



SUSTAINABLE DEVELOPMENT STUDIES PROGRAM

International Sustainable Development Studies Institute

สถาบันการศึกษาการพัฒนาที่ยั่งยืนนานาชาติ

Culture and Ecology of the Andaman: Islands, Reefs and Mangroves

ECODEV (Ecology/Geography): 4 Credits

Fall Semester, 2017

Course Description

The oceans and coastal ecosystems are some of the most important and critically threatened ecosystems on the planet. This course examines coastal and island communities as well as the near shore ecologies that they are embedded within — mangroves, sea grasses, coral reefs, as the surrounding ocean. Fishing — both small scale artisanal fishing and larger commercial enterprises — shape the communities as well as the ecosystems on which they depend. Multiple competing stakeholders and overlapping and transient resources make this a complex topic to study. All of this is happening in the broader context of climate change, ocean acidification, and rising sea levels.

This course studies two distinct places to better understanding the intersection of culture and ecology in the context of our changing oceans.

The Islands Section of the course focuses on the study of tropical coral reefs, islands, and the role of state management of marine resources. The study site is the Tarutao National Marine Park, focused on the Adang-Rawi archipelago and the popular tourist destination of Koh Lipe. This is also the home of the Urak Lawoi, a traditionally semi-nomadic sea people. The course uses sea kayaks to explore the archipelago, re-tracing some of the traditional routes and camping sites of the Urak Lawoi, while focusing reef ecology and human impacts on the island and reef ecosystems.

The Coastal Section of the course takes place on the West Coast of Thailand in Trang province, where coastal communities are working to conserve their traditional fishing practices through mangrove and sea grass conservation and restoration. This area, composed of extensive mangroves, beaches, reefs, islands, and rubber plantations, is under increasing pressure from the expansion of shrimp farms, commercial fishing, and the impact of climate change. The communities are also distinctive in that they are primarily Muslim, a minority group in predominantly Buddhist Thailand, facing both religious and ethnic discrimination.

Objectives

By the end of the course students will understand the key issues in resource conservation and restoration in tropical coastal and islands ecosystems, the function and interrelationships between coral reefs, sea grasses and mangroves, the role and limitations of both state and community management, and the broader challenge facing island, coasting and ocean conservation in the context of climate change.

Learning Outcomes

Upon completing of the course, students will be able to:

- Understand the key issues and challenges to ocean and coastal ecosystems
- Have specific knowledge about field research and experiential studies of reefs, sea grasses and mangroves
- Understand the sociopolitical dynamics of resource management in Southern Thailand
- Understand the ecological context and constraints on fishing and resource use in Southern Thailand
- Be competent in both biological and social field research methods
- Understand the struggles of marginalized communities in Southern Thailand that depend on the oceans for their livelihood
- Be able to articulate the key challenges facing coastal and island communities in Southeast Asia and how it applies to global issues and climate change

Grading and Assessment

Class participation and expedition skills: Class participation in this course means on-time attendance, active involvement in the classroom and during other activities, being responsive and active in peer teaching/learning, exhibiting culturally appropriate dress and behavior, and being an active member of the team, including leadership, active followership, and being able to safely travel and learn in the the environments where the course takes place. Participation requires that students ask questions in class and in the field, be active in seeking answers to their questions, and be actively involved in group discussions with both peers and farmer educators.	10%
Experiential Learning Workbook (ELW): Each student will fill out and complete assignments in the Experiential Learning Workbook, focused on field based studies of sustainable food systems, biological and ecological topics, as well as the broader social and cultural context.	15%
Species presentation: During seminar week students will sign up to lead a 10 minute presentation while in the field on a useful plant or animal. Students will complete independent research on their chosen species, and gather additional information in the field for presentation during the course.	5%
Analytical Field Essays (AFE) (3): Three times during the course students will write an AFE in their field notebook about a significant connection between culture, ecology and sustainable food systems. The AFE should have a thesis statement that connects field experiments to the course, analyze the issue drawing on both course readings and experience in the field, and discuss further questions to consider related to their chosen topic. AFEs need to be clearly labeled as such at the top of EACH page. 4 PAGES	15%
Reflection Essays (3): Three times during the course, students will write an essay reflecting on any challenging or interesting cross-cultural experiences related to their understanding of the course topic. Reflection Essays need to be clearly labeled as such at the top of EACH page. 2 PAGES	10%
Quizzes: Throughout the course, there will be short quizzes on the readings and lectures.	10%
Seminar Week Exam: This exam will evaluate students' understanding of the theories and context of the course, based on the material covered during the first week. There will be two short essays as well as one longer essay connecting ecology and culture in the context of sustainable food systems.	10%
Mid-Course Exam: This exam will consist of short essays analyzing sustainable food systems studied during the first part of the field expedition, based on both readings and field experience and studies.	10%
Final Exam: This exam will cover lectures, readings, experiential field studies and other topics covered during the course. This will be an in-class short essay based exam.	15%
TOTAL	100%

