



Culture and Ecology of the Andaman: Islands, Reefs and Mangroves
(Ecology/Geography)

Spring Semester, 2011

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Course Overview

Coastal communities are on the front line of the ecological impact of marine resource depletion, the crashing of global fish stocks and the impact of global warming and climate change. This course examines islands, oceans, reefs and mangroves, focusing on the human communities that depend on fishing and related activities. Special emphasis is on coastal and marine ecology and the human communities that depend on those resources. This course examines coastal and marine ecosystems and relationships between local communities and natural resources as well as the impacts of outside forces, including development as it is related to fishing, tourism development and globalization.

The field study will be in two distinct locations. For our study of islands and reefs, we will be in the Adang Archipelago National Marine Park in the Andaman Sea, Southwest Thailand. The area is remarkable for its diversity of marine life. It is a breeding ground essential to the conservation of the biodiversity of Southeast Asian seas and for the sustainability of regional fisheries. For the last century, the Adang Archipelago has also been a home of the Urak Lawoi, a formerly semi-sea nomadic people. The case represents a complex situation — multiple and often conflicting resource demands in a marine protected area, rapidly changing ways of life for the island people, and significant changes in their relationships with natural resources.

The second study site will be the coastal fishing community of Hat Jao Mai, Trang. This community and area is remarkable for its work on mangrove and sea grass conservation, and the close links they have to small scale fishing. The community is also distinct in that it is primarily a Muslim community, with cultural practices different from the rest of the Buddhist Thai majority. This area is composed of extensive mangroves, coastal beaches and reefs, rubber plantations, and coastal islands, and is under increasing pressure from the expansion of shrimp farms and commercial fishing.

Objective

Learning experientially about reefs, mangroves, tropical islands and human and ecological communities, students will understand the value, uniqueness, and fragility of coastal marine ecological systems and cultures, and the importance of their conservation. Through field-based learning the students will examine the relationship between various stakeholders and the ecology of the region. By the end of the course, students will understand the interaction of human and ecological communities (reefs, mangroves and sea grasses) in coastal areas.

Learning Outcomes

Students on the course will demonstrate competency in the following:

- Understanding of the key issues concerning the sustainability of coastal environments and cultures
- Understanding the biological processes within marine ecosystems with particular knowledge of significant fish, reef, mangrove and seagrass ecology
- Understanding of local knowledge related to fish and fishing as well as understanding the links between coastal culture and marine resource utilization
- Understanding of the social dynamics related to marine ecology and island resource conservation and development (e.g. ethnic culture, tourism, commercial fishing, national park conservation)
- Ability to successfully carry out the essential technical skills related to the study of marine ecology, including sea kayaking and skin-diving

- Geographic field survey methods, especially as related to marine ecology and island environment
- Comparative field marine biology survey methods for coral reefs, mangroves and sea grasses
- Sociological survey methods, including competency in surveys of stakeholders in the islands (e.g. resort owners, tourists, park officials, and local fishermen)
- Understanding the economic, social and cultural adaptations within the coastal environment and in relation to non-local forces
- Proficiency with the tools of field research, including GPS, topographic maps, and satellite photos
- Proficiency in marine/island navigation, including using tide charts, GPS and maps
- Ability to identify significant reef and mangrove species, including vertebrates, invertebrates and corals (hard and soft)

OCEANS: Communities and conservation

A distinctive part of this course is a comparative case study of two very different cultural and ecological places, both linked by the ocean and marine environment. While sharing many common characteristics, we will be examining each of the case studies through a specific lens to better understand the issues related to each case study.

The **Coastal Section** of the course will focus specifically on “Community Resource Management,” with a study of the fishing community of Baan Jao Mai on the coast of Trang. Here our emphasis will be on understanding how the community manages and conserves and shapes the environment within which it is embedded, managing resources such as mangroves, fishing areas, sea grasses and other resources to benefit and sustain the community. The coastal environment of Trang is very much shaped by the human communities that have lived there for generations, subsisting on small scale fishing, and currently dealing with the complex political ecology of a marine coastal area. The primary focus is the human community embedded within a specific ecosystem.

