



Roundtable Discussion Series on Sustainable Food and Agriculture Systems in SEA

Promoting Carbon Farming in Agriculture in Southeast Asia through Regional Cooperation

19 April 2023 | Face-to-face Event

Panel Session 5: Education, Capacity Building, and Partnerships

Guide Questions:

- What are the potential innovative approaches to carbon farming under Southeast Asian region context?
- What are the possible research and development areas in carbon farming for undergraduate & graduate students? Who are the possible funding institutions to support these and contact person?
- How can women community leaders be involved in green financing (eg., Microfinance targeting women and women-led businesses)?
- What is the relevant capacity building for officials from NGAs and LGUs for the design of policies and regulations that can effectively support the development of sustainable finance and sustainability reporting, monitoring, and verification to enhance, transparency in the sustainable finance ecosystem?

Education, capacity building and partnerships: carbon farming and sustainable land management in SEA

Dr Eleanor Milne - CSU/WOCAT eleanor.milne@colostate.edu

- Approaches to C farming
- Tools to assess C farming impacts
 - COMET Farm USA
 - FAO Exact: e-learning
 - The Carbon Benefits Project (CBP) tools
- Introduction to WOCAT and link with CBP

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- SLM Technologies and SLM Approaches in SEA
- Integrated Farming Systems
- Gender-lense to SLM
- Embedding sustainable agriculture topics into higher education and beyond

Reducing N₂O emissions from soil
Improving fertiliser timings and placements
Reduce fertiliser use



Agricultural conservation practices that can increase organic carbon storage and promote a net removal of CO₂ from the atmosphere (from Paustian 2014).

MANAGEMENT PRACTICE	INCREASED C INPUTS	REDUCED C LOSSES
Increased productivity and residue retention	✓	
Cover crops	✓	
Conversion to perennial grasses and legumes	✓	✓
Manure and compost addition	✓	
No-tillage and other conservation tillage		✓
Rewetting organic (i.e., peat and muck) soils		✓
Improved grazing land management	✓	

Range of tools available to help estimate C/GHG impacts

- Many with accompanying training materials!!

COMET Farm | **USDA** United States Department of Agriculture Natural Resources Conservation Service | **Colorado State University** | Whole Farm and Ranch Carbon and Greenhouse Gas Accounting System. | [HOME](#) [TOOL](#) [INFO](#) [HELP](#) | [\(Sign in or Register \)](#) [f](#) [t](#) [i](#)

What is COMET-Farm?

COMET-Farm is a whole farm and ranch carbon and greenhouse gas accounting system.

The tool guides you through describing your farm and ranch management practices including alternative future management scenarios. Once complete, a report is generated comparing the carbon changes and greenhouse gas emissions between your current management practices and future scenarios.

[Start Using COMET-Farm](#)

- [COMET-Quarterly Newsletter](#)
- [Upcoming Trainings](#)
- [Why should I use COMET-Farm?](#)
- [USDA GHG methods](#)
- [What information do I need?](#)
- [How are my results calculated?](#)
- [Is my information safe?](#)
- [Overview video](#)
- [How do I use COMET-Farm?](#)

[Need Help?](#)

Range of tools available to help estimate C/GHG impacts

- Many with accompanying training materials!!

/www.fao.org/in-action/epic/ex-act-tool/training-and-webinars/e-learning/en/

Food and Agriculture Organization of the United Nations

ENHANCED BY Google

English

Economic and Policy Analysis of Climate Change

Home Background **EX-ACT Tool** Projects Countries News and events Resources

Overview
Suite of tools
Partners
Training and webinars
E-Learning
EX-ACT case studies
EX-ACT past projects

An e-learning course on the EX-Ante Carbon balance Tool has been released through a joint collaboration by the World Bank and FAO, with support from IRD.

The e-course is permanently accessible for *self-paced distance learning* from both the FAO and WB websites, while in regular intervals also a guided *Massive Open Online Learning Course* is organized by the WB e-Institute. As part of these learning events, users are guided through the online course by WB and FAO specialists and can interact through targeted forum discussions.

This e-learning course provides users with a first solid understanding and practical capability to use the EX-ACT tool at Tier 1 level of complexity.