A note on writing essays:

- Use your course journal; be ensure that it is legible and neatly presented.
- Each essay should have a TITLE describing the subject, written in the Table of Contents.

Citations: Citing your sources gives credit to the published and unwritten (verbal, observed, experienced) sources that contribute to your writing. Just as you normally cite written sources in research papers, it is especially important in field-based courses to acknowledge the people who have contributed to your learning and formulation of new ideas.

Format for citing written sources in text:
(Lastname Year), example--> (Carroll 2007).

Format for citing Field Notes (FN) in text:
(FN Page#). example--> (FN 23).

Expectations

This course is the capstone of the semester, and the final Expedition Field Course. By now students should be able to manage the challenges of time management while studying and traveling in the field, and be writing at a higher level. Essays should be shifting to be more sophisticated with a grasp of the larger issues in sustainability, and group presentations and discussions with local people (government officials, villagers and others) should show a more sophisticated understanding of the broader social and historical context of the issues than in earlier courses.

Schedule

The schedule for the Expedition Field Course is below. There are three sections to the course:

- Seminar Week
- Field Expedition to Mid-Course Seminar
- Field Expedition to Final Seminar

Seminar is 1 PM to 4 PM unless otherwise announced. Class will be all day on Friday.

Readings are listed on the day they are due. A reader will be distributed along with the key texts for the course

SEMINAR WEEK: CONTEXT AND ISSUES IN COASTAL AND MARINE SUSTAINABILITY

Monday: Ecosystem and Environmental Overview

1PM-4PM: Seminar with Ajaan Saisunee

4PM-5PM: Check out student field course gear

Levinton, Jeffrey, *Marine Biology: Function, Biodiversity, Ecology*, Oxford University Press, New York, 2014.

Chapter 2: The Oceanic Environment, pp. 13-39;

Chapter 3: Ecological and Evolutionary Principles of Marine Biology, pp.40-68. Chapter 14: The Tidelands: Mangroves, pp. 343, 345-349;

Chapter 15: The Shallow Coastal Subtidal: Sea Grass Beds, Rocky Reefs, Kelp Forests, and Coral Reefs 361-366, 378-401.

Smith III, Thomas J. "Mangrove Forest Structures." In *Mangrove Ecology: A Manual for a Field Course*, I.C. Feller and M. Sitnik, editors, Smithsonian Institution, Washington. DC, 1996.

Barbier, E.B. et al., "the value of estuarine and coastal ecosystem services." *Ecological Monographs*, Vol 81(2): 169-193, 2011.

Duffy, J.E., "Biodiversity and the functioning of seagrass ecosystems." *Marine Ecology Progress Series*, Vol. 311: 233-250, 2006.

Roberts, Callum, *The Ocean of Life*, New York: Penguin Group, 2012: Chapter 14.

Tuesday: Threats to Marine Ecosystems—Over harvesting and Illegal fishing

1PM-3PM: Seminar with Ajaan Saisunee

3PM-5PM: Snorkel skills at 700 Year Stadium

Jackson, Jeremy BC, et al. "Historical overfishing and the recent collapse of coastal ecosystems." *Science* Vol. 293.5530: 629-637, 2001.