The **Island Section** of the course will focus on “Conservation Ecology” with the Adang Archipelago, a Marine Protected area and National Park, as well as traditional home to the *Urak Lawoi* people. The Adang Archipelago is also host to fishing trawlers, tourists, national park officials, and a complex coral reef and island ecosystem. The focus on this section of the course is understanding the ecology of the archipelago, these various user groups and what can be done to conserve the reefs and fishing resources. Competition by various stakeholders for the resource (both for extraction and conservation) are significant, and we will be examining the ecology of the archipelago and strategies to use the resource sustainably while maintaining ecological integrity. The primary focus is the ecosystem with various user groups impacting and using the ecological resources.

Grading and Assessment

Participation

10%

This means doing the reading, participating in discussions, and being an active member of the course.

Expedition skills

10%

This means being competent in working together in a group, sharing the leadership and being an active follower, as well as being able to safely travel and learn in the environments where the course takes place.

Field guide

10%

Each student is required to compile a personal field guide of the flora and fauna they encounter during the course. This should include significant mangrove trees, plants and animals; reef species (fish, invertebrates, corals; sea grasses), etc. The field guide should include a sketch as well as your own observations. Use the field guide reference books (both for mangroves and reefs) as well as local knowledge. Where possible include the common English name, the scientific (Latin) name, as well as the Thai name (written in Thai).

Field notes

5%

You need to take legible, well-organized field notes. This is an important skill you will learn on the course. You need to record in a consistent way what you are observing each day, and demonstrate that you are

able to process and understand your experience. This includes lectures, seminars, guest speakers, course activities and explorations, etc.

Daily reflections **10%**

Five (5) reflections on something you have learned that day about the cultures and ecosystems of the course area. Each one should be about one page long. 2-3 should be on the coastal section, 2-3 should be on the islands section.

Focused Reflections **10%**

Focused reflections are more in-depth than the daily reflections, and should be 2 pages long, well written and thoughtful. These will take some more time, and require the student to think through the implications and issues more than the daily reflections. Each one should touch on the core issues in the course, reflecting on both ecosystems and human use/impacts in the coastal zone. Each student needs to complete five (5) focused reflections on the following topics:

1. Communities in the coastal zone: How is the community you are living with and learning from shaped by the coastal zone?
2. Mangroves and seagrasses: How are these different than terrestrial ecosystems?
3. Coral reefs and fish stocks: What is the human impact on marine ecosystems?
4. Oceans, winds and tides: What do you learn from paddling a sea kayak through the ocean?
5. Expedition learning in the coastal zone: Reflect on leadership and self leadership on this course.

Foundational essay (theory) **10%**

Due on the end of class the first Friday of the course, this essay will integrate the theories and concepts studied during the first week. Students should focus on a specific aspect of the material that they find interesting, and consider the issue in the broader context of coastal resource management and conservation. (8 pages) Due 5 PM on Friday of Seminar week.

Coasts essay (reflective) **15%**

Reflecting on your time in the community, focus specifically on how the community shapes and manages the ecosystem in which it is embedded. Some questions to consider: What institutional arrangements are there to manage the resource base? How does the community rely on the local ecosystem? What constraints does the local resource base place on the community? What larger threats and/or opportunities are there that impact the community and its ability to efficiently manage the local resources? (8 pages) Due 5 PM mid course.

Islands essay (integrative) **15%**

Reflecting on your time in the field on the island and marine zone (beach, islands, reefs and oceans) focus specifically on conservation ecology in the archipelago. Some questions to consider: What is the general state of the ecosystem? What pressures and impacts are there on ecosystem health? Who are the stakeholders in the archipelago? What conservation efforts are being made? What problems are there in conservation ecology in the archipelago? How does this compare with the community based resource management you saw in Baan Jao Mai? (8 pages) Due at the end of the Islands section.

A note on essays in the field journals: The essays, and your journal in general, need to be legible and neatly presented. It is VERY important that the instructor can read it with no difficulty within the constraint of time and environment during the EFC. If the instructor can't read it, it will not get graded! Please DO NOT write in pencil in your journal.

You need to provide a reference to all of the sources you cite in an essay. Write a list of your sources—including written records of direct observation (e.g. your field notes)—at the end of the essay. If you reference your field notes, cite the date.

Expectations

In order for a course like this to be a success, it requires the full participation of all members of the course. While it is true in any context, given what we are studying, the phrase “you get out what you put in” is especially relevant – learning about sustainability in this context will be an interactive on-going learning process. Please show your fellow students the courtesy of only contributing to discussions if you have read the material.