EX-ACT e-learning Platforms

- World Bank e-Institute (e-course available)
- FAO e-learning Centre (e-course available)

Range of tools available to help estimate C/GHG impacts

www.carbonbenefitsproject.org

The screenshot displays the Carbon Benefits Project Modelling, Measurement and Monitoring web application. The interface includes a navigation menu with options like 'Start Here', 'Project Description', 'Guidance', 'Analysis Tools', and 'Reports'. A map on the left shows a geographical area with various land use types and a highlighted yellow region. The main content area is titled 'Agroforestry Stage 2 of 4: Annual Crops' and contains several steps for data entry:

- 1 Initial Land Use** ✓
- 2 Baseline Scenario** ✓
- 3 Project Scenario** ✗

The 'Project Scenario' step is currently active and includes the following sub-steps:

- 1 Select Project Activity Area/Group**: A dropdown menu shows 'technologies_2325 [5000010 ha]'.
- 2 Select an Agroforestry System**: A dropdown menu shows 'Silvipasture'.
- 3 Select a cropping system that best describes the crops in your agroforestry system.**: A dropdown menu shows 'Continuous wheat/barley/oats/upland rice'.
- 4 Describe Selected Annual Cropping Systems**: A table for describing cropping systems.

Annual Crop Name	Improved?	Tillage System*	Amount of N Fertilizer (kg/ha)*	% of nitrogen (N) in fertilizer*	Residue Management*
Hay	<input type="checkbox"/>	None	0	0	Grazed

Online tools to estimate GHG/C impacts of different land use/management scenarios

Users complete information on different land management changes

Produce a report of ghg/C impact



Training

Quick Guide

Click [Quick Guide](#) to download a quick guide to the CBP tools which includes:

1. The methodology the tools use
2. Input and output data
3. A step-by-step guide to using the tools
4. Advantages of using the tools

Tutorials

- [CBP General Tutorial](#) – Gives an overview of the entire CBP system and how to navigate it
- [Project Description Module Tutorial](#) – This tutorial shows you how to set up your project activity areas on a map
- [Developing Land Use Scenarios For Your Project](#)
- [Measurement and Monitoring Tutorial](#)
- [Simple Assessment Tutorial](#)
- [Reports Tutorial](#) – Helps you create a GHG balance report and understand it
- [Socio-Economic Tutorial](#)

Data Collection

Below are some forms which can be used to collect land management information (Activity Data) needed to run the CBP tools. Forms are in English or Spanish. Thank-you to Marco Flores Maldonado and Matias Bosio for the Spanish Translation.

CBP Online Training Videos

All CBP Training Videos are on You Tube on [The Carbon Benefits Platform](#). Videos are available in English and Russian

CBP training videos [1-3 in English](#)

CBP training videos [5-6 in English](#)

[Uploading a CBP report to WOCAT \(1:08:27\)](#)

CBP training in [Russian Day 1](#)

CBP training in [Russian Day 2](#)

CBP training in [Russian Day 3](#)

CBP Online Training Slides

To view/download the slides, click on the links below which will take you to the presentation on SlideShare:

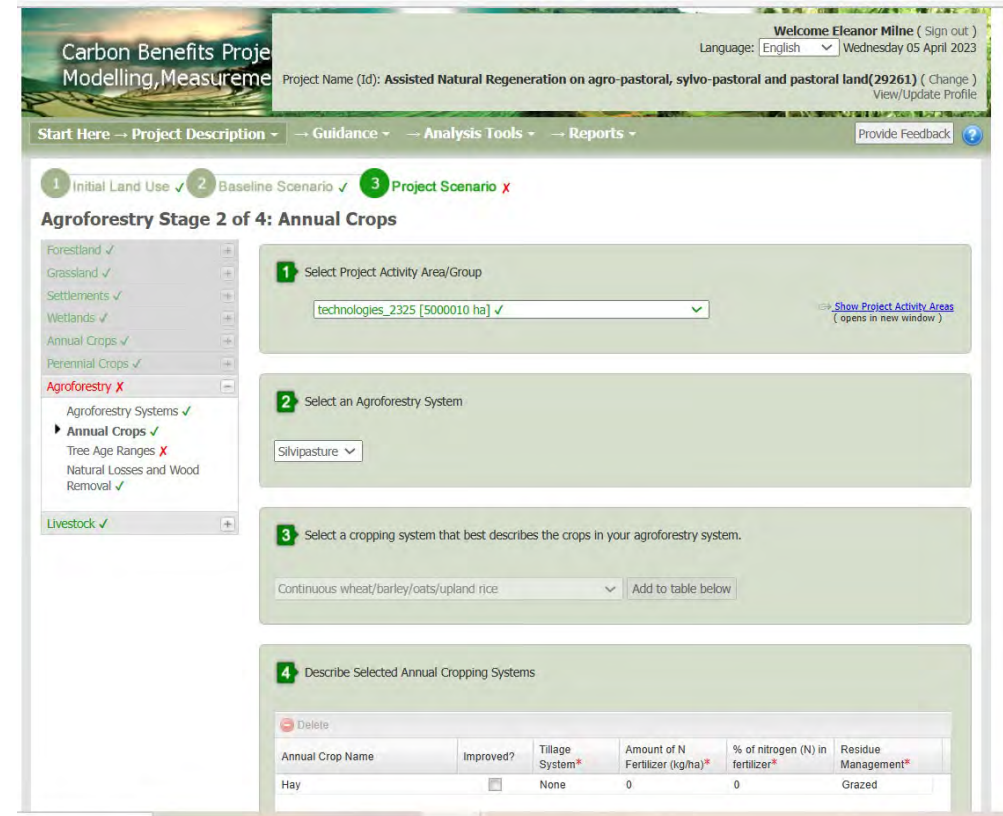
1. [Overview of the CBP tools](#)
2. [Describing your project spatially](#)
3. [Exercise 1 'An agroforestry project'](#)
4. [The Simple Assessment](#)
5. [Overview of a mixed landscape project for Exercise 3](#)
6. [The Detailed Assessment](#)

Exercises

English

[Setting up a project](#)

[Point file for exercises 1 & 3](#)



Agroforestry Stage 2 of 4: Annual Crops

1 Initial Land Use ✓ 2 Baseline Scenario ✓ 3 Project Scenario x

1 Select Project Activity Area/Group

technologies_2325 [5000010 ha] ✓ [Show Project Activity Areas](#) (opens in new window)

2 Select an Agroforestry System

Silvipasture v

3 Select a cropping system that best describes the crops in your agroforestry system.

Continuous wheat/barley/oats/upland rice v Add to table below

4 Describe Selected Annual Cropping Systems

Annual Crop Name	Improved?	Tillage System*	Amount of N Fertilizer (kg/ha)*	% of nitrogen (N) in fertilizer*	Residue Management*
Hay	<input type="checkbox"/>	None	0	0	Grazed

Possible Research and Dev Areas

- How can permanence of SOC gains be ensured?
- What are the trade-offs in terms of other ecosystem services?
- What are the impact of different SLM practices on SOC and net GHG emissions in different soil/climate conditions



Choose appropriate SLM technologies from
the WOCAT database



Estimate the C and GHG impacts of the SLM
technologies with the CBP tools

About WOCAT

The World Overview of Conservation Approaches and Technologies (WOCAT) is a **global Network established in 1992**.

WOCAT supports the compilation, documentation, evaluation, sharing, dissemination, and application of **sustainable land management (SLM) knowledge**.

In 2014, WOCAT's growth and ongoing improvement culminated in being **officially recognized by the UNCCD** as the primary recommended Global SLM Database for best SLM practices.

