International Sustainable Development Studies Institute
สถาบันการศึกษาการพัฒนาที่ยั่งยืนนานาชาติ

Sustainable Food Systems: Social and Biological Factors in Sustainable Agriculture

Spring Semester, 2024

Instructor: Neil Ransom, PhD

Course Description

This is an advanced course examining key issues in sustainable food production, with a special emphasis on field-based studies of organic polycultures. Perhaps one of the most challenging topics in sustainability studies, sustainable food systems are critical to creating a sustainable future. This course will look at agroecology, regenerative agriculture, study both lowland and upland agriculture as practiced in Thailand, and learning in the fields and gardens of farmers and villagers. This course will focus on Southeast Asian smallholder agriculture, with a special emphasis on organic farming and agroecology. Students will be learning about both the biology of sustainable agriculture as well as the social and political issues surrounding sustainable agriculture and current commercial food systems. Students will also explore the role of cash cropping in small-scale farming including a focus on coffee, cacao, and cannabis.

Course Objectives

The objectives for this course are to:

- Understand the major issues in sustainable food systems.
- Understand the major ecological, biological and social challenges to sustainable agriculture.
- Have specific knowledge of agriculture and its ecological and social context in both upland and lowland Thailand and Southeast Asia.
- Understand the role cash crops play in small landholding farmers in Northern Thailand including a deeper understanding of the ecology and economics of coffee, cacao, and cannabis.

Methodology

The course will integrate course lectures and readings with group discussions and seminars. Experiential field studies will be an important component of the course, both formal and informal. A large portion of the course is based on field research and on-site research and study. Guest lecturers will be a part of the course to share their experiences and perspective with students. Keeping up with readings, materials presented in class, and assignments is critical for success during this course.

Grading and Assessment

Engagement	
This means participation in and out of the classroom, being an active member of the course, and being fully present and engaged in the field. This includes participation in discussions during seminars and in the village, etc. This also means being an active and supportive member of the course, including as a designated leader and active follower/self leadership.	10
Writing	
Seminar and Observation Notes: An important component of learning to observe and analyze the issues during this course is taking notes in class as well as keeping an on-going daily journal of observations outside the classroom. Please put the date at the top of each page.	5
Field Research Notebook: A more structured way of taking notes and learning outside the classroom assigned to specific field studies.	15
Essays: There are two (2) essays during the course. Essays should be 4-5 pages long in your journal, and cover the following points: • How this issue or topic links to the overall topic of the course. (1) • Why you are interested in this specific issue or topic. (1) • A description and analysis of the specific issue and why it is important. (5) • Reference to interviews or observations during the course. (2) • Other questions that this issue raises for you to explore further. (1)	20
Independent Field Research Project (IFRP)	
Each student will choose an issue **related to the course** to study independently. This should be a combination of research, observations, and analysis of a topic that the student is interested in. The **emphasis is primarily on field observations** drawing on field studies as well as independent observations. This is not a book report or literature review, but field research. **Students must receive instructor approval for their chosen topic/issue.**	
Proposal: The IFRP proposal is a written outline and a short presentation to the class explaining the question, how it is related to the course topic, how data will be gathered, and any potential challenges you may anticipate running into. 1 page typed as well as an in-class presentation.	10
Progress update: An update during the course on what the student has discovered about their topic so far, what further questions this raises, any challenges and how they have been overcome, as well as further information they will be looking for during the second half of the field study. 1 page written in your notebook as well as an in-class presentation.	5
Final Presentation: On the last day of the course each student will give a five minute presentation on their research. Focus on clarity, field observations, interviews/discussions with community members, and analytical depth. 5-10 slides in PDF format. **Organization for final presentation** 1. What did you study/research focus? How is this related to the course topic? (2) 2. How did you study this, including observations and interviews? (5) 3. What did you learn? Findings and analysis. (10) 4. Further questions this raises for you. (2) 5. Final slide of references / interviews. (1)	15
Final Exam	
The final exam will be a comprehensive review of course topics with an emphasis on what was learned during the field portion of the course. There will be 10 short answer questions. Students may use their notes but not their readers or the internet during the exam.	20
TOTAL	100

Seminar Week Topics and Schedule

Readings are in the course reader. The readings are a resource for the seminars, field studies, and for your final presentation. There are a lot of readings the first week, which you will refer to later on during the field section of the course. **Be strategic in your reading** so that you focus on new materials and information, and then go back and dive deeper into the readings as needed.