During class and in the field, students are expected to ask questions during guest lectures, field activities and other learning opportunities. Active learning—asking questions, taking notes, exploring new ideas and concepts, talking with local people—are all required to do well in this course. During the EFC, students are also expected to follow these guidelines:

- Attendance and active participation of expedition, field activities and a service learning project are required.
- Students are expected to demonstrate leadership and teamwork.
- Students are expected to manage their time well. You should have completed the reading assignments before class meetings and turn in assignments on their due dates. You will be traveling in a hot and humid environment of South Thailand, moving to another island and setting up a new campsite every few days, helping cook, and immersing yourself in the beautiful environment of a tropical island and underwater world. **It will be impossible to complete the required assignments if you do not pay attention and manage your time wisely.** For all your field projects, you should start early. Do not wait till the last night!
- You need to take legible, well organized field notes. Please make sure that you take particularly good care of your field journal in the wet and humid environment.

Schedule and reading list

A note on the reading:

There is a **significant** amount of reading during the first week. The course will **require** you re-read the first week's reading later on—you cannot expect to absorb all of the reading the first week, but will have to revisit it to dig deeper into the material later on. You will need to work to understand new concepts and ideas, and develop the skills of comprehending written material on a deep level. The first week's reading will be your reference material and source of ideas for following weeks.

The emphasis during week 1 is context and theory. The emphasis during weeks 2-4 is more on applying theory to the reality of the biological and sociological systems that you will be a part of. The "text" for the course during weeks 2-4 includes the ocean, shores, islands, tourist spots, and communities that you will be studying. Rather than mediated through reading a prepared text, you will be involved **directly** in learning the subject matter. This will be challenging, as direct learning is more difficult—there is no author who has preformatted or organized the material for you. Part of what you will be learning in this course is how to collect and analyze information yourself.

SEMINAR: Context and Issues in Coastal and Marine Sustainability

During the first week, seminar is 1:00-4:00 M-Th and 9-12 on Friday. Please be prompt.

Monday Ecosystem Overview

Knowlton N, Jackson JBC, "Shifting Baselines, Local Impacts, and Global Change on Coral Reefs," *PLoS Biology* 6 (2), 2008.

Worm, B. et al., Rebuilding global fisheries. *Science*, 325, 578-585, 2009.

Smith, M.D. et al., Sustainability and global seafood. *Science*, 327, 784-786, 2010.

Greenberg, P., "Time for a Sea Change," National Geographic, October 2010.

Levinton, Jeffrey, *Marine Biology: Function, Biodiversity, Ecology*, Oxford University Press, New York, 2001
Habitats and Life Habits: Chapter 8: The Water Column: Nekton

Tuesday Human Impacts — Reefs and Pollution / Population Ecology 1

Bellwood, Hughes, Folke and Nystrom, "Confronting the coral reef crisis," *Nature*, 429, 2004.

Fitt, Brown, Warner and Dunne, "Coral bleaching: Interpretation of thermal tolerance limits and thermal thresholds in tropical corals," *Coral Reefs*, 20, 2001.

Buddemeier, Kleypas and Aronson, *Coral Reefs and Global Climate Change: Potential Contributions of Climate Change to Stresses on Coral Reef Ecosystems*, Pew, 2004.

Diaz, Robert and Rutger Rosenberg, "Spreading Dead Zones and Consequences for Marine Ecosystems." *Science*, Vol. 321, 2008.

Ryan, P., et. al., "Monitoring the abundance of plastic debris in the marine environment," *Phil. Trans. R. Soc.*, 364, 2009.

Bourne, J., "Gulf of Oil," National Geographic, October 2010

Wednesday Biodiversity / Population Ecology 2

Worm, Boris, et. al., "Impacts of Biodiversity Loss on Ocean Ecosystem Services," *Science*, Vol. 314, November 2006.

Jaenike, John, "Comment on 'Impacts of Biodiversity Loss on Ocean Ecosystem Services'," *Science*, Vol. 316, June 2007.

Wilberg, Michael and Thomas Miller, "Comment on "Impacts of Biodiversity Loss on Ocean Ecosystem Services,"", *Science*, Vol. 316, June 2007.

Hölker, Franz, et. al., "Comment on "Impacts of Biodiversity Loss on Ocean Ecosystem Services,"", *Science*, Vol. 316, June 2007.

Worm, Boris, et. al., "Response to Comments on "Impacts of Biodiversity Loss on Ocean Ecosystem Services,"", *Science*, Vol. 316, June 2007.