Worm, B. et al., "Impacts of biodiversity loss on ocean ecosystem services." *Science*, Vol. 314: 787-790, 2006.

Pitcher, Tony J., & WL Cheung. "Fisheries: Hope or despair?." *Marine Pollution Bulletin* Vol. 74.2: 506-516, 2013.

Lehmköste, J., et al. "Exploiting a living resource: Fisheries " *World Ocean Reviews.: Living with the Ocean 1*. Maribus, Hamburg, 2010. Chapter 6 : Exploiting a living resource: Fisheries -The cause of overfishing pp.126-135.

Lehmköster, J., et al. " The Future of Fish- The Fisheries of the Future" *World Ocean Reviews.: Living with the Ocean 2*. Maribus, Hamburg, 2013. Chapter 3 : Plenty more fish in the sea?- Illegal fishing pp.70-77.

Roberts, Callum, *The Ocean of Life*, New York: Penguin Group, 2012: Chapter 3.

Wednesday: Threats to Marine Ecosystems—Climate Change and Pollution

1PM-4PM: Seminar with Ajaan Saisunee

- Bijma, J. Portner, H.O., Yesson, C., & Rogers, A.D., "Climate change and the oceans—What does the future hold?," *Marine Pollution Bulletin*, vol. 74, pp. 495-505, 2013.
- Hoegh-Goldberg, O., et al., "Coral reefs under rapid climate change and ocean acidification." *Science*, Vol 318: 173-175, 2007.
- Ellison, J.C., "Vulnerability assessment of mangroves to climate change and sea-level rise impacts." *Wetlands Ecology & Management*, Vol. 23:115-137, 2015.
- Orth, R.J., et al., "A global crisis for seagrass ecosystems." *BioScience*, Vol. 56(12): 987-996, 2006.
- Vikas M., G.S.Dwarakish. "Coastal Pollution" International Conference on Water Resources, Coastal and Ocean Engineering. Aquatic Procedia Vol.4 :381-388, 2015.
- Cole, Matthew *et al.*, "Microplastic as Contaminants in the Marine Environment" *Marine Pollution Bulletin* Vol 62: 2588-2597, 2011.
- Lehmköster, J., *et al.* "Exploiting a living resource: Fisheries " *World Ocean Reviews.: Living with the Ocean 1.* Maribus, Hamburg, 2010. Chapter 6 : How climate change alters ocean chemistry-The oceans – the largest CO₂-reservoir, the consequences of ocean acidification. pp.26-43.
- Lehmköster, J., *et al.* "Marine Resources – Opportunity at Risks " *World Ocean Reviews.: Living with the Ocean 3.* Maribus, Hamburg, 2014. Chapter 1: Oil and gas from the sea – Oiling the oceans. pp.36-51.
- Roberts, Callum, *The Ocean of Life*, New York: Penguin Group, 2012. Chapters: 5-7

Thursday: Resource Management—Ecological Aspects and Governance

1PM-3PM Seminar with Ajaan Saisunee

3PM-4PM Expedition Briefing

- Lester, S.E., *et al.*, "Biological effects within no-take marine reserves: a global synthesis." *Marine Ecology Progress Series*, Vol 384:33-46, 2009.
- Halpern, B.S., Lester, S.E, & K.L. McLeod. "Placing marine protected areas onto the ecosystem-based management seascape." *PNAS*, Vol. 107(43): 18312-18317, 2010.
- Gell., F.R. & C.M. Roberts. "Benefits beyond boundaries: the fishery effects of marine reserves." *TRENDS in Ecology and Evolution*, Vol. 18(9): 448-455, 2003.
- Lehmköster, J., *et al.* "Exploiting a living resource: Fisheries " *World Ocean Reviews.: Living with the Ocean 1.* Maribus, Hamburg, 2010. Chapter 6 : Exploiting a living resource: Fisheries –Toward more sustainable fisheries pp.136-139.
- Lehmköster, J., *et al.* " The Future of Fish- The Fisheries of the Future" *World Ocean Reviews: Living with the Ocean 2.* Maribus, Hamburg, 2013. Chapter 3 : Plenty more fish in the sea? - Towards better fisheries management. pp.108-120.
- Lehmköster, J., *et al.* " Sustainable Use of Our Ocean-Making Idea Works" *World Ocean Reviews : Living with the Ocean 4.* Maribus, Hamburg, 2015. Chapter 3 : Plenty more fish in the sea? - On the Difficult of Governing the Sea. pp.76-94.
- Roberts, Callum, *The Ocean of Life*, New York: Penguin Group, 2012: Chapter 20.