Schedule Overview

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Feb. 12 AM: 8:30am-11:30am Thai Language PM: 1am -4pm Agroecology and People's Movements	**Feb. 13** AM: 8:30am-11:30am Thai Language PM: 1am -4pm Regenerative Agriculture and Climate Change	**Feb. 14** AM: 8:30am-11:30am Thai Language PM: 1am -4pm Agriculture in Southeast Asia and Thailand	**Feb. 15** AM: 8:30am-11:30am Thai Language PM: 1am -4pm IFRP Proposal presentation Cacao Foundations	**Feb. 16** Field Study At ECHO Debrief with staff at ECHO Travel back to Kuang Singh and ISDSI	Feb.17
Feb. 18	**Feb. 19** AM: Travel to Don Jiang Village introduction & Village survey PM: Bamboo weave and herbal tea FRN: Village Survey1	**Feb. 20** AM: Help host family prepare for market and travel to Kuang Kaset Insri to learn about organic market and help host family FRN: Fresh market Survey 1	**Feb. 21** AM: Agricultural practicum (Learning how to make herbal pesticide and effective miicroorganism juice PM: Polyculture survey at Mae Venus Farm Farewell dinner	**Feb. 22** AM: Travel to Maetha Lunch @Maetha PM: Introduction to Maetha @ Learning Center Village Survey 2 (FRN)	**Feb. 23** AM: Maetha Sustainable Agriculture with Paw Panomkorn PM: Chicken Farm, polyculture survey at Pi Aun's field (FRN) Integrated Pest Management (IPM) with Mae Suphan	**Feb. 24** Community Work Day:Help out at the school in the village (Whole Day) **ESSAY #1 & Field note DUE @5:00 pm**
Feb. 25 AM: Seed bank & seed saving with pi Pui (FRN) PM: Agriculture Practicum - Bedding - Planting - Seedling Field transect at pi Pui's field (FRN) Species ID Presentation	**Feb. 26** FRN day: -Polyculture survey (Pi Dtey's, Pi Pui's 2nd field) -Comparative soil assessment: polyculture, agroforest, chemical mono crop Species ID Presentation	**Feb. 27** 9:00 AM-3:00 PM Thai Coffee and Cocoa (Cacao Learning Center) in Lampang FRN: -Cacao Cash Crop Practicum PM: Discussion with Host Family	**Feb.28** 9:00 AM Mid Course (IFRP Progress Presentation) Seminar with Aj. Neil Coffee and Cannabis Foundations PM: Discussion with Young Farmers group Species ID Presentation	**Feb.29** AM: Rimping Best Flower (Cannabis Farm) in Lamphun FRN -Cannabis Cash Crop Practicum PM: Imm Farm (Dairy Farm) FRN -Dairy Farm Nutrient Cycle -Organic Fertilizer	**March.1** Family Day Farewell dinner	**Mar. 2** AM: Travel to 91 Coffee Farm Introduction PM: Make Compost/ Organic Fertilizer (FRN) **Submit Field note DUE @05:00 PM**
Mar. 3 AM: Farm management, coffee terrace, farm survey, insect trap PM: How to manage mold, how to spray coffee plant with anti-mold	**Mar. 4** AM: composting coffee farm PM: Sorting coffee beans and peeling	**Mar. 5** AM: Coffee Roasting Travel back to Chiang Mai PM: Siamaya Chocolate Factory	**Mar. 6** AM: Leave ISDSI by 08:30 am Fresh Market Survey (FRN) Muang Mai market Ethnography of cafes/ Khom Chocolatier House Cannabis shop in old town and Taste of Art	**Mar. 7** Final Exam IFRP Final Presentation Ethnography Presentation Discussion **ESSAY #2 DUE** **Field note DUE** **Field Research notebook DUE Before 5 PM**		

Monday - February 12
Agroecology and People's Movements
Agroecology is an approach to food production based on the idea of a farm as an ecosystem. More than that, it also represents a global people's movement for food sovereignty. We will examine some of the problems with industrial agriculture, but primarily focus on the approach of small holder agroecological farming, as well as the communities in the Global South using agroecology as a way to re-establish control over their food systems.