<https://www.wocat.net/en/about>



The Global Network on Sustainable Land Management

Consortium Partners



u^b
UNIVERSITÄT
BERN



ISRIC
World Soil Information



ICARDA
Science for resilient livelihoods in dry areas



FAO
Food and Agriculture
Organization of the
United Nations



Alliance
Biodiversity CIAT



giz
Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



ICIMOD

Funding Partners



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra



Federal Ministry
for Economic Cooperation
and Development



Swiss Agency for Development
and Cooperation SDC

Global WOCAT SLM Database

<https://qcat.wocat.net>

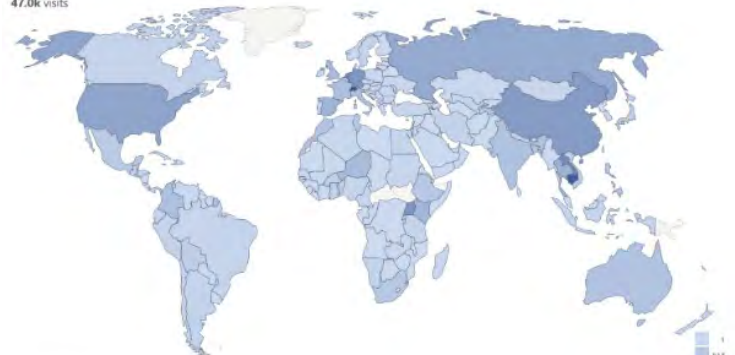
Main features of the WOCAT Global SLM Database:

- ✓ free upload and worldwide sharing of countries' good SLM practices in English, Spanish, French, Russian and Chinese
- ✓ free access to 2000+ proven, field-tested SLM practices from over 130 countries
- ✓ database filter to find relevant SLM practices for specific landscapes, land uses etc.
- ✓ possibility to integrate national SLM good practices in national/project/global platforms through API

UNCCD parties and other reporting agencies are encouraged to enter and share SLM best practices in the WOCAT SLM Database, and report in PRAIS under "Implementation Framework"/"Actions on the ground" (section 7.4.1 of the PRAIS reporting manual)

