Proceedings of the National Workshop on Agroecological Transition

30th and 31st March 2016, Phnom Penh, Cambodia

Supported by:

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I. WORKSHOP WRAP UP

1. Introduction

The 2 days' workshop has been very intense and very fruitful paving the way to some common principles, common understanding and common expectations about agroecology. There are still some works to do in order to define in an encompassing way agroecology but it is on the right track.

The workshop has offered room for a lot of experience sharing from Cambodia. It has enabled to start knowing each other and to present the regional dynamic that ACTAE intends to support. It also allowed identifying some key challenges faced by farmers and that are hindering broader promotion of agroecology.

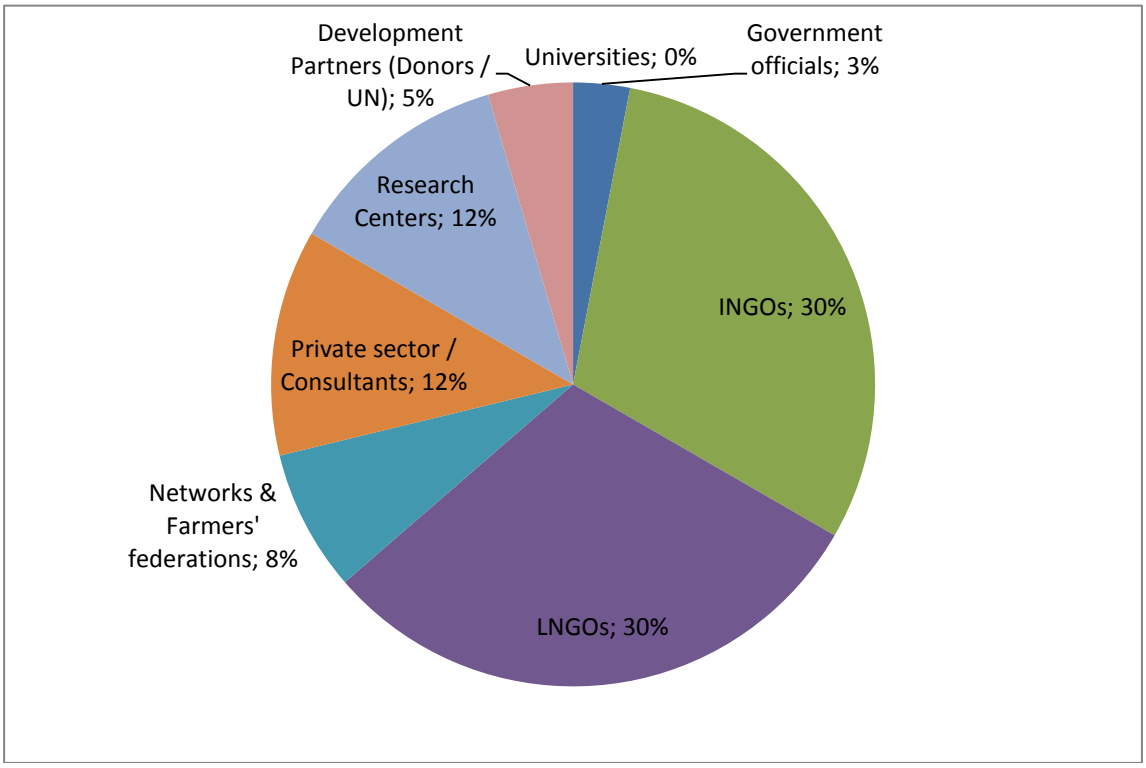
This 1st national workshop was instrumental in laying down the foundations of a national Cambodia network that will partake in a regional Agroecology Learning Alliance, bringing together all stakeholders active in the field of agroecology.

It was the first of its kind and it is expected that others will follow to keep on networking, sharing experiences and best practices and ultimately promote agroecology transition in the Mekong region.

2. A short account of the 2 days' workshop

The 1st national multi-stakeholder workshop addressing Agroecological Transition in the Mekong Region, and more especially in Cambodia, was held on the 30th and 31st of March 2016 in Phnom Penh. It was organized by CIRAD and GRET as part of the inception phase of ACTAE project, funded by the French Agency for Development (AFD).

It brought together **66 specialists and practitioners** from national and international NGOs, research, farmers' and consumers' associations, government agencies, development partners and private sector actively working on sustainable agriculture sector in Cambodia (see participants list in annex).



It aimed at sharing knowledge, information and experiences between agricultural development stakeholders, more especially through:

§ The presentation of ACTAE program with its 2 components:

- Conservation Agriculture Network in South East Asia (CANSEA)
- Agroecology Learning Alliance in South East Asia (ALiSEA)

§ The discussions of initial findings from the 1st study carried out in the framework of ALiSEA about *Cambodia agroecology stakeholder mapping and policy framework review* (report available on ALiSEA website: http://ali-sea.org/aliseaonlinelibrary/agroecology-stakeholder-mapping-and-situation-review-in-cambodia/

§ The introduction to the online ALiSEA knowledge management and experience sharing platform on Agroecology (http://ali-sea.org/) and its Facebook page (https://www.facebook.com/AgroecologyLearningAlliance/)

§ The presentation of 12 case studies from various stakeholders

§ Working groups building upon lessons learnt from the case studies and ACTAE presentations resulting in

- A brainstorming about main agriculture challenges faced by farmers and formulation of recommendations for promoting agroecology
- A shared understanding and common vision of agroecology and a sound and accurate translations (in national language) of the concept of agroecology
- A preliminary brainstorming about governance and structure for a future national platform addressing agroecology transition

2.1 Day1: Setting the stage

Agriculture at a crossroad and the urgent need for a shift towards agroecology

The first day of the workshop provided room for presenting few overall reflections about agroecology in general and some concrete illustrations of past / ongoing agroecological initiatives in Cambodia. It provided some lessons learnt and supported collective discussions regarding agroecology promotion and dissemination.

First of all, to have a shared understanding regarding why agroecology is necessary today, it was reminded the Green Revolution's limits and negative impacts, the increasing importance of climate change and the current ecological crisis that agriculture and small holders in particular are facing.

These elements call for alternative cropping systems, and agroecology provides convincing and evidence-based alternatives to the current agrifood systems.