Reflection #1 Due

Friday : Resource Management - Coastal livelihood approach

9AM-12PM: Final Exam

12PM-1PM: Lunch

1PM-4PM: Final Seminar

- Ostrom, Elinor. "A general framework for analyzing sustainability of social-ecological systems." *Science* 325.5939: 419-422, 2001.
- Rochette, J., *et al.*, "Regional oceans governance and mechanisms: A review." *Marine Policy*, Vol. 60:9-19, 2015.
- Allison, E.H. & F. Ellis. "The livelihoods approach and management of small-scale fisheries." *Marine Policy*, Vol. 25: 377-388, 2001.
- Roberts, Callum, *The Ocean of Life*, New York: Penguin Group, 2012: Chapter 19.

Field Reading

Lipe (Read before Lipe module)

UNESCO, *Bridging the Gap between the Rights and Needs of Indigenous Communities and the Management of Protected Areas: Case studies from Thailand*, pp 30-45, 2007.

Arunotai, Narumon Hinshiranan, *We, the Sea People*, Bangkok: Chulalongkorn University Social Research Institute, pp. 45-67.

Bennet, Nathan James, Philip Dearden. "Why local people do not support conservation: Community perceptions of marine protected area livelihood impacts, governance and management in Thailand." *Marine Policy* 44 (2014): (107-116).

Arceo, Hazel O., and Catherine Chueung. Thailand Marine Protected Areas. *Marine Protected Areas in Southeast Asia* (86-92).

Trang (Read before Trang module)

Prasertcharoensuk, Ravadee, et al. "Time for a Sea Change: a Study of the Effectiveness of Biodiversity Conservation Measures and Marine Protected Areas Along Southern Thailand's Andaman Sea Coastline." (2010).

Bennet, Nathan James, Philip Dearden, Ana Maria Peredo. "Vulnerability to multiple stressors in coastal communities: a study of the Andaman coast of Thailand." *Climate and Development* 2014: (1-18).

Group A Schedule

Day 1: Sunday 26/11 — Travel to Koh Adang

Students will travel by airplane from Chiang Mai to Hat Yai. From the Hat Yai airport, students will take a van or mini bus to the port city of Pak Bara, then take a boat to Lipe island followed by a long tail boat trip to the National Park on Koh Adang.

Analytical Essay #1 Due

Day 2: Monday 27/11 — Orientation to Kayak skills / Survey of Lipe Kayak skills / Meeting

ISDSI instructors will conduct an introduction to kayaking skills and safety expectations.

Koh Lipe Island Survey: The students will conduct a brief survey of tourist development on Koh Lipe in order to better understand the management scope, scale, and strategy of the Adang National Park. Observations and findings will be recorded in the ELW.

Meeting with Khun Komsak or Chao Lay Villagers

Depending on scheduling, students may meet with Khun Komsak, businessman, resort-owner, and commercial fisherman. The focus of inquiry will center on the history of commercial fishing, marine-resource extraction, and tourism development in the archipelago, with specific attention paid to the definition of commercial vs. subsistence fishing. Alternatively, students will meet with Pi Jaeng, the Urak Lawoi owner of the Sanom Beach Guesthouse on Lipe, as well as other members of the Urak Lawoi,. They can discuss the history of the Urak Lawoi in the archipelago, their livelihood, and their thoughts about park management and tourism development in the area. This meeting will also provide a chance to discuss the rapid change in the area with an older generation.

