Capacity-Building Program

Implementation and dissemination of agroecological practices
Kingdom of Cambodia - Siem Reap

from 26 November to 4 December 2013

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Capacity-building program implemented by Agrisud International in the context of a decentralized cooperation between the Conseil Général des Hauts-de-Seine in France (CG 92) and Siem Reap Province in Cambodia.

CONTEXT

The project “Diversification of peri-urban agriculture in Siem Reap “implemented by Agrisud with the financial support of the Conseil Général des Hauts-de-Seine has begun in January 2011. Supporting activities target small family farms and focus on improving agricultural techniques, crop diversification and improving agricultural products marketing.

Between 2011 and 2013, 320 farms were supported Krabei Real and Puok Communes (outskirts of Siem Reap city). The results show that the support brought to these family farms that produce upon local markets’ demand is an effective way to fight against poverty and food insecurity. By increasing and diversifying their production, these farms gradually acquire food self-sufficiency, get regular income as well as they improve the supply of local markets.

Le Conseil Général des Hauts-de-Seine has therefore wished to continue its support by signing a cooperation agreement with Siem Reap Province (agreement signed March 7, 2013) with the objective to extend the support to other farms.

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As part of this agreement, Agrisud continues the project "Diversification of peri-urban agriculture in Siem Reap" and field supporting actions have the following objectives:

- To increase and diversify production (objective 1);

- Increase the income of small family farms (objective 2);

- Strengthen products marketing (objective 3);

- Structuring the rural socio-professional organizations (objective 4);

- Create a local dissemination network of agroecology (objective 5).

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The organization by Agrisud of a capacity-building program on agroecology from 26 November to 4 December 2013 is part of the objective 5 of the project.

Several stakeholders have been invited to participate:

- GRET and its partners ⇨ GRET is indeed another operator of the program of agriculture development and fight against malnutrition of the Conseil Général des Hauts-de-Seine and Siem Reap Province;

- Local organizations involved in Siem Reap agricultural development;

- State service ⇨ PDA (Provincial Department of Agriculture) and PDRD (Provincial Department of Rural Development);

- Cambodian organizations associated with the work of translation into Khmer of the guide "Agroecology, best practices", Agrisud - 2010 edition.

The objective was dual:

- Upgrade the technical knowledge of the field officers working in Siem Reap Province on agroecology and work on their ability to transfer to producers, practices to sustainably improve production;

- Bring together key stakeholders of the agricultural development of the province (NGOs and government services) and reflect of the development of a local dissemination network of agroecology.

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This report describes the work achieved during the training session (Part 1) and analyzes the achievements at the end of training (part 2).

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IMPLEMENTATION OF THE CAPACITY-BUILDING PROGRAM

1. Participants

12 organizations involved in actions that support small family farms participated in this capacity-building program for the implementation and dissemination of agroecology (22 participants): Agrisud, GRET, Human Bright Organization, PADEK, Rachana, Reada Cambodia, Trailblazer Cambodia Organization, CIRD, Srer Khmer, GIZ, PDRD and PDA.

(See participants list in Annex).

The training was done in Khmer.

2. Learning progression

The Agroecology training session (CAA) aims at improving participants' ability to disseminate agroecological practices by strengthening their knowledge (technical aspect) and know-how (methodological aspect). It is implemented through the organization of plenary session and group work in the classroom and on the field, to enable:

- The transfer of knowledge and methods to understand agroecology and identify practices to promote among producers,

- the implementation of knowledge transferred.

The CAA is built on the following learning progress:

1. **Prior to the dissemination of practices :**
   - ⇨ understand what is an ecosystem and the importance of agroecology (maintaining the balance of ecosystems to ensure the stability of agricultural activities);
   - ⇨ enable to identify agroecological management principles of the of different components of an ecosystem (soil, water, plant , animal , landscape) to maintain these balances;
   - ⇨ understand that the elements of an ecosystem interact and therefore that is all agroecological principles of management of different components together (soil, water , plant, animal , landscape) that keep the balance (complementarity) ;
   - ⇨ know the economic and social dimensions of agroecology and understand that this is a model of sustainable agriculture that combines productivity and low pressure on productive natural resources while taking into account the diversity of contexts / situations ;
   - ⇨ understand that agroecology is not a "quick fix" and that if it has many advantages; it also has disadvantages that must be taken into account in the dissemination strategies.
2. **Identification of practices to promote and dissemination**
   - ⇨ being able to characterize agricultural production system to cense constraints faced by farmers,
   - ⇨ being able to identify practices in response to constraints identified during the characterization of agricultural production systems and validate the feasibility;
   - ⇨ Understand the method and tools to prepare, conduct and evaluate a training session on an agroecological practice.

Learning progression elaborated during the training session and rebuilt at the end by participants.

3. Program

OPENING SESSION

- ⇨ Presentation of the agroecology training session (CAA)
- ⇨ Introduction of the participants
- ⇨ Assessment of participants' level

Objectives:

- *To give to the participants an overview of the CAA contents*
- *To put each participants in the logic of the training program (assessment of participants' initial knowledge)*

MODULE 1: Basics

- ⇨ Definition of ecosystem
- ⇨ Interest of agroecology for ecosystem
- ⇨ Agroecological principles of management of elements within an ecosystem : soil, water, plant, animal and landscape
- ⇨ Synthesis: interactions in an agrosystem

Objectives:

- *To master what is an ecosystem and the relationship between agriculture and ecosystem.*
- *To understand the interest of agroecology for ecosystems*
- *To understand the different management principles and the associated agricultural practices*
- *To describe the main interactions within an ecosystem*

MODULE 2: Agroecology, an alternative for sustainable agriculture

- ⇨ Agroecology in the frame of agricultural development projects,
- ⇨ Discussion about the different agricultural models,
- ⇨ Advantages and drawbacks of agroecological practices implementation.

