Narrative report - ACTAE Small Grant Facility

Developing an E-learning platform in Agroecology

Contract in the Framework of ACTAE regional project
CANSEA component

Channa Bou[1], Vichet Lay[2], Heng Lay[1], Florent Tivet[23]

August 2019

[1]Institute of Technology of Cambodia, E-learning Center ; [2]Conservation Agriculture Service Center, Department of Agricultural Land Resources Management, GDA, Cambodia; [3]Centre de Coopération International en Recherche Agronomique pour le Développement (CIRAD),

Acknowledgement

This work was funded by ACTAE/CANSEA and was the continuity of activities supported by Agropolis Fondation, France, Investissements d'Avenir.

Partnership

This initiative brings together the E-learning Center of the Institute of Technology of Cambodia (ITC), the Royal University of Agriculture (RUA) and the Center of Excellence on Sustainable Agricultural Intensification and Nutrition (CE SAIN), the University of Battambang (UBB), the Department of Agricultural Land Resources Management (GDA/DALRM), the Conservation Agriculture Service Center (CASC/DALRM), the French Agricultural Research Centre for International Development (CIRAD) and the TICE team from SupAgro, Montpellier, France.

Partners

With the support

Developing an E-learning platform in Agroecology

Table of content

Main field of involvement

Education, training materials, pedagogical resources, E-learning.

Summary

A first initiative, funded by Agropolis Fondation and Investissements d'Avenir (Project 1401-016), was conducted from January 2015 to June 2017 aiming at developing e-learning in the field of Agroecology pooling together partners from the Royal University of Agriculture, the University of Battambang, the Department of Agricultural Land Resources from GDA and CIRAD. Lessons covering four main dimensions of an agroecological transition were designed for an audience of bachelor and master students with (i) co-design agroecological practices, (ii) support the transition to agroecological practices, (iii) adapt appropriate-scale mechanization, and (iv) quantifiy the efficiency and impacts of agroecological practices. These first resources are not exhaustive and it is expected through the establishment of a collective e-learning platform that others universities, NGOs, research institutes will develop educational materials to complete each dimensions and others.

During this first phase, a content management platform (CMS ; http://e-learning.rua.edu.kh/) has been developed by RUA and CIRAD to host the resources. However, these e-learning resources are hosted under a platform that present a low level of security (high hacking risk) and low tracking possibilities (students' participation and scores). For these reasons, and based on the expertise and leadership of ITC on the development, support and management of e-learning content, it was targeted to transfer all resources on a LMS platform hosted at ITC, to provide a larger visibility, to record the progress of the users and to improve the interactivity between trainees and trainers.

The objective of the present initiative funded by ACTAE/CANSEA was to establish an E-learning platform (LMS) that will be hosted and managed by ITC. That means that the copyright and the authorship remain the property of the institutions and the authors which were involved on the development of the resources.

The report is organized with three main sections with (i) brief introduction to the past initiative funded by Agropolis Fondation with the IPERCA project, (ii) presentation of complementary resources developed on the use of cover crops, and (iii) the development of a LMS platform to host all resources and increase the visibility.

Part 1 – E-learning content developed through IPERCA (Agropolis Fondation, 2015 – June 2017)

Content and dimensions

Four main dimensions were developed with (i) co-design agroecological practices, (ii) support the transition to agroecological practices, (iii) adapt appropriate-scale mechanization, and (iv) quantifiy the efficiency and impacts of agroecological practices.

Partners from the Department of Agricultural Land Resources Management (DALRM/GDA), three faculties of the Royal University of Agriculture (RUA, Faculty of Agricultural Engineering, Faculty of Agronomy and Faculty of Economy and Rural Development and Ecoland Centre), the Faculty of Agronomy and Food Processing from the University of Battambang (UBB) along with CIRAD were involved on this process with back-stopping from the TICE team of SupAgro.

The resources are available both on the e-learning platform (CMS, http://e-learning.rua.edu.kh/) of RUA and on the LMS platform developed recently with the support from ITC (http://e-learning.rua.edu.kh/). A pedagogical leaflet for the trainers and lecturers is available here.