It was mentioned that agroecology seeks to produce diversified and high-quality food, reproduce – or even improve – the ecosystem's fertility, limit the use of non-renewable resources, avoid contaminating the environment and people, contribute to the fight against global warming.

In addition, it was emphasized on the fact that agroecology is not new, relying on empirical learning processes and knowledge transfer from generation to generation. Meanwhile, it can be also seen as a modern approach for agriculture, building on both traditional empirical knowledge and scientific research for a better understanding and use of ecological processes operating in the farming systems.

Thus, Agroecology provides innovative concept and approaches capable of tackling issues related to food security / sovereignty, and mitigation & adaptation to climate change

In line with the need for concept clarification, historical principles of agroecology (Altieri and al. 2005) were reminded since they provide a sound basis for addressing most of technical issues related to food production

- **Enhanced recycling of biomass**, optimizing nutrient availability and balancing nutrient flows.
- **Securing favorable soil conditions** for plant growth, particularly by managing organic matter and enhancing soil biotic activity.
- **Minimizing losses** due to flows of solar radiation, air and water by way of microclimate management, water harvesting and soil management through increased soil cover
- **Species and genetic diversification** of the agro-ecosystem in time and space.
- **Enhanced beneficial biological interactions** and synergisms among agro-biodiversity components thus resulting in the promotion of key ecological processes and services.

To put it in a nutshell and to quote some of the work from A. Wezel (2009), Agroecology can be seen as a set of practices, a scientific discipline and a social movement.

A broad range of agroecology practices found in the region and in Cambodia: quick stakeholder mapping and few case study based illustrations

A presentation from Proyuth Ly, independent consultant hired by ALiSEA, of his main findings regarding Cambodia agroecology stakeholder mapping and policy framework review, introduced a session of the workshop dedicated to take stock of the multitude of agroecology initiatives implemented in Cambodia.

6 sets of practices most commonly found have been identified during a feasibility study conducted by GRET in 2013 across the Mekong Region: System of Rice Intensification (SRI), Integrated Pest Management (IPM), Organic Agriculture (OA), Integrated Farming System (VAC as its acronym in Vietnam), Conservation Agriculture (CA), Agroforestry (AF)

As far as Cambodia is concerned, most of these practices are implemented across the country, and supported by different mechanisms. They are either

- driven by market demand (OA for instance),
- promoted by INGO/LNGO (SRI or Integrated farming for instance),
- implemented by default by farmers due to remoteness of their locations and lack of access to input or affordability (OA for instance)
- supported by factory scale production

All these support mechanisms vary according to the crops and to the regions.

In relation to the 5 historical principles of agroecology (presented above) and/or to the 6 most commonly found "set of practices" in the Mekong region, 12 cases studies were presented by various stakeholders according to 3 main topics (see detail list of case studies in annex):

- Improving production through agroecological practices (5 case studies)
- Trade-off between agriculture production and ecosystems services (2 case studies)
- Making markets work for agroecology products: value chain development, farmers empowerment and certification (5 case studies)

Such case studies were completed by a movie on farmer testimonies regarding the implementation of agroecological practices in Siem Reap province.

In terms of diversity of stakeholders, there were 1 presentation from Government representatives, 3 from research centers, 1 from agricultural cooperative, 1 from LNGOs representative, 4 from INGOs representatives and 2 from private sector.

Such presentations were instrumental to feed the collective brainstorming on Day 2. In addition, they stimulated some preliminary exchanges between the different stakeholders.

Most of the remarks mostly addressed 3 important issues:

- Participants suggested enhancing and facilitating more exchange on agroecology if we want to promote agroecology.
- The main problem of Organic Agriculture in Cambodia is the lack of market. One asked for improving local certification of Organic Agriculture and for better price compare to products from conventional agriculture. Policy for Organic Agriculture in Cambodia is not yet finalized and published by MAFF. To improve its market, the participants suggest doing assessment the demand and supply of Organic Agriculture and also improving the soil fertility.
- Overall trend of agricultural production in the past 5 years: The agricultural sector in Cambodia has moved towards more commercial agriculture as the number of cash crop planting have been increasing from year to year : Massive increase in cassava production driven by international demand (around 600 000 ha under cassava at the moment which need to be seriously taken into consideration since it has a huge impact on natural resource depletion and play an important role for smallholder economy), significant increase in rice production especially aimed for export (short term / medium term fragrant varieties which is quality and high value rice). However, questions have arisen about sustainability regarding Jasmine rice since productivity is still low and farm gate cannot cover fully labour and production costs / difficulties to invest in quality rice. In addition, despite this shift towards commercial agriculture, majority of farmers still focus on home consumption rather than market oriented production.

Other issues were also mentioned and should be given further room for discussions:

- To have a clear definition of agroecology.
- Labor constraints for upscaling agroecology practices (such as SRI) and need to develop alternatives that can address farm labour shortage (small machinery in some cases)
- Need for assessing the economic performance of Integrated Farming system (production costs and income) alongside with the scale of its dissemination across the country.
- Impact of climate change (increasing occurrence of high temperature) on vegetable growing. c. Several organizations mentioned some ongoing activities on this specific topics such as the National IPM program (addressing rice and vegetable, with specific work on impact of temperature increase due to climate change), IDE (conducting research & experiment on drought tolerant vegetable varieties such as capsicum), and APSARA (conducting experimentations of vegetable growing (cabbage) under shade together with climbing plant (beans) → with 50% less radiation, it is found that the productivity increases by 30% in the dry season)

2.2 Day 2: Working groups and brainstorming about agriculture challenges and a future governance for ALiSEA

Addressing agriculture challenges and agroecology principles

3 working groups were set up according to the nature of the stakeholders (Local NGOs & Networks, International NGOs & Private Sector, and Research) in order to brainstorm about challenges currently faced in agriculture especially related to:

- Agriculture production (soil fertility, pest and disease management / control, water management, access to good quality seeds…)
- Dissemination of innovations / extension approaches
- Access to market (certifications, incentives for quality product)

5 main cross cutting issues were highlighted:

- Poor soils fertility and irregular rain/drought
- Difficulties in access to knowledge of innovations
- Farmers have limited market linkages, rely mainly on middlemen
- Lack of quality guarantee systems and application;
- Lack of consumers awareness; Agroecology needs a facelift in the region in terms of public perception.