Visitor Map

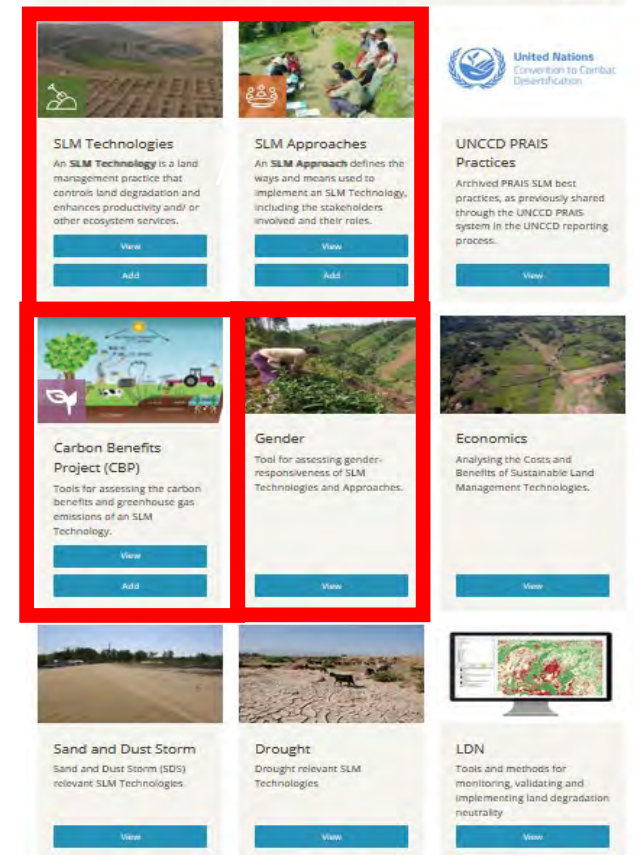
47.0k visits



Database Visitors

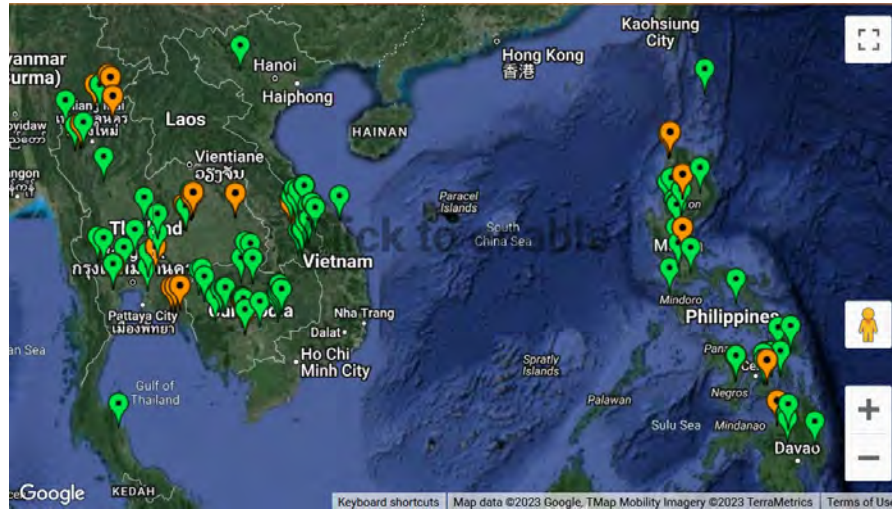


SLM good practices in Database



SLM Technologies / Approaches in SEA

[WOCAT Database](#)



Intercropping of orange trees with mungbean in mountainous areas (Cambodia)

DESCRIPTION

Intercropping of mungbean between orange trees improves soil fertility and generates income before the orange trees bear fruit. Agroforestry is a farming practice that can involve growing of a mixture of woody perennials like trees, shrubs, palms, bamboos, etc. with crops and/or animals, on the same land-management units. Agroforestry systems play an important role in ecological and economical interactions between the different land use components (Lundgren and Rains, 1992). It represents an interface between agriculture and forestry, and encompasses mixed landscape practices. Agroforestry systems are composed of three attributes:

1. Productivity (improved tree products, yields of associated crops, reduction of cropping system inputs, and increased labor use efficiency);
2. Sustainability (beneficial effects of woody perennials);
3. Adaptability (Adaptation Fund/UNEP, 2016).

In Cambodia, mungbean grows throughout the whole year, mostly depending on the moisture factor. Mungbean is short maturity crop which can be grown both in sloping upland and in lowland areas. In upland areas farmers usually plant their second crop in August and harvest it in October. Mungbean is a crop that can be grown on many soil types, but grows best on alkaline, sandy, and volcanic soils which well drained containing high levels of nutrients (Int. P. K. Ca. Mg) and organic matter (SMAT, 2006). Mungbean crop duration depends on the variety, with short-term, medium-term and long-term

LOCATION



Location: Phnum Kravanh of Cambodia, Ongroeng Village, Samrong Commune, Phnum Kravanh District, Pursat Province, Cambodia.
No. of Technology sites analysed: single site



Assisted Natural Regeneration (ANR) (Philippines)

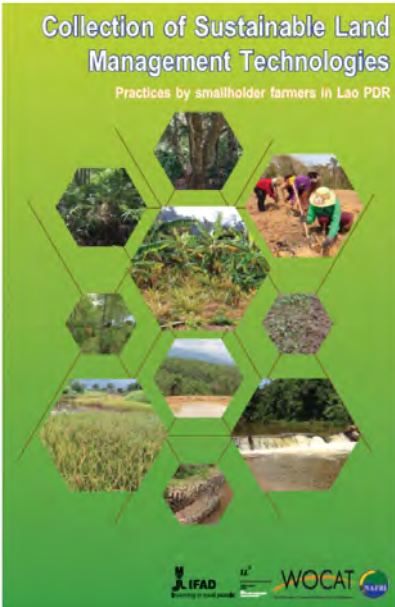
DESCRIPTION

The objectives of the Assisted Natural Regeneration (ANR) approach includes reduction of cost, speeding-up of forest restoration and enhancing plant diversity. It accelerates the succession process by removing or reducing barriers to natural regeneration such as competition with weedy species, soil degradation and recurring disturbances. ANR is a method for enhancing the establishment of secondary forest from degraded grassland and shrub vegetation by protecting and nurturing mother trees and their seedlings inherently present in the area. Stages of implementation: (a) Site identification wherein ideal sites for ANR implementation are those with 100-700 vigorous seedlings per hectare with 15-200 cm height of pioneer species, brush and other woody species relatively well spread on the area; (b) Survey, Mapping and Planting (SMAP) including and marking of seedlings which include tagging, measurement and identification for monitoring of growth and survival rates; (c) Laboring and tending of regenerants through ring weeding and placing of the cut grasses into the base of the seedlings to serve as mulch, and protect them from direct exposure to sunlight and to serve as fertilizer overtime; (d) Suppressing the grass; and (e) Maintenance and protection of established ANR site. The project of ANR in Barangay San Miguel, Davao, Bohol was initiated 2006 until 2009. Stakeholders involved are the Department of Environment and Natural Resources