Thursday Resource Management

Tan-Mullins, May, "The state and its agencies in coastal resources management: The political ecology fisheries management in Pattani, southern Thailand," *Singapore Journal of Tropical Geography*, 28 (2007)

Chanyut Sudtongkong and Edward Webb, "Outcomes of State- vs. Community-Based Mangrove Management in Southern Thailand," *Ecology and Society*, 13 (2): 27, 2008

Johnson, Craig, and Timothy Forsyth, "In the Eyes of the State: Negotiating a "Rights-Based Approach" to Forest Conservation in Thailand," *World Development* Vol. 30, No. 9, 2002

Barbier, E.B. (2006). Mangrove dependency and the livelihoods of coastal communities in Thailand. In C.T. Hoanh, J.W. Gowing and B. Hardy (eds.), *Environment and livelihoods in tropical coastal zones* (pp. 126-139). CAB International.

Friday Context: Southern Thailand

Bajunid, Omar Farouk, "Islam, Nationalism and the Thai State," in *Dynamic Diversity in Southern Thailand*," Wattana Sugunnasil, ed., Silkworm Books, 2005.

McCargo, Duncan, "Southern Thai Politics: A Preliminary Overview," in *Dynamic Diversity in Southern Thailand*," Wattana Sugunnasil, ed., Silkworm Books, 2005.

UNESCO, "Bridging the Gap between the Rights and Needs of Indigenous Communities and the Management of Protected Areas: Case Studies from Thailand." 2007

COASTAL SECTION: Hat Jao Mai Village, Mangrove Conservation and the Near-shore Environment

READING:

Johnson, Craig, and Timothy Forsyth, "In the Eyes of the State: Negotiating a "Rights-Based Approach" to Forest Conservation in Thailand," *World Development* Vol. 30, No. 9, 2002

Barbier, E.B. (2006). Mangrove dependency and the livelihoods of coastal communities in Thailand. In C.T. Hoanh, J.W. Gowing and B. Hardy (eds.), *Environment and livelihoods in tropical coastal zones* (pp. 126-139). CAB International.

Suutari, A. & Marten, G. (2007). Eco tipping points: How a vicious cycle can become virtuous, *Earth Island Journal*, Summer, 26-31.

Karen L. McKee, "Mangrove Ecosystems: Definitions, Distribution, Zonation, Forest Structure, Trophic Structure, and Ecological Significance." In *Mangrove Ecology: A Manual for a Field Course*, I.C. Feller and M. Sitnik, editors, Smithsonian Institution, Washington. DC, 1996

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

Aaron Ellison, et. al., "Testing patterns of zonation in mangroves: scale dependence and environmental correlates in the Sundarbans of Bangladesh," *Journal of Ecology*, 2000, 88.

Primavera, J.H. (1997). Socio-economic impacts of shrimp culture. *Aquaculture Research*, 28, 815-827.

PLEASE NOTE: Additional readings may be assigned.

23 April, Sa Travel to Bangkok.

Students will travel as an independent group overland by train and meet the instructor team in Hat Chao Mai Village on Monday, the 25th.

24 April, Su Explore the Aquarium Fish section at Chatuchak (JJ) Weekend Market. Travel to Trang City.

Students will arrive early in the morning at Bangkok's Hua Lamphong Railway Station. Large bags will be checked at the left-baggage area of the station. Students will travel via the Bangkok MRT (underground railway) to Chatuchak Weekend Market, the largest market in Thailand.

In recent years the market has gained considerable attention among wildlife conservation and anti-trafficking organizations like World Wildlife Fund. Chatuchak has become a notorious hub for buying and selling exotic animals, notably in the isolated northwest corner of the market. A large-scale coordinated bust on the trade was recently covered on CNN's "Planet in Peril" series.

Students will have the morning and early afternoon to explore the market, focusing specifically on the Aquarium Fish section. The trip south will continue with travel via MRT back to Hua Lamphong, and an overnight train to Trang.

25 April, M Travel to Hat Jao Mai Village. Community Meeting & Lunch. Afternoon with Host Family.

Students will arrive in the city of Trang early in the morning. In Trang they will meet Bang Eit, our primary local contact, and then travel via mini-bus to Hat Jao Mai Village. Hat Jao Mai is a small muslim fishing village on the shore of the Andaman Sea. The community in Hat Jao Mai village has, for generations, relied heavily on the mangrove and near-shore environment for food, housing materials, and more recently commercial marine-life harvesting. Recently, the mangrove surrounding Hat Jao Mai has fallen under the management of the 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.