The following section is mostly extracted from the research / academia group since it encompasses most of what has been discussed as well within the other working groups:

Production techniques:

- Changes in scale of production
- Lack of knowledge on chemical fertilizers use leading to soil degradation issues
- Widely use of counterfeit inputs (fertilizers, pesticides) due to lack of control and enforcement
- Irrigation – lacking, but in some cases even drinking water is problematic
- Comprehensive packages of soils/water management needed to emphasize links between agricultural and ecological issues
- Farmer planning: multi-year, on-farm planning allows a number of sustainability innovations. However this is especially difficult for the poorest producers with little financial liquidity and stability

Biophysical:

- Soils (acidity, erosion), poor soils in general
- Vegetable diversity very low in many regions
- Genetic resources – massive loss of diversity, landraces, genetic heritage
- Seed quality, especially for indigenous landraces

Weather/climate change:

- Drought/irregular rain
- Deforestation-related water management concerns

Research/technology dissemination:

- Extension service not yet widely cover the farming population
- Lack of clear identification and awareness of priority issues
- Difficulties in access to knowledge of innovations
- Little leadership/willingness in on-farm experimentation and motivation to effect change
- Long-term nature of soil-based interventions
- Collective learning systems a critical need

- Little to no real valorization of natural resources (soil, water, air, etc.) in meaningful terms

Operational guidance:

- Are researchers working in the right place, and with the right people, to change producers' attitudes?
    - Input producers/sellers
    - Market/end user demands
- Need for a mutual, collective consensus on the nature and definitions of agroecology in local languages

Public awareness:

- NGOs and agencies often work with the poorest of the poor – this is valuable from a humanitarian perspective, but they are also the most powerless stakeholders
    - Subsistence agriculture of the poorest is *not* the major effector for agriculture-based environmental degradation
    - This is not the type of work that will create the needed links with industry
- Agroecology needs a facelift in the region in terms of public perception
- Communications and media work very critical
- Need to avoid the 'Good and Bad' narrative when we talk about agriculture. This dialogue marginalizes people and industry by making them the 'bad guys'. Better to bring them on board using positive, adaptive language and approaches rather than finger-pointing
- Understanding of the real value of natural resources and ecosystem services is a critical step towards accepting and implementing conservation

Governance

- Particularly an issue in relation to technical advice, regulation of inputs, sales
- Linkages to stakeholders, public policy necessary
- Public consultations not sufficient
- Agribusiness models are extractive, following the classic post-industrial resource exhaustion curve
    - How do we better engage agribusinesses in agroecological production?
    - Need for market-oriented linkages that motivate these actors to invest in sustainability of the resource base
- Cambodia, Laos – cases of raw resource extraction with value-added transformation occurring in neighbouring countries. This leaves little possibility for financial incentive reflows to emphasize sustainable production domestically
- Transnational trade: within ASEAN there is some emphasis on food security, sustainability – but these policies are difficult to enforce in the face of neoliberal trade policies and big agribusiness interests

Market access

- Lack of understanding about seasonal market prices for various products
- Lack of quality guarantee systems and application
- Poor linkages between producers and hotels, leading to practices such as delayed payments. Middlemen negotiating unfavorable deals from unorganized producers

Addressing governance and structure features for ALiSEA Cambodia

✓ **Experience sharing on past and current involvement in existing networks**

The discussion highlighted the need to clarify the different terminologies = forum, network, platform, learning alliance.

What is ALiSEA?

- A Network / platform (both terms are synonymous)
- A learning alliance as a group of people with different background, sharing same goal, interested to learn and share among each other
- A forum as public open space to allow free discussion

A platform allows:

- To share and exchange experience/knowledge towards a common goal that members want to reach together;
- To develop common advocacy policy to address to policy makers;
- To share information, findings from other organizations, to facilitate the dissemination of good experience and innovations.

What are the requirements to become a member of ALiSEA? ALiSEA is an open coalition of a wide diversity of stakeholders sharing the same vision and willing to promote agroecology. ALiSEA wish to be member driven and provide services to its members.

How ALiSEA works? In this regard, the project focuses on: 1) strengthening knowledge and experience sharing among agroecological initiatives and actors; 2) increasing visibility and credibility of agroecological movement towards policy makers and consumers; and 3) scaling up the development and adoption of agroecological practice among farmers.

What is going on after the project finishes? For this concern, this is 10 years project and we plans to create the network and recruits the National Secretariat for each country to ensure that project activities will be continuous implementing after project ends.

How to get information accessible and understandable by farmers? The platform need to raise awareness among farmers, to increase visibility through documenting farmers testimonies, sharing videos library, broadcasting documentaries on TV etc. The participants propose to include the Farmer Organization and researchers into the AE network for sharing experience on AE implementing.

SOFDEC inform on current studies that should be broadly shared: Sustainable land management study carried out by FAEC including case study; CARDI also conducting some work on farming systems; and IFPRI also conducted recently a study on rice.

- ✓ **What are the expectations of the stakeholders towards their participants to ALiSEA network?**
  - To help local organizations to make their voice heard and understand to provincial and national levels.
  - To play a role of marketing facilitator regarding the certification and control system as currently poor added-value are given to agroecological or organic products.
  - To promote consumers awareness and to support linkages between producers and buyers.
  - To provide cases studies analysis that give concrete examples of successful farmers able to improve their livelihood thanks to agroecology practices. To generate evidence base of successful agroecology farming system compared to chemical agriculture.
  - Investment cost and gross margin data should assessed more closely and made available to farmers in order to support adaptability / mass adoption of agroecology practices.
  - To create and gather data on agroecology (GIS mapping), to make a regional observatory on agroecology.

- To dissemination information and reach farmers through close collaboration with farmers federations. Federations could mainstream agroecology concept to their members.
- To enhance awareness of consumers through national and international consumers associations.
- To aggregate all agroecology initiatives, to works as inclusive platform that belongs to the members and take into consideration information access of farmers. Farmers could be reaching through the collaboration and dissemination by Federations.