Objective:

- *To have a complete overview of agroecology including social and economic dimensions,*
- *To know the different agricultural models,*
- *To understand their advantages and drawbacks of agroecology.*

MODULE 3: Agricultural production systems

- ⇨ Definitions
- ⇨ Exercise : characterization of production systems with participants

Objectives:

- *To understand the agricultural production system,*
- *To characterize systems in participants' working area and identify producers main constraints in these systems*

MODULE 4: Dissemination of practices

- ⇨ Presentation of the Guide « Agroecology, best practices », Agrisud- 2010 Edition translated in Khmer
- ⇨ Presentation of a methodology to identify and select the agroecological practices to promote
- ⇨ Presentation of a method to prepare, facilitate and assess a training session on an agroecological practice.
- ⇨ Practical exercise : training facilitation

Objectives:

- *To master the methodology to identify and validate agroecological practices to promote,*
- *To master the method of training objectives,*
- *To know main facilitation methods.*

Guide « Agroecology, best practices » Agrisud – 2010 Edition translated in Khmer

CLOSING SESSION

- ⇨ Evaluation of the CAA
- ⇨ Training certificates and training tools sharing.



PLANNING:

	T.26	W.27	T.28	F.29	S.30	S.1	M.2	T.3	W.4
Opening session									
Module 1 : Basics									
Definitions									
Agricultural management principles of an ecosystem									
Agricultural interactions in an ecosystem									
Module 2 : Agroecology, an alternative for sustainable agriculture									
Agroecology and supporting project									
Different agricultural models									
Agroecology : advantages and drawbacks									
Module 3 : Agricultural production systems									
Definitions									
Characterization									
Module 4 : Practices dissemination									
Guide presentation									
Identification and validation of practices									
Preparation of training sessions : lessons preparation sheet									
Training implementation exercise									
Closing session									

Launching of the Agroecology guide in Khmer and testimonies of hotels that purchase agroecological products from small farms supported by Agrisud

4. Restitution of group exercise

Module 1: To understand ecosystem and agricultural management principles of key elements (soil, water, plant, animal and landscape) and interactions.

Group exercise:

Draw an ecosystem, and then give a definition.

An ecosystem is a defined area within alive elements (fauna and flora) interact with

An ecosystem is a defined area in which living elements (fauna and flora) interact with inert material to form an ecological unit. Ecosystems are changing but constantly seeking balance. If ecosystems are unbalanced, then the components of these ecosystems are threatened.

Several factors can threaten ecosystems: natural factors (volcanic eruption, earthquake ...) or anthropogenic factors (human activities).

Plenary: Introduce the link between agriculture and ecosystems.

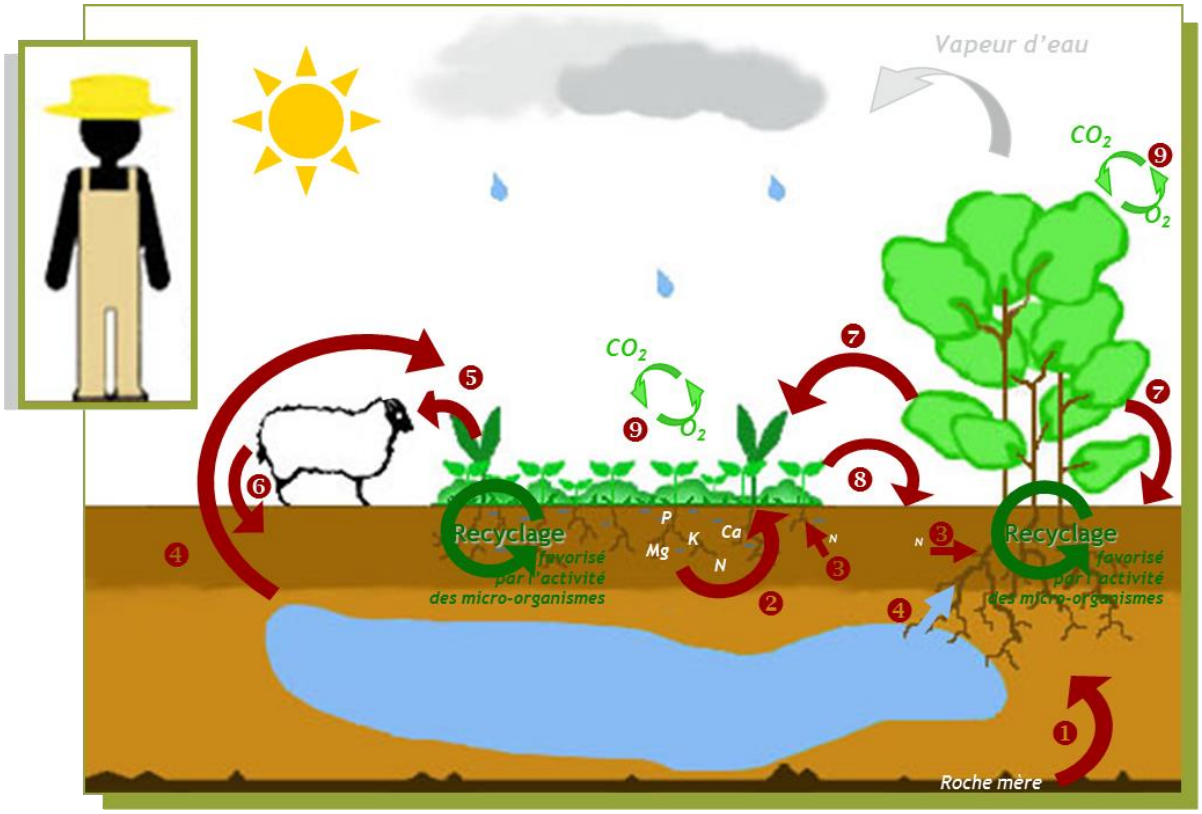
Among human activities, agriculture by nature modifies ecosystem. Agriculture must be reasoned and take into account necessary balances to maintain ecosystems (= maintaining of the agricultural activities frame).

Group Exercise: Identify the role / functions of agricultural soil, water, plant and animal and specify the principles for these elements ensure that role / these functions over time.