- Oehen, Bernadette, and Angelika Hilbeck, eds., *Feeding the People: Agroecology for Nourishing the World and Transforming the Agri-Food System.* IFOAM EU Group, Brussels, Belgium, 2015
  - Transform? Or Conform and Adjust; Introduction; Chapter 1 & 2
- Gliessman, S. 2007. *Agroecology: The Ecology of Sustainable Food Systems*, 2nd ed. CRC Press
  - Chapter 1 & 2

Tuesday - February 13
Regenerative Agriculture and Climate Change
Regenerative agriculture uses a similar approach to agroecology by looking to natural ecosystems as the model for sustainable food production. Regenerative agriculture is especially focused on restoration of natural ecosystems, building soil health, and sequestering carbon in the soil to help both mitigate climate change and in some cases help draw down more carbon than regenerative food production emits.

- Olson, Kristin, *The Soil Will Save Us: How Scientists, Farmers, and Foodies are Healing the Soil to Save the Planet*, Rodale Books, 2014.
  - Chapter 1 & 2
- Shepard, M. 2013 *Restoration Agriculture: Real World Permaculture for Farmers*. Acres USA. 59-68.
  - Chapter 6 & 9

Wednesday - February 14
Agriculture in Southeast Asia and Thailand
Agriculture in Southeast Asia is diverse, based on specific cultural and agronomic practices rooted in distinct ecosystems and bioregions. Most agriculture in mainland Southeast Asia, and Thailand in particular, can be divided into lowland paddy / "wet-rice" agriculture, and upland farming, often using long fallow shifting cultivation practices. We will be examining the specific practices of both upland and lowland agriculture, with an emphasis on both production methods and the social systems that have developed around these two practices.

- Halwart, Matthias and Modadugu V. Gupta, eds., "The Rice Field Ecosystem," in *Culture of fish in rice fields,* FAO, 2004
- Marten, Gerald G., "Small-Scale Agriculture in Southeast Asia," In M.A. Altieri and S. Hecht (eds.), Agroecology and Small Farm Development (CRC Press. 1990), p. 177-194.
- Plews-Ogan, Erin, et al. "Polyculture, Autonomy, and Community: the Pursuit of Sustainability in a Northern Thai Farming Village." International Journal of Agricultural Sustainability, vol. 15, no. 4, Nov. 2017, pp. 418–431., doi:10.1080/14735903.2017.1335044.
- Srimongkol, Katin, and Gerald Marten, "Traditional Agriculture in Northern Thailand," *Traditional Agriculture in Southeast Asia: A Human Ecology Perspective*, Westview Press, 1986.

Thursday - February 15
Independent Field Research Project Proposal Presentations
It will be set aside for students to present their proposed focused inquiry, and discuss both challenges and opportunities in gathering data in the field.

- IFRP PROPOSAL PRESENTED AT ISDSI

Cacao Foundations

- Coe, Sophie and Coe, Michael, *The True History of Chocolate*, Third Edition, Thames and Hudson, 2019.
  - Introduction and Chapter 1

Discussion about Fieldwork Methods

Cacao Foundations

- Edoh Adabe, K. Ngo-Samnick, E. (2014). Cocoa Production and Processing.
  - Chapter 6-8

Friday - February 16
AM: Day Trip - ECHO Demonstration Farm
We will spend full day at ECHO Asia's demonstration farm, learning about how this international NGO supports and works with farmers in Asia, especially small holders. We will also learn how the 5 regenerative agriculture principles are applied here.