2.3 A contribution to the way forward…

✓ **A first working group formed**

At the end of the 2 days' workshop, a **first working group** of 12 volunteer members have committed to contribute to the elaboration of the **structure of the future Cambodia Agroecology Learning Alliance**:

From left to right on the picture hereafter: Mr. Mike Tharamangalar (Green Business JV), Mr. Neou Sethea (PADEK), Mr. Khun Leang Hak (SOFDEC), Ms Im Sothy (ADG), Mr. Prak Sereyvath (CIRD), Mr Christophe Goossens (ADG), Ms Chhey Horn and Lim Ratha (Union of Maison Familiale Rurale), Ms Neang Malyne (Ecoland).

Not on the picture but also included in the working group: Mr. Chhim Phallyboth (COD) and Ms. Seng Kim Hian (IDE).

✓ **Launching the small grants facilities**

2 Small Grant Facilities will be launched shortly with different objectives as described in the PowerPoint (available on ALiSEA website shortly):

- One managed by CIRAD, aiming at supporting CANSEA members and amounting 320 000 Euros
- One managed by GRET, aiming at supporting ALiSEA members and amounting 210 000 Euros

ALiSEA Network will provide around **22 grants** for **2 years** and **4 countries** (Myanmar, Cambodia, Lao PDR and Vietnam). Grants will preferably be proposed as co-funding, with a

maximum of 10,000 USD. The objective of the SGF is to provide means to address the issues related to agroecology dissemination, production, market access. It aims at fostering knowledge generation and sharing.

ALiSEA SGF will be launched at the end of the 4 National Workshops on Agroecology Transition in Mekong Region, around June 2016. All details information will be displayed on ALiSEA website.

Interested stakeholders should send a 2 pages concept note with an obligation to produce **2 short "agro-ecological transition stories"** and a brief narrative and financial report.

The concept note should be preferably written in English. Specific support through ALiSEA national coordinator could be provided to grass root organizations that could write their concept note only in Khmer language. The objective is to support all potential applicants to develop a concept note and other documents in English so that it can be shared within the region with other stakeholders.

Master students can get the small grant if their project proposal meets to the project goals.

✓ Learning and sharing events: organizing collective events in the coming months…

For farmers they need face to face meeting. While for other levels we can have email, workshop, google group, Facebook, and Skype meeting.

Several kinds of events could be considered according to the target audience and the message that needs to be disseminated:

- To develop organic agriculture in Cambodia
- Internal Control System vs Participatory Guarantee System (ICS not suitable for local it suites for exporting, PGS is suited for local certification)
- To have sharing knowledge at national and international level
- ALiSEA should have tools to support partners in Cambodia

Annexes

II. CASE STUDIES (POWERPOINTS)

All the case studies presented and listed below are available for download on ALiSEA website

http://ali-sea.org/1st-national-multi-stakeholder-workshop-addressing-agroecological-transition-in-cambodia/

Improving production through agroecological practices

- IPM National Program, Chou Cheythyrith
- How to improve yield crop in organic farming? Case study of vegetable and rice crop on poor acid sandy soil of Angkor World Heritage, APSARA
- Improving soil fertility, rice productivity and fodder resources in the lowlands rice of Cambodia, CASC
- Accompany transition toward agro-ecology production practices, ADG
- Advocacy for a living soil, CIRAD

Trade-off between agriculture production and ecosystems services

- Trade-offs between ecosystem services and opportunity costs in the Tonle Sap Lake agro-ecosystem, Ecoland
- Key dynamic of Ibis Rice is to pay a premium to farmers to not expand production into protected forest, not hunt wildlife and not use chemicals, WCS

Making markets work for AE products: value chain development, farmers empowerment and certification

- Development of an economically viable organic rice supply chain via a Contract Farming scheme, SCCRP
- How does the agroecology practice integrate and develop in the vegetable value chain? PUAC
- Strengthening farmers' organizations to meet certification and quality requirements, COD
- Role in market in agroecology – a case study on vegetable supply. Promote safe food supply and empower farmer market, Natural Agri-village Shop.
- Khmer community Market Shop, COG

III. WORKSHOP PRESENTATION EXTENDED ABSTRACTS

How to improve yield crop in organic farming? Case study of vegetable and rice crop on poor acid sandy soil of Angkor World Heritage

Presenter: Dr Tan Boun Suy, Department of Agriculture and Community, APSARA National Authority

Problem addressed

Compost is the basic natural fertilizer of Organic Farming. It brings beneficial microorganisms resulting in good health of the soil. But the nutrients released are very low comparing with the chemical fertilizers.

How to solve this issue? We present our experimentation on poor acid sandy soil of Tuk Vil Research Station. Objective: utilization of Green Manure, Bat Guano, Rice Husk Ash in vegetable and rice crop.

Results

- Green Manure can replace Urea; bat guano is rich in nitrogen and phosphorus.
- We obtained encouraging results with *Chromolaena odorata* and bat guano.
- The effect of *Chromolaena odorata* is fleeting, that of bat guano is more sustainable.

Key issues:

1. ***Chromolaena*** is suitable for small demonstration plot. Spontaneous vegetation, we find it everywhere in the open space. But for large surface of crop, the quantity naturally found is not enough, for we use 10T/ha. So it is recommended to study how to grow this plant for getting large quantity of leaves and stems.

2. **Bat Guano** is expensive due to its scarcity. Some farmers host bats, sugar palm tree leaves are pulled down around the trunk to create shelter for bats.

3**. Rice Husk Ash** brings potassium, calcium to improve the pH of acid soil. It is cheap and available in great quantity; it could become one of the most interesting amendment of sandy acid soil.

Improving soil fertility, rice productivity and fodder resources in the lowlands rice of Cambodia: a complex trade-off

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Introduction

Rice is the principle staple crop of Cambodia and a commodity with increase export of jasmine and fragrant rice in the last few years. Any deterioration of rice production systems through climate change (less water, higher prevalence of diseases and pests …) would seriously impair food security of the nation and the export capacity. Drought is a major limiting factor for the production of rain-fed lowland rice representing 2.2 million ha (Tsubo et al. 2009). Most rice paddies lie in gently sloping lowlands but field water availability varied from upper (sandy soils) to lower positions (clayed soils) of a sloping land in the rain-fed lowland ecosystem of the Tonle Sap region, causing variation in yield within the toposequence. The production of paddy rice has remarkably progressed during the last 10 years from 4.2 million tons in 2004 to 9.4 million tons in 2013. However, this global increase of the rice production remains poorly qualified and presents deep disparities between regions (some remaining very sensitive to climate accidents), between type of rice farming system and type of producers. Rice is commonly grown only once a year as a mono-crop in the wet season with still low input and relatively low output even if the yield has increased from 1.4 to 2.8 t/ha over the last 20 years (Fukai and Ouk, 2012). Animal husbandry is one of the main components of the rice farming system. Cattle and buffalo are in a constant state of undernourishment as they rely on poor-quality roadside grasses and rice straw as their primary source of nutrition in both wet and dry seasons (Pen et al. 2010).