ELW: Field Activity 2: Koh Lipe Island Survey

Day 3: Tuesday 28/11 — Meet with National Park / Paddle to Chao Lay Village Meeting with National Park

Students meet with a representative of the national park to discuss park management and development in the area.

Paddle to Chao Lay Village

The group will paddle from the National Park to the Chao Lay Village on the west side of Koh Adang where they will camp for the next two nights

Meeting with Khun Komsak or Chao Lay Villagers (see above)

Day 4: Wednesday 29/11 — Chao Lay Village Survey / Biodiversity Part I

Chaolay Village Survey: Students will complete a survey study of the Chao Lay village, gathering observational information and interviews to learn about connections between island communities on Adang and Lipe.

Biodiversity Activity: Students will snorkel the reef and observe some of the vast diversity of organisms that can be found on coral reefs and gain a greater appreciation of the range of life to be found in the Adang Archipelago.

ELW: Field Activity 5: Chaolay Village Survey

ELW: Field Activity 4: Biodiversity Part I

Reflection #2 Due

Day 5: Thursday 30/11 — Paddle to Hat Ratcha

Students will begin a long paddle early in the morning and paddle north and then west along the coast of Koh Adang before crossing the channel to Koh Rawi. During this paddle students must plan for and navigate the ecosystem shaping forces of wind, waves, and tides as well as observe semi-abandoned villages along the coasts. They will camp at Hat Ratcha for the following three nights.

Day 6: Friday 1/12 — Snorkel Day I

Anemone and Anemonefish Populations Survey: Students will study 2 reef populations, magnificent sea anemones (*Heteractis magnifica*) and anemone fish (*Amphiprion spp.*) in order to see firsthand the concept of symbiotic mutualism and reinforce concepts of population-level ecology. This activity is also designed to teach proper population sampling technique for calculating distribution, abundance, and population density.

ELW: Field Activity 7: Anemone and Anemonefish Populations Survey

ELW: Field Activity 4: Biodiversity Part II

Meeting with Pi Tain & Pi Kahn

In the evening, students will sit down with our two local instructors, Pi Tain and Pi Khan, to discuss the impacts of the National Park and tourism development from their perspective. The line of questions should focus on both the benefits and downfalls of National Park Management and tourism development. Through this discussion students will deepen their understanding of the effectiveness of various Park initiatives to conserve or exploit specific areas or resources.

Day 7: Saturday 2/12 — Snorkel Day II

Zonation Survey: Students will conduct a zonation study, examining the organisms that live and thrive in different zones from the high tide line to the shelf. The zonation study will provide a better picture of which types of organisms are likely to be found in any given zone.

ELW: Field Activity 7: Zonation Survey

Analytical Essay #2 Due

Oceans of Life Presentations

Day 8: Sunday 3/12 — Paddle to National Park / Pack Kayaks and Group Gear

Day 9: Monday 4/12 — Travel to Mod Ta Noi Village

Mod Ta Noi is a small Muslim fishing village on the shore of the Andaman Sea. For generations, the community in Mod Ta Noi has relied heavily on the mangrove and near-shore environment for food, housing materials, and more recently commercial marine-life harvesting.

Day 10: Tuesday 5/12 — Midcourse Exam / Midcourse Seminar

1/2 ELW Due

Day 11: Wednesday 6/12 — Fish Market / PIPO Meeting / Village Meeting

This day students will wake up early in the morning to travel to Kantang to see where boats will unload their catch from the ocean.

Port In Port Out (PIPO): PIPO is an organization appointed by the Royal Thai Navy on Law enforcement to fight illegal, unreported unregulated fishing to learn about commercial fishing policy and management.

Village Meeting: In the afternoon, students will meet with representatives from Mod Ta Noi village. Students can ask about the history of the village, livelihoods and involvement in the conservation of local ecosystems such as mangroves.

Day 12: Thursday 7/12 — Coastal Activity I / อ.บ.ท. (Aw Baw Taw) Meeting

Mudflat Activity: Students will explore the diversity of life that can be found on tidal mudflats. Mudflats are important ecosystems in coastal areas for a variety of reasons, including human food gathering.

