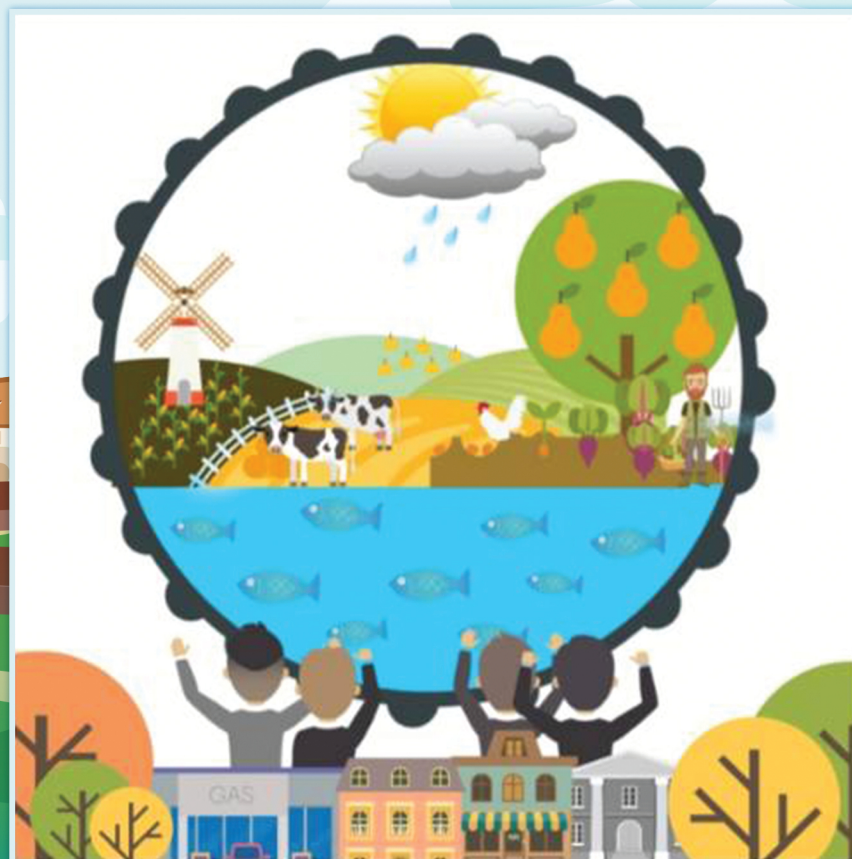




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Module 2

Environmental / Ecosystem for Sustainable Agriculture



PARTICIPATORY AND INTEGRATIVE SUPPORT FOR AGRICULTURAL INITIATIVE

ERASMUS+

HIGHER EDUCATION – INTERNATIONAL CAPACITY BUILDING PROGRAM

Khon Kaen University, Khon Kaen Thailand



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Completed in 2020

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2018



2019

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01

General Information

1. General Information

This module is separated into 3 weeks which mainly focus on providing knowledge and methods for understanding farming systems and agricultural constraints for smallholders in Northeast Thailand, where it is considered as the marginal land for agriculture. At the same time we also aim at introduce the students to tools for assessing the impact of agricultural activities by using both economic assessment indicators and environmental tools. Nevertheless, for sustainable production and further improve of farm, students must understand how farmer make the decision on farm activities, what the limitation for each group of farmers are and what the strategies of farmers to cope with uncertainty by both on-farm adaptation and non-farm activities. The report, therefore, is divided in to each week of activities as following.

2. Session 1 Part 1: Ecosystems service for sustainable agriculture in a challenging environment (Type of agricultural activities, farmers' decision making and its impact on farm economic conditions)

2.1 General learning objectives

- 1) To understand the common farming systems in northeast Thailand
- 2) To develop capacity for building a farming systems appraisal
- 3) To be able to identify and characterize a activity vsystem at the household scale, i.e; a set of agricultural activities combined and interrelated with each other (cropping systems and animal rearing systems), and off-farm activities, guided by coherent decision taking
- 4) To be able to identify system properties of each household (productivity, profitability, vulnerability resilience and sustainability)

2.2 Organizing teams

Hosting institute: Khon Kaen University

Organizing team of the session:

Khon Kaen University:

- Department of Agricultural Extension and Agricultural Systems: Dr. Arunee Promkhambut and Dr. Sukanlaya Choeunkwan,

- Department of Agricultural Economics: Dr. Satit Aditto and Dr. Yoawarat Sriwaranun

SupAgro University: Dr. Didier Pillot

CIRAD: Dr. Benedicte Chambon

Period: 12-17 November 2018

2.3 Activities organizing during the session

02

Session 1 Part 1

DAY

1

Learning objectives:

- Understanding of environmental constraints for sustainability of agriculture in Northeast Thailand and farmers' strategies for coping and adaptations
- Understanding of farming system concepts and methods for assessment
- Identifying the impact of agricultural practices to environment

Since PISAI students have already known each others before since the last module in Chiangmai University, this module directly get into the academic program. The official program started shortly after the registration. The welcome remark was briefly done by Assoc. Prof. Dr. Darunee Chotithayangkool, Associate Dean for Academic Affair and Quality Insurance, Faculty of Agriculture, KKU. The opening speech was given by Assist. Prof. Dr. Denpong Soodphakdee, Vice President for Academic Affairs and Communications, KKU; Asst. Prof. Chutima Tantikitti (coordinator of the whole PISAI project) and Assist. Prof. Dr. Supat Isarangkool Na Ayuthaya (KKU coordinator PISAI Project). At the same time, organizing staff and lecturers were introduced.

Shortly after the official program, students were introduced to sustainability in Northeast Thailand: Challenge issues on sustainable agriculture Northeast Thailand lectured by Assoc. Prof. Dr. Suchint Simaraks from Program on System Approaches in Agriculture for Sustainable Development, Department of Agricultural Extension and Agricultural Systems, Faculty of Agriculture, KKU. And then the students were randomly separated into group for 4 groups and a group work was assigned to identify environmental challenges in Northeast Thailand and proposed alternative farming systems for better performance and then students presented what they knew and feedback was done by training teams to ensure understanding of students to the environmental constraints in Northeast Thailand. In the afternoon, Dr. Didier Pillot has given a short lecture on the assessment of farming systems and the group work on "Agricultural practices and its impacts on environment" was assigned to students to clarify their understanding and then finished by presentation and feedback session by training staff.



DAY

2

Learning objectives

- Understanding the meaning of farming system concepts and methods of analysis for each farm components
- Developing the criteria for household interviewing for cropping systems, animal rearing systems, household history
- Understanding the methods of economic assessment of the farm activities
- Understanding techniques for farmer interviewing

In the morning, farming system concepts and methods of analysis of farm components was given by Prof. Dr. Anan Polthanee, an invited lecturer from Department of Agricultural Extension and Agricultural Systems, who is an expert in farming system and cropping systems in Northeast Thailand. Generally, students, particularly from other regions know quite few information of farmers' livelihood in this region. In the afternoon, each group was assigned to brainstorm and presented sub-topics for interviewing household and introduced to techniques of interviewing. Generally, students did perform well in terms of discuss and sharing the idea because the discussion was organized in Thai even they have to present in English. But it was noted that mostly the presenters will be the same person who can communicate in English.





DAY 3-4

Learning objectives

- Experience farmers' interview and analyzing data analysis in the field
- Experience local foods and culture in the area
- Understanding constraints for doing agriculture and coping strategies of farmers in rainfed conditions

This day we went to Nongwaengklang village in Phon district, Khon Kaen province. In the first day during morning, students interviewed head of the village to understand the general information of the village and the afternoon, each group accompanying by one training staff or lecturer went to each selected households having different agricultural activities and interviewed farmers according to the developed sub-topics. In the evening, the group was asked to check their data and did a first household analysis and economic calculation in order to make sure that the data they collect is enough for further analysis in the campus. The students work very hard on that with the suggestion and guide from the staff. Next day, in the early morning, they presented their work. In general, most of the group did quite well in all require analysis but unable to identify the conditions for such activities.

During these 2 days, students have to stay in the village and have 1 night in the temple. Some students said that this was the first time for them and they enjoy about it, particularly, the traditional food which prepared by the villagers.