Problems/Challenges addressed

Significant improvements in the rice production systems are crucial and should be based on diversification of non-rice crops e.g. pulses, sesame and/or establishment of fodder legume species after wet season rice (Tivet et al., 2015), while always improving income, soil fertility and water management. Thus, the main objective is to increase the resilience of the rice farming system through an improvement of the soil fertility and diversification pattern with the use of legume fodder species after wet season rice. A paired-plot design was established in 2011 in the irrigation scheme of Stung Chinit (Santuk district, Kampong Thom) to assess the soil fertility changes under contrasted soil and crop management comparing Conventional Tillage (CT, farmer's practice) and Conservation Agriculture (CA: no ploughing, residues are maintained on the top soil to preserve the soil fertility and cover/relay crops are used to diversify the productions) management comprising different rice cropping patterns with 1 to 3 cycles of rice per year. In addition, a demonstration plot of the most potential system was set up in 2013 to have a better assessment of labour requirements and economic performances. Under CA, leguminous plant species, *Stylosanthes quianensis* (stylo) and *Centrosema pascuorum* (centro), were broadcasted before or after rice harvesting at the end of the rainy season (from earlier November to mid-December depending of the position on the

toposequence) when water still remains in the field with main objectives to improve the soil fertility and to increase the fodder resources. After four years, changes in soil fertility were assessed (soil organic C-SOC, total N-TN, labile C pool). Soil samples were collected at 4 depths (0-5, 5-10, 10-20 and 20-40 cm depths). In addition, biomass productions of these two fodder species were assessed in 2015.

Stakeholders involved / existing partnerships

These activities are implemented by the Conservation Agriculture Service Center (CASC) of the Department of Agricultural Resources Management (DALRM), General Directorate of Agriculture (GDA). The representatives of the Farmer Water User Community (FWUC) in Stung Chinit are invited with volunteer farmers from surrounded villages to 2-3 field days per year to demonstrate the technical operations, progress results, and to identify the main challenges to adapt on their own farms these technologies. Recently, smallholders, who have lands inside and outside the irrigation scheme, were engaged in a diversification pattern using stylo and centro after wet season rice. At this scale the performances and abilities of the systems to match the means and goals of the farmers will be assessed. Our team provides technical support to them and seeds of the fodder legumes to start this activity. This process is still on his early stage and as emphasized hereafter there is a need to move to a social and collective learning approach.

Results / impacts / Lessons learnt

Our results indicate that soils under CT decreased SOC (from 16.8 to 36.8 tons of soil organic C per ha) stocks from 25% to 66% when compared with the native vegetation (49.4 tons soil organic C per ha), contributing to the depletion of the soil fertility and rice productivity. After 4 years, soil organic C and N stocks are higher under CA than that observed under CT. On average, SOC and TN accumulation under CA ranged from 0.2 to 1.4 tons C/ha/yr. and from 0.10 to 0.23 tons N/ha/yr when compared with CT. The increase in N stock is a unique advantage for small-scale farming, especially on sandy terraces with poor soil fertility where the use of mineral fertilizers induces economic hazards under conventional management. In addition, increasing trend in labile C stock was also observed also under CA in 0-20 cm depth. This result means that higher energy is available for the soil biota activity and significant changes were observed with higher macrofauna activity under CA when compared with CT. This labile-C pool also contributes to an improvement of the soil physical properties improving soil porosity and aggregation preventing fast soil organic matter oxidation.

In addition to the provision of ecosystem services of regulation, the use of stylo and centro increases the fodder resources in the dry season, and thus might enhance the efficiency of the rice – livestock system. These two species produced from November to May on the sandy soils between 14 to 25 tons of fresh biomass per ha. Increase in yield of the jasmine rice was also observed and ranged from 2 to 4 t/ha in some fields that were previously abandoned by farmers.

Key issues identified as be furthered / conditions for upscaling / potential bottlenecks

Our result emphasized that the soil fertility can be improved even on a poor sandy soil (80% sand, upper sandy terraces) under CA management, an increase in biomass inputs and the use of a large diversity of plants enhancing biological processes and synergies. However, several issues should be considered if we expect a dissemination of these agro-ecological systems. The first issue is related to the trade-off between the use of the biomass of stylo and centro as fodder sources and the biomass quantity that should be restituted to improve the soil fertility avoiding a fast depletion of the soil fertility through the exportation of an already limited pool of soil nutrients. Additional research and soil fertility monitoring should be implemented on a medium and long-term process to define this trade-off. The second issue is the way the remaining biomass of stylo and centro will be managed for the rice production. Two options

would be explored by smallholder farmers: (i) the remaining biomass will be used as a green manure and incorporate into the soil or (ii) the biomass will be rolled down at least 2 to 3 weeks before rice sowing (depending of the biomass), then rice will be direct seeded into the mulch and soon after rice emergence water will be bring into the field to control the weeds. The second option implies to have access to specific no-till planter that opens a furrow and drops the seeds into the soil through a thick mulch layer on the soil surface. The lack of no-till planters in Cambodia represents a clear constraint to move to this option that represents the best management of the soil fertility. Another option is to improve the seed broadcasting technology broadcasting rice seeds into thick mulch which introduce more technical challenges than the first two options. Beside technical constraints, the main challenge is related to social barriers for adoption, where for example, new collective rules for livestock and rice stubble fire management should emerge within the community. In many areas, roaming animals is the norm in the dry season and rice stubble is generally burnt to facilitate land preparation (ploughing even done by tractor). With this new fodder resource there is a need to 'control' the grazing in order to prevent a high stocking rate that will damage the soil physical properties and the fodder resources. Changes in the way livestock are managed imply collective decision and to go through a negotiation process between farmers within the same community. Our main strategy is to provide flexibility and options to smallholder farmers and to move with them to an iterative process understanding the advantages of diversification and biomass restitution for the management of the soil fertility, improving the fodder resources, and increasing yield and profitability.