LOCATION



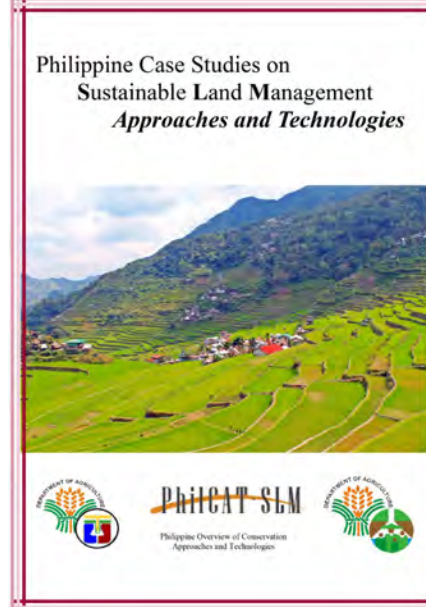
Location: Davao, Bohol, Philippines
Geo-reference of selected sites
124-2702, 9.9566
Initiation date: 2006
Year of termination: 2009



Working Towards Sustainable Land Management (SLM)
A collection of SLM Technologies from Cambodia



2018



PhilCAT SLM **PHILCAT**

TECHNOLOGIES IN THE DIFFERENT ECOSYSTEM

Coast (0-10 msl)	Lowland (<100 msl)	Lowland-Upland	Upland-Hillyland (100-500 msl)	Highland (>500 msl)	
1. Mangroves as Buffer Against Forests	1. Lowland Rice (C ₄) 2. In Situ Seed Decomposition in Wetland Rice 3. Conservation Tillage for Cereals Production 4. Ecological Engineering for Irrigated Lowland Rice 5. Modified Rapid Composting	1. Wetlands 2. Planted Vegetative Strip 3. Small Farm Reservoir	1. Upland Rice (C ₃) 2. Multi-Storied Cropping 3. Small Water Impounding Project 4. Pruning of Cages 5. Ricebrake/Greenbrake 6. Sweet Potato Relay Cropping 7. Improved Pasture Under Grazing	1. Little Growth for Forest Rehabilitation 2. Residue Incorporation 3. Trees as Buffers 4. Concrete Slope Block Layer 5. Sediment Traps 6. Highly Diversified Cropping in Live Fences 7. Sludge mill waste water Re-use for Irrigation	1. Natural Vegetative Strip 2. Rained paddy rice terraces 3. Contour farming using indigenous techniques 4. Rockwall Terracing 5. Stone bunds and small basin 6. Seed Production of multi-purpose shrubs/legumes 7. Vegetable Terracing 8. Organic Mulching 9. Composting Using IMO 10. Companion Farming for Vegetable Production

Integrated farming systems



Picture: Tim Sophea, RUA

*Integrated farming systems (IFS) evolved with the aim to **combine multiple crops** (e.g., cereals, legumes, tree crops, vegetables) and **multiple enterprises** (e.g., livestock, apiary, aquaculture) **on a single farm in an integrated manner** (Behera et al., 2015).*

IFS include a combination of different SLM Technologies each of them aiming at a specific benefit

... but may also :

include «synergies» between different SLM Technologies:
e.g. farm manure from livestock is used for improved vegetable gardens, rice straw is used for mulching of vegetable gardens, etc.



Increased C inputs

- ✓ Residue retention
- ✓ Cover crops
- ✓ Manure & compost
- ✓ ...

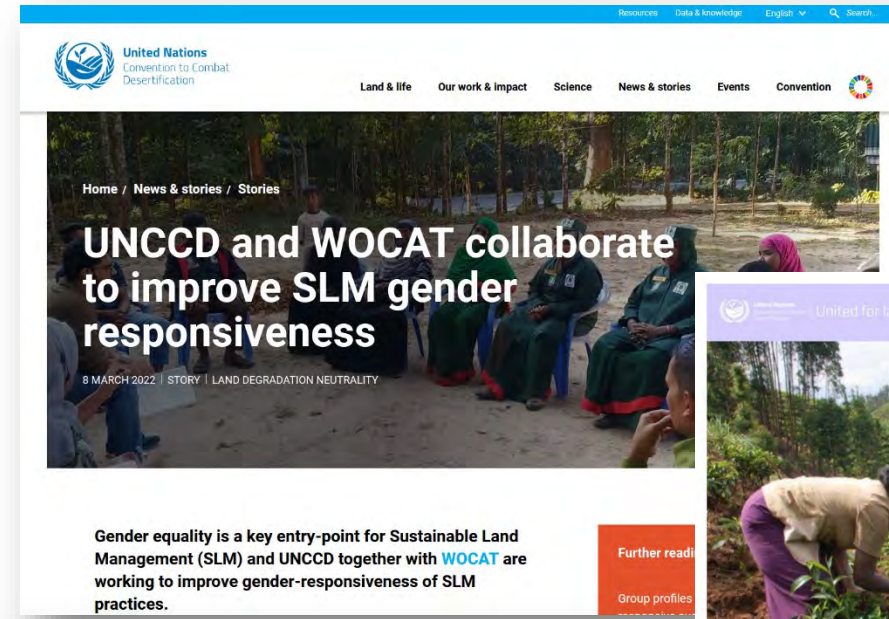


Reduced C loss

- ✓ Conservation tillage
- ✓ Conversion to perennial grasses & legumes
- ✓ ...

Adding a gender lens to Sustainable Land Management

- assess the gender responsiveness of SLM practices
- evaluate how **gender responsiveness** of SLM Technologies and Approaches **can be improved, stepping up adoption and dissemination**, making SLM beneficial for women and men alike
- support project planners, designers and implementers to **identify, implement and scale gender-responsive SLM Technologies and Approaches**



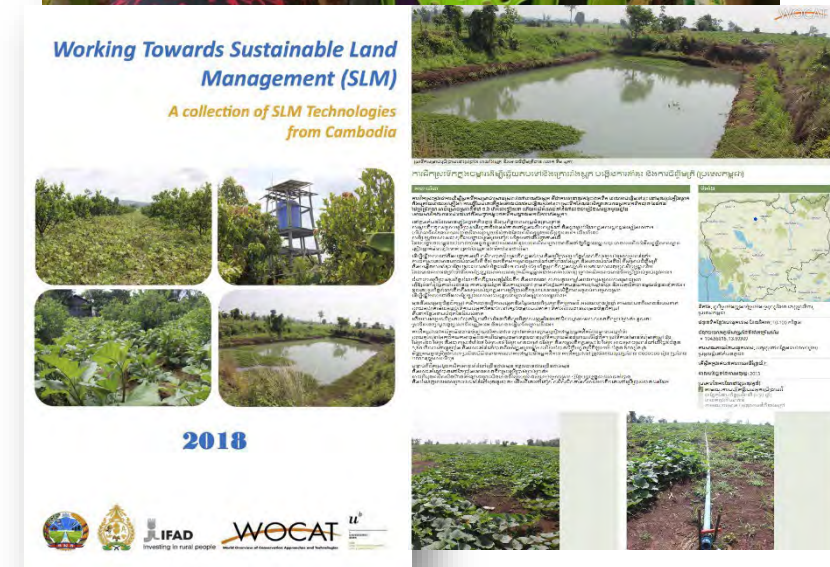
[Questionnaire](#)



[SLM Technology Group Profiles with insights from 15 countries](#)

Embedding sustainable agriculture topics into higher education and beyond

- **Agroecology / SLM / carbon farming / integrated farming** need to be included into higher education teaching
 - ✓ Systemic perspective of farming and landscapes
 - ✓ Tailored solutions for specific agro-ecological zones
 - ✓ Integrated participatory approaches
- **Education for Sustainable Development (ESD)** approaches need to be included into higher education
 - ✓ A broad range of competences need to be built (academic knowledge, skills and attitudes)
 - ✓ Combination of innovative didactics, new teaching-learning arrangements – link to practice / field
- Building on **national / regional / global Databases**
 - ✓ Global WOCAT network, www.wocat.net and others
- Link **outputs of implementation projects** with higher education curricula
 - ✓ Tools developed and evidence generated

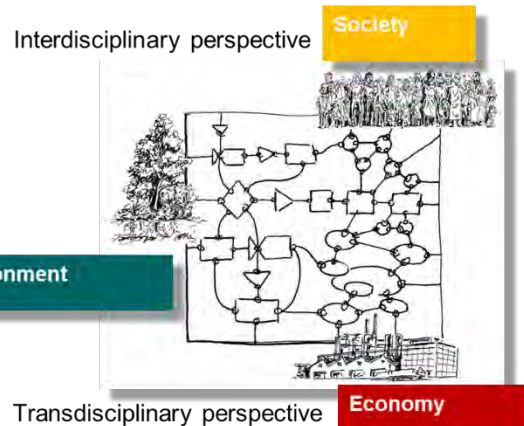


Pilot project: develop a Sustainable Development and Sustainable Land Management / Agroecology curriculum at RUA

Collaborative process

Co-design of curriculum for the RUA and other agriculture-focused higher education institutions in Cambodia.

- ✓ Including systemic perspective and tailored solutions for specific contexts
- ✓ Including participatory processes between science and practice



Climate-resilient integrated farming systems – SUCRA project

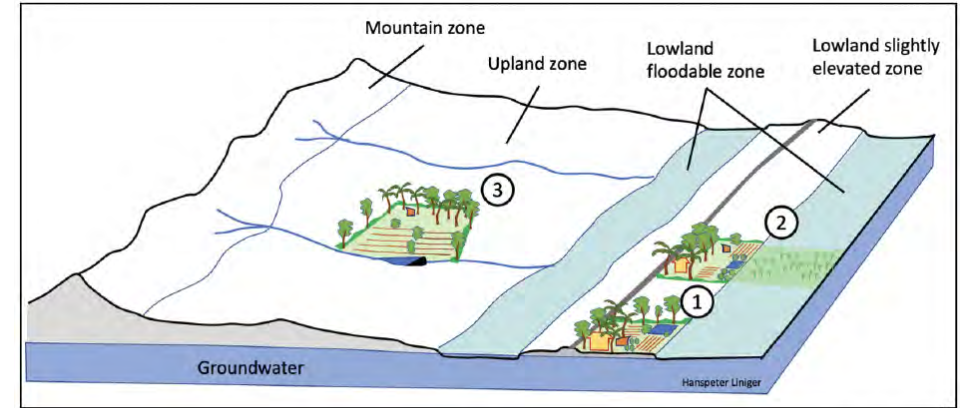


Figure 3. Simplified illustration of the identified General Landscape Units for IFS implementation. 1: Homestead (GLU1), 2: Homestead with Rice (GLU2), 3: Chamkar (GLU3).

Homestead – IFS including artificial pond and aquaculture (GLU1 – IFS M3)



Photo: Hanspeter Liniger

- Vegetables, fruit trees, multi-purpose crops, small livestock, and artificial pond and aquaculture:
- 1: Farmhouse
 - 2: Pond with fish
 - 3: Irrigated leafy vegetables
 - 4: Irrigated climbing/fruit vegetables
 - 5: Agroforestry with fruit trees
 - 6: Banana, herbs along walk path
 - 7: Small livestock (chickens, ducks)
 - 8: Wells
 - 9: Water storage tanks
 - 10: Vegetable nursery
 - 11: Living fence, multipurpose trees, indigenous trees

[Tim et al. 2023](#)

→ Integration into teaching at RUA

WOCAT

World Overview of Conservation Approaches and Technologies

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Photo: RUA Cambodia