26 April, Tu Hat Jao Mai Village Family Day & Student Meeting

This is a "family day" and as with all family days you are expected to become an active member of your family for the entire day.

There will be an evening meeting and discussion, facilitated by the student leadership team, with ISDSI staff in attendance. This is a time for the group to gather, ask questions about major course themes, and hear about village background and history. Students should be prepared with questions and areas of intrigue that they would like to investigate further.

27 April, W Mangrove Activity 1 : Narratives of mangrove use and conservation.

This day students will learn about the variety of local human uses of the Jao Mai mangrove from two primary informants. In the morning we will go to the mangrove with "Ma", one of the female leaders of the Jao Mai Community. In the afternoon we will explore the mangrove with Bang Hed, the local mangrove expert, and leader of the mangrove conservation movement in Jao Mai Village.

With both of the informants, we will seek to understand their narrative and learn about their personal connection, use pattern, and history of the mangrove. By focusing on community-based management, we will explore ways in which this management strategy succeeds and fails to achieve its desired results. We will also seek to identify and understand any differences in gender roles or use-patterns pertinent to mangrove use and conservation.

After the activity, we will have a short debrief facilitated by the student leadership team.

28 April, R Mangrove Activity 2 : Tourism, Fishing, Shrimp Farms and Charcoal production. Outside stakeholders encroaching on mangrove and seagrass conservation.

This day will begin on the seagrass beds in front of Hat Jao Mai Village. The focus will be conducting surveys of seagrass species and Dugong feeding trails. We will also visit an abandoned charcoal kiln and discuss the history of charcoal concessions with Bang Eit.

In the afternoon we will have 2 meetings. First we will visit the Hat Jao Mai National Park and discuss the conservation strategy applied to the Jao Mai area. We will then have the opportunity to visit a shrimp farm on the edge of the Jao Mai Mangrove. We will have about 1.5 hours with the owner to tour the facilities and discuss pertinent issues in shrimp production and sustainability. Students should have an appropriate focus of inquiry prepared in advance.

After the shrimp farm visit, students will have a short meeting facilitated by the student leadership team to further explore or clarify topics from the days exploration.

29 April, F Mangrove Activity 3 : Ta'Sae Community Mangrove. Community-based conservation and Institutional Arrangements.

Students will travel for 1.5 hours from Jao Mai Village to the Ta'sae community mangrove. Here we will discuss the community-based conservation strategy, institutional arrangements, networking, and issues in creating a locally managed conservation area. Key informants from the Jao Mai community will travel with us and join with local leaders from the Ta'sae community as guides to the area.

Students will also design, implement, and present a micro pilot-project in the mangrove, based on their observations from 4/27 and 4/28.

30 April, Sa Islam and the community.

This day students will explore local religion, customs, and tradition. Students will participate in a goat slaughter with the Imam (religious leader). After the harvest and discussion, we will make rot'dii and southern-thai curry with some of the host moms. In the evening, we will host the community for dinner, songs and dancing.

1 May, Su Mid-course Seminar.

In the morning students will have the option of visiting Tham Morakot, a cave and tourist destination on Koh Muk. By exploring the cave, we will have the opportunity to view "ecotourism" in Trang Province.

Mid-course Seminar with Ajaan Mark will be from 3pm until 8pm at the community restaurant.

ISLANDS SECTION: Koh Lipe & Adang National Park. Tourists, Commercial Fishing, National Park, and the Urak Lawoi. Stakeholders and marine resource management.

Levinton, Jeffrey, *Marine Biology: Function, Biodiversity, Ecology*, Oxford University Press, New York, 2001
Habitats and Life Habits
Chapter 3: Ecological and Evolutionary Principles
Chapter 8: The Water Column: Nekton
Chapter 14: The Tidelands (selection)
Chapter 15: Sea Grass Beds, Kelp Forests, Rocky Reefs, and Coral Reefs
Glossary

Narumon, A., et. al., "Additional and Alternative Occupations for the Urak Lawoi Sea Nomads of Phuket, Thailand." Chulalongkorn University, 2007.

Wongbusarakam, Supin, "Loss of Traditional Practices, Loss of Knowledge, and the Sustainability of Cultural and Natural Resources: A Case of Urak Lawoi People in the Adang Archipelago, Southwest Thailand." in *Learning and Knowing In Indigenous Societies Today*, UNESCO, 2009.