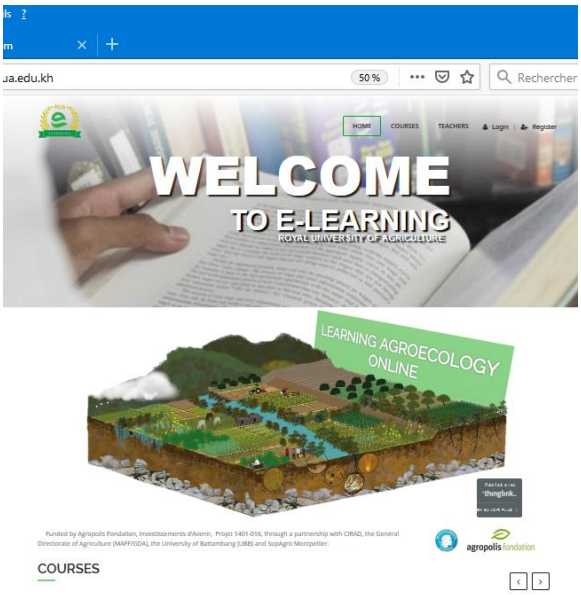

Fig. 1. E-learning platform hosted at RUA

DIMENSIONS	SUMMARY	COURSE	SUB-SECTION
To support the transition to agroecological practices	Several courses, including Agrarian transition and window opportunity for agroecology in Laos, Land use and land cover in Northwestern Cambodia and Introduction to Agrarian system and diagnosis will give an overview of the main challenges to support agroecological transition of smallholder farmers.	COURSE 1: AGRARIAN TRANSITION AND OPPORTUNITY WINDOWS FOR AGROECOLOGICAL INNOVATION	• LESSON 1: ELEMENT OF CONTEXT • LESSON 2: INTRODUCTION TO LAND USE INTENSIFICATION IN LAOS • LESSON 3: INTRODUCTION TO "ADOPTION OF CONSERVATION AGRICULTURE"
		COURSE 2 : LAND USE AND LAND COVER CHANGES, NORTHWESTERN UPLANDS OF CAMBODIA	• LESSON 1: CHANGES OF LAND USE AND LAND COVER (LULC) • LESSON 2: PROCESS OF LAND USE AND LAND COVER CHANGES • LESSON 3: PROXIMATE CAUSES, UNDERLYING FACTORS, AND THEIR LINKAGES
		COURSE 3 : AGRARIAN SYSTEM ANALYSIS AND DIAGNOSIS	• LESSON 1: THE CONCEPT OF AGRARIAN SYSTEM • LESSON 2: LANDSCAPE READING • LESSON 3 : HISTORICAL STUDY • LESSON 4: PRODUCTION SYSTEM STUDY AND MODELING
To co-design agroecological practices	Nine courses will guide you through the concept of Conservation Agriculture and Direct Seeding Mulch-based cropping systems. You will also learn why a healthy soil is the cornerstone of sustainable production.	COURSE 1: CONSERVATION AGRICULTURE AND DIRECT MULCH BASED CROPPING SYSTEMS	• LESSON 1: THREATS FOR AGRICULTURAL RESOURCES IN CAMBODIA • LESSON 2 : INTRODUCTION TO CONSERVATION AGRICULTURE • LESSON 3: THE DRIVERS OF CA FOR A PRODUCTIVE AND A SUSTAINABLE AGRICULTURE • LESSON 4: CONCEPTUAL MODEL OF DMC SYSTEMS
		COURSE 2: BUILDING A HEALTHY SOIL	• LESSON 1: SOM DYNAMICS AND SOIL STRUCTURE