Elements	Agricultural Functions	Principles to respect in order that element ensures its agricultural functions
Soil	➨ Support of the activities ➨ Containing plants nutrients	➨ Use first organic fertilizers *Organic fertilizers work on soil's structure to favor root development of the plants (support function) and to improve its ability of nutrient fixations (containing function)* *Organic fertilizers also provide nutrients that may be supplemented by synthetic chemical fertilizers (food function)* ➨ Cover the soil *The cover protects the soil and reduces the risk of damaging its structure related to climatic stress (to preserve the support)* *Cover with live or dead plant material improves soil structure (organic matter supply and development of soil biological activity)* ➨ Soil preparation with respectful techniques *Soil preparation techniques impact on the soil's structure ⇨ acceleration of the mineralization of organic matter (aeration) disruption of soil life (aerobic microorganisms in depth and anaerobic microorganisms on the surface)* Principles work on two soil's properties: the structure and biological life Reminder: Texture = components of soil (sand, clay, silt) and proportion Structure = how elements are arranged
Water	➨ Transport of nutrients for the plants ➨ Habitat / living environment for some species (aquatic plant or animal species)	➨ Storing the water to make it available and to set up water supply system for the farm or the plot ➨ Managing the water in a reasonable way ➨ Maintain water quality / do not pollute (preserving habitat for aquatic species)
Plant	➨ Food and raw material production (wood, ropes…) ➨ Production of ecological services (protection of	➨ Setting-up crops adapted to the ecosystem and customers' demand (production function) ➨ Respect techniques that meet plants needs and preserve environment (to ensure the 2 functions = production /ecological services function)

	other plants, soils protection)	*The choice of plants (species or varieties) must take into account the environmental conditions in which they will be set up (climate, soil type, pest pressure) for a good development.* *Plants have needs related to their physiology (aerial development, underground development, nutrient and water needs), the part consumed (leaf, fruit, root); their sensitivity (pests and diseases). Crop management plan must consider these needs to address them better.* *Please note that the response to the needs of the plants should not be at the expense of the resources it needs to grow. Eg overuse of synthetic chemical fertilizers to feed the plant at the expense of soil quality preservation*
Animal	➨ Production of food (meat, eggs, milk), services production (traction, pollination, fertilizer) ➨ Saving function	➨ Raising animals in accordance with techniques that meet their needs and preserve the environment (ecosystem): housing, health, breeding, feeding, effluent collection (production function) *Reminder:* *Just like plants, animals have needs related to their physiology ... raising techniques must take them into account.* *Similarly, the response to the needs of animals should not be at the expense of resources they need to grow. Eg water pollution by animal manure.* ➨ Adapt animal to the Demand - market, self-consumption, beliefs (production function and saving /cash flow) ➨ Adapt animal to the ecosystem (production function)

Plenary session: Using the scheme, identify the interactions between soil, water, plant, animal and landscape in an ecosystem where men implement an agricultural activity.



Interactions: scheme rebuilt with participants

To keep in mind:

The elements soil, water, plant, animal and landscape are in interactions. Agricultural management principles of each of these elements are complementary to ensure the ecosystem's balance.

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Module 2: To know the economic, social of agroecology and to understand that is a sustainable agricultural model.

Group exercise: Identify at least one advantage and one drawback (the objective is not to be exhaustive) for the 3 dimensions technique/environmental, economic and social for 3 different agricultural models (traditional agriculture, conventional agriculture and agroecology).

Traditional Agriculture	Environmental	Economic	Social
Advantages	No use of chemical inputs ⇨ decrease of the pollution risks, of the degradation of natural resources	Low expenditures (animal traction; seeds locally produced)	Use of local seeds ⇨ autonomy of producers
Drawbacks	Big impact on forests (slash and burn cultivation with insufficient fallow period to restore the forest) ⇨ erosion / modification of the water dynamic in the ecosystem	Irregular yields	Food insecurity

Conventional Agriculture	Environmental	Economic	Social
Advantages	Water savings (drip irrigation systems)	High yields	Access to new knowledge
Drawbacks	Loss of environmental balance with disappearance of auxiliaries due to the use of chemicals	High expenditures for material and equipment	Loss agricultural job (mechanization)

Agroecology	Environmental	Economic	Social
Advantages	Maintaining balances through the use of bio-pesticides	Reduction of expenditures for chemical inputs (fertilizers and pesticides)	Better health of farmers and customers (decreasing use of chemical inputs)
Drawbacks	Risk of pressure on some natural resources (biomass for compost and bio-pesticides making)	Slow increase of yields compared with conventional agriculture	Hardship of work

Module 3: To be able to characterize agricultural production system in order to identify constraints faced by producers.

Group exercise: Characterize 1 agricultural production system in a defined geographical area after having defined key information; then identify at least 3 main constraints met by producers[1].

Siem Reap Province Krabei Real Commune	Vegetable production
General characteristics of the area	**Climate** tropical hot and humid; two seasons : dry season from November to April (18-30 ° C) / rainy season from May to October (25-35 ° C), 1 200-1 300 mm / year **Soils :** loam (low fertility) **Relief :** plain (possible flood during rainy season) **Natural vegetation :** little natural vegetation; small plants and some palm trees around houses and rice fields **Water resources :** water from mountain or rivers (that supply the "Baray"), natural ponds
Description of the production system	**Main crops:** leaf vegetables (salad, morning glory, spinach, aromatic herbs like bunching onion and basil…), fruit vegetables (gourds, cucumber, chili, eggplant, yard long bean…) **Agricultural seasons :** 3 different seasons ⇨ one season where vegetable growing activity is intense from November to February, one season of medium production from March to June and a season of very low production from July to October **Land :** 0,5 ha cultivated per household in the high production season, 0,2 ha from March to June and 300 m^2 from June to November ; land owned **Equipment :** cultivator (10%), pump, plow, oxcart + small equipment (rake, hoe, bucket and watering can, wood stick, basket) **Inputs :** purchase of imported seeds ; fertilizers = 50% chemical e (DAP, Urea et NPK) - 50% organic (farm manure) ; bio-pesticides with chili… against caterpillars and fleas + chemical pesticides **Labor :** family (2 people generally) ; temporary labor hiring very rare **External services :** seeds credit ; cultivator rent **Destination of products:** 95% of products are sold on Siem Reap markets, the majority of products are purchased by collectors who come to the village. Only 15% of producers are going by themselves to markets. 5% of the production is self-consumed
Identification of 3 main constraints	1. **Poor soils** 2. **High pests and disease pressure** on leaf vegetable 3. **Too much water** during flood period **and scarcity of water** at the end of dry season to meet crops needs

[1] Within the training, exercises are done in order to illustrate the methodology; information needs to be completed and checked after.