อ.บ.ท. Meeting: Students meet with subdistrict leaders to ask questions about the village community, resource management, and local leadership roles.

ELW: Field Activity 10: Mudflat Exploration

Reflection #3 Due

Day 13: Friday 8/12 — Family Day / Ronggeng Dancing

The students have the opportunity to spend the day experiencing local livelihoods with their host families. Many will join their families to fish or gather marine products like squid, fish, and various shellfish. In the evening the community hosts a farewell party that includes performances of traditional Ronggeng Dancing.

Day 14: Saturday 9/12 — Travel to Baan Jao Mai Village / Seagrass Meeting / Nipa Palm

Baan Jao Mai is a small Muslim fishing village on the shore of the Andaman Sea. For generations, the community in Baan Jao Mai has relied heavily on the mangrove and near-shore environment for food, housing materials, and more recently commercial marine-life harvesting. In recent years, the mangrove surrounding Baan Jao Mai has fallen under the management of the Hat Jao Mai National Park. Since this jurisdictional change, members of the community have been protesting and struggling to maintain their access to the mangrove and their traditional ways of life.

Seagrass Meeting: Students will meet with Kun Ban Jon, the founder of Baw Hin Farmstay. Kun Ban Jon has been an influential figure in grassroots efforts to replant seagrass and empower local livelihoods.

Nipa Palm: Students will then travel to visit Yan Sue where the community is heavily involved in nipa palm cultivation and harvesting for a variety of uses, including human consumption, roof construction, and handicrafts. They will be able to practice making local handicrafts with the villagers.

Day 15: Sunday 10/12 — Coastal Activity II

Seagrass Community Study: Students will snorkel to observe important aspects of seagrass ecosystems and to investigate an excellent example of a mutualistic relationship between animals. They will

ELW: Field Activity 9: Seagrass Community Study

Day 16: Monday 11/12 — Mangrove Paddle Day

Mangrove Paddle Study: Students will travel via long tail about 8 kilometers north of Baan Jao Mai to the mouth of a river leading into the mangrove. From the mouth of the river, you will kayak through the mangroves back to Baan Jao Mai. This will be a full day of kayaking, snorkeling, and conducting research in the mangrove witnessing how abiotic and biotic conditions vary within mangrove ecosystems.

ELW: Field Activity 8: Mangrove Paddle Day

Analytical Essay #3 Due**Day 17: Tuesday 12/12 — Meeting with Department of Marine and Coastal Resources / Islam and the Community**

Meeting with Department of Marine and Coastal Resources (DMCR): Students will meet with a representative from the office for DMCR to gather information about National Park management and community relations.

This day students will explore local religion, customs, and tradition by discussing these topics with the village *Imam* (Islamic leader). After the discussion, students will witness a goat slaughter and spend time with their host families. In the evening, the group will host the community for dinner, songs and dancing.

Day 18: Wednesday 13/12 — Travel from Baan Jao Mai to Chiang Mai

ELW Due

Day 19: Thursday 14/12 — Final Exam / Final Seminar / Re-entry talk

In the afternoon, students who are not continuing at ISDSI for ICRP or internship will meet to discuss about reentry, discussing personal takeaways from the semester and covering and the transition out of Thailand back into the U.S.

Day 20: Friday 15/12 — Thai Language Final Exam / Group gear washing / Return all ISDSI gear / Bring in any donations

Group B Schedule

Day 1: Sunday 26/11 – Travel to Mod Ta Noi

Mod Ta Noi is a small Muslim fishing village on the shore of the Andaman Sea. For generations, the community in Mod Ta Noi has relied heavily on the mangrove and near-shore environment for food, housing materials, and more recently commercial marine-life harvesting.

Analytical Essay #1 Due

Day 2: Monday 27/11 – Fish Market / PIPO Meeting / Village Meeting

This day students will wake up early in the morning to travel to Kantang to see where boats will unload their catch from the ocean.