- Ferguson, Rafter, "Why We Can't Separate Justice and Sustainability in the Food System," Union of Concerned Scientists, September 20, 2019
- Oehen, Bernadette, and Angelika Hilbeck, eds., *Feeding the People: Agroecology for Nourishing the World and Transforming the Agri-Food System*. IFOAM EU Group, Brussels, Belgium, 2015
  - Chapter 3 & 8
- Shepard, M. 2013 *Restoration Agriculture: Real World Permaculture for Farmers*. Acres USA. 59-68.
  - Chapter 18

Field Schedule

Monday - February 19
AM: Travel from ISDSI to Donjiang village
Donjiang is an organic farming village located in the northern part of Chiang Mai that borders to Maerim.

- Readings: TSWSU, Chapter 3

Tuesday - February 20
Travel to Khuang Kaset Insri Market to help host family and learn about organic fresh market

- Readings: TSWSU, Chapter 4

Wednesday - February 21
AM: Agricultural practicum (Learn how to make herbal pesticide and an effective micro-organism juice

PM: Cultural learning with local intructors. Learn how to make Baisri-Suquan and bamboo weave. Farewell dinner

- Readings: TSWSU, Chapter 5-6

Thursday - February 22
AM: Travel from Donjiang village to Maetha
Maetha is an organic farming village located in the southern part of Chiang Mai that borders Lamphun.

PM: Introduction to Maetha & Village Survey
Pi Aun, an second generation organic farmer and community representative, will show us around the village and explain significant places in the community.

- Readings: TSWSU, Chapter 7-8

Friday - February 23
AM: Maetha Sustainable Agriculture with Paw Panomkorn
Paw Panomkorn is one of the first people in Maetha who switched from chemical farming to organic farming and he will tell us about when Maetha started doing organic farming and how it is today.
PM: Chicken Farm, Farm Survey, Polyculture Survey
We will learn about organic chicken farming in Maetha with pi Por at his farm. We will also collect eggs from his chickens and do a quality test of organic eggs vs non-organic eggs.

Saturday - February 24
Community Work Day—Help out at the school
We will help out at the school in the village where this will be our community work day.

- **Essay 1 & Field Notes Due by 5:00 PM**
- Burnette, Richard R., *Agroforestry Options for Small Upland Farms, Upland Holistic Development Project* April 2006. • Introduction, Chapter 1-4, & 6.
- Prasit W., et al. 2010. "Fallow to Forest: Applying indigenous and scientific knowledge of swidden cultivation to tropical forest restoration." *Forest Ecology and Management* 260: 1399-1406.

- Bruun, Thilde Bech, et al. “Intensification of Upland Agriculture in Thailand: Development or Degradation?” *Land Degradation & Development*, vol. 28, no. 1, 9 Sept. 2016, pp. 83–94., doi:10.1002/ldr.2596.

Sunday - February 25

AM: Seed Bank & Seed Saving Workshop with Pi Pui

We will learn about seed saving and seed bank from Pi Pui who is an organic farmer and a seed saving expert.

PM: Agriculture Practicum (Bedding, Planting, Seedling), Field Transect at Pi Pui’s Garden

We will have an opportunity to learn how to grow your own garden from bedding to seedling with Pi Pui and then to a field transect at her garden to study the biodiversity there.

- Species ID presentation

Monday - February 26

Polyculture Survey (Pi Dtey and Pi Pui’s Farm), Comparative Soil Assessment—Polyculture (Pi Dtey and Pi Pui’s Farm), Agroforest (Pi Pui’s Agroforest), Chemical Monocrop (Baby Corn Field)

- Species ID presentation

Tuesday -February 27

AM: Day Trip - Cacao Farm Visit

We will go to Thai Coffee & Cocoa—a cacao learning centre in Lampang province—to learn about the chocolate production process from cacao plant to cacao nibs.

- Walters, Dale, *Chocolate Crisis: Climate Change and Other Threats to the Future of Cacao*, University of Florida Press, 2021.
  - Chapter 13-15

PM: Discussion with Host Family

This is an opportunity for students to ask and learn from host families about farming, livelihoods, organic co-op, etc. in a group setting.