Battambang Province Ta Kream Commune	Rice cultivation
General characteristics of the area	**Tropical climate with** two seasons : dry season from November to April (28-32 ° C) / rainy season from May to October (32-35 ° C), 1 300-1 400 mm / year with heavy rains between September and November **Soils :** sandy clay soils **Relief :** plain **Natural vegetation :** trees on rice fields dikes, creepers and bushes **Water resources :** mountain streams flowing into the lake dam
Description of the production system	**Crops :** rice (4 varieties) **Agricultural seasons :** possibility to grow rice all year round (3 cycles possible : one in rainy season and 2 in dry season) by using different varieties (2 varieties in rainy season and 2 varieties in dry season) **Land :** 10 ha cultivated per households ; land owned **Equipment:** cultivator (1 or 2 per family), pumping facilities, sprayer… **Inputs :** purchase of seeds ; purchase of organic manure and chemical fertilizers (urea, NPK et DAP) ; chemical pesticides **Labor :** family (between 2 to 4 people) ; temporary labor : 10% of the farms only for fertilization and treatment works **External services:** rental of tractor and harvester, repairing cultivator, payment of irrigation fees to irrigation management service **Destination of products :** selling to mills, self-consumption and seed storage for future cycles
Identification of 3 main constraints	1. **High humidity rate of the paddy** due to lack of drying ⇨ low selling price 2. **Excess or lack of water** during growing cycles 3. **Loss of fertility** from one rice cycle to another

Presentation of the 2 groups: vegetable growing and rice cultivation

Pailin Province Stoeung Kach Commune	Fruit tree cultivation
General characteristics of the area	**Tropical climate with 2 seasons** ⇨ dry season from January to May (20 to 25°C) / rainy season from June to December (25 to 37°C) ; heavy rain from August to November **Types de sols :** red fertile soils **Relief :** uplands **Natural vegetation :** bamboos **Water resources :** lake and streams
Description of the production system	**Main crops :** longans (80%), jackfruits, mangoes and bananas **Agricultural season :** longan trees cultivated all year long *(see. calendar of agricultural works below)* **Land :** 3 Ha per household ; land owned **Equipment :** cultivator, tractor, sprayer, irrigation facilities with pump, water reserve, mower, hoe, pruner / saw **Inputs :** - imported seedlings for the setting-up of new orchards then use of local seedlings ; - organic fertilizers purchased (bat, cow and chicken manures) ; chemical fertilizers during pruning and flowering ; - pesticides (purchased) **Labor :** family (between 2 to 4 people) ; hiring of temporary labor for pruning and harvesting **External services :** cooperative for commercialization **Destination of the products :** sale (90%) with 80% for export (via cooperatives), products are collected in orchards
Identification of 3 main constraints	1. **Lack of water during dry season** that disturbs tree development 2. **Pests and insects** that attack the production (losses) 3. **Starting investment** (3 000 dollars per ha) and first incomes only 3 years after planting

Calendar of agricultural works on longan tree :

Activity	**Month**											
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
Land preparation												■
Planting					■	■	■					
Maintenance (fertilization and treatment)	■	■	■			■	■	■	■			■
Pruning					■	■					■	■
Harvest				■						■		

Siem Reap Province Puok Commune	Chicken raising
General characteristics of the area	**Climate** tropical hot and humid; two seasons : dry season from November to April (22-32 ° C) / rainy season from May to October (32-38 ° C), 1 200-1 300 mm / year **Soils :** loam (fertile) **Relief :** flooded plain from August to October **Natural vegetation :** small plants, bamboos, palm tree, tamarind trees **Water resources:** rivers and streams.
Description of the production system	**Raising activity:** raising of chicken for meat, local breed. **Agricultural season:** all year long but the production is more intense from November to April (interesting prices with Chinese and Khmer new year); between May to October the production decrease. **Land:** 150 m^2 on average dedicated to raising activity for en moyenne30 to 60 heads. Land owned **Equipment:** bamboo shelters, wood and leafs, waterer and toughs. Breeding animals : 9 hens and 1 roaster **Inputs:** feed purchased (concentrated feed) for chicks and farm made feed (rice bran, paddy, and kitchen by-products) for hens and roasters, vaccines and medicines. **Labor :** family (2 to 3 people per household) **External services :** veterinary services (vaccination, treatment) **Destination of products :** sale (75%), self-consumption (15%) and the 10% left are kept for renewing breeding animals
Identification of 3 main constraints	1. **Mortality** due to **gastroenteritis** (in august and October) and Newcastle disease (Jan/Feb = temperatures changes) ; Newcastle affects mostly chicks 2. **Flooding of raising shelters at the end of rainy season** = mortality of small chicks (drowning) 3. **Additional feeding costs in rainy season** 4. **Irregularity of production cycles** due to flood periods

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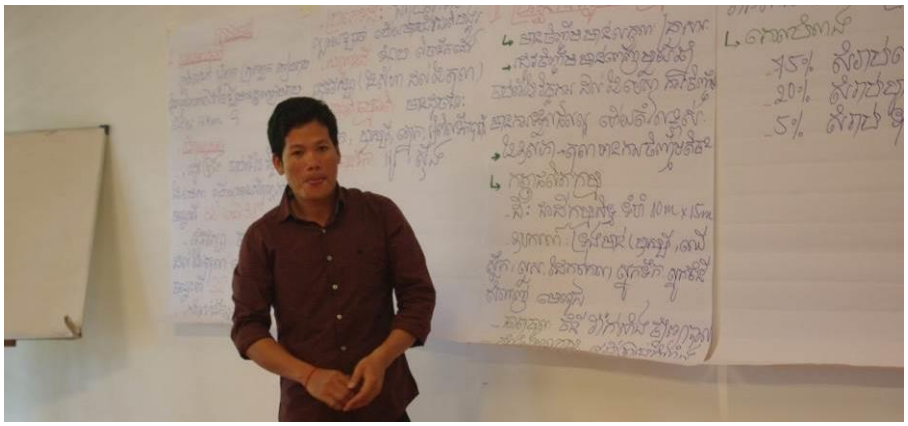


Presentation of chicken raising group

Module 4: To know how to identify practices to address the constraints identified during the characterization of production systems *(objective 1).*

To know how to validate the practices and to understand the method and the tools to prepare, implement and assess a training session on an agroecological *practice (objective 2).*

Group exercise *(linked to the 1st objective of the module)*: From the characterization exercise done during module 3, identify for 1 constraint the issue, the agroecological management principle and the practices.