			• LESSON 2: FERTILITY AND PLANT NUTRITION • LESSON 3: WATER USE EFFICIENCY • LESSON 4: PLANT HEALTH PESTS AND DISEASES MANAGEMENT • LESSON 4: WEEDS MANAGEMENT
To quantify the efficiency and impacts of agroecological practices	Efficiency and impacts of contrasted cropping systems will be taught through the lens of soil organic matter and soil aggregation.	COURSE 1: SOIL ORGANIC MATTER	• LESSON 1: WHAT IS SOIL ORGANIC MATTER (SOM)? • LESSON 2: DYNAMICS OF SOIL ORGANIC MATTER • LESSON 3: ROLES OF SOIL ORGANIC MATTER
To adapt appropriate-scale machinery	The increase demand for appropriate-scale machinery is part of an integrated approach of soil and water management, targeting a sustainable intensification of the farming systems in the lowlands and in the uplands.	COURSE 1: LASER LAND LEVELING	• LESSON 1: ABOUT LAND LEVELING AND LASER LAND LEVELING • LESSON 2: GENERAL OPERATIONAL COMPONENTS OF LASER LAND LEVELING • LESSON 3: LASER SURVEYING • LESSON 4: LASER LEVELING OPERATION
		COURSE 2: A VERSATILE MACHINE	• LESSON 1: A VERSATILE MACHINE • LESSON 2: MAIN COMPONENTS OF A POWER TILLER • LESSON 3: ADJUSTMENT AND MAINTENANCE OF POWER TILLER

Table 1: Course and lessons developed through the project IPERCA (Innovative Pedagogical Resources in Conservation Agriculture and Agroecology for South-East Asia)

Part 2 – E-learning resource on use of cover crops

An additional e-learning content has been developed on the use of cover crops and series of clips has been produced to describe and explain the benefits, uses and challenges in using cover crops. Camille Giraudet (SupAgro intern) developed this resource with Vichet Lay (RUA, Computer Center) and Sopheak Noun (CE SAIN) (http://e-learning.rua.edu.kh/courses/cover-crops/). Support was provided by the TICE team from SupAgro (Sarah Clerquin and Julien Rose).

E-learning resource on Cover Crops

Background

Through the e-learning course: Cover crops, the student learn about the diversity of cover crops, their main functions and benefits and the way to manage it. The course will guide the student gradually to the knowledge thanks to many schemas, researchers' videos, farmers' testimony and quizzes.

Most of the examples take place in Cambodia and comes from the experiments of the CASC (Conservation Agriculture Service Center) which belong to the GDA (General Department of Agriculture). Although other examples and explanations are based on the Practical handbook of direct seeding on permanent soil cover in Madagascar (Husson et al, 2009)

Lesson 1: What are cover crops?

Definition of cover crops as a permanent or temporary cover of the soil by plants, which its first objective is to avoid the ground to be left bare for any length of time. An overview of the diversity of the cover crops in Cambodia is presented and also when we use it and what are the benefits from it linked to the functional biodiversity.

Lesson 2: Main functions and benefits of cover crops

The main functions and benefits provided by several species are detailed one by one: protecting the soil from erosion, increasing total biomass production, improving soil organic matter, nurturing soil biota, improving soil structure, recycling nutrient, integrating pests and diseases management and integrating weeds management.

Lesson 3: How to choose a cover crop or a combination of cover crops?

This lesson describes the different adaptations of the cover crops to the environmental context (soil, climate…) and which cover crops can provide and answer to a specific agronomic challenge. For example, we will explain that Crotalaria juncea limits the population of nematodes.

Lesson 4: How to use the cover crops?

Thanks to the examples of rainfed rice cultivation in Cambodia, rubber tree plantation, cassava and maize production, we will illustrate all the steps to success in the establishment of cover crop in a given cropping system. The question of the adaptation of the cover crops with the current cropping system is crucial: what type of relay crop could fit with the maize or rice cropping system or which cover crops can growth in a fruit plantation? Which type of implementation according to the equipment available (no-till planter, broadcasted manually…)? The different steps to manage well the cover crops are described from the sowing to the termination of the cover crop.

Camille Giraudet has also spent one month with ECHO Asia (Thailand, Chiang Mai, June 2018) designing a technical booklet that highlight the methods to preserve a genetic bank, produce and store seeds of under-utilized species and cover/relay crops. This handbook will be released soon.