Port In Port Out (PIPO): PIPO is an organization appointed by the Royal Thai Navy on Law enforcement to fight illegal, unreported unregulated fishing to learn about commercial fishing policy and management.

Village Meeting: In the afternoon, students will meet with representatives from Mod Ta Noi village. Students can ask about the history of the village, livelihoods and involvement in the conservation of local ecosystems such as mangroves.

Day 3: Coastal Activity I / อ.บ.ต. (Aw Baw Taw) Meeting

อ.บ.ต. Meeting: Students meet with subdistrict leaders to ask questions about the village community, resource management, and local leadership roles.

Mudflat Activity: Students will explore the diversity of life that can be found on tidal mudflats. Mudflats are important ecosystems in coastal areas for a variety of reasons, including human food gathering.

ELW: Field Activity 10: Mudflat Exploration

Day 4: Wednesday 29/11 – Family Day / Ronggeng Dancing

The students have the opportunity to spend the day experiencing local livelihoods with their host families. Many will join their families to fish or gather marine products like squid, fish, and various shellfish. In the evening the community hosts a farewell party that includes performances of traditional Ronggeng Dancing.

Day 5: Thursday 30/11 – Travel to Baan Jao Mai Village / Nipa Palm

Baan Jao Mai is a small Muslim fishing village on the shore of the Andaman Sea. For generations, the community in Baan Jao Mai has relied heavily on the mangrove and near-shore environment for food, housing materials, and more recently commercial marine-life harvesting. In recent years, the mangrove surrounding Baan Jao Mai has fallen under the management of the Hat Jao Mai National Park. Since this jurisdictional change, members of the community have been protesting and struggling to maintain their access to the mangrove and their traditional ways of life.

Reflection #2 Due

Nipa Palm: Students will then travel to visit Yan Sue where the community is heavily involved in nipa palm cultivation and harvesting for a variety of uses, including human consumption, roof construction, and handicrafts. They will be able to practice making local handicrafts with the villagers.

Day 6: Friday 1/12 – Meeting with Department of Marine and Coastal Resources / Orientation to Kayak skills / Coastal Activity I

Meeting with Department of Marine and Coastal Resources (DMCR): Students will meet with a representative from the office for DMCR to gather information about National Park management and community relations.

ISDSI instructors will conduct an introduction to kayaking skills and safety expectations.

Day 7: Saturday 2/12 – Mangrove Paddle Day

Mangrove Paddle Study: Students will travel via long tail about 8 kilometers north of Baan Jao Mai to the mouth of a river leading into the mangrove. From the mouth of the river, you will kayak through the mangroves back to

Baan Jao Mai. This will be a full day of kayaking, snorkeling, and conducting research in the mangrove witnessing how abiotic and biotic conditions vary within mangrove ecosystems.

ELW: Field Activity 9: Mangrove Paddle Day

Oceans of Life Presentations

Day 8: Sunday 3/12 — Seagrass Activity / Islam and the Community

Seagrass Community Study: Students will snorkel to observe important aspects of seagrass ecosystems and to investigate an excellent example of a mutualistic relationship between animals. They will

This day students will explore local religion, customs, and tradition by discussing these topics with the village *Imam* (Islamic leader). After the discussion, students will witness a goat slaughter and spend time with their host families. In the evening, the group will host the community for dinner, songs and dancing.

ELW: Field Activity 10: Seagrass Community Study

Day 9: Monday 4/12 — Midcourse Exam / Midcourse Seminar

1/2 ELW Due

Day 10: Tuesday 5/12 — Travel to Lipe / Lipe Survey / Meet with Khun Khomsak or Chaolay Group

Koh Lipe Island Survey: The students will conduct a brief survey of tourist development on Koh Lipe in order to better understand the management scope, scale, and strategy of the Adang National Park. Observations and findings will be recorded in the ELW.

