



REPORT

SECOND ANNUAL REGIONAL WORKSHOP CAMBODIA CONSERVATION AGRICULTURE AND SUSTAINABLE INTENSIFICATION CONSORTIUM

28 - 29 SEPTEMBER 2021



CSAM



CONSERVATION AGRICULTURE & SUSTAINABLE INTENSIFICATION (CA/SI) SUPPORT AND COLLABORATORS



**KANSAS STATE
UNIVERSITY**



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Executive Summary

Cambodia Conservation Agriculture and Sustainable Intensification Consortium (CASIC) is a multi-stakeholder consortium consisting of organizations who have the incentives to come together and meet on a regular basis to discuss the promotion of Conservation Agriculture and Sustainable Intensification (CA/SI) throughout Cambodia. CASIC's version is to be a well-established platform with a vast network of organizations that are working on the CA issues in Cambodia, e.g. markets, research, policies, service provision, and its mission is to establish knowledge management of CA related resources for easy access by smallholder farmers, semi-commercial farmers, and agricultural cooperatives; create an enabling environment to boost investment in CA/SI; promote and enhance CA/SI practices and enhance collaboration between stakeholders.

Following the success of the 1st Regional Training Workshop held in 2019 in Siem Reap and Bos Khnor (Cambodia) and contributing to the increasing regional and international interest in the topic, this 2nd Annual Regional Workshop was jointly organized by the General Directorate of Agriculture (GDA) of the Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia, and the Centre for Sustainable Agricultural Mechanization of the United Nations Economic and Social Commission for Asia and the Pacific (CSAM-ESCAP), Agroecology in Southeast Asia (ASEA) the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and Swisscontact. The main objectives of the CASIC's 2nd Annual Regional Workshop were to: (1) provide updates on country policies that promote agroecology; (2) provide lessons learnt on broad scale adoption of CA/SI; (3) present success, scale, and commercialization story(s); (4) identify new challenges and opportunities; and (5) discuss any regional efforts needed.

The 2nd Annual Regional Workshop was organised in a two-half-day meeting where the project teams and partners gathered and met over Zoom video conference. The workshop was attended by 141 participants from over 38 different countries. The participants were researchers and university professors (28.4%), NGO staff (22%), government officials (15.6%), employees from development partners and UN Agencies (11.3%), university students (8.5%), and others [i.e., private firms, farmer organizations, freelancers, etc.] (22.7%).

This regional workshop does enable participants to share and discuss in a great detail of different important aspects of CA/SI research and large-scale adoption. It is clearly shown that transitioning the current farming into CA/SI approach faces a number of different critical problems and challenges, and requires great deals of time, resources and effects. The main conclusion drawn from this workshop is undoubtedly the clear and long-term commitment, enthusiasm, and positive attitudes of relevant stakeholders toward promoting a broader scale CA/SI adoption. One key learning from many countries has shown that wider adoption of CA/SI technologies requires concerted effort of all the stakeholders in the expanded partnership with participatory approaches in which farmers experiment and provide rapid feedback. This would need to be actively supported and participated by government bodies, development partners, researchers, extensionists, farmers and private sectors along with machine manufacturers. Building capacity of all stakeholders is acknowledged as an important ingredient for a long-term success of CA/SI transition.

Welcome Letters

Welcome Letter from H.E. Om Kimsir

Dear Participants,

On behalf of the Ministry of Agriculture Forestry and Fisheries, Cambodia and Conservation Agriculture and Sustainable Intensification Consortium (CASIC), I would like to take this opportunity to welcome you to CASIC's 2nd Annual Regional Workshop.

As many of you are well aware, creating a market requires collective effort. However, bringing in all relevant market actors together in order to initiate that collective effort was challenging due to communication gap, lack of access to CA resources and government policies that were not necessarily catered towards commercialization of CA etc. Therefore, a consortium such as CASIC was established in order to kick start this collective effort and address the pertinent issues to make CA more accessible to farmers. CASIC is an initiative of the Ministry of Agriculture Forestry and Fisheries, Cambodia, under the leadership of **His Excellency Minister Veng Sakhon**.

Today's workshop is the second, in the planned series of the annual regional trainings hosted by General Directorate of Agriculture (GDA) in collaboration with the Centre for Sustainable Agriculture Mechanisation (CSAM). The first regional training was held back in May of 2019. The recommendation and feedbacks from the first regional training laid the foundation for this workshop. I am also proud to announce that the outcomes of this second workshop will also be featured in the upcoming *Agroecological and safe food transitions for a green and healthy COVID-19 recovery in the ASEAN region*, workshop to be held in October 2021, organized by Agroecological and Safe food System Transitions (ASSET) project.

I would also like to take this opportunity to thank our collaboration partners: Center of Excellence for Sustainable Agricultural Intensification and Nutrition (CE SAIN) at the Royal University of Agriculture (RUA), the Centre for Sustainable Agricultural Mechanization of the United Nations Economic and Social Commission for Asia and the Pacific (CSAM-ESCAP), Agroecology in Southeast Asia (ASEA), the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and Swisscontact.

Last but not the least, my heartiest thank you to all the participants for joining us today. I hope you find this workshop informative, and you are able to learn, take away important lessons and contribute to CA/SI transitions not only in your countries, but also join hands to make regional and global impact.

H.E. Om Kimsir

Secretary of State and Chair of CASIC Steering Committee

Ministry of Agriculture, Forestry and Fisheries

Welcome Letter from H.E. Chan Saruth

Kingdom of Cambodia Nation Religion King



Ministry of Agriculture, Forestry and Fisheries
Cambodia Conservation Agriculture Sustainable
Intensification Consortium (CASIC)

Phnom Penh, Dated.....September 2021

Subject: Invitation to the CASIC's 2nd Annual Regional Workshop with a focus on development of and transition towards Conservation Agriculture and Sustainable Agriculture (CA/SI) and Agroecology (AE) in the region

Dear Participants,

On behalf of the Organizing Committee, I have the pleasure and honour to invite you to the CASIC's 2nd Annual Regional Workshop which will be conducted on 28-29 September 2021 from 2:00pm to 5:00pm. The workshop, with the focus on development of and transition towards Conservation Agriculture and Sustainable Agriculture (CA/SI) and Agroecology (AE) in the region, is jointly being organised by General Directorate of Agriculture (GDA) of the Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia, Center of Excellence for Sustainable Agricultural Intensification and Nutrition (CE SAIN) at the Royal University of Agriculture (RUA), and the Centre for Sustainable Agricultural Mechanization of the United Nations Economic and Social Commission for Asia and the Pacific (CSAM-ESCAP), Agroecology in Southeast Asia (ASEA) the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and Swisscontact.

The objective of the workshop is to provide updates on country policies that promote agroecology, to present new prototypes that are ready for commercial application, to share the recent success, scale, and commercialization story(s), to identify new challenges and opportunities through stakeholder consultations, and to discussion on any regional efforts needed to promote CA/SI and AE in the region.

Due to the travel restrictions and other logistical challenges posed by COVID-19, the workshop will be conducted *virtually*. It is envisaged that the 2-day workshop will be attended by over 50 participants from 10 countries from the region. The outcomes of this workshop will also feed into another workshop on Agroecological and safe food transitions for a green and healthy COVID-19 recovery in the ASEAN region that will be organized by Agroecological and Safe food System Transitions (ASSET) project in October 2021.

Please feel free to be in touch with Vathana Chamroeun, member of the Coordination team for the event (vathana.chamroeun@swisscontact.org, Tel: +855 95 945 985) for further information and arrangements.

I look forward to your participation in this CASIC's 2nd Annual Regional Workshop.

Sincerely yours,

CHAN Saruth
CASIC Executive Board Chair

1. Introduction

Cambodia Conservation Agriculture and Sustainable Intensification Consortium (CASIC) is a multi-stakeholder consortium consisting of organizations who have the incentives to come together and meet on a regular basis to discuss the promotion of Conservation Agriculture and Sustainable Intensification (CA/SI) throughout Cambodia. CASIC is a result of the untiring efforts of the various organizations who are also represented on the executive board, namely, Department of Agricultural Land Resources Management/GDA, Department of Agricultural Engineering/GDA, CIRAD, Centre of Excellence on Sustainable Agricultural Intensification and Nutrition (CE SAIN) of the Royal University of Agriculture, Swisscontact, and Kansas State University. Five ministries, namely the Ministry of Agriculture Forestry and Fisheries (MAFF), Ministry of Water Resources and Meteorology (MOWRAM), Ministry of Environment (MOE), and the Cambodia Chamber of Commerce are involved at the CASIC Steering Committee.

While Conservation Agriculture (CA) initiatives in Cambodia had been focused primarily on cropping system design, soil fertility assessment, agricultural engineering, rather than commercial practices, CASIC attempts to further augment the current work by bringing together other stakeholders to make CA/SI practices more accessible to farmers through the market actors offering the services. CASIC's vision is to be a well-established platform with a vast network of organizations that are working on the CA issues in Cambodia, e.g. markets, research, policies, service provision, and its mission is to establish knowledge management of CA related resources for easy access by smallholder farmers, semi-commercial farmers, and agricultural cooperatives; create an enabling environment to boost investment in CA/SI; promote and enhance CA/SI practices and enhance collaboration between stakeholders. Interventions of CASIC are classified into four main components: (1) Knowledge Management led by the Royal University of Agriculture (RUA), (2) Networking and Collaboration led by Swisscontact, (3) Research led by the Department of Agricultural Land Resources Management (DALRM) in close collaboration with the Center for International Cooperation in Agricultural Research for Development (CIRAD); and (4) Promotion led by Swisscontact.

In 2019, Regional Training Workshop on Appropriate Scale Mechanization for Conservation Agriculture was organised by CASIC in Siem Reap and Bos Khnor Research Station, Cambodia. The 2019 training workshop topics covered mechanization aspects for conservation agriculture, importance of market systems analysis and engagement with the private sector along with policy issues favouring appropriate-scale mechanization for conservation agriculture and needs for future training that could be offered by the Bos Khnor Research Station. During the workshop, there was a suggestion that CASIC would organize an annual regional workshops series with a focus on development of and transition towards Conservation Agriculture and Sustainable Agriculture and Agroecology in the region.

Thus, following the success of the 1st Regional Training Workshop held in 2019 in Siem Reap and Bos Khnor (Cambodia) and contributing to the increasing regional and international interest in the topic, the 2nd Annual Regional Workshop was jointly organized by the General Directorate of Agriculture (GDA) of the Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia, and the Centre for Sustainable Agricultural Mechanization of the United Nations Economic and Social Commission for

Asia and the Pacific (CSAM-ESCAP), Agroecology in Southeast Asia (ASEA) the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and Swisscontact. Due to the travel restrictions and other logistical challenges posed by COVID-19, this 2nd Annual Regional workshop was conducted virtually via Zoom.



1.1 Objectives

The main objectives of the 2nd Annual Regional Workshop were to:

- Provide updates on country policies that promote CASI and agroecology;
- Present various machinery prototypes that are ready for commercial application;
- Present success, scale and commercialization story(s);
- Identify new challenges and opportunities through stakeholder consultations, and
- Discuss on any regional efforts needed.

1.2 Workshop Participants

The workshop was attended by 141 participants from over 38 different countries. The participants were researchers and university professors (28.4%), NGO staff (22%), government officials (15.6%), employees from development partners and UN Agencies (11.3%), university students (8.5%), and others [i.e., private firms, farmer organizations, freelancers, etc.] (22.7%).

2. Workshop methodology

This 2nd Annual Regional Workshop was organised in a two-half-day meeting where the project teams and partners gathered and met over Zoom video conference. This virtual workshop provided an opportunity for project teams, partners and relevant key stakeholders to highlight each country's updates and provide updates and lessons learnt on progress of their work around supporting CA/SI research and scaling. The presentations made during the workshop were well prepared and of high quality. Time for discussions and Q&A were allocated at the end of each set of presentations, followed by each day recap. The presentations and discussions gave the workshop participants a comprehensive overview of the Conservation Agriculture and Sustainable Intensification, as well as an understanding of some of the challenges encountered, opportunities emerged and regional efforts around Conservation Agriculture and Sustainable Intensification, and agroecology agenda. The below were the workshop organising outline.

Day 1 covered:

- Welcoming and opening remarks
- Session 1: CA/SI status in ASIA
- Session 2: Addressing technical challenges related to CA/SI broad-scale adoption

Day 2 covered:

- Session 3: Managing diversity in CA/SI systems
- Session 4: Driving CA/SI dissemination process
- Session 5: Support by development partners on enabling CA environment and consultative discussion on the workshop
- Closing remarks

3. Workshop outcomes

3.1 Welcoming and opening remarks



Welcoming and opening session laid the foundation for the workshop. This session was chaired by Mr. Rajiv Pradhan, Country Director of Swisscontact Cambodia. Mr. Pradhan firstly welcomed all participants and partners who participate in this 2nd Annual Regional Workshop on Conservation Agriculture and Sustainable Intensification, and provided a comprehensive introduction of the workshop; including workshop concept and organisation, workshop objectives, workshop linkage (to Agroecological and Safe food System Transitions project long with UNESCAP and the ASEAN secretariat in early November 2021), workshop participants, workshop agenda and other important logistics.



Mr. Punthea HO, Deputy Director of the General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries of Cambodia and Vice Chair of CASIC Executive Board, gave a warm welcoming remark during he pointed out that agriculture is one of the main drivers of Cambodia's economy, food security and job. But, agriculture has also contributed to several big problems such as climate change, natural resources depletions and so on. Conservation Agriculture and Sustainable Intensification is a pathway of doing farming in a way that it minimizes those adverse effect causes. So, today's workshop is well linked to the Royal Government of Cambodia's framework. He ended his speech with his sincere welcome to distinguished national and international guests, ladies and gentlemen, along with his wishes for the workshop and discussion to be fruitful and successful.



Dr. Li Yutong, Head of Centre for Sustainable Agricultural Mechanization of the United Nations Economic and Social Commission for Asia and the Pacific (UN CSAM), delivered the keynote address by showing her great pleasure in joining this regional workshop on Conservation Agriculture and Sustainable Intensification. Dr. Yutong emphasised her sincere appreciation to Cambodia's General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries, and co-organizers of this workshop. On behalf of UN CSAM, we are delighted to be a partnership with CASIC. She highlighted farmers find it so hard and challenging to face several issues, including soil degradation, climate change, etc. Conservation Agriculture (CA) presents a key approach to address those issues and challenges (i.e., soil erosion, soil fertility decline, ...). However, CA itself faces many constraints when it comes to the implementation, especially with availability of machinery and suitability equipment.



HE. Dr. Chan Saruth, Under Secretary of State of the Cambodian Ministry of Agriculture, Forestry and Fisheries and Chair of CASIC Executive Board, began his opening remarks with a warm welcome to distinguished guests, ladies and gentlemen and sincere thanks to workshop supporters and organizers. He pointed out how Cambodia is dealing with agricultural production challenges by implementing a number of measures and practices, including adopting CA/SI approach since 2004; and sincerely thanked many development partners and collaborators who have joined Cambodia's CI/SI initiatives and transitions over the last two decades or so. He encouraged all participants to actively share knowledge and experience, to bring up all technical challenges and to discuss the way forward to addressing those challenges. With these remarks, he officially declares this 2nd CASIC Regional Workshop open and wishes you all fruitful deliberations.

3.2 CA/SI Status in Asia: Country updates

Conservation Agriculture and Sustainable Intensification (CA/SI) presents to a technically viable, sustainable and economic alternative to current food production challenges and threats; including depletion and losses of natural resources and biodiversity, soil degradation caused by unfriendly farming practices, and increasing pollution from the use of fertilizers and pesticides. Adoption of CA/SI practices has led to a reversion of this downgrading process, and introduced a new way of producing sufficient, safe and nutritious food to meet demand of a fast-growing population, while protecting the environment. There is an increasing attention of CA/SI adoption around the world, including in ASIAN countries. This session, therefore, aimed to provide a sense of country updates and to share some success stories around support and implementation of CA/SI transitions. Showcase presentations of three countries including Cambodia, China and India were given in this Session 1. This session was facilitated by Mr. Anshuman VARMA, Deputy Head of the Centre for Sustainable Agricultural Mechanization (CSAM) of the Regional Institution of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) in Beijing.

Facilitator		
	<p>Mr. Anshuman Varma, Deputy Head of the Centre for Sustainable Agricultural Mechanization (CSAM) UNESCAP</p>	 2:30 PM – 3:30PM (60 mins)
Speakers		
 <p>Dr. SENG Vang (Ph.D.) Director of Department of Agricultural Land Resources Management (DALRM), Ministry of Agriculture, Forestry and Fisheries (MAFF), Cambodia</p>	 <p>Dr. Li Hongwen (Ph.D) Professor, Changjiang Scholar, China Agricultural University; Director of Conservation Tillage Research Center (CTRC), Ministry of Agriculture and Rural Affairs (MOA), P.R.C</p>	 <p>Dr. ML Jat Principal Scientist/Systems Agronomist and Sustainable Intensification Strategy Leader for Asia & North Africa</p>

FIGURE 1. UPDATES OF CONSERVATION AGRICULTURE AND SUSTAINABLE INTENSIFICATION (CA/SI) IN ASIA

3.2.1 Cambodia's Country Updates

Dr Vang SENG, Director of Department of Agricultural Land Resources Management, Cambodian General Directorate of Agriculture of the Ministry of Agriculture, Forestry and Fisheries, delivered a presentation entitled "Current Status of CA/SI in Cambodia". Several key updates shared during the talk included a quick overview of country context and agriculture, CA/SI transitions, CA/SI R4D, CA/SI education and training, CA/SI extension model, exploring CA/SI market, and CA/SI institutionalization support and promotion. It appeared that the country had started CA/SI research work since 2004, then gradually moved towards R4D, strategic development and adoption promotion (Figure 2).

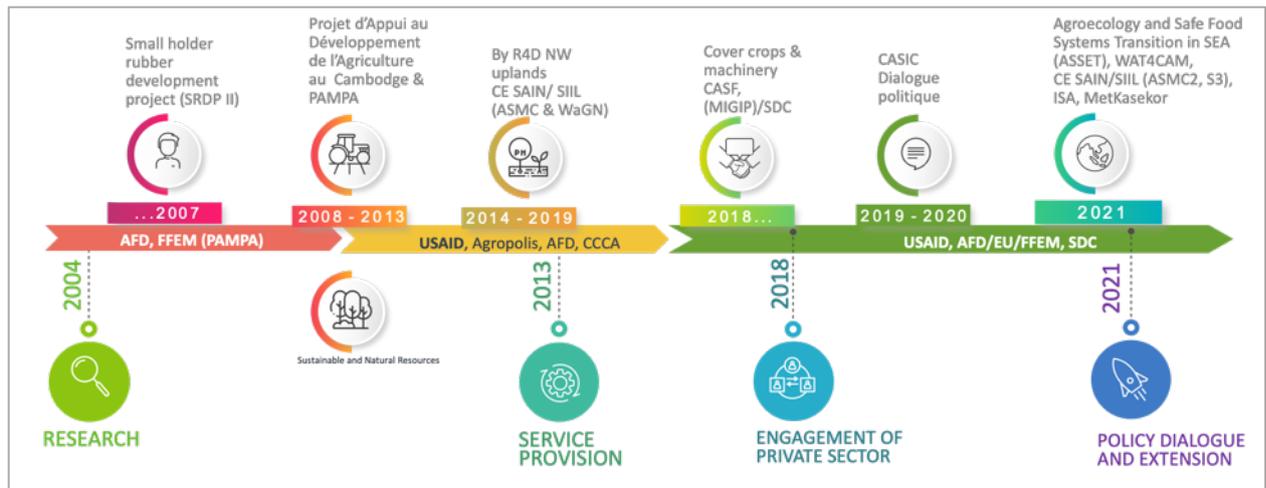


FIGURE 2. INITIATIVES TOWARDS THE AGROECOLOGICAL TRANSITIONS IN CAMBODIA

Dr. SENG also shared a case of research and development of CA/SI to suit local conditions of Cambodia. After the CA/SI practices were confirmed to be more productive and profitable, they were incorporated in the development programs towards a safe and sustainable food systems (Figure 3). This indicates that the county has been establishing a strong institutionalisation and supporting framework to promote CA/SI across the country.

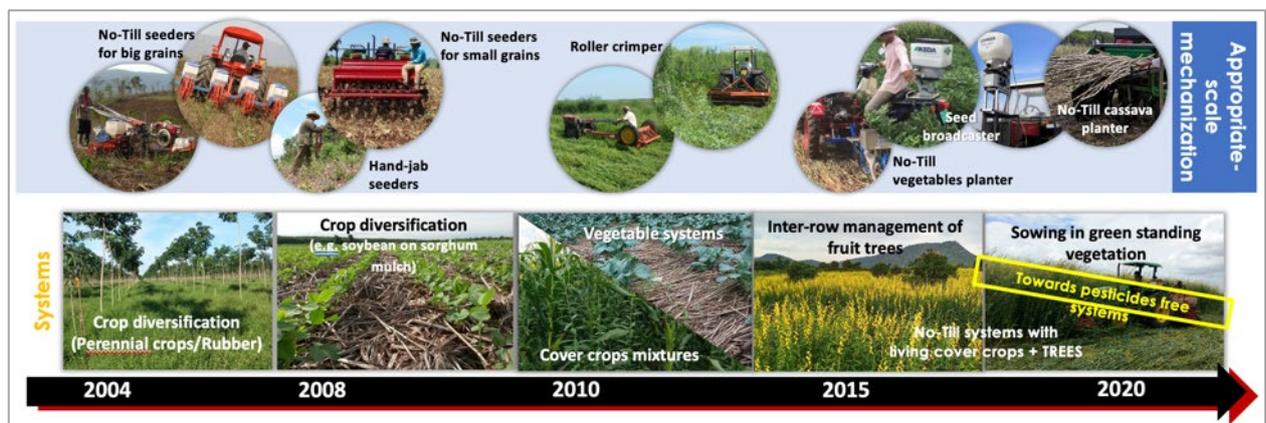


FIGURE 3. ON-GOING RESEARCH AND DEVELOPMENT OF CA/SI TO SUIT THE COUNTRY LOCAL CONDITIONS.

Another fascinating learning from Cambodia country update was the early adopters led extension model called "METKASEKOR" which is an opening market approach for early adopters led extension

service model. METKASEKOR focuses on opening the market for private sector investments on sustainable intensification via government agents and the private sector to smallholder farmers in Cambodia. Figure 4 presents the key steps of the METKASEKOR extension model.



FIGURE 4. METKASEKOR EARLY ADOPTERS' EXTENSION MODEL.

The following are key takeaways drawn from this presentation:

- Historical development phases of CA/SI with well-designed objectives.
- Promoting large scale adoption of CA/SI requires a long-term commitment and participation from governments (country and region), development partners, private sector, and farmers.
- Well-established institutionalisation, supporting policy and framework, and extension are vital ingredients for promoting a successful CA/SI transition.

3.2.2 China's Country Updates

The talk was delivered by Dr. Li Hongwen, Director of China Institute for Conservation Tillage of China Agricultural University. The title of the presentation was “New Development of Conservation Tillage in China”. The presentation provided a well country overview of SA/SI research, development, promotion, and adoption of CA/SI. Interesting to know that CA/SI research had begun in China since 1992 by groups of researchers; and the CA/SI adoption began to increase dramatically from 2006 after more than a decade of research and promotion efforts (Figure 5).

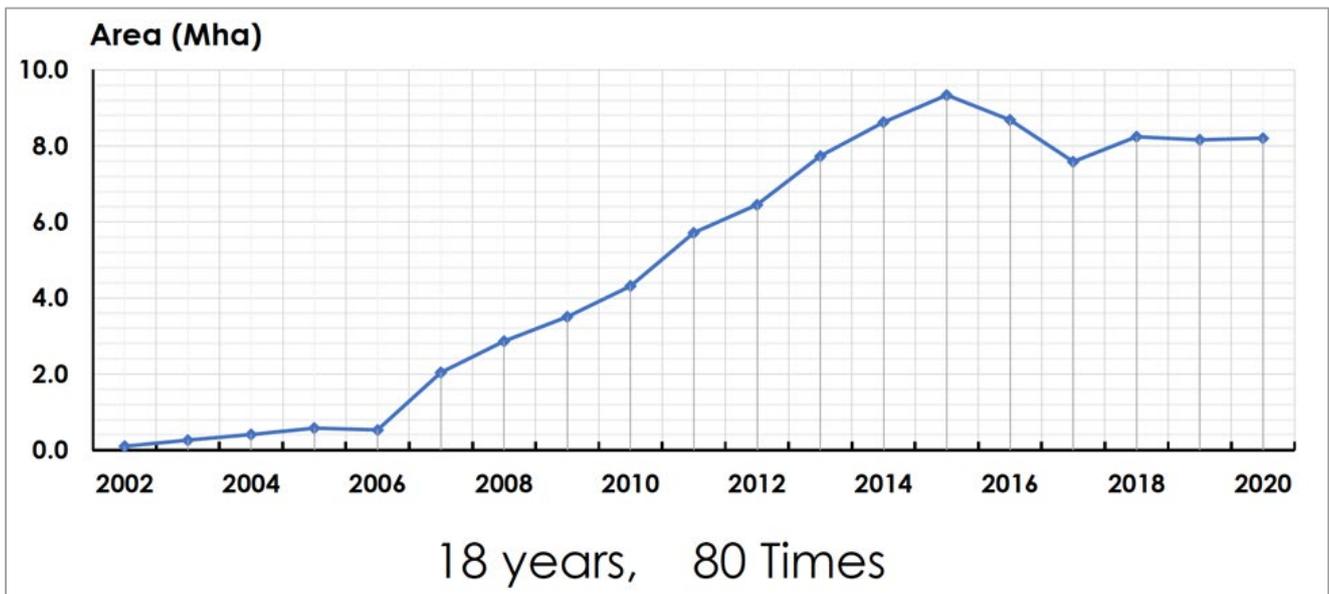


FIGURE 5. CROP PRODUCTION AREAS PLANTED IN MILLION HECTARES BY NO-TILL PLANTERS IN CHINA

Current focuses and efforts are placed heavily on: (1) research and development of high-tech and precision mechanised no-till planters, straw cutting machines, satellite based no-till seeders; and (2) promotion of CA/SI to achieve the Sustainable Development Goals.



Figure 6. Development and advancement of Conservation Agriculture machinery and technology in China.



Figure 7. Conservation Agriculture has been widely spread through different forms of communications and known at all levels from farmers to the highest governmental level.

The following are key takeaways drawn from this presentation:

- CA/SI has been widely known across China and got attention from the highest government level.
- An important public message was set and widely spread to promote CA/SI practices in black soil: Protect black soil as protect pandas.
- CA/SI priorities are set for advanced development in CA technology and machinery and CA/SI adoption promotion

3.2.3 India's Country Updates

Dr ML Jat, a Principal Scientist and Systems Agronomist and Sustainable Intensification Strategy leader for Asia and North Africa, had shared key updates around CA/SI transition from India. During the talk, Dr Jat informed that the first no-till seed drill was developed in the 1990s; and later on, more and more seed drills were continuously built and modified to suit local farming conditions and needs. Since the late 1990s, there were more than 75 CA machinery modifications to the first developed no-till seed drills, as well as newer CA machinery such as furrow openers, low-cost seed metering systems, precision land leveling, and other innovative seeders were developed for the use in the country and exported to over 40 countries. There have been a number of research and training programs implemented to inform policy and educate farmers in order to promote and adopt resilient farming through CA/SI.

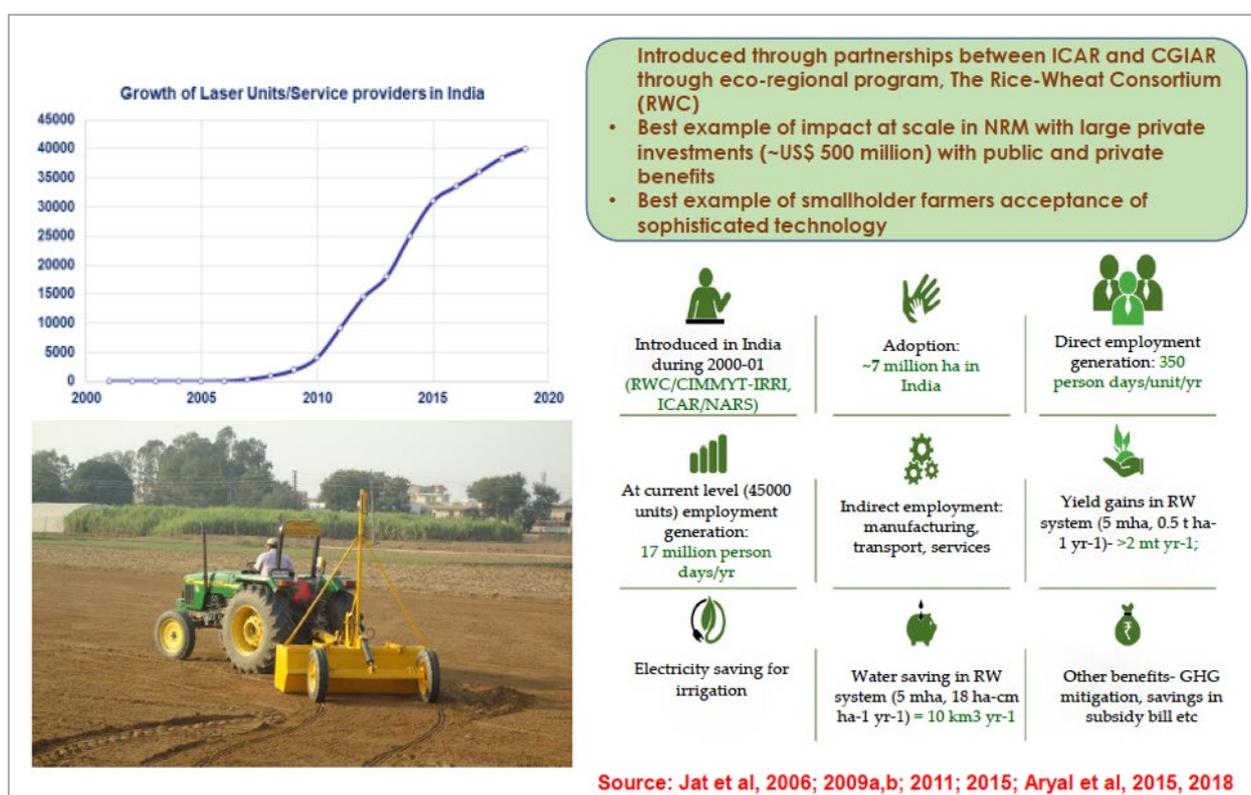


FIGURE 8. LASER ASSISTED PRECISION LAND LEVELING: A SILENT WATER REVOLUTION WITH IMPACT AT SCALE THROUGH SCIENCE AND PARTNERSHIPS

Very positive findings from a recent study conducted to understand farmers' feedbacks on direct seeding of rice in Northwest India were also shared during the presentation (Figure 9).

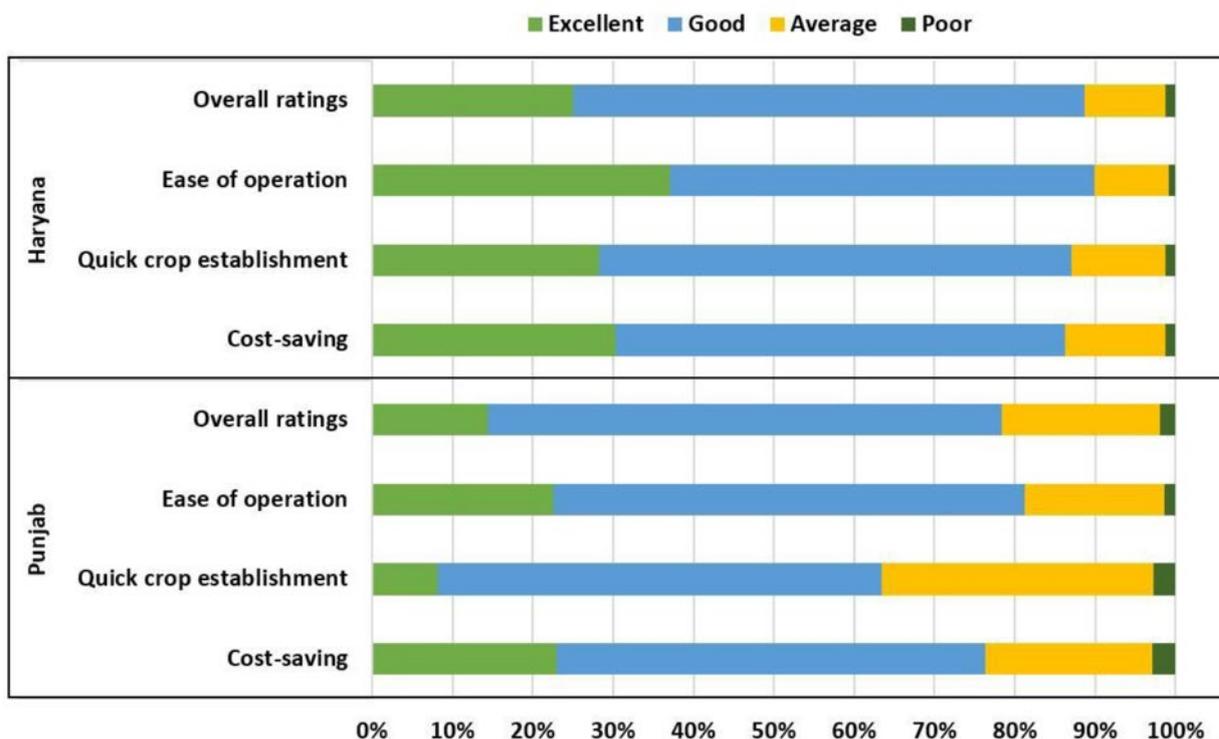


FIGURE 9. FARMERS' RESPONSE ON DIRECT SEEDING OF RICE IN NORTHWEST INDIA (N = 1602)

The following are key takeaways drawn from this presentation:

- Impressed achievements with the development and refinement of CA machinery including laser precision land leveling, no-till planters, direct seeded rice, etc.
- On-going research and demonstration on tillage cropping systems, crop establishment practices, biomass management options, and precision water management methods
- A wide variety of research and promotion programs to inform policy and create awareness among farming communities to increase uptake of CA/SI farming practices.

3.3 Addressing technical challenges related to CA/SI broad-scale adoption

Conservation Agriculture and Sustainable Intensification (CA/SI) introduces an alternate pathway to sustainable intensification of farming, and it generally differs from current farming practices which are based heavily on intensive tillage and high chemical inputs that often interrupt ecosystem functions. The CA/SI incorporates several seemingly counter-intuitive and often unrecognised elements that instantaneously enhance soil health, productivity, and ecosystem services. Experiences across many countries have shown a great deal of significant constraints preventing broad-scale adoption of CA/SI. This session, therefore, aimed at exploring opportunities and pathways to address technical challenges in relation to CA/SI broad-scale adoption. Three case studies on plant material, promoting mechanization and bio-products were presented in this session. This session was chaired by Dr Pascal Lienhard, Researcher of CIRAD.

Facilitator		
	Dr. Pascal Lienhard , Researcher of CIRAD	 3:40 PM – 4:40PM (60 mins)
Speakers		
 Dr. Florent Tivet , Researcher of CIRAD and Technical Advisor of Department of Agricultural Land Resources Management (DALRM)	 Mr. Madhusudan Singh Basnyal , Independent Consultant, Agricultural Mechanization Specialist for TCP/FAO-Nepal	 Dr. Lionel Moulin , microbial plant ecologist and research director at IRD (French National Research Institute for Sustainable Development)

FIGURE 10. SESSION 2: ADDRESSING TECHNICAL CHALLENGES RELATED TO CA/SI BROAD-SCALE ADOPTION.

3.3.1 Cambodia: Plant Material

Dr Florent TIVET from CIRAD had provided a comprehensive talk on *Cambodia Experience on Plant Material*. His presentation covered the main functions of cover crops, example of cropping systems, an emphasis on the genetic bank of cover crops that is preserved at the Bos Khnor CA Station, and steps forward to foster the uptake of cover crops and plant diversity. There has been a long-term research, development, promotion of cover crops and recent involvement of private sector into this value-chain. Figure 11-13 provide some perspectives of the three pillars of Conservation Agriculture, functions of cover crops and field activities tested in Cambodia.



FIGURE 11. THE THREE PILLARS OF CONSERVATION AGRICULTURE TESTED IN CAMBODIA.



FIGURE 12. FUNCTIONS OF COVER CROPS TESTED IN CAMBODIA.

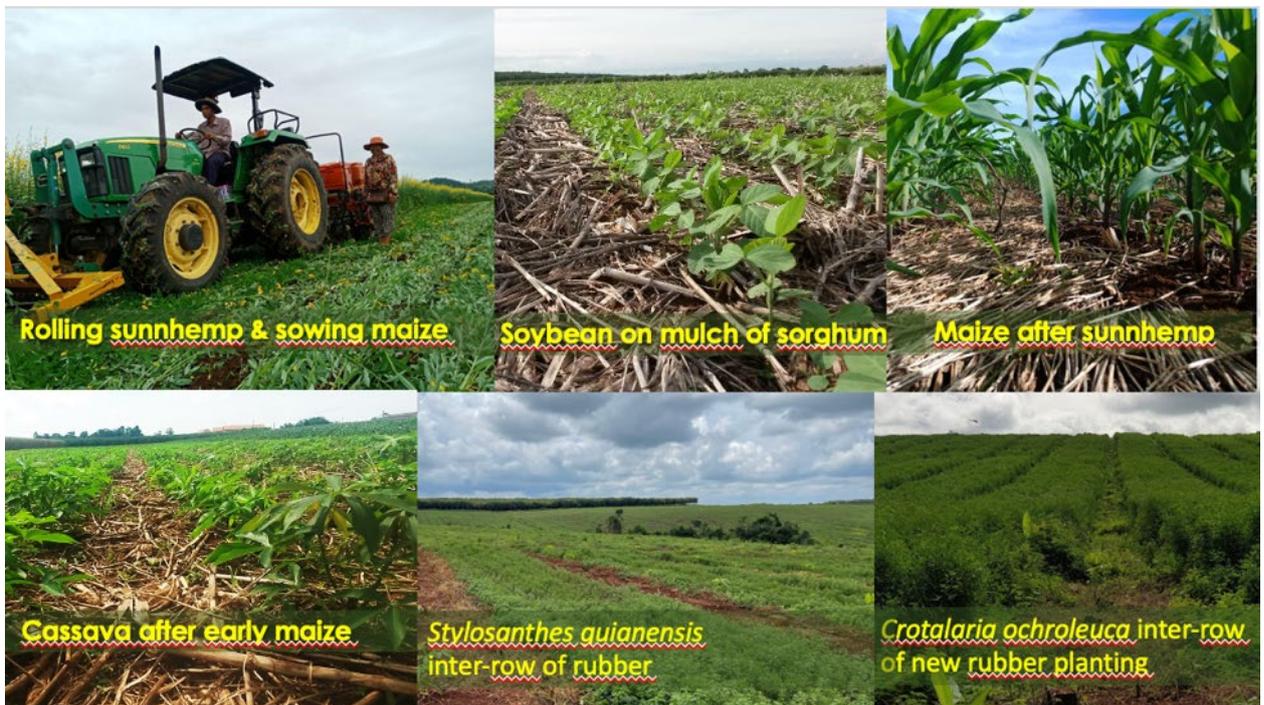


FIGURE 13. A DIVERSIFIED USE OF COVER CROPS WHICH INCLUDE ANNUAL AND PERENNIAL CROPPING SYSTEMS IN CAMBODIA.

The following are key takeaways drawn from this presentation:

- Significant benefits from cover crops: improving soil health, integrated weed management, gaining additional income from cover crop seed production; and gaining benefits in terms of adaptation and mitigation.
- No-till sowing along with use of cover crops represent among the best options to adapt farming systems to climate change while mitigating its impacts.
- There is a need to recognize within a national portfolio the genetic bank of cover crops that is currently preserved at the Bos Khnor Station and shared with farmers communities. This recognition is also a key element to facilitate the engagement and investment of private companies and foster the dissemination nationwide.

3.3.2 Nepal: Promoting Mechanisation

From Nepal, Mr Madhusudan Basnyat, an Independent Consultant of FAO-Nepal and a Former Deputy Director General of Nepalese Department of Agriculture, presented his talk on Nepalese Experience in Promoting Mechanization for Conservation Agriculture and Sustainable Intensification. The main focuses of his talk were: policies and strategies promoting mechanisation for CA/SI; technology used in different agroecological zones; CA/SI promotion experience; and constraints and challenges associated with adoption and update of the CA/SI.



FIGURE 14. NEPALESE EXPERIENCES ON TESTING AND PROMOTING CA MACHINERY AND PRACTICES IN ASSOCIATION.

The CA/SI concepts and practices were firstly introduced to the country in the mid 1990s; and since then, the country has been working on developing and refining various CA machinery including minimum tillage power tillers and 4-wheel tractors for seed drills, no-till planters, raised bed planters,

laser land levellers, etc. There have been quite a number of research trials, field demonstrations and trainings conducted to demonstrate and disseminate CA/SI farming technologies and practices. While promoting CA/SI transition, the country experienced a wide variety of constraints and challenges such as low investment and inconsistent support from public sector in promoting CA/SI, low funding for CA/SI research, development and promotion, poor linkages among various relevant sectors in supporting and operating CA/SI transition, difficult to change people farming mindset, subsistence farming operated in small farms, limited access to specialised equipment and machinery to implement CA/SI, and so on.

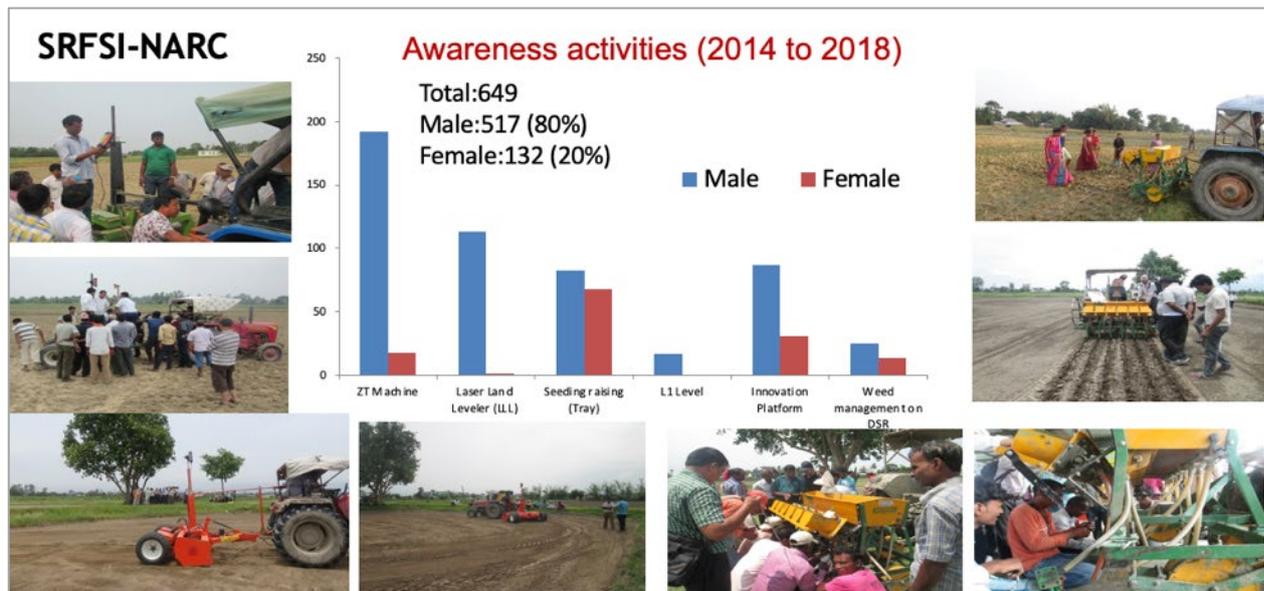


FIGURE 15. NEPALESE EXPERIENCES ON PROMOTING CA/SI.

The following are key takeaways drawn from this presentation:

- CA machinery and practices need to be adjusted to suit local specific context and agroecological zones.
- Developing effective linkages and collaboration with a range of relevant stakeholders is the key to accelerate large-scale CA/SI adoption.
- Farmers often need to scarify the losses of crop yield and revenue in the first 5 years of adopting CA/SI practices. Thus, the government should assist farmers financially in the first 5 years to help their CA/SI transition.

3.3.3 Regional Experience: Bio-Products

The last talk of the Day 1 session was on bio-products and their roles for sustainable agriculture presented by Dr Lionel Mounlin, a Microbial Plant Ecologist and Research Director at IRD (French National Research Institute for Sustainable Development). From this presentation, we learned about bioproducts which include biofertilizers and biocontrol agents. Bioproducts can be living microorganisms, or products derived from microbe and plant compounds. We also learned about bioproducts mode of action (Figure 16), bioproduct research programs, and their regulations for use in agriculture.

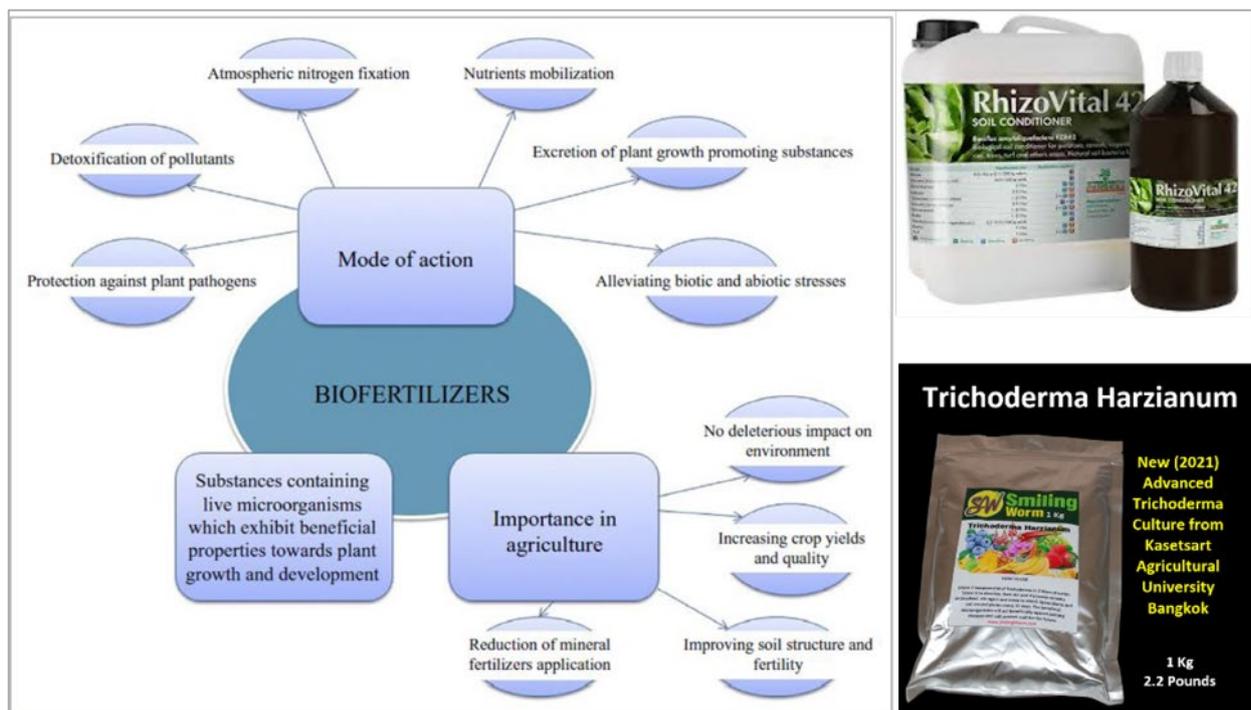


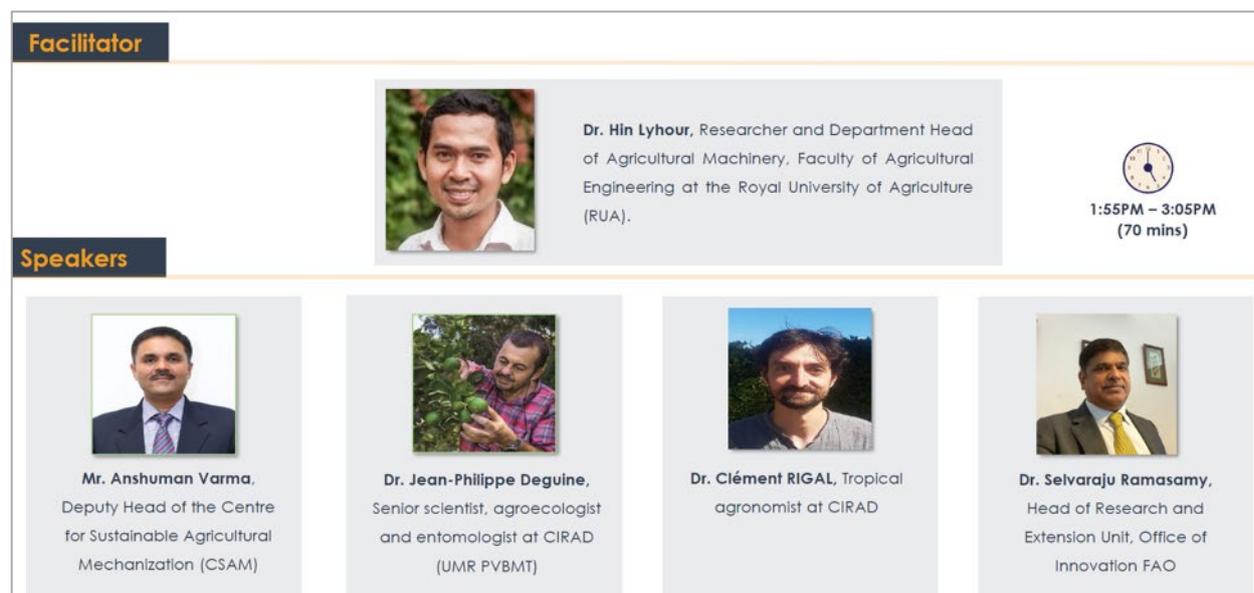
FIGURE 16. BIOPRODUCTS AND THEIR MODE OF ACTION (SOURCE: LEFT: MACIK ET AL., 2020 IN ADVANCES IN AGRONOMY; RIGHT: BIOPRODUCTS SOURCED FROM INTERNET)

The following are key takeaways drawn from this presentation:

- Need new specific regulations for use in agriculture, as living microorganisms biofertilizers are not biocontrol agents or chemical pesticides.
- Need on-going research on bioproducts and better inform farmers on their use of biofertilizers and biocontrol agents.
- Need to develop local markets on biofertilizers.

3.4 Managing diversity in CA/SI Systems

This session examined interactions and relationships of diversity elements in CA/SI systems based on four showcase presentations from regional ASIA. First case study presentation was on integrated straw residue management. Then, the second talk was on promoting vegetal biodiversity in agroecological crop protection; followed by the third one which was about tree integration in farming systems; and the final presentation was about strengthening agricultural innovation systems from sustainable agriculture intensification. This session was facilitated by Dr. Lyhour HIN, Researcher and Head of Agricultural Machinery Department of Royal University of Agriculture (Figure 17).



Facilitator

 **Dr. Hin Lyhour**, Researcher and Department Head of Agricultural Machinery, Faculty of Agricultural Engineering at the Royal University of Agriculture (RUA).


1:55PM – 3:05PM
(70 mins)

Speakers


Mr. Anshuman Varma,
Deputy Head of the Centre
for Sustainable Agricultural
Mechanization (CSAM)


Dr. Jean-Philippe Deguine,
Senior scientist, agroecologist
and entomologist at CIRAD
(UMR PVBMT)


Dr. Clément RIGAL, Tropical
agronomist at CIRAD


Dr. Selvaraju Ramasamy,
Head of Research and
Extension Unit, Office of
Innovation FAO

FIGURE 17. SESSION 3: MANAGING DIVERSITY IN CA/SI SYSTEMS ADOPTION

3.4.1 Regional experience on straw management

Mr. Anshuman VARMA, Deputy Head of the Centre for Sustainable Agricultural Mechanization (CSAM), shared experiences on mechanization solutions for integrated management of straw residue in Asia-Pacific. It was highlighted that ASIA is the largest producer of crop residue, with annual production of straw residue from rice alone amounting to around 600-800 million tonnes. Managing crop residue through burning is a common practice in the region which leads to adverse effects on soil health, air pollution, public health hazard, transportation disruptions, etc. CSAM is a regional institute of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) dedicated to promoting international cooperation and partnership in sustainable agricultural mechanization. This presentation shared a successful case study about application of farm machinery and best practices for sustainable straw management. Figure 18 – 10 give an overview of technical modes of straw utilization as fertiliser and animal fodder.



FIGURE 18. TECHNICAL MODE OF RETURNING STRAW BACK TO THE FIELD. (PICTURES COURTESY CHINA AGRICULTURAL UNIVERSITY)



FIGURE 19. TECHNICAL MODE OF CONVERTING STRAW AS FODDER. (PICTURES COURTESY CHINA AGRICULTURAL UNIVERSITY)

The following are key takeaways drawn from this presentation:

- Burning of straw residue poses an important challenge to CA/SI and to nature positive production
- CSAM-ESCAP is making efforts via its regional initiative on integrated straw management towards a sustainable, circular model of using straw residue.
- Agricultural machinery can provide sustainable solutions to address residue burning but local adaptation, community engagement, capacity building and regional cooperation are critical.

3.4.2 Promoting vegetal biodiversity in agroecological crop protection

Dr Jean-Phillippe Deguine, Research of CIRAD and Can Tho University, delivered a comprehensive talk on promoting vegetal biodiversity in agroecological crop protection. Given the current crop protection of high dependence on the use of pesticides which causes significant damages to the agroecosystems and the environment, increasing the capacity of natural pest control through promoting biodiversity is critically important. From this presentation, we understood the importance and modes of vegetal diversification agroecological crop protection; we learned the five major diversification practices in cropping systems, including agroforestry, intercropping, variety mixtures, crop rotation and cover crop systems; we learned various challenges and requirements for vegetal diversification promotion, and so on.



FIGURE 20. ASSOCIATION BETWEEN VEGETAL BIODIVERSITY AND ANIMAL BIODIVERSITY. AS THE VEGETAL BIODIVERSITY INCREASES, THE ANIMAL BIODIVERSITY ALSO INCREASES.

The following are key takeaways drawn from this presentation:

- Plant diversification improves natural crop protection against pests

- Management of vegetal diversity in agroecological systems is more complex than the conventional systems
- Need for a socio-ecological and technical accompaniment and policy support during the transition period

3.4.3 Tree integration in coffee farming systems

Monoculture production has become less attractive to farmers due to long-term unsustainability in terms of productivity and profitability. We observed transitions have already been taking place, and fruit trees become the most favourable crops (Figure 21). The key question is how to best guide these ongoing transitions – and that was the key theme of the presentation given by Dr. Clément RIGAL, Tropical agronomist of CIRAD.

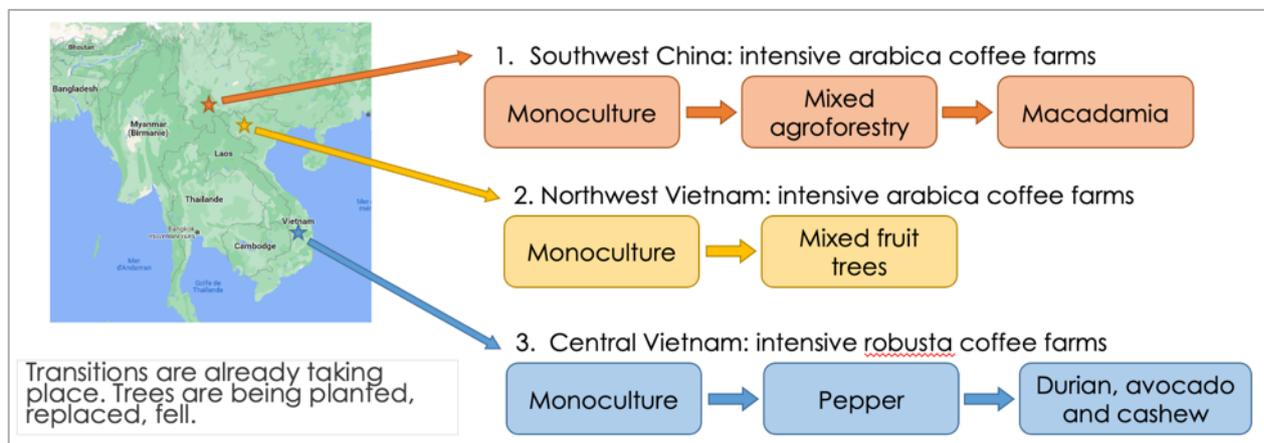


FIGURE 21. EXISTING FARMING TRANSITIONS. FARMERS ADAPT THEIR FARMING SYSTEMS TO CHANGING CONDITIONS (I.E., PRICE INCENTIVES, ENVIRONMENTAL ADAPTATION, ETC.).

When considering incorporating trees with coffees, we need to be able to identify other important services that the trees can provide. These following questions should help guiding the ongoing transitions:

- Which services are the most important and/or relevant?
- What are the tree species, arrangement and management that provide additional benefits to the current farming systems?

It should be mentioned that we cannot avoid competition; but we can identify and avoid barriers and incompatibilities. The competition might lower coffee yield; it may be okay if the total output balances the coffee loss. It is also important to fine-tune the existing system through improving spatial design and improving resource use efficiency.

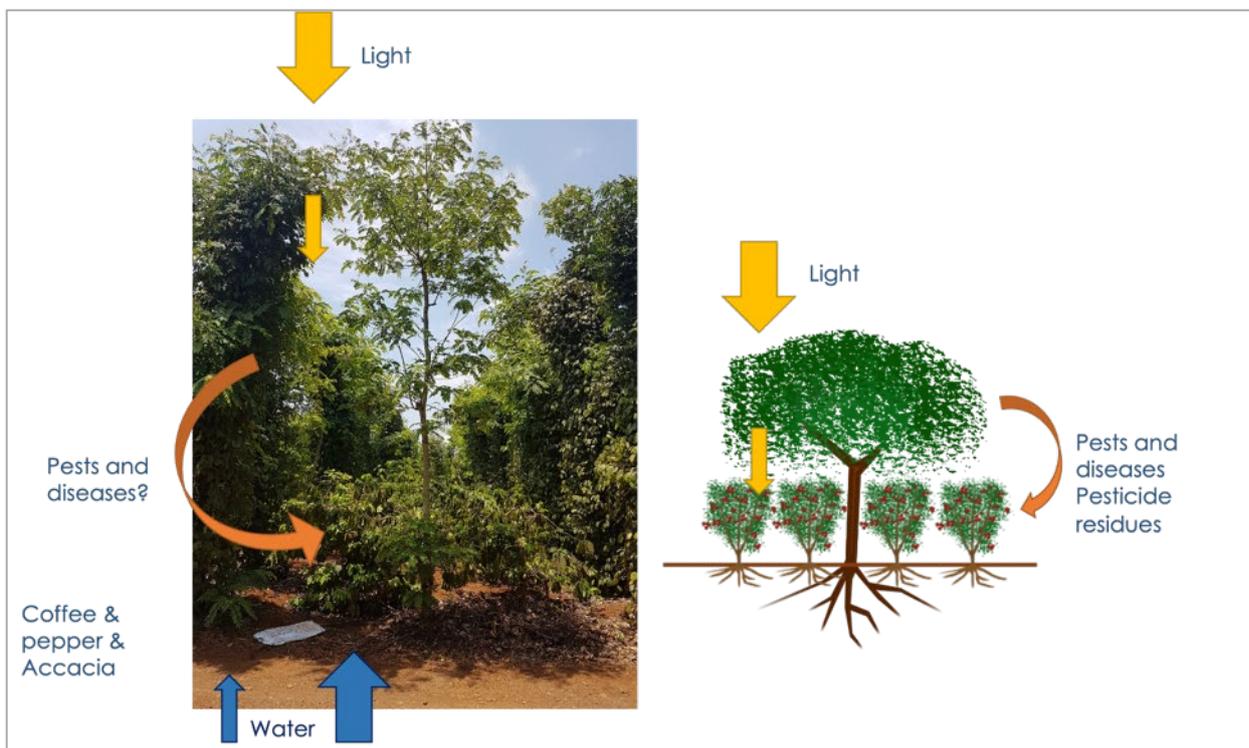


FIGURE 22. INCORPORATING FRUIT TREES WITH COFFEES

The following are key takeaways drawn from this presentation:

- Environmental services are important, but they are only part of the solutions
- Guiding/accompanying the existing transitions rather than pushing for entirely new systems
- A more sustainable coffee farming system can be coffees planted with a mixture of fruit trees for economic performances & economic resilience, plus other tree species for locally important ecosystem services

3.4.4 Strengthening Agricultural Innovation Systems

Dr. Selvaraju Ramasamy, Head of Research and Extension Unit of FAO, started his talk by defending *Agricultural Innovation* and *Agricultural Innovation Systems* as below:

Agricultural Innovation: The process whereby individuals or organizations bring existing or new products, processes and forms of organization into social and economic use to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability, thereby contributing to food and nutritional security, economic development and sustainable natural resource management.

Agricultural Innovation Systems: A network of actors or organizations, and individuals, together with supporting institutions and policies in the agricultural and related sectors, that brings existing or new products, processes, and forms of organization into social and economic use. Policies and institutions (formal and informal) shape the way that these actors interact, generate, share and use knowledge, as well as jointly learn.

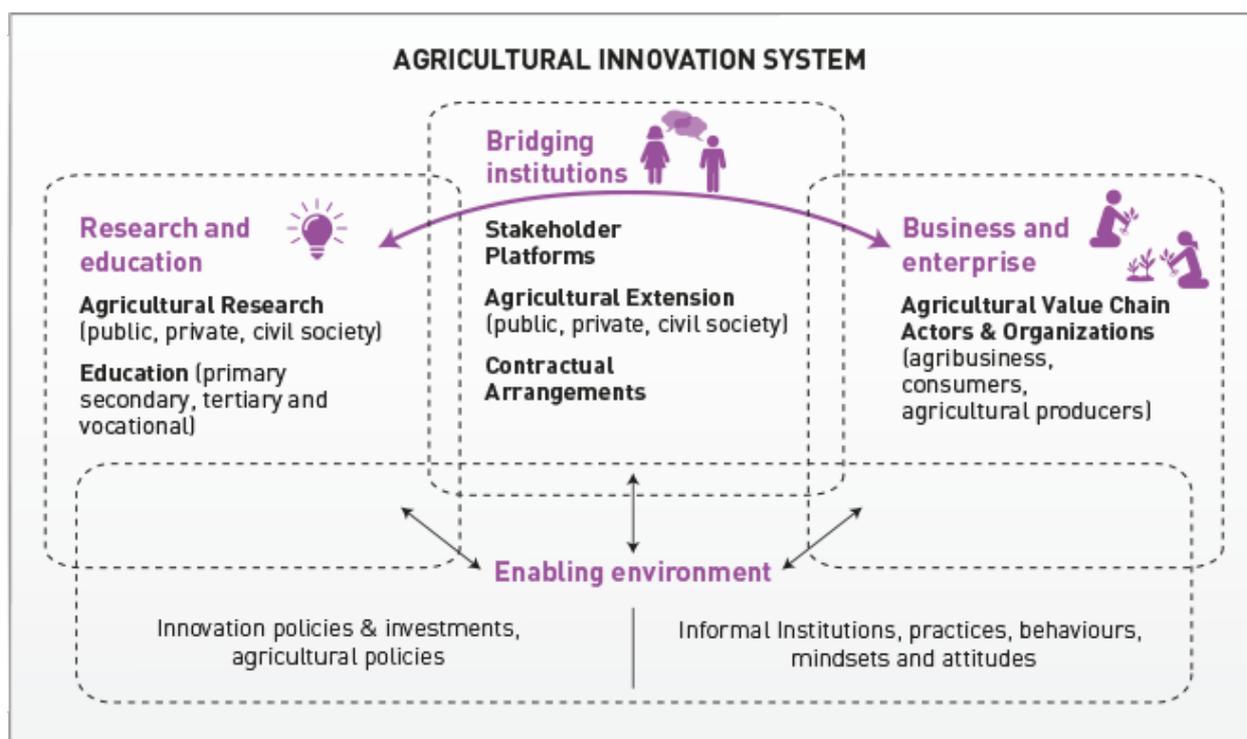


FIGURE 23. SUSTAINABLE TRANSFORMATION OF AGRIFOOD SYSTEM NEEDS INNOVATION SYSTEM APPROACH BY INTEGRATING DIFFERENT ELEMENTS TOGETHER.

This presentation was to highlight research findings from Cambodia and Laos associated with promoting Agricultural Innovation System (AIS) for sustainable agriculture intensification. The below are the key takeaways from the talk.

Key learnings from Cambodia:

- *Cambodia has made great strides in strengthening its AIS; e.g., through developing the capacity of the agricultural research system to produce and disseminate new rice varieties and production technologies*
- *Insufficient funding for agricultural research, development and extension coupled with low salaries and no incentive system for research and teaching staff remains a critical issue*
- *Platforms are needed to facilitate better coordination and communication between AIS actors (e.g. agriculture research, higher education, extension and private sector)*
- *A more coherent and supportive policy framework is needed to support agricultural innovation (e.g., facilitate access to credit, update extension policy, etc.)*

Key learnings from Laos:

- Functional capacities of key national institutions and linkages among them need to be strengthened also to facilitate uptake and scaling of sustainable agricultural intensification practices.
- Closer research-extension-farmer collaboration, increased market orientation and a more favorable enabling environment will improve optimal use of human and financial resources,

facilitate agricultural innovation and thus faster and appropriate uptake of sustainable intensification practices:

- Mechanism (e.g., blog, other ICT-based method) to facilitate information delivery and sharing among farmers established at DTEAP
- Farmer Field School (FFS) for participatory research established by NAFRI in cooperation with DTEAP
- Agribusiness curricula tailored to the needs of women and youth, developed and in use by LFN
- Policy dialogue process to strengthen coordination among AIS actors, including DTEAP, NAFRI and LFN

3.5 Driving CA/SI dissemination process

This session aimed to taste and experience different support for CA/SI transition from a few countries of the region. The presentations shared during this session were on an extension model for promoting laser land levelling from Pakistan, carbon funding mechanism pilot project from Cambodia, and supportive policy initiatives from Laos. This session was facilitated by Ms. Lucie Reynaud, ALiSEA and ASSET Coordinator (Figure 24).

Facilitator

 Ms. Lucie Reynaud, ALiSEA and ASSET Coordinator

Speakers


Mr. Mushtaq Gill, founder member of South Asian Conservation Agriculture Network (SACAN).


Mr. Pierre VERNET, French international volunteer working with CIRAD


Mr