Law, Vol. 19, 2016, pp. 105–138
- Nijman, An overview of international wildlife trade from Southeast Asia. Biodivers Conserv (2010) 19:1101–1114

Assignments: student presentations

Morning Activities: Lecture “International Sustainability frameworks” with discussion touching on Biodiversity conservation legal instruments and representative institutions in the region, International sustainable Development frameworks, ASEAN 2025 and the UN SDGs

Afternoon Activities: free time for Student report presentations preparation, Field program wrap up

Evening Activities: “Tomorrow and the day after tomorrow”: movie and reflections

Day 19 - Permaculture and Sustainable living & Presentations

Description: Today is a practical illustration of previous day's discussions, specifically experiencing permaculture design and self-reliance solutions at Spirit Mountain learning and development center. During the day we will experiment with natural building (bamboo, earth bricks) and permaculture focusing on design and agency based on ecological knowledge for food production. We spend the day at the center, hands-on playful activities and reflecting on the course aims.

Location: Spirit Mountain learning and development center

Readings: Hahn 2014 A permaculture Primer. Midwest permaculture

Assignments: NA

Morning Activities: hands-on activities on site

Afternoon Activities: Presentations, course wrap up and conclusions

Evening Activities: Farewell party

Day 20 - Free

Free day. Optional activities arranged.

Day 21 – Free and departure

Free day. Optional activities arranged. Report due.