Wednesday - February 28

AM: Midcourse & Seminar

IFRP progress presentation followed by a seminar with Ajaan Neil

- **DUE: IFRP PROGRESS UPDATE**

Coffee and Cannabis Foundations

- Simms, Jessica, *I Know Coffee: Harvesting, Blending, Roasting, Brewing, Gridding & Tasting Coffee*, Skinny Bottle, 2017.
  - “Introduction to Coffee” to “Environmental Conditions” (p.1-22)
- Russo, Ethan B., History of Cannabis and Its Preparations in Saga, Science, and Sobriquet. *Chemistry & Biodiversity*, vol. 4, 2097, pp. 1614–2648.

PM: Discussion with Young Farmers Group, Animal Integration (FRN) at Pi Aun’s Field

We will hear from representatives of the Young Farmer’s Group about what they used to do before coming back and becoming an organic farmer, what made them decide to come back and do organic farming, as well as the work that they are currently doing.

- Species ID presentation

Thursday - February 29

AM: Cannabis Farm Field Study

We will go to Rimping Best Flower—a cannabis farm in Lamphun province—to learn about cannabis farm management, cannabis law in Thailand, cannabis plant, and how they process their cannabis before they sell them.

- Nantthasorn Zinboonyahgoon et. al. “Medicinal cannabis in Thailand: 1-year experience after legalization,” PAIN, 162 (2021) S105–S109

PM: Dairy Farm Field Study

We will go to Imm Farm—a Jersey cow farm in Lamphun province—to learn about dairy farm management, the cow’s diet and how they turn cow manure into organic fertilizer and biogas. We will also do a comparative soil assessment of the cow’s grazing field and non-grazing field in the area. Additionally, we will learn how to make ice-cream from the milk they produce.

- Conor McCabe, “Dairy Cows — The Original Upcyclers: How ruminant digestion turns byproducts into high-quality nutrition,” Clarity and Leadership for Environmental Awareness and Research at UC Davis, January 07, 2022
- Mitloehner, Frank, Ermias Kebreab and Michael Boccadoro, *Methane, Cows, and Climate Change: California Dairy’s Path to Climate Neutrality,* Clarity and Leadership for Environmental Awareness and Research Center University of California, Davis, September 2, 2020

Friday - March 1
AM: Family Day
Students will spend time with their host families and participate in their host family’s day-to-day routine or activities.

PM: Free Study & Farewell Dinner
- Field Notes Due by 5:00 PM

Saturday - March 2
AM: Travel to 91 Coffee, Farm Introduction by Khun Waan
Khun Waan is the owner of 91 Coffee and our local instructor at 91 Coffee. We will meet at their coffee shop in Doi Saket and take a truck to go up to the farm in Pa Miang. At 91 Coffee, we will learn about coffee farm management and the process of coffee production from bean to cup.

PM: Make Compost/Organic Fertilizer
We will learn how to make an organic fertilizer from Khun Waan.
- Pendergrast, Mark, *Uncommon Grounds: The History of Coffee and How it Transformed the World*, Basic Books, 2010.
  - Chapter 17: The Speciality Revolution.

Sunday - March 3
AM: Farm Management, Coffee Terrace Survey, Farm Survey, Making Insect Traps
We will have the opportunity to go around the farm and learn from Khun Waan on how he manages his farm, how he manages the insects without using chemical products, and the big picture process of coffee production.

PM: How to Manage Fungi, How to Spray Coffee Plant with Anti-Fungi Solution
We will learn from Khun Waan on how to manage fungi in coffee plants by using the anti-fungi spray.
- Simms, Jessica, *I Know Coffee: Harvesting, Blending, Roasting, Brewing, Gridding & Tasting Coffee*, Skinny Bottle, 2017.
  - “Farming Methods” to “Growing Regions” (p.23-39)

Monday - March 4
AM: Put Compost in Coffee Farm
We will do some farm work and put the compost that’s ready to use in the coffee farm.