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Trade-offs between ecosystem services and opportunity costs in the Tonle Sap Lake agro-ecosystem (Cambodia)

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Abstract

The usefulness of Ecosystem Services Framework (ESF) to emphasize relationships between agriculture and ecosystems has received much less attention. In addition, studies applying ESF to understand links between ecosystem services and rice production systems are still missing. The objective of this paper is to try to fill this gap by adopting the ES and EDS (ecosystem dis-services) approach suggested by Zhang *et al.* (2007), and combine with Agrarian System Analysis and Diagnosis methodology (Cochet and Devienne, 2006a; Dufumier, 2006; Cochet *et al.*, 2007; Cochet, 2012) in order to identify ES and EDS provided by rice production systems adopted by peasants on the agro-ecosystem of Tonle Sap Lake flood plain. Our finding show that organic rice production system is not economically and ecologically performant in ES provision. Contrary, rainy season rice, floating in particular, is the most performance for ES provision. We propose 3 choice to reconcile economic and ecologic performance as following (1) Promote production system with medium performance for ES but low opportunity cost is to promote adoption of rainy season rice excluding floating rice in combination with short-term rice. (2) Promote production system with medium performance for ES with medium opportunity cost is to promote adoption of rainy season rice including floating rice in combination with short-term rice. And (3) Promote production system with high performance for ES with high opportunity cost is to promote adoption of floating rice alone in production system.

Ibis Rice: making conservation not just viable, but valuable.

Presenter: Nick Spencer, nick@smpcambodia.org Cambodia, Sansom Mlup Prey – Ibis Rice
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The key dynamic of Ibis Rice is to pay a premium to farmers to not expand production into protected forest, not hunt wildlife and not use chemicals. Having previously had limited, low-value and unreliable access to market for agricultural produce they would look to the forest to supplement their living in unsustainable ways. De-forestation risks the long-term viability of the community for short-term gains. The best climate change mitigation strategy for the communities is to have healthy forest around them for water retention, biodiversity and soil conservation. Furthermore, the Giant Ibis, no 1 bird on the EDGE list (Evolutionarily Distinct and Globally Endangered) is found almost exclusively in these forests. By combining high-end, low-impact ecotourism with Wildlife Friendly, premium markets for their prestigious Pkha Roumdol Jasmine rice, conservation becomes not just viable but highly valuable to these communities.

Farmers in these areas are already organic chemical compliance which is monitored through our conservation compliance. However to really communicate this to the consumer, especially internationally, we saw the need to gain EU and USDA regarded Organic certification. It has been shown that this certification can bring an increase in value enough to pay the farmers 20% more for their farming methods. This certification long-term can open international markets that will allow growth of the project and stable income. We successfully certified 40% of our production in 2015.

Furthermore, the training in organic methods and the premium we pay them strengthens resistance to the pressures and coercive tactics of the chemical salesman that target these remote, often illiterate communities. Chemicals sold are often without Khmer translation and with very dangerous advice.

Organic certification means all a farmers land and outputs are inspected and certified. It also requires the farmer group to address soil fertility through organic methods such as preserving hummus, mulching, use of legumes and low/zero tillage techniques. Effective implementation of these methods have will great impact on both fertility and water retention, vital in a single crop, rain-fed system increasingly effected by climate change. This really is the next great challenge for Ibis Rice, to design a system specific to a village level that can progressively improve soil condition and therefore yield.

Organic certification would make legumes cash crops, such as black-eye peas on the fallow a valuable practice, as these too would be certified organic. This again improves income without expansion of agricultural land and strengthens food security with an increasingly variable climate and wet season.

During the last year we have begun to leverage Ibis Rice to pilot the Sustainable Rice Platform (SRP) Standards and Indicators within extensive dry-season rice farming areas in the Tonle Sap floodplain. The SRP is a global organization composed of public and private sector partners, and NGOs, of which WCS is the only wildlife conservation organization. Through our pilot, we will test the efficacy of version 0.1 of the SRP Standards and Indicators, and build on our experience with Ibis Rice to improve the biodiversity gains achieved under SRP. This represents an incredible opportunity to improve the sustainability of rice cultivation on a large scale. Consumer preferences are driving change in the industry at the farm level with global consequences. We see SRP as a tool for major commodity corporates to assess their supply change for the most acute sustainability challenges and built privately funded or co-funded projects to address these issues.

Development of an economically viable organic rice supply chain via a Contract Farming scheme in Preah Vihear province, Cambodia

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Summary

Whereas organic value chains have not always succeeded to maintain their costs of management and certification, a partnership based on a contract farming model is showing encouraging results in Preah Vihear province. Economy of scale, achieved by a rapid growth of paddy volumes engaged and by the willingness of farmer leaders to pull resources for the creation of a Union of Agricultural Cooperatives, is the keystone of the viability of this organic paddy supply chain. Long term vision and the aspiration of a committed exporter to build a fair partnership with farmers are also essential pillars of this success.

The challenge of developing economically viable organic supply chains

Despite the potential and the numerous initiatives to promote organic agriculture in Cambodia in the past 15 years, success stories of economically viable organic value chains are scarce, notably in the rice sector. Whereas growing concerns of Cambodian urban middle-class regarding food safety opens a potential, the absence of public regulation or organic standards and the lack of a reliable and consumers-known private-owned organic label makes the potential of domestic market barely exploited. On the other hand, the lack of connection to international markets limits the scale of organic production initiatives. As a consequence, international certification costs per unit of product remains too high to be sustained, and the potential of international markets for organic products is left untapped.

Initial support to organic rice production in Preah Vihear province

The Support to the Commercialization of Cambodian Rice Project (SCCRP) is financed by the *Agence Française de Développement* (AFD). Among other objectives, it aims at developing the involvement of Farmer Organizations in the commercialization of paddy and at differentiating Cambodian Rice on international market by various quality labels and compliance with standards.

In 2013, in partnership with the Cambodian Organic Agriculture Association (COrAA), a first support was provided to 5 cooperatives in Preah Vihear province (a remote province in the North of Cambodia) to produce organic rice. The objective for that first year was only the compliance with COrAA private organic standard, yet allowing the setting-up of an Internal Control System (ICS). COrAA organic logo could be used for domestic market, yet could also be considered within some regional market destinations which do not have a public regulation on organic agriculture and labelling (such as Singapore). It was expected that this would

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already generate a moderate premium to motivate producers, while this first season would be used as a springboard toward international certifications. This first year was successful from the point of view of building awareness of farmers on organic production and establishing internal control system: about 625 tons of paddy were declared compliant with COrAA standards. But it was a failure from the commercial point of view as only about 100 tons of paddy were sold as organic, to AMRU Rice (Cambodia) Co. Ltd., one of the lead Cambodian rice exporters.

Lessons learnt from 1st season and improvements in 2014

AMRU Rice Co. was actually willing to buy more organic paddy from 2013 harvest. But the paddy was bought fresh (before drying), whereas the logistic organization of the paddy collection was not efficient enough. To avoid depreciation of the quality, farmers had to sell the paddy within 48 hours after harvest, to local traders (as conventional paddy) if the company could not buy on time. For the Agricultural Cooperatives involved, this revealed the risk of investing further in the internal control system without reasonable guarantees that the paddy will be sold as organic, with the corresponding premium price. To secure deals with buyers from the beginning of the cropping cycle was thereof seen as a must.

In 2014, 8 cooperatives were involved and a meeting was organized with potential buyers of organic paddy in the very early stage of the season to select a partner. Cooperatives have met individually three or four potential buyers to compare the conditions they would possibly offer for organic paddy purchase, then decided to negotiate a Contract Farming agreement with AMRU Rice. Contracts were signed for the supply of a total of 1,800 tons of organic jasmine paddy for harvest 2014. The agreement defined different grade of quality with corresponding detailed specifications, and for each grade, the level of premium price to apply. Reference price was set based on prices offered by other rice mills in the neighboring province of Kampong Thom. The target in 2014 was to achieve organic certification against both EOS/EU and USA/NOP standards. Moreover the modalities of quality control and collection were clarified in order to address the difficulties faced in 2013. AMRU Rice Co. was in charge to hire an international certification body (Ecocert), while cooperatives had to maintain the internal control system. Additional training and supervision of cooperatives inspectors was provided by COrAA, mobilized by the SCCRP project.

At harvest time, even if the full target volume was not achieved, the results were very encouraging: all the 8 cooperatives were certified by Ecocert and 1,465 tons of organic paddy were delivered to AMRU. In average, the level of premium applied was +128 Riels/kg of paddy, additional to a reference price already significantly higher than prices offered by collector in the production area.

Building the economic viability

Results of 2014 harvest were very encouraging. However, it was acknowledge that the role undertaken by COrAA and financed by the project was still crucial to sustain the organic certification. The next challenge faced was thereof to ensure a complete weaning of the emerging organic paddy supply chain from project subsidies. To maintain a team able to supervise internal control inspectors, verify and consolidate the data of the Internal Control System, liaise with the certification body and provide managerial support to the cooperative was seen as a must. Different scenarios were developed, with a simulation of associated costs. Two options in particular were considered: 1. the externalization of this support service, possibly by the mobilization of COrAA paid directly by the cooperatives, or 2. the mutualization of resources by the cooperatives in order to hire (and keep) a competent team. The second option was chosen: the eight cooperatives have decided to establish a Union of Agricultural Cooperatives (which is about to become the first – or one of the first – Union of Cooperatives registered in Cambodia) through which they will mobilize the adequate staff.

Before to engage further support, the partners were asked to formally confirm the following commitments, seen as the pillars of the economic viability of the model: AMRU Rice took commitments regarding the increase of premium prices and volumes to be purchased (not less than 3,500 tons of paddy by 2016). Cooperatives have accepted to channel 50 Riels/kg of paddy, withhold on the premium, to cover the cost of the Union. And on its side, the SCCRP project (reassured by the above commitments of its partners), has accepted to subsidize the costs of the Union from mid-2015 until the harvest. Based on a hypothesis of 2,500 tons of organic paddy sold to AMRU, it was foreseen that the Union would generate enough resources to cover 75% of its costs in 2016. Then additional growth up to 3,500 tons would be sufficient to balance the costs from 2017.

2015 harvest: on track with previsions

For the second year, contracts were signed between AMRU Rice and the 8 cooperatives, with agreed level of premiums and for over 3,300 tons of paddy. The Union (still informal) has recruited 4 staffs, temporarily paid with project's subsidy for the first 6 months. Organic certification was obtained, and Ecocert has even noted the improvement of the ICS allowed by the presence of the team of the Union, operational since mid-July 2015.

2,438 tons of organic paddy were delivered to AMRU: still less than the volumes expected as per contracts, but very much in line with the foreseen scenario toward economic sustainability of the model. Since the level of premium was significantly increased, incentives for farmers were still very satisfactory, while 50 Riels per kg were actually withhold and transferred to the Union of Cooperatives after the harvest, generating a budget of nearly 30,000 Dollars US for the Union (approximately 3/4 of its annual budget).

In average, the level of premium applied was +150 Riel/kg of paddy, additional to a reference price already significantly higher than prices offered by collector in the production area.

Scaling up: on track toward a viable organic paddy supply chain

Via its commercial efforts, AMRU Rice captures a growing demand for organic rice notably on the USA and European markets. Further scaling-up is expected in 2016, with considered aggregation of new cooperatives and inclusion of new farmers. AMRU could order approximately 5,000 tons of organic paddy this year: enough to ensure sufficient resources to cover the costs at cooperatives and Union level.

In this model, the involvement of a large scale exporter, committed to seek markets for organic rice, and the solid partnership built on a long term perspective between the exporter and cooperatives are keys of the success, while project investments are made with a well-defined phasing out plan, clearly understood by partners.

How does the agroecology practice integrate and develop in the vegetable value chain of Peri Urban Agriculture Cooperative (PUAC)?

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In the last five years, there are various impacts from non-respect and over dosage of chemical products. In order to increase yield, farmers mostly decide to apply chemical products including chemical fertilizer, pesticide, and herbicide. Farmers are often insufficient skill to use properly and correctly of chemical products above. Consequently, farmers are not profitable economically because the production cost is quite high. There are also the health impact to consumers and producers. Based on these problem statements, the farmers were initially syndicated to become cooperative specialized in vegetable production named Peri-Urban Agriculture Cooperative (PUAC). PUAC was established since 29th April 2009 registered in the Provincial Department of Agriculture in Kampong Speu in 2009; with the purpose of producing and selling vegetables in order to improve the small scale farmers in Peri-Urban to grow chemical-free vegetables and to promote local sustainable development. PUAC locate in village Chamkar Doung, commune Chbar Morn, district Chbar Morn, Kampong Speu province. This cooperative has actually 70 farmers who are vegetable producers with the average surface of 0.2 acre per household. The applied cultivation methods consists of using only natural fertilizer as well as imported vegetables seeds from Belgium, Vietnam and Thailand. Nowadays, PUAC grow mostly Europe Vegetable including romaine, red romaine, red butter head, Batavia, Batavia red, lolo rosa, frisé, iceberg, cherry tomato, tomato, okra, Khmer and Japanese cucumber. The annual production is approximately 50 tons.

PUAC is playing as agriculture platform centre to disseminate agriculture technique and facilitate on the access to market. There are two kinds of agroecology practises including solid and liquid compost which are developing as below:

- ***Solid compost:*** farmers are practically used by collecting the local existing resources: water hyacinth, tree leaf, waste vegetable, cow manure and rice husk. Farmers dig a hole to store this solid compost and keep for the process of humufication within a minimum of one month.
- ***Liquid compost:*** farmers are practically used by collecting the local existing resources: siam weed *(Chromolaena odorata),* kitchen waster and cow manure. Farmers prepare a jar to put this liquid compost mixed with cow and human urine for the process of humufication within a minimum of one month.

The farmers are using the classic model of agriculture technique such as (i) soil preparation (animal traction), (ii) manual line preparation, (iii) natural fertilization (compost from animal manure, (iv) manual plough, (v) nursery, (vi) manual transplantation, (vii) watering, (viii) maintenance (manual wedding and natural pesticide) and (ix) harvesting. After harvesting, PUAC is collecting point centre from members' farmers and distribute different sale points in Phnom Penh such as Khmer Farmer Garden, Japan Farm Shop, Market Kilometer Number 6 and O'Russey Market. There is local sale point in Kampong Speu Market. To conclude, these two agroecology practices are advantages to enable the good value chain of vegetable production and support small-scale farmer by reducing the chemical fertilizer and improving soil fertility. Farmers can used their local existing resources to produce the natural fertilizer. More importantly, agroecology products are quite demanding in the market with the higher price than chemical products.

Strengthening farmers' organizations to meet certification and quality requirements

Chhim Phallyboth, Executive director of Center for Organic Development

The Center for Organic Development (COD) is a nationwide operating non-governmental organization working for the promotion of organic agriculture in Cambodia. COD is active in support of organic agriculture, the processing and marketing of organic products. It aims to facilitate trading, and provides technical support especially for organic rice farmers to meet the requirements for organic certification as well as the quality criteria for export. Furthermore, COD gathers information on the organic sector and analyses the capacity of potential organic producers to meet the requirements.

Vision: The livelihoods of Cambodian smallholder farmers are enhanced, as they are reliable partners of other value chain actors. They produce crops based on sustainable agricultural principles and supply healthy food to the market at premium prices.

Mission: To support organic producers and their cooperatives in accessing national and international markets by enabling and strengthening the farmers' organizations to meet certification and quality requirements and to satisfactorily manage their own affairs.

Objectives:

- To raise awareness on the requirements of organic agriculture standards and certification;
- To provide services to stakeholders in organic value chains to meet especially quality and certification requirements;
- To link organic and sustainable smallholder farmers to markets;
- To assist leaders of agricultural cooperatives and farmers' associations.

IV. LIST OF PARTICIPANTS

No	Name	Position	Institution
1	Aymeric Roussel	Attaché Natural Resources Management - Rural Development	European Union
2	Bun Sovansa	Admin & Accountant	SEED
3	Bun Sreag	Managing Director	Natural Agriculture Village Shop
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6	Chhey Horn	Manager of Association	MFR Cambodia
7	Chhim Phallyboth	Executive Director	COD (Center for Organic Development)
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9	Chinh Pheareak	Agriculture Coordinator	Agrisud
10	Chou Cheythyrith	Coordinator IPM/GDA	IPM/GDA
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12	Dennis McMahon	Chief Executive Officer	Green Business JV
13	Erik Delaquis	Cassava agroecologist in Hanoi	CIAT
14	Florent Tivet	Agronomist Researcher	CIRAD Cambodia
15	Franck Enjalric	CANSEA coordinator	CIRAD Lao
16	Germain Priour	Consultant	Film maker and photopgrapher
17	Guillaume Jumel	Program manager	Vivre de sa terre
18	Guillaume Lestrelin	Technical Advisor	CIRAD Lao
19	Haruko Toyama	Agriculture Manager	JICA
20	Ieng Sotheara	Chairman	Eco-Agri Co., Ltd.
21	Im Sothy	Senior Agronomist	ADG
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25	Khin Theary		Khmer Market of Association
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27	Khun Leang Hak	Director	SOFDEC
28	Kong Meurn		PUAC
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30	Kong Sophalrachana	Volunteer in Land Management and	Ecoland-RUA

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32	Lang Seng Horng	PO	ICCO
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40	Neang Malyne	Director	Ecoland-RUA
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42	Noun Sopheak		COrAA
43	Ouk Lykhim	Community Engagement Manager	Conservation International
44	Pan sodavy	Executive Director	ATSA
45	Philippe Cao Van	ACTAE coordinator	CIRAD Lao
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49	Prak Norak	Member of Association	Khmer Market of Association
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52	Ry Saren	Field Technician	Siem Reap
53	Samorn Channa	Advisor	GIZ
54	Sar Sanphiren	Consultant	Agroecology Consultant
55	Say Sophal	Manager	Community Organizing Group
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