DAY 5-6



Learning objectives

- Be able to calculate the assessment of economic efficiency of the system and farm characteristics for farm typology
- Understand farm vulnerability and risk and farmers strategies to cope with
- Identify constraints and opportunity of farmers in each group

During morning, the students ask to analyse information from their interviewed and fill in the information in the previous designed table in order to compare and group each farm household for example, unit of labour, farm size, farm activities, land productivity, labour productivity etc. and then the lecturer try to lead them to do farm typology. Also students were asked to identify constraints and opportunity of farmers in each group. Later Dr. Benedicte Chambon, an invited lecturer from CIRAD, had given them the short lecture about risk and vulnerability concepts and then they were asked to identify the vulnerability and farmers coping strategies from field experiences. Most of the students could relate the situation in field to the concepts. Finally, the finding in 1st week was presented to the 2nd week team.

03

Session 1 Part 2

3. Session 1 Part 2: Ecosystems service for sustainable agriculture in a challenging environment (Type of agricultural activities and its impact on soil functioning properties)

The session in brief

The workshop in the framework of Participatory and Integrative Support for Agricultural Initiative program PISA module 2 week 2 was held from 19/11/2018 to 24/11/2018 at KhonKaen University in Thailand, and organized by KhonKaen University by Assistant Professor Dr. Phruksa Lawongsa (2nd week of module 2 coordinator) and two Agrinatura (CIRAD and from IRD ECO&SOLS) experts: Dr. Alain Brauman and Dr. Alexis Thoumazeau with assistance of local staff Ms. Phantip Panklang (LDD Region 12) and Ms. Porntip Puttasao (PhD student at KKU). The training gathered 16 students from 4 Universities (KKU, KU, PSU and CMU), Thailand. The main objective of the training week was to assess a part of farm sustainability, based on the soil system analysis. To do so, the Biofunctool[®] indicators, based on low-tech and rapid measurements of the soil biological functioning were implemented. At the beginning, the students worked on scientific papers focusing on the soil quality. This exercise allowed them to understand the global scientific dynamic on this subject. From this basis, Dr. Brauman and Dr. Thoumazeau introduced the importance to assess soil quality, the methods available and the Biofunctool[®] framework through short lectures. On the second day, a field mission was organized in Ban Nong Waeng Klang village to implement the Biofunctool[®] set of indicators in three plots with three different land uses (Rice, Mango and Guava). The students went through different working groups led by the trainers. The objective was for them to understand and implement all the Biofunctool[®] indicators in the field. The third day was devoted to short laboratory analysis and results readings. Ms. Panklang also trained the student on statistical analysis of the data sets, using R software. The students were finally able to analyze their data-set, and to build a consistent presentation on the impact of several land uses on soil quality, using their results obtained with the Biofunctool[®] indicators. This led to interesting scientific discussion between trainees and trainers during a final oral presentation.

Registration, Soil quality introduction session, warm up and teambuilding

DAY



Planning detail

► The registration of the participants began at 8:00 am. Then, at 8:30 am., the opening session was given by Assistant Professor Dr. Phruksa Lawongsa (2nd week of module 2 coordinator) to introduce the official program and main lecturers who involved in the 2nd week of module 2 which are Dr. Alain Brauman (Institut de recherche pour le Development), Dr. Alexis Thoumazeau (Cirad), Miss Phantip Panklang (Prince of Songkla University) and teaching assistant, Miss Porntip Puttaso (Khon Kaen University). Then, students were divided into 4 teams (based on random selection) and the very first activity of the day was “introduction of the participants”. The students from 4 universities chose one of his/her friend to present their name and interests. At 9:00 am. Dr. Alexis Thoumazeau gave briefly introduction to soil quality and provided 1 scientific papers about soil quality assessment to each team. The first task of the day was scientific papers analysis. The responsibility of each team was to read and answer

- What is the context of the study?
- What is the main objective of the study?
- What measurements are used to assess soil quality?
- What statistical methods are implemented?
- What are the main results?
 - What are the limits of the study? (Team's opinion)
 - What is the definition of the soil quality? (Team's opinion)

The students had 1 hour to read, answer the question and prepare their slide presentation. The presentation time lasted maximum 10 min/team and weak that everyone in each team had to talk. Then, lecturers gave them feedback for 5 min/team.