Bellwood, Hughes, Folke and Nystrom, "Confronting the coral reef crisis," *Nature*, 429, 2004.

Fitt, Brown, Warner and Dunne, "Coral bleaching: Interpretation of thermal tolerance limits and thermal thresholds in tropical corals," *Coral Reefs*, 20, 2001.

Buddemeier, Kleypas and Aronson, *Coral Reefs and Global Climate Change: Potential Contributions of Climate Change to Stresses on Coral Reef Ecosystems*, Pew, 2004.

2 May, M Travel Day : Hat Jao Mai Village to Koh Lipe.

Students will leave Hat Jao Mai Village early in the morning, and travel for approximately six hours to Koh Lipe, a small island in the Tarutao National Marine Park.

3 May, T Koh Lipe Survey Activity. Urak Lawoi history and conservation. Kayak skills training. Meeting with Khun Comsak.

Students will use this morning to conduct a rapid appraisal 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 presented to the group over lunch. After lunch we will meet with Jang, our primary contact in the Urak Lawoi community. In a student-lead interview, we will focus on the history of the Urak Lawoi in the archipelago with the aim of identifying the conservation ethic of the Urak Laowoi, and any changes to this ethic that may have occurred over time.

In the afternoon ISDSI staff will facilitate an introduction to sea kayaking.

In the evening we will have the opportunity to meet with Khun Comsak, businessman, resort-owner, and commercial fisherman. The focus of inquiry will center on the history of commercial fishing and marine-resource extraction in the archipelago, with specific attention paid to the definition of commercial vs. subsistence fishing.

4 May, W Kayak Paddle 1 : Koh Lipe to Adang National Park Office.

With our first day of paddling, we will circumnavigate Koh Lipe before crossing the deep-water channel to Adang Island and the offices of the Adang National Park office. At the park we will meet with Khun Panapol (Pa'na'pone), and discuss resource management issues within the archipelago.

In the evening we will camp on the beach near the park headquarters.

5 May, R Kayak Paddle 2 : Adang National Park Office to Ra'cha Beach, Koh Rawi.

Students will paddle from the Adang National Park office around the northern tip of Koh Adang, cross the channel between Adang and Rawi islands, and land at Ra'cha Beach on Rawi island. This long paddle has the potential to expose the group to strong winds and large swells. Along the way, we will have the opportunity to stop at the Adang Urak Lawoi settlement, a small community that has resisted the Park's forced resettlement to Koh Lipe.

In the evening we will camp at Ra'cha beach.

6 May, F Reef Study 1. Meeting with Tain and Khan

In the evening, we will sit down with our two boatmen, Tain and Khan, and discuss the impacts of the National Park from their perspective. The line of questions should focus on both the good and the bad of National Park Management. Through this discussion we will deepen our understanding of the effectiveness of various Park initiatives to conserve or exploit specific areas or resources.

Study-sites TBA

7 May, Sa Reef Study 2.

Study-sites TBA

8 May, Su Reef Study 3.

Study-sites TBA

9 May, M Kayak Paddle 3 : Ra'cha Beach to Sunset Beach, Koh Rawi.

On this paddle we will reach the most remote corner of the Adang Archipelago. Paddling north-east through the channel between Rawi and Tong islands, we will access Ai Talo Ta'ngo (Ta'ngo Bay), known to ISDSI as Sunset Beach. Here we will set up camp and enjoy the unobstructed view northwest, out across the Indian Ocean towards the Bay of Bengal.

10 May, T Reef Study 4.

Study-sites TBA

11 May, W Travel Day : Adang Archipelago to Chiang Mai

A pre-dawn wakeup call will allow students to depart Sunset Beach and begin the journey back to Chiang Mai. After taking a long-tail boat, a ferry boat, a mini-van, and two flights, students will arrive in Chiang Mai late in the evening.

12 May, R Final Seminar @ ISDSI. Final Essays Due

Integrative Final Essay due by 5 p.m. @ ISDSI.

ADDITIONAL MATERIAL IN THE READER

Coastal Glossary in Thai and English

Ecosystem Glossary

Schedule for Group A and Group B

Map of Adang Archipelago

Tide chart for Adang Archipelago

Map of Hat Jao Mai area

Tide chart for Hat Jao Mai area