PM: Sorting and Peeling Coffee Beans
We will learn how to peel and sort the coffee beans and understand the criteria of a good coffee bean.
- Simms, Jessica, *I Know Coffee: Harvesting, Blending, Roasting, Brewing, Gridding & Tasting Coffee*, Skinny Bottle, 2017.
  - “Pest Control” to “No Harvest? No Problem!)” (p.40-52)

Tuesday - March 5
AM: Coffee Roasting, Travel Back to Chiang Mai

PM: Siamaya Chocolate Factory
We will learn about the process of chocolate making and a little bit of how the chocolate business works in Thailand. We will also have the opportunity to make our own chocolate bars.
- Edoh Adabe, K. Ngo-Samnick, E. (2014). Cocoa Production and Processing.
  - Chapter 6-8
- Simms, Jessica, *I Know Coffee: Harvesting, Blending, Roasting, Brewing, Gridding & Tasting Coffee*, Skinny Bottle, 2017.
  - “How to Roast Green Coffee Beans Like a Pro” to “Roast Levels” (p.87-107)

Wednesday - March 6
AM: Fresh Market Survey at Muang Mai Market
Muang Mai market is the main market for wholesale fruit and produce shopping in the city. the market has a massive collection of around a dozen wholesale vendors within a large building, plus another 50 smaller vendors nearby selling even more produce. This is where restaurants and other establishments around the city come to shop for their fresh fruits and vegetables at really low prices.

PM: Ethnography of Cafes/Dispensaries at Khom Chocolatier House, Cannabis shop and TASTE OF ART Coffee Roaster
The focus of this activity is to understand the end users of the three key commodity crops we study (coffee, cacao, and cannabis), how it is sold, how cafes/shops/dispensaries work as a business, as well as how single commodities (coffee beans, cacao, or cannabis) can be processed and used in a variety of end products (e.g. espresso, pour over coffee, chocolate bars, chocolate drinks, CBD, edibles, etc.).

Thursday - March 7
AM: Final exam, IFRP Final presentations & Cafe Ethnography discussion
- Essay #2, Fieldnote and Field Research Notebook due at 5:00 PM

Field Research

Field research is an important component of this course, and mastery of the field research methods will help make the course a success. Each student will record detailed field observations and studies in their Field Research Notebook as a critical part of the learning on this course. Some of the key methodologies and techniques are described below. Specific days and assignments for the field research will be assigned.

The questions and format in the Field Research Notebook will be more extensive and detailed.

Northern Thailand Plant Identification
This activity will introduce you to a variety of plants that are utilized by communities in Northern Thailand.

There are many species in Northern Thailand that are used for food, fiber, construction, medicine, or for ceremonial purposes. A number of these also have a market value. Traditionally people would grow these or gather products from the forests and fields surrounding their homes.

In this activity you will identify the species you find and understand their role in the community and ecosystem. Throughout your time you will have opportunities to ask local people about the plants in their surrounding environment. They will help you identify various species and provide information on their usage, and preferred habitat. You will combine this local knowledge with your own illustrations in the Plant ID pages to create a useful catalogue of these plants. You will need to ask a variety of people and make your own observations to complete the Plant ID pages. Cite all sources of information (informant and location). Plant identification should include the common name in English, the common name in the local language (Thai or Karen, etc.), and the scientific name as well where available from the field guides.

Information to be recorded will include:
- Use (food, medicinal, other) and specify what is used (leaves, fruit, bark, etc.)
- Ecological context / placement in the garden / forest / field
- Propagation
- Care
- Harvest
- Sketch of leaf / flower / fruit (as appropriate) including context if needed

Polyculture Survey
In this activity you will examine the different ways Thai farmers and households utilize polyculture (mixed species farming) in their farms and gardens. The use of polyculture cultivation can have numerous benefits including more efficient use of space, the exploitation of beneficial relationships between organisms, and weed and pest control, to name a few. The activity will show you how polyculture farming and gardening benefits farmers and households.

Identify at least **three examples** of polyculture through observation and interviews with farmers, gardeners, or local experts. Complete an entry in your Field Notebook for each example of polyculture, and include a sketch of relationships and placement as appropriate.