Meeting with Khun Komsak or Chao Lay Villagers

Depending on scheduling, students may meet with Khun Komsak, businessman, resort-owner, and commercial fisherman. The focus of inquiry will center on the history of commercial fishing, marine-resource extraction, and tourism development in the archipelago, with specific attention paid to the definition of commercial vs. subsistence fishing. Alternatively, students will meet with Pi Jaeng, the Urak Lawoi owner of the Sanom Beach Guesthouse on Lipe, as well as other members of the Urak Lawoi,. They can discuss the history of the Urak Lawoi in the archipelago, their livelihood, and their thoughts about park management and tourism development in the area. This meeting will also provide a chance to discuss the rapid change in the area with an older generation.

ELW: Field Activity 2: Koh Lipe Island Survey

Day 11: Wednesday 6/12 — Meet with National Park / Paddle to Chao Lay Village

Meeting with National Park

Students meet with a representative of the national park to discuss park management and development in the area.

Paddle to Chao Lay Village

The group will paddle from the National Park to the Chao Lay Village on the west side of Koh Adang where they will camp for the next two nights

Meeting with Khun Komsak or Chao Lay Villagers (see above)

Day 12: Thursday 7/12 — Chao Lay Village Survey / Biodiversity Part I

Chaolay Village Survey: Students will complete a survey study of the Chao Lay village, gathering observational information and interviews to learn about connections between island communities on Adang and Lipe.

Reflection #3 Due

Biodiversity Activity: Students will snorkel the reef and observe some of the vast diversity of organisms that can be found on coral reefs and gain a greater appreciation of the range of life to be found in the Adang Archipelago.

ELW: Field Activity 5: Chaolay Village Survey

ELW: Field Activity 4: Biodiversity Part I

Day 14: Friday 8/12 — Paddle to Hat Ratcha

Students will begin a long paddle early in the morning and paddle north and then west along the coast of Koh Adang before crossing the channel to Koh Rawi. During this paddle students must plan for and navigate the ecosystem shaping forces of wind, waves, and tides as well as observe semi-abandoned villages along the coasts. They will camp at Hat Ratcha for the following three nights.

Day 15: Saturday 9/12 — Snorkel Day I / Meet with Pi Tain and Pi Kahn

Anemone and Anemonefish Populations Survey: Students will study 2 reef populations, magnificent sea anemones (*Heteractis magnifica*) and anemone fish (*Amphiprion spp.*) in order to see firsthand the concept of symbiotic mutualism and reinforce concepts of population-level ecology. This activity is also designed to teach proper population sampling technique for calculating distribution, abundance, and population density.

Meeting with Pi Tain & Pi Kahn

In the evening, students will sit down with our two local instructors, Pi Tain and Pi Khan, to discuss the impacts of the National Park and tourism development from their perspective. The line of questions should focus on both the benefits and downfalls of National Park Management and tourism development. Through this discussion students will deepen their understanding of the effectiveness of various Park initiatives to conserve or exploit specific areas or resources.

ELW: Field Activity 7: Anemone and Anemonefish Populations Survey

ELW: Field Activity 4: Biodiversity Part II

Day 16: Sunday 10/12 — Snorkel Day II

Zonation Survey: Students will conduct a zonation study, examining the organisms that live and thrive in different zones from the high tide line to the shelf. The zonation study will provide a better picture of which types of organisms are likely to be found in any given zone.

ELW: Field Activity 7: Zonation Survey

Oceans of Life Presentations

Day 17: Monday 11/12 — Paddle to Sanome Beach / Clean Kayaks / Sleep at National Park

Analytical Essay #3 Due

Day 18: Tuesday 12/12 — Clean and Pack Gear / Send Cargo / Meet with Khun Khomsak or Chao Lay Group (see above)

Day 19: Wednesday 13/12 — Travel from Adang National Park to Chiang Mai

ELW Due

Day 20: Thursday 14/12 — Final Exam / Final Seminar / Re-entry talk

In the afternoon, students who are not continuing at ISDSI for ICRP or internship will meet to discuss about reentry, discussing personal takeaways from the semester and covering and the transition out of Thailand back into the U.S.

Day 21: Friday 15/12 — Thai Language Final Exam / Group gear washing / Return all ISDSI gear / Bring in any donations