After 2 team talks, Dr. Alain Brauman gave his lecture on “Soil ecosystem and its environment why modern agriculture need to take into account soil biodiversity”.

After lunch, Dr. Alain Brauman continued his lecture on “Soil quality: a new vision of an old concept”.

Then, 2 teams continued present their slide presentation. At the end of first day,

Dr. Alexis Thoumazeau gave lecture on “biofunctional set and protocol” to prepare students for biofunctional workshop on day 9.



DAY 9

Biofunctool workshop and field study

► Second day of 2nd week started at 8:00 am. Students visited sustainable agricultural learning center at MuangPhon District, KhonKaen. Today learning objective was to experience the methodology of biofunctool which is a new framework to assess the impact of land management on soil quality in the field. Three economic crops (rice, mango and guava) were selected. Each team student had responsibility for monitoring soil quality in these three crop fields using the Biofunctool[®] indicators (7 tools link to two functions).

1. Maintenance of soil structure

- 1) aggregate stability
- 2) beerkan test for infiltration monitoring
- 3) VESS for visual soil structure assessments
- 4) bulk density for monitoring the level of soil compaction

2. Soil carbon degradation

- 5) Bait lamina for monitoring soil fauna activities
- 6) Permanganate Oxidizable carbon test for monitoring labile carbon
- 7) Basal soil respiration

Today collected data were used for next day analysis.



04

Session 2

4. Session 2: Utilizing genetic resources for sustainable agriculture

DAY 10



Laboratory analysis and R-statistic session

▲ During third day each student team was responsible to analyze their data and learn how to use statistical analysis technique. In the morning session, they experienced how to analyze their collected data. In the afternoon session, Miss Phantip Panklang gave her lecture regarding R-statistical method and the students were asked to try to evaluate their own data using R-statistical method.

DAY 11

R-statistical analysis (cont.) and slide preparation

▲ In the morning session, each student team continued to analyze their data. In the afternoon, the students were asked to prepare their own team slide presentation which was presented on next day morning.



Data presentation

► During final day of 2nd week, each team student presented their research outputs in form of oral presentation. The design and content of the presentations was very nice. Each team went through questions and feedback comments from lecturers and friends. The majority of the comments was oriented to the content of the presentations. Before ending session, students reflected their opinions and comments for 2nd week workshop that they mostly appreciated the knowledge and experience they received. However, they wish to have more time to collect and analyze data.





DAY 13



► This day, the lecture about using animal and crop genetic resource for sustainable agricultural production in the region was provided by invited lecturers from Department of Animal Science (Assistant. Prof. Dr. Theerachai Haitook) and Department of Agronomy (Assistant. Prof. Dr. Jirawat Sanitchon) and experimental farm visit was provided to students to see how plant breeding techniques were done at Agronomy research station, Faculty of Agriculture, KKU.

► Students visited the Animal Experimental Farm in the campus in order to see production system and marketing system of poultry and swine production in the campus.

DAY 14

DAY 15

◀ This day, students joined field excursion to dairy farm and animal-based integrated farm of smallholders in Khon Kaen province. Students were asked to interview farmers' production systems and economic performance of the systems. According to students' assessment of the module, most of students enjoyed these activities very much. It provided the opportunity for them to see the real situation in farmer farms.



DAY 16

◀ This day, students had experience on aquaculture in Khon Kaen province. The first place was cage fish rising in river under contract farming system. And the second place was smallholders who raised fish in pond under salted affected area. This place, many method were applied by farmers to reduce the cost of feed for fish including raising chicken above the pond or inducing natural feed by using rice straw.