Vegetable production
Siem Reap Province, Krabei Real Commune

Constraint:
- Attacks of caterpillars on leaf vegetables

Issue:
- Decrease damages and the spread of insects (preventive and curative measures)

Principles:
- Setting-up crops adapted to the ecosystem,
- Mastering cropping systems that prioritize complementarities
- Crop management plan responding to plant needs and environment-friendly

Examples of practices:
- Selection of varieties tolerant / resistant to caterpillars
- Adaptation of the cropping calendar to harvest before the attacks of caterpillar/to plant after the period of proliferation
- Crop succession and association
- Hedging
- Mechanical control (collection of crop residues and caterpillars during land preparation)
- Use of bio-pesticides
- Physical Control (ditch filled with water or ashes to prevent the spread of insects)
- Use of chemical pesticides as a last resort and respect of use standards.

Fruit tree cultivation
Pailin Province, Stoeung Kach Commune

Note: choice to work on the mango tree because nobody in the group masters longan tree cultivation

Constraint:
- Duration of the return on investment (time between planting and the first harvest 4 to 5 years) + maintenance costs during this period not offset by cash flow

Issue:
- Reduce the time between planting and first harvest / generate incomes on the plots before first harvest

Principles:
- Setting-up plants adapted to the ecosystem
- Mastering cropping systems that prioritize complementarities
- Crop management plans responding to plant needs and environment-friendly

Examples of practices:
- Selection of early varieties
- Adaptation of planting techniques (planting on a mound: hole digging with separation of the different soil layers, rest period, fertilization...)

- Planting seedling 18 months aged (production in nursery of older seedlings...habits of producers to plant at 8 months)
- Setting-up crops under the mango trees with the objective to get complementary incomes (pineapple and beans) and to fertilize (beans).

Rice cultivation system
Battambang Province, Ta Kream Village

Constraint:
- Loss of soil fertility from one rice cycle to the next

Issue:
- To maintain soil fertility

Principles:
- Respectful soil work
- Management of soil fertility on an organic basis
- Mastering cropping systems that prioritize complementarities

Examples of practices:
- Flattening the rice field
- Division of rice field into smaller units
- Provision of compost
- Burying crop residues
- Use of green manures
- Use of chemical fertilizers in accordance with technical standards

Chicken raising system
Siem Reap Province, Puok Commune

Constraint:
- Increase of feed cost during rainy season

Issue:
- To provide farm-made feed during rainy season

Principles:
- Raising techniques that respond to animals' needs and environment-friendly
- Mastering complementarities cropping/animal raising

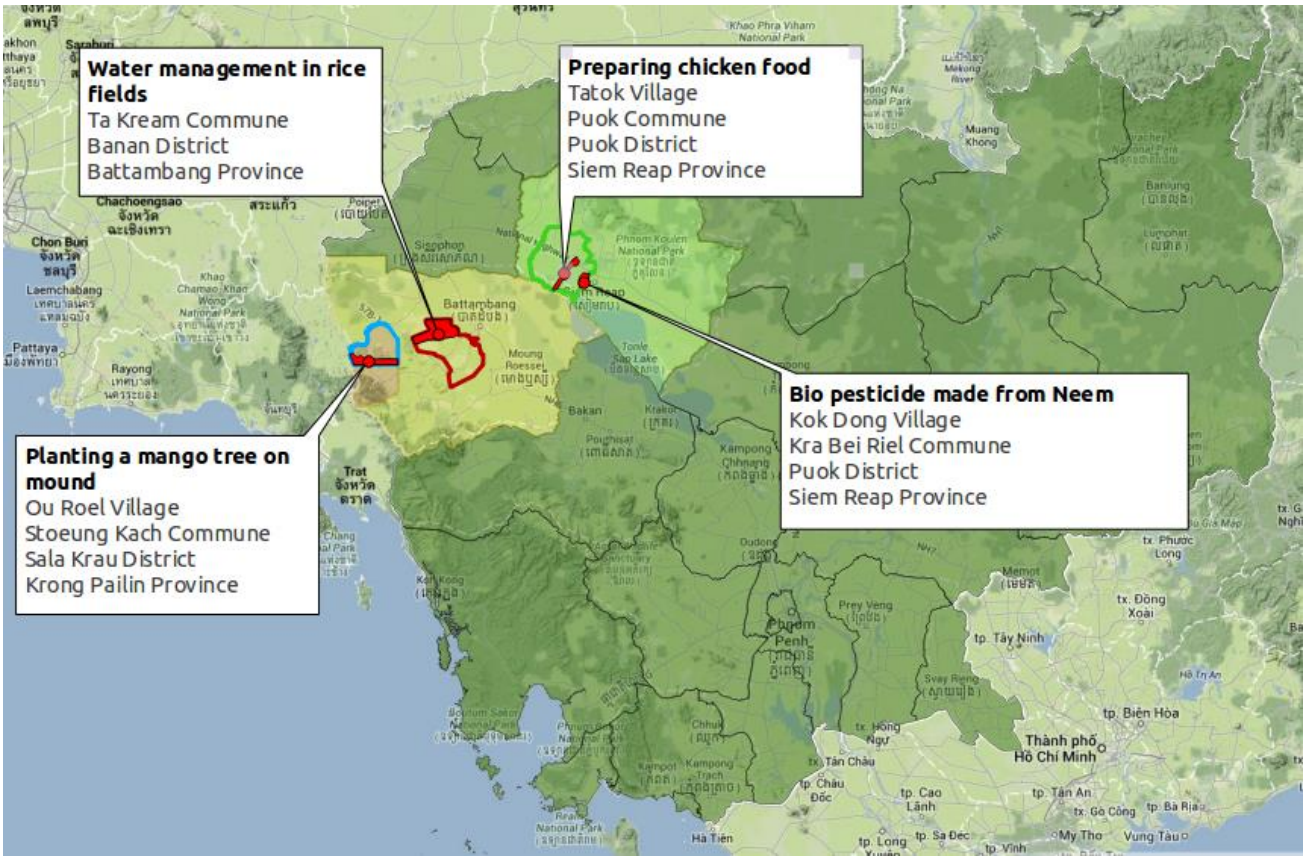
Examples of practices:
- Building animals shelters on highlands protected from the flood (giving animals the possibility to continue to peck during the rainy season)
- Planting vegetables to feed chicken (eg aquatic vegetables: water spinach + additional vegetables on higher lands)
- Production of feed that can be stored

Group exercise *(linked with the 2nd objective of module 4)*: Validate the feasibility of one of the identified practices in the previous exercise. Then, prepare a training session (formal training or demonstration).