Additional supports

Sovanda Son, Suos Vuthy, Chett Ouddom, Sovannara Chheong, Samnang Yen, Rada Kong, Rick Bates, Lyda Hok, Koy Ra, Patrick Trail, Vira Leng, and Florent Tivet. Disseminating underutilized species as a foundation of resilient farming systems. Poster. Regional Forum Agroecology Futures, 5-6 November 2018, Siem Reap. https://bit.ly/2MRe9j7

Son Sovanda. Disseminating underutilized species as a foundation of resilient farming systems. Oral presentation. Regional Forum Agroecology Futures, 5-6 November 2018, Siem Reap. https://bit.ly/2YYzuJM

Plant diversity, our main tool to build a healthy and living soil. Poster. Regional Forum Agroecology Futures, 5-6 November 2018, Siem Reap. https://bit.ly/2KHKVk7

WCS farmers' testimonies, Preah Vihear. Benefits of forest ecosystem and use of cover/relay crops under an organic rice management system in Preah Vihear. Retrieved from Soil is Life: https://bit.ly/2Bu9Tjn

Testimonies from Mr. Bros Barang and Lam Sareth farmers from Veal Kropeu, Banan district, Battambang. Use of cover/relay crops after rice in the flood plains of Banan (Battambang) and use of sunnhemp of a tool to generate additional income and to communicate. Retrieved from Soil is Life: https://bit.ly/2POpa7w

Testimony of Ms. Phon Sovanny, seed production of sunnhemp in the uplands of Battambang. Retrieved from Soil is Life: https://bit.ly/2CS9JDQ

Testimony from Mr. Rada Kong. Living cover of Stylosanthes guianensis for rubber plantation. Retrieved from Soil is Life: https://bit.ly/2DUxM6g

Cover crop – Functional diversity. E-learning resource, Retrieved from Soil is Life: https://bit.ly/2Qe2tct

Cover crops and rice cropping systems. E-learning resource, Retrieved from Soil is Life: https://bit.ly/2AgYVw3

Benefits of cover crops. E-learning resource, Youtube Channel Soil is Life: https://bit.ly/2QegJlq

Destruction of cover crops with roller crimper. E-learning resource, Retrieved from Soil is Life: https://bit.ly/2QfueRW

Cover crops and biomass production. E-learning resource, Retrieved from Soil is Life: https://bit.ly/2PSPLAc

Cover crops and adaptation to climatic conditions. E-learning resource, Retrieved from Soil is Life: https://bit.ly/2Bu4LMr

Outline E-learning course on cover crops by Camille Giraudet and Florent Tivet, 23 pages, http://bit.ly/2YTwAdh

What about cover crops by Camille Giraudet and Florent Tivet, 30 pages, http://bit.ly/2M9sisn

Part 3 - Development of an e-learning platform

Background

The objective was to develop an e-learning platform (LMS) to be hosted at ITC and to transfer all e-learning resources developed through the IPERCA project for the two reasons emphasized previously (safety procedure avoiding potential hacking that was experienced during IPERCA) and to give a larger visibility to such resources with use by others national university and agricultural schools. In addition, a learning management system (LMS platform) allows to track all record, progress of trainees and higher interactivity between trainees and trainers/lecturers. The team of the E-learning Center from ITC had the lead on this initiative with Mr. Lay Heng, Mr. Channa Bou.

At this stage all resources have been transferred to the LMS platform and a last validation process is on-going by all authors. Before releasing the resources there is still a need to clarify the Copyright and authorship. Providing access to a larger community of lecturers and students will increase the visibility and use with the main objective to attract others partners to develop additional resources. In addition, and through coming initiative such as ASSET, there is a need to define the steps forward to develop a national and potentially a regional E-learning platform on Agroecology that will bring together Universities from Laos, Cambodia, Vietnam and Myanmar.

Development Progress

Moodle is chosen to be the National Learning Management System (LMS) ; it is a free open-source application. Following is a snapshot of current system and features that were developed (customization) in collaboration with World Education and Moodle.