DAY

17

05

Module summarization

▲ This activity was held in the last day of the module with 2 main purposes 1) to relate all activities that students participated during the whole module, farm typology, economic assessment of farm activities, constraints and farmers' coping strategies (the first week), soil functioning assessment among different cropping systems (the second week) and case studies from farm visits (the third week) and 2) to assess the understanding of the 1st week activities and module assessment

So during the morning session, students were asked to compile the information of the first and second weeks and discuss the sustainability of each cropping system both in terms of economic and environment. And then provide some cases of the third week to support information. However, it seems like some soil



analysis can not fully use to indicate sustainability of the system. However, students found that in one guava plot, there is the high risk of pest infestation due to its high number of larvae of insect pest which is useful for farmers to take care of their plot.

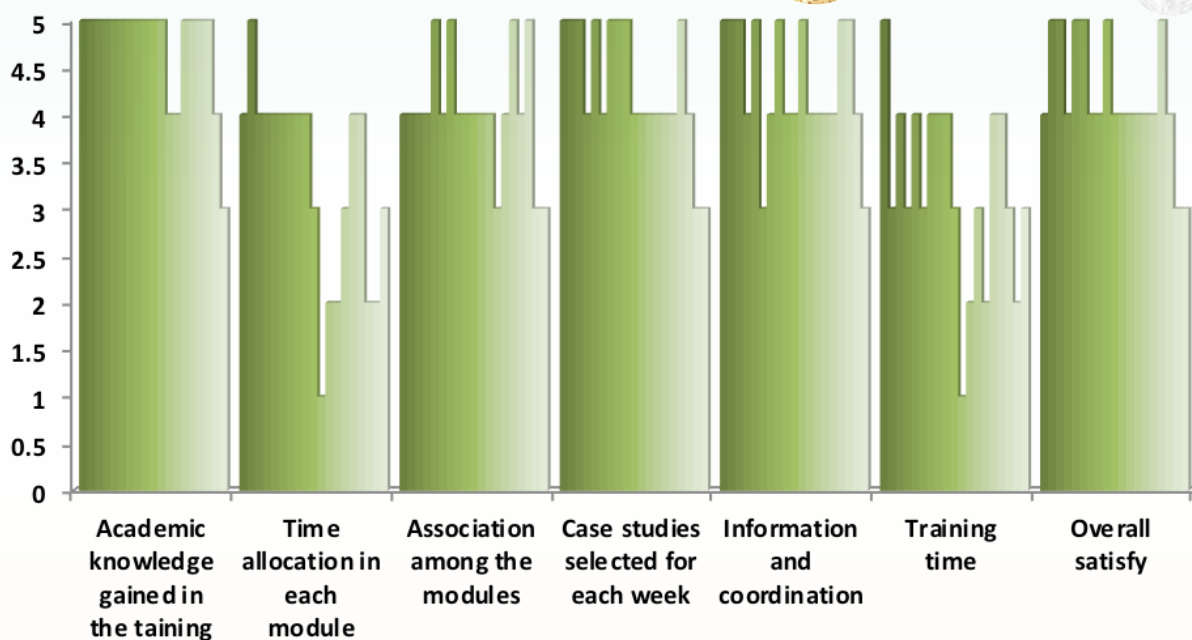
In the afternoon, students were asked to take an exam for the 1st week session. It is found that 60% of the students can understand the content more than 80%. However, there is 40% that can not describe the economic terms that were used in the class and some can not clearly identify farm constraints for each type of land.

Finally, the students were awarded for participation of the module by Assoc. Prof. Dr. Darunee Chotithayangkool, Associate Dean for Academic Affairs and Quality Assurance, Faculty of Agriculture, KKU.



06

Evaluation by students



Students' evaluation of the module (n=19) where 5= Most satisfy and 1= least satisfy



Some comments from the students for each week

Week 1

- All activities gave me benefits because there were new activities and interested, I can apply in my thesis
- I wanted more times in the part of the farmer's interview I wanted more times in the part of the farmer's interview
- Some contents are difficult to understanding. If possible, I want to exact the topic because I never learn it before. If I have known the advances topic, maybe I will be prepared first.
- For farming system module, the sampling methods should be added for more understanding in the future.
- A lot of contents to learn, the contents were good, but I wanted more time to content understanding. It would be better if we can limit the lecture activity to a maximum of 8-9 hrs for intensive work.