Note: feasibility of practices must be analyzed following 3 angles:

- Feasibility according to the key information of the area (climate, soil type ...)
- Feasibility within the production system described (module 3)
- Feasibility within the socio-cultural context

At the end of this analytical work, the groups identified the following practices:



Remark: the group that worked on rice cultivation systems, finally decided to work on the constraints related to access to water because the technical solutions identified to overcome the constraints of soil fertility were not feasible in the producers 'context.

Training session preparation: Develop training preparation sheet

Note: Once the sheets have been elaborated, the groups had to facilitate a training session on the field.

Preparation Sheet: Bio pesticide made from Neem to fight against caterpillars Siem Reap Province, Krabei Real Commune	
Topic	Preparation, use and storage of a bio-pesticides made from Neem leaves to prevent caterpillars attacks
General Objective	To be able to prepare, use and store a bio-pesticide made from Neem leaves.
Training objectives (detailed)	- Quote the interest of using a bio-pesticide made from Neem leaves. - Quote the equipment and the raw material used for the bio-pesticide making. - Explain the stages of the bio-pesticide making - Explain the method of use and storage
Prerequisites from participants	- To know Neem - To know how to identify damages made by caterpillars.
Program	**1. Introduction** Introduction of facilitators, participants, training objective and program **2. Interest** Questions / answers together with producers and facilitators **3. Material** Presentation **4. Stages of making** **5. Method of use and storage** **6. Summary**
Material	- 3 containers of 15 liters - 3 kg of Neem fresh leaves - 1 machete and 1 board - 1 piece of fabric to filter - 1 piece of natural soap without perfume - 1 mortar and 1 pestle - Water
Evaluation	Check with questions if the training objectives are achieved
Duration	1 hour
Location	In the village, close to water point

Preparation sheet: Planting a mango tree on mound
Pailin Province, Stoeung Kach Commune

Topic	Planting a mango tree on a mound
General Objective	To be able to plant properly a mango tree on mound (to get faster production)
Training objectives (detailed)	- Quote the interest of mound planting - Quote the favorable planting season - Explain the criteria of selection of planting place - Explain the criteria to select the seedling - Quote spacing between plants - Explain the steps of hole digging/ planting / protection
Prerequisites from participants	- none
Program	**1. Introduction** Introduction of participants and identification of their expectations **2. Interest of the technique to plant on mound** **3. Preliminary stages before planting** Identification of producers' practices related to planting season, planting place, density and seedling's characteristics **4. Stages of hole digging, planting and protection** Identification of producers' practices, correction and demonstration of the new practice **5. Evaluation**
Material	- Material to dig the hole : hoe, pickaxe shovel - Basket to transport soil - water can - 10 kg of compost - 1 handful of wilted plants rich in nitrogen - 1 handful of dry leaves (straw ...) - 1 mango seedling ready to plant - Wood stick and string, small bamboos and safety net
Evaluation	- What are the interests of planting on mound? - When to plant? - Where to plant? - What is the spacing between seedlings? - How to select the seedlings? - How to dig the hole? to plant? and to protect?
Duration	1 hour
Location	In the village on a place appropriate for planting

Preparation sheet: Setting-up small water channels around rice fields
Battanbamg Province, Ta Kream Village

Topic	Layout and maintenance of small water channels around rice fields
General Objective	To be able to set-up small water channels in rice fields to manage water efficiently and to be able to maintain them
Training objectives (detailed)	- Explain the interest of small water channels within rice fields - Explain the stages of setting-up water channels and material needed - Explain how to use water channels - Explain how to maintain them
Prerequisites from participants	- None
Program	**1. Introduction** Introduction of facilitators, participants, training objective and program, initial knowledge assessment **2. Definition and interest of small water channels** Questions to participants and correction with facilitators **3. Building techniques and material needed** Brainstorming ; Explanation with pictures **4. Techniques of water channels use and maintenance** Explanation with schemes and pictures **5. Evaluation**
Material	- Schemes and pictures - Markers - Flipcharts
Evaluation	Questions to participants in accordance with initial knowledge assessment
Duration	1 hour
Location	In the village, in a shaded space with possibility to display flipcharts

Preparation sheet: Making chicken feed
Siem Reap Province, Puok Commune

Topic	Preparation and storage of chicken feed mix
General Objective	To be able to prepare and store the feed mix
Training objectives (detailed)	- Quote the different elements to make the feed - Explain the stages of making - Explain the principles for a good storage
Prerequisites from participants	- To know the nutrients needs of chicken and the local resource available to address them -
Program	**1. Introduction** Introduction of facilitators, participants, training objective and program **2. Elements to make the feed mix** **3. Making stages** Demonstration **4. Principles for a good storage** **5. Evaluation**
Material	- 5 L of palm sugar - 5 kg of small fishes - 10 kg of rice bran - 1 jar - 1 machete and 1 board - 1 mix bowl
Evaluation	Questions to participants : - What are the elements to make the feed mix? - What are the quantities? - How to mix? - What are the conditions of storage?
Duration	1 hour
Location	In the village, close to chicken raising shelter.