Module	Feature	Description	Status
Course management	Course operation	Create, update a course	YES
	Enrollment	Enroll teacher and student to a course	YES
	Access E-learning contents	Students access lecturing contents	YES
User	User operation	Create, update a user	YES
Role management	Role assignment	Assign role (admin, teacher, student) to a user	YES
	Role creation	Create a new role	YES
Report management	Track user learning progress	Overall learning progress of a student can be tracked	YES
		Learning progress for a student on a lesson of a course	YES
	Evaluation of learning result	Grade and learning result of a student	YES
	Access logs	Show all access and activities of a user to the system	YES
Learning contents	Interactive lecturing videos	IPERCA learning courses	YES
	Handouts, course materials, quizz, assignment	Create relevant teaching materials provided by a teacher	YES

Table 2: Features and progress of LMS development (https://moodle.itc.edu.kh/)

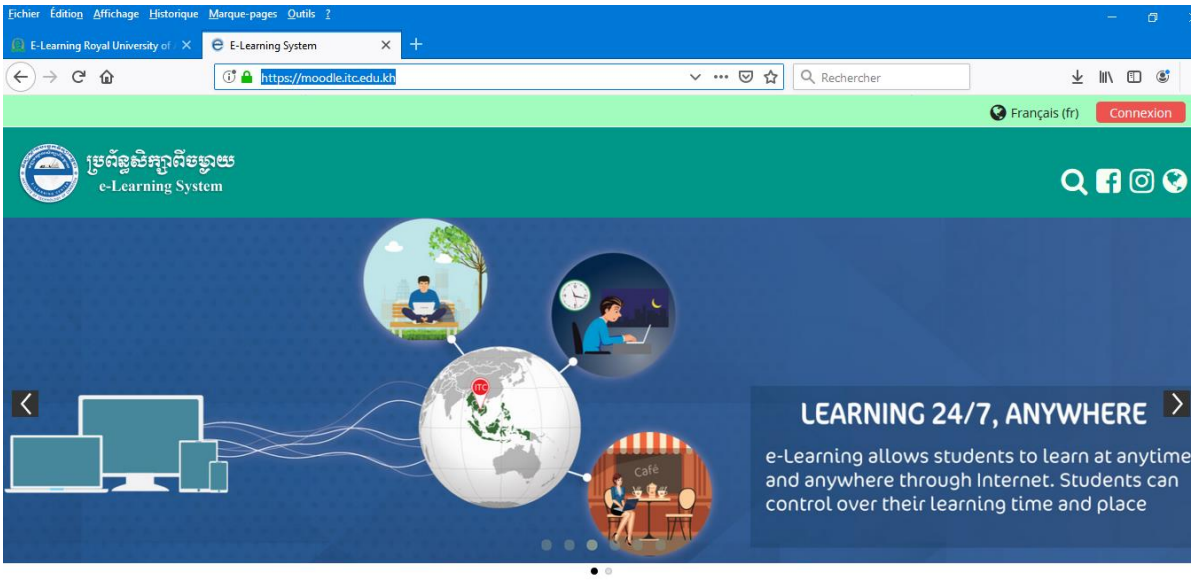

Fig. 2. LMS E-learning platform at ITC

Following steps

- It is expected to rollout the system to public in September 2019 with the principle features listed in Table 1 following a process of agreement of Copyright and authorship between the institutions and teams involved.
- Availability will be given to all publics interested to learn about Agroecology including higher education, governmental agencies, private sectors, NGOs and development operators.
- The Faculty of ITC has been approached the Meanchey University (MCU) to see their interest in using such resources within their curriculum.
- The LMS platforma and the E-learning resources will be presented early September at ITC during a training/communication event organized by the Faculty of ITC bringing together several universities and agricultural schools of Cambodia.
- To discuss within the scope of ASSET and others initiatives the possibility to develop additional e-learning resources in Agroecology.

The present R4D work has been financed by the French Agency for Development (AFD). The ideas and the opinions presented in this document are the ones of its authors and do not represent necessarily those of the AFD.