- Names of the plants or animals
- Context (garden, farm, food forest, etc.)
- Relationship between organisms
- Use/benefits

Field Transect

Farms and fields are very diverse. One good way to capture this diversity is to complete a transect — a study of diversity along a specific line. For this activity you will use a 20 meter transect line to do your survey. Working in groups of 3-4 students:

- Place your transect line to capture maximum diversity
- Record all plants directly along the transect line
- Record any other organisms (insects, etc.) that you observe in and around your transect
- Sketch of placement of transect line in context
- List of plants along transect line
- List of other organisms in/around transect line

Agroforest Transect

Agroforests are characterized by density and diversity. Like the Farm Transect, this will use a 20 meter transect line to do your survey. Working in groups of 3-4 students:

- Place your transect line to capture maximum diversity
- Record all plants directly along the transect line, including trees directly adjacent to the transect line
- Record any other organisms (insects, etc.) that you observe in and around your transect
- Sketch of placement of transect line in context
- List of plants/trees along transect line, noting approximate hight in meters
- List of other organisms in/around transect line

Seed Origins and Seed Saving

Seeds and their control is a critical part of food sovereignty. Sourcing and saving seeds is an essential part of farming and gardening. Farmers utilize a number of strategies to locate, buy, trade and save seeds. Some seeds are purchased, some traded with others, and some saved either on the farm or from locally managed seed banks. Record at least **3 types of plants** and where the seeds come from.

Animal Integration

Animals have always played a critical role in agriculture including in nutrient cycles, crop waste disposal, up-cycling of inedible waste, labor, pest control, and more.

- What animals have you observed in and around the farm?
- What are their roles / how are they used?

Farm Survey and Map

Farms, especially for small holders in the tropics, often have a specific layout to aid in crop production and harvest. **Draw and annotate a map of the farm**, noting each area and what it is used for.

Fresh Market Survey

Fresh markets are a feature of most communities in Asia. The focus of this study is the *origin* and *price* of products in the market. **Choose 4 agricultural products** and list what they are, where they are from, their price, and what they are used for.

Village Survey

The use of space and the built environment tells us a lot about a community. Use the space below to **draw and describe observations** about the village, including housing (common features), infrastructure (roads), and other observations.

Organic Fertilizer

On-farm production of fertilizer and compost is a critical part of organic farming and sustainable food production. **Describe and illustrate** the process of organic fertilizer production below.

Comparative Soil Assessment

Building healthy soils is one of the core practices of regenerative agriculture. This activity is a rapid assessment of soil quality and health.

You will do a rapid assessment of soil quality in three places: organic polyculture farm, agroforest, and a commercial (chemical) mono crop.

Complete in groups of 3-4.

Equipment
- Metal ruler
- Trowel
- Square plastic cardboard 50 cm / side

1. Selection: Choose a place to study that will be reasonably representative of where the soil is healthiest — under crops, plants, etc.
2. Size and depth: Mark with a central point and then dig a circle 20 cm in diameter to a depth of 20 cm (this will be pretty big!)
3. Quality assessment: As you dig note any changes in color, moisture, and texture as you dig deeper. Note depth where you see changes in color, moisture, and texture.
4. Soil organisms: As you dig, put the soil on the plastic square and separate it to observe, count, and sketch any soil organisms (insects, worms, etc.)

Soil colors: black, brown, gray, sandy, white, etc.

Soil texture: soft, hard, sandy, loamy, clumping, etc.

Soil moisture: wet, moist, dry, etc.

Dairy Farm Nutrient Cycle

Ruminant animals can play a key role in nutrient recycling. The propose of this field activity is to explore the role small-scale dairy farm plays in recycling nutrients. Using observation and interviews with the farmers, complete the following activity.

Create a list of that the dairy cows are eating. Next to each item explain what each item is and whether it is agricultural waste, a food processing byproduct, food humans can't eat (i.e. grass), or if it is food humans can eat (are the cows eating agricultural products that would otherwise be eaten by humans). Use the data to complete the next section.

Draw two piecharts using the data from above.
(1) Draw a piechart should show the percentage of the food that comes from from (a) agricultural waste and food processing byproducts, (2) grazing, and (3) other products
(2) Draw a piechart showing the percentage of food that the cows are eating that is (a) edible for humans vs (b) non-edible for humans.

Observe the dairy cows' grazing field compared to the surrounding land. Are there any observations about the health of the soil and grasses compared to non grazing land? What role might the cows play in the the difference between the two areas?