EVALUATION OF THE TRAINING SESSION

Evaluations have 2 levels:

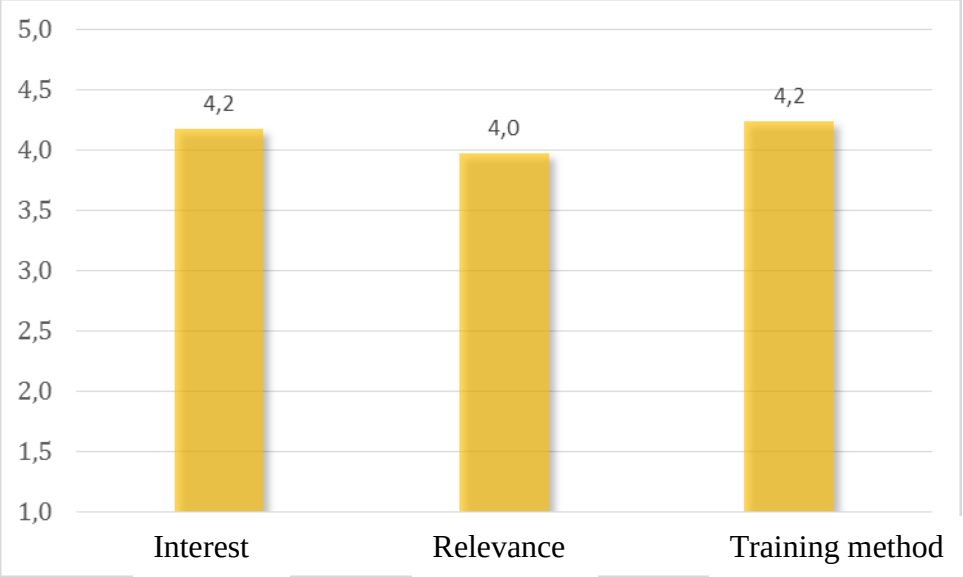
- the level « reaction », that assess participants' satisfaction ;
- the level « acquisition », that identifies the knowledge acquired by the participants during the training ;

1. Evaluation of satisfaction

The evaluation concerns the 4 modules and takes into account 3 criteria:

- the interest within the professional activity of the participants,
- the relevance of the contents
- the quality of the training method.

For each of these 3 criteria, participants score their level of satisfaction from 1 (very bad satisfaction) to 5 (very good satisfaction).



In addition, participants are can also make free comments by completing 4 sentence starters. The following table summarizes their comments:

I liked	▪ the methodology used by facilitators ; the link between methodological and technical aspects	▪ the atmosphere, the exchanges between participants and facilitation techniques	▪ the method to disseminate practices suggested during the CAA
I learned	▪ what is an ecosystem and what is agroecology	▪ to know well agricultural production systems	▪ to analyze problems and to suggest adapted solutions
I will implement	▪ the method to analyze problems	▪ the preparation of training sessions and facilitations techniques	▪ the dissemination of my acquired knowledge in my organization
I suggest	▪ new trainings and a follow-up after training	▪ to keep in touch and to go on exchanges (with the network)	▪ more Field practice

2. Evaluation of acquisitions

Assessment of learning is based on an evaluation of initial knowledge and a final evaluation after training. At the beginning of the training the evaluation of initial knowledge allows:

- to know the level of participants for each training content and to adapt consequently the pace of the training;
- each participants to position themselves in relation to training contents and the level of the group of participants

At the end of the training, the evaluation allows to assess the progress done during the training.

The tables above show results. A color code is used to ease the reading: blue = theme or practice unknown or not understood; orange: theme or practice understood but not mastered for a transfer; green = good understanding of the theme or practice.

<u>Module 1</u>: Basics

The tables above show the mastery levels[2] of participants at the beginning and at the end of the training about ecosystem definition and the interest of agroecology for these ecosystems.

Beginning of the training:

Participants	Ecosystems	Interest of agroecology
1	0	0
2	2	0
3	1	0
4	1	0
5	0	1
6	0	0
7	0	0
8	1	1
9	1	1
10	1	1
11	0	1
12	1	1
13	1	1
14	2	1
15	0	0
16	1	0
17	0	0
18	0	1
19	0	0
20	0	1
21	0	0
22		
Group	**0,6**	**0,5**

End:

Participants	Ecosystems	Interest of agroecology
1	1	1
2	2	2
3	0	1
4	2	2
5	2	2
6	2	2
7	1	1
8	2	1
9	2	2
10	2	1
11	2	2
12	2	2
13	2	1
14	2	2
15	1	1
16	2	1
17	2	1
18	2	2
19	0	1
20	2	2
21	2	1
22	1	2
Group	**1,6**	**1,5**

<u>Note</u>: at the end of the training 2 participants confused ecosystem and agroecology. For the interest of agroecology, some participants integrated economic and social concepts while this exercise only take into account ecosystem.

[2] 0 = Not mastered, 1 = Incomplete, 2 = Mastered.

For each of the basic elements of an ecosystem, participants must be able to identify at least one management principles and associate with it agricultural practices.

Tables below show per element: if the participant is able to quote or not one principle (0 = no; 1 = yes); if the participant is able or not to quote a practice linked to this element (0 = no; 1 = yes) and to associate it with a principle (2).

Beginning of the training:

Participants	SOIL		WATER		PLANT		ANIMAL		LANDSCAPE	
	Principle	Practice	Principle	Practice	Principle	Practice	Principle	Practice	Principle	Practice
1										
2	1	2	1	2	1	2	1	2	0	0
3	1	2	1	2	0	1	0	0	0	0
4	1	2	1	0	0	0	0	1		
5	1	2	1	2	0	1	1	0		
6	0	0	0	0	0	0	0	1	0	0
7			1	2	0	0	0	1		
8	0	0	1	2	0	1	0	0		
9	1	2	1	2	0	0	0	1	1	2
10	1	2	0	0	0	0	0	1	0	0
11	0	0	1	0	0	0	0	0	0	0
12	0	0	1	0	0	0	0	0	0	0
13	1	2	0	0	0	0	0	0	0	0
14	1	2	1	2	0	1	0	0	0	0
15	1	2	0	0	0	1	0	0	0	0
16	0	1	1	0	0	0	0	1	0	0
17	1	2	0	1	0	0	0	0	0	0
18	1	2	1	2	0	0	0	0	0	0
19	1	2	0	1	0	1	0	1	0	0
20	1	2	0	0	0	1	0	1	1	2
21	1	2	1	2	0	1	0	0	0	0
22										
Group	**0,7**	**1,5**	**0,7**	**1,0**	**0,1**	**0,5**	**0,1**	**0,5**	**0,1**	**0,3**

<u>Note</u>: For the whole exercise the participant n°22 is not assessed at the beginning of the training (blank) For this exercise participant n°1 did not understand the instruction and is then not assessed.