Week 2

- Interesting topics, I got the new knowledge in the part of soil collection methodology and soil analysis. I can apply this knowledge to the farmer group in my project.
- The contents were much perfected. I learn a lot of knowledge and the new experiments. I hope this knowledge will more develop agriculture skills for me.
- Should be added knowledge database about soil science research and statistic using before leaning because some students come from another field, I known just a little knowledge for this part.
- The contents are very complicated.

Week 3

- I liked everything in this week.
- I got new knowledge about animals and new experiences, contract farming, semi-intension farming and aquaculture.
- The contents were appropriate for the time and easy to understand.
- I wanted to go to more farmer farm places.
- I wanted more details on secondary livelihoods such as sheep, goat, turkey and more details on genetic resources.

07

Recommendation for the next module

- Language barrier between foreign lecturers and Thai students which the module assisted by translation by Thai lecturers.

- Preparing of the training team should be well prepared to make it clear among the training lecturers and staff to help students during analysis and interpretation of the study.

- Time of the year for farmers' interview should be changed because this time it is coincident with rice harvesting which farmers have short time for interview.

- The content in each part should be suitable for the time provide.

First Batch - Year 2018

Student participants of the module

	Name		Organization
1	Miss Keminee	Tongma	PSU
2	Mr. Poramet	Kaewprasert	PSU
3	Miss Warin	Klakankhai	PSU
4	Miss Laksanaporn	Sriyapunt	PSU
5	Miss Chattamas	Promdach	PSU
6	Miss Nongnaphat	Jongkrajia	PSU
7	Mr. Natthidech	Beesa	KU
8	Miss Niyaporn	Khwanet	KU
9	Miss Jureeporn	Sukhatiphum	KKU
10	Mr. Sornnarin	Suangto	KKU
11	Miss Apinya	Seanto	KKU
12	Miss Wantanee	Meelun	KKU
13	Miss Chatnapa	Nowat	KKU
14	Miss Chanikarn	Klinpratun	KKU
15	Mr. Seksan	Duangsingtham	CMU
16	Mr. Nhean	Sophea	KKU
17	Mr. Davuth	Chhim	PSU
18	Miss Mee	Mee	PSU
19	Miss Phenpitchaya	Phupuak	KKU

KKU PISAI Project coordinator

Name	Organization	Expertise
Assist. Prof. Dr. Supat Isarangkool Na Ayutthaya	Department of Horticulture, KKU	Physiology of tree, Fruit tree

Organizing team of the session 1 part 1

No.	Name	Organization	Expertise
1	Dr. Didier Pillot	SupAgro University	Agro-economics
2	Assist. Prof. Dr. Arunee Promkhambut	Department of Agricultural Extension and Agricultural Systems, KKU	Crop production system analysis, Participatory Rural Development
3	Dr. Sukanlaya Choeunkwan	Department of Agricultural Extension and Agricultural Systems, KKU	Agro-tourism, Rural development
4	Dr. Benedicte Chambon	CIRAD, Bangkok, Thailand	Agro-socioeconomist
5	Dr. Bupha Simma	Research assistant, Agronomy, KKU	Agronomy

Organizing team of session 1 part 2

No.	Name	Organization	Expertise
1	Dr. Alain Brauman	Institut de recherché pour le Development (IRD) ECO&SOLS	Ecology, Microbiology, Molecular Biology, Soil Fertility
2	Assist. Prof. Dr. Phrueksa Lawongsa	Department of Soil Science and Environment, KKU	Soil Microbiology, Soil Biotechnology, Soil Ecology
3	Dr. Alexis Thoumazeau	Cirad - La recherche agronomique pour le développement	Ecology, Microbiology, Soil Fertility
4	Ms. Phantip Panklang	Land Development Department region 12	Ecology, Microbiology, Soil Fertility
5	Ms. Porntip Puttaso	Ph.D. student (Department of Soil Science and Environment, KKU)	Soil Ecology, Soil Microbiology, Soil Fertility

Organizing team of session 2

No.	Name	Organization	Expertise
1	Assist. Prof. Dr. Theerachai Haitook	Department of Animal Science, Faculty of Agriculture, KKU)	Integrated farming and Animal Husbandry/ Production

Invited speakers of the module

No.	Name	Organization	Expertise
1.	Prof. Dr. Anan Polthaneer	Department of Agricultural Extension and Agricultural Systems, KKU	Farming systems, cropping systems
2	Assoc. Prof. Dr. Suchint Simaraks	Department of Agricultural Extension and Agricultural Systems, KKU	Sustainable Agriculture and Rural Development, Participatory Rural Development
3	Assist. Prof. Dr. Satit Aditto	Department of Agricultural Economics, KKU	Agribusiness, Risk management
4	Assist. Prof. Dr. Yaowarat Sriwaranun	Department of Agricultural Economics, KKU	Agricultural Economics, Agricultural Marketing
5	Assist. Prof. Dr. Jirawat Sanitchon	Department of Agronomy, KKU	Plant breeding
6	Assoc. Prof. Dr. Penpan Srisakultiew	Department of Fisheries, KKU	Aquaculture

Second Batch - Year 2019

Student participants of module

No.	Name	Surname	Organization
1	Miss Rachel	Mazac	UHEL
2	Miss Pia	Malm	UHEL
3	Miss Milka	Keinanen	UHEL
4	Miss Jirattikan	Yontawong	CMU
5	Miss Kawintip	Kongin	CMU
6	Miss Ammarin	Auparakat	CMU
7	Mr. Natcha	Ketpanich	CMU
8	Mr. Chutisorn	Deemak	KKU
9	Mr. Suppanat	Thaneerat	PSU
10	Miss Kanokwan	Maaiaad	PSU
11	Miss Sudarat	Chantakam	PSU
12	Miss Timapon	Artnafai	PSU
13	Miss Phornthawon	Phanbut	KU

Organizing team of session 1

No.	Name	Organization	Expertise
1	Dr. Didier Pillot	SupAgro, Montpellier	Agro-economics
2	Dr. Yumi Kobayashi	University of Copenhagen	Agronomy
3	Dr. Sukanlaya Choenkwan	Department of Agricultural Extension and Agricultural System, KKU	Agro-tourism, Rural development
4	Asst. Prof. Dr. Theerachai Haitook	Department of Animal Science, Faculty of Agriculture, KKU	Integrated farming and Animal Husbandry/ Production

Organizing team of session 2

No.	Name	Organization	Expertise
1	Dr. Alain Brauman	Institute de recherché pour le Development (IRD) ECO&SOLS	Ecology, Microbiology, Molecular Biology, Soil Fertility
2	Dr. Nancy Rakotondrazafy	Institute de recherché pour le Development (IRD) ECO&SOLS	Ecology and Soils
3	Asst. Prof. Dr. Phruksa Lawongsa	Department of Soil Science and Environment, KKU	Soil Microbiology, Soil Biotechnology, Soil Ecology
4	Asst. Prof. Dr. Prakaijan Nimkingrat	Department of Land and Resources and Environment	Entomopathogenic
5	Ms. Phantip Panklang	Land Development Department region 12	Ecology, Microbiology, Soil Fertility
6	Ms. Porntip Puttasao	Ph. D. student (Department of Soil Science and Environment, KKU)	Soil Microbiology, Soil Biotechnology, Soil Ecology

Organizing team of session 3

No.	Name	Organization	Expertise
1	Asst. Prof. Dr. Satit Aditto	Department of Agricultural Economics, KKU	Agribusiness, Risk management
2	Asst. Prof. Dr. Yaowarat Sriwaranun	Department of Agricultural Economics, KKU	Agricultural Economics, Consumer Behaviour, Agricultural products' Price Analysis
3	Assoc. Prof. Dr. Penpan Srisakultiew	Department of Fisheries, KKU	Aquaculture



Summary

Module 2 - Environmental/Ecosystem Services for Sustainable Agriculture

For the second module of the PISAI programme, the objective is to look at the conditions of agricultural sustainability at the level of the cultivated plots and at the level of the people's livelihood and their farms.

The module was separated into 3 weeks which mainly focus on providing knowledge and methods for understanding farming systems and agricultural constraints for smallholders in Northeast Thailand (Issan), where it is considered as the marginal land for agriculture. At the same time, we also aim at introducing the students to tools for assessing the impact of agricultural activities by using both economic assessment indicators and environmental tools.

The plot is considered as the elementary spatial unit where the environmental conditions are the same and where the human interventions are, and have been, common. Therefore, they are the units where one can precisely measure and assess what are the main characteristics of the environment, and also what can be the impact of the agricultural activities on this environment.

The farm is the unit where the decisions are taken, hence where one can understand the reasons that link these decisions with the social, economic and technical situation of the livelihood.

In this module, the concepts and the methodological tools are all given through practical exercises on the field. The principle is that students more easily acquire the learning objectives when they practically use them by themselves at the same moment. Therefore, the students attending this module have moved to different rural places of Issan in the first and second years:

- Phon district, Khon Kaen province (Nongwaengklang village) in 2018;
- Roi Et district (villages of No Nong Sean and Pho Sai) in 2019.

On the first week, they assessed the variability of the natural conditions in the area, leading to designing a map and a transect line model of the area.

They also studied the transformation of agriculture for the last 50 years, which partly explains what the farmers do today. They surveyed the different types of farmers who are living on the place, in order to identify the strategies, they may have. Based on this, they identified at least two main types of farms strategies in the district, for whom the decision taking is quite different, especially with regard to the cropping systems and the level of intensification.

The consequences of these different cropping systems on the parameter of soils have been assessed in the following week. Soils structure and stability, carbon storage, microfauna biodiversity and transformation were measured and compared, by combining direct observations with the use of Biofunctool® index. Three different cropping systems were compared, that relate with the main identified cropping strategies.

Then, during the last week, students assessed the economic performance of the same cropping systems undertaken by different representatives of the identified four types of farms in the area. The results were combined with those of the environmental assessment to reach a global appraisal of the social economic and environmental sustainability for the local systems.

By the combination of indicators coming from different disciplines (environmental, social, economic) and positioning them into the evaluation of farming and cropping systems, students in this module therefore acquire tools of methods that can practically allow them to assess the decision-taking at farm level and its consequences on the sustainability of the local agricultural production.

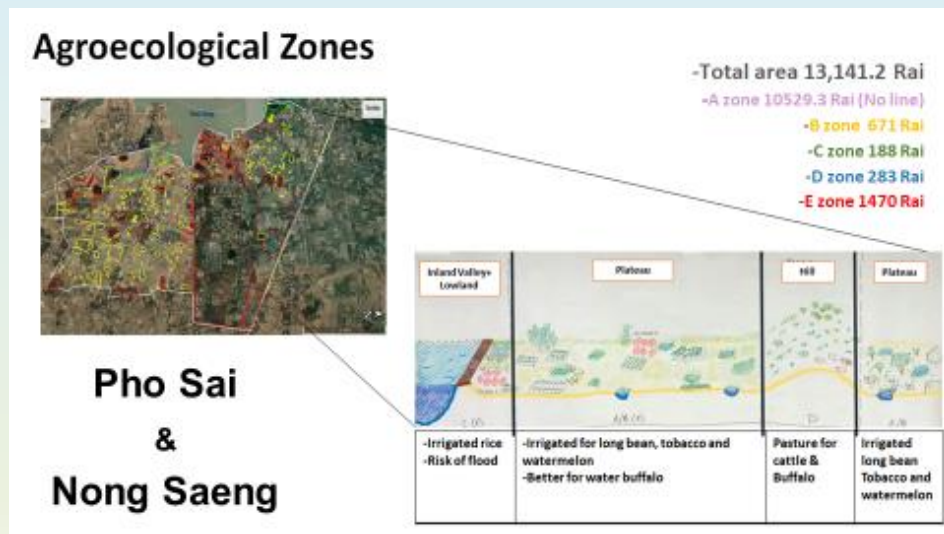


Figure 1: The agroecological transect of the zonation achieved in 2019 (produced by the PISAI students)

Report for Module 2 held in 2019

for the second batch of PISAI students

Please visit our website:

https://www.youtube.com/watch?v=KpQsxSKdG4k&feature=emb_logo