Coffee Cash Crop Practicum

The purpose of this activity is gain a fuller understanding of coffee as a cash crop in Thailand including the biology and ecology of the coffee plant, farming and post-harvest processing, and the economic role to small and medium-scale farmers. This practicum also provides you with an excellent context to examine existing and potential sustainable and regenerative farming practices and principles used in coffee production. You

will learn about coffee through farm visits, processing facility visits, and discussions with farmers and experts.

To complete this activity you will be asked to draw and identify coffee, chart out the farming and processing methods, and answer discussion questions. You will complete the activity using your first-hand observations while in the field and your discussions from farmers and experts.

Coffee Harvesting and Processing
Draw and illustrate a flowchart describing each stage from farming to a cup of coffee. Include harvesting, post-harvesting processing, and each value-added step along the way. Show each exchange and any brokers /sales that many take part in the product's journey. Try and detail the money captured at each step and by whom.

Cannabis Cash Crop Practicum

The purpose of this activity is gain a fuller understanding of cannabis as a cash crop in Thailand including the biology and ecology of the cannabis plant, farming and post-harvest processing, and the economic role for small and medium-scale farmers. This practicum also provides you with an excellent context to examine existing and potential sustainable and regenerative farming practices and principles used in cannabis production. You will learn about cannabis through farm visits, processing facility visits, and discussions with farmers and experts.

To complete this activity you will be asked to draw and identify cannabis, chart out the farming and processing methods, and answer discussion questions. You will complete the activity using your first-hand observations while in the field and your discussions from farmers and experts.

Cannabis Harvesting and Processing
Draw and illustrate a flowchart describing each stage of cannabis production from farming to final product(s). Include harvesting, post-harvesting processing, and each value-added step along the way. Show each exchange and any brokers / sales that many take part in the product's journey. Try and detail the money captured at each step and by whom, well as any controls on flowers/seeds and chain of custody.

Cacao Cash Crop Practicum

The purpose of this activity is gain a fuller understanding of cacao and chocolate as a cash crop in Thailand including the biology and ecology of the cacao plant, farming and post-harvest processing, and the economic role to small and medium- scale farmers. This practicum also provides you with an excellent context to examine existing and potential sustainable and regenerative farming practices and principles used in cacao production. You will learn about cacao through farm visits, processing facility visits, and discussions with farmers and experts.

To complete this activity you will be asked to draw and identify cacao, chart out the farming and processing methods, and answer discussion questions. You will complete the activity using your first-hand observations while in the filed and your discussions from farmers and experts.

Cacao Harvesting and Processing
Draw and illustrate a flowchart describing each stage from farming to a bar of chocolate. Include harvesting, post-harvesting processing, and each value-added step along the way. Show each exchange and any brokers / sales that many take part in the product's journey. Try and detail the money captured at each step and by whom.

Attendance Policy
Students are expected to be on time and attend all classes. If you are ill or otherwise need to miss a class, please inform your instructor or teaching assistant.

Academic Integrity
Academic integrity is essential to a positive teaching and learning environment. All students enrolled in ISDSI courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else's work as your own can result in disciplinary action.

Scholastic Dishonesty
Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering forging, or misusing an academic record; or fabricating or falsifying data, research procedures, or data analysis. Within this course, a student responsible for scholastic dishonesty can be assigned a penalty up to and including an "F" or "N" for the course. If you have any questions regarding the expectations for a specific assignment or exam, ask.

Grading Standards

Letter grade	Score or percentage	Description
A	93–100	Achievement that is outstanding relative to the level necessary to meet course requirements.
A-	90–92	Achievement that is significantly above the level necessary to meet course requirements.
B+	87–89	Achievement that is significantly above the level necessary to meet course requirements.
B	83–86	Achievement that is significantly above the level necessary to meet course requirements.
B-	80–82	Achievement that meets the course requirements in every respect.
C+	77–79	Achievement that meets the course requirements in every respect.
C	73–76	Achievement that meets the course requirements in every respect.
C-	70-72	Achievement that is worthy of credit even though it fails to meet fully the course requirements.
D+	67-69	Achievement that is worthy of credit even though it fails to meet fully the course requirements.
D	60-66	Achievement that is worthy of credit even though it fails to meet fully the course requirements.
F	0-59	Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an Incomplete.