End of the training:

Participants	SOIL		WATER		PLANT		ANIMAL		LANDSCAPE	
	Principle	Practice	Principle	Practice	Principle		Principle	Practice	Principle	Practice
1										
2	1	2	1	2	1	2	1	2	1	2
3	0	1	1	2	1	0	0	1	0	0
4	1	0	1	2	1	2	1	0	0	0
5	1	2	1	0	1	0	1	0	1	2
6	1	2	0	0	1	0	0	0	0	0
7	1	2	1	2	0	0	0	0	0	1
8	1	2	1	2	0	1	1	2	1	2
9	1	2	1	2	1	2	1	2	1	2
10	1	2	1	2	1	0	1	0	1	0
11	1	2	1	2	1	2	1	2	1	2
12	1	2	1	2	1	2	1	2	1	2
13	1	2	1	2	0	1	0	0	0	0
14	1	0	1	2	1	2	0	1	1	2
15	1	2	1	2	1	2	1	2	0	0
16	1	2	1	2	1	2	1	2	1	2
17	0	1	1	2	0	0	0	0	1	2
18	1	2	1	2	1	2	1	2	0	0
19	1	2	1	0	1	2	1	2	1	2
20	1	2	1	2	1	2	1	2	1	2
21	1	2	1	2	1	0	1	2	1	2
22	1	2	1	2	1	2	1	2	0	1
Group	**0,9**	**1,7**	**1,0**	**1,7**	**0,8**	**1,2**	**0,7**	**1,2**	**0,6**	**1,2**

<u>Note</u>: good progression done by the group on this part, besides the analysis of the landscape element that is often confused with the soil.

<u>Module 2</u>: Alternative for sustainable agriculture

The tables below show the level of understanding of agroecology (complete definition) and the advantages and drawbacks of its implementation (following the 3 dimensions)

Participants	Definition	Advantages			Drawbacks		
		Environmental	Economic	Social	Environmental	Economic	Social
1	0	0	1	0	0	0	0
2	2	0	1	1	0	0	0
3	0	1	1	0	0	0	0
4	1	1	1	1	1	0	1
5	0	1	1	0	0	0	0
6	1	0	1	1	0	0	0
7	0	0	0	1	0	0	0
8	0	2	1	1	1	0	0
9	0	1	1	0	0	1	0
10	2	0	0	0	0	0	0
11	1	0	0	0	0	0	0
12	1	0	2	0	0	0	0
13	2	0	1	0	0	1	0
14	2	1	2	2	0	0	0
15	0	0	1	0	0	0	0
16	0	1	1	0	0	0	0
17	1	1	2	0	1	1	1
18	1	2	1	2	0	1	0
19	0	0	0	0	0	0	0
20	1	1	2	1	0	0	0
21	0	1	1	1	0	0	0
22							
Group	**0,7**	**0,6**	**1,0**	**0,5**	**0,1**	**0,2**	**0,1**

Participants	Definition	Advantages			Drawbacks		
		Environmental	Economic			Environmental	Economic
1	2	2	1	1			
2	4	2	2	1	1	1	0
3	1	1	1	2			
4	4	2	2	1	0	1	1
5	4	2	2	1	0	1	1
6	4	2	2	1	0	1	0
7	2	1	2	1			
8	3	1	2	1	0	1	0
9	4	2	2	2	0	1	1
10	2	1	1	0			
11	4	2	1	1	0	1	0
12	4	2	2	1	0	0	1
13	3	2	2	2	0	1	0
14	3	2	2	2	1	0	1
15	2	2	1	1			
16	4	1	2	1	0	0	0
17	3	1	2	1	1	1	0
18	4	2	2	2	0	1	0
19	2	0	1	1			
20	4	2	2	2	0	1	1
21	2	0	2	2	0	0	0
22	4	2	2	2	1	1	0
Group	**3,1**	**1,5**	**1,7**	**1,3**	**0,3**	**0,8**	**0,4**

<u>Module 3</u>: Production systems

Participants must define what a production system is.

Beginning of the training:

Participants	Agricultural production system
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0
17	0
18	0
19	0
20	0
21	0
22	
Group	**0**

End of the training:

Participants	Agricultural production system
1	0
2	1
3	0
4	0
5	0
6	1
7	1
8	0
9	1
10	1
11	1
12	1
13	0
14	1
15	1
16	1
17	0
18	1
19	0
20	1
21	1
22	1
Group	**0,6**

<u>Note</u>: at the end of the training, participants of blue level gave a definition of agroecology or forgot some key elements of the production system.

<u>Module 4</u>: Dissemination of practices

During the CAA, a method is introduced to participants in order to:

- identify and validate the agro-ecological practices to promote;
- prepare, conduct and assess a training session on a practice (the method of "training objectives")

At the end of the training:

- 17 participants out of 22 are able to synthetize the method to identify and validate a practice (9 participants without omission and 8 participants with on step missing) ;
- 14 participants out of 22 are able to define the training objectives (the 8 other gave the complete definition of the training lesson preparation sheet, and thus they do not respect the instruction).

CONCLUSION

This CAA was organized with a dual objective:

- Strengthen the capacity of field officers to disseminate agroecology among family farms that they support;
- Set-up the basis of a local network for the dissemination of agroecology in Siem Reap Province.

At the end of the training, the 1st objective seems to be achieved regarding to the results shown in the part 2 of this report. achieving the first goal seems achieved for the results presented in Part 2 of this report, despite the difficulties of translation from French to Khmer during training. In addition, the interest for the proposed method and tools is clearly expressed by the participants.

Regarding the second objective (creation of a local network for the dissemination of agroecology, achievements done during this training concern different level

- 1. participants have now a common and shared understanding of agroecology ;
- 2. they are able to work using consistent methods and common work tools for analyzing production systems, identifying constraints and technical solutions to address them, train farmers for the use of these technical solutions;
- 3. beyond these aspects of understanding and methods, participants were also able to develop a common culture of agroecology and agree on translations of key terms in Khmer language (agroecology, ecosystem production system ...).

This group of field stakeholders must now take over the knowledge by implementing them in their working area

During this implementation, methods and techniques will face real situations, questions, challenge and successes. These are the elements that will feed the network for the dissemination of agroecology.

ANNEX

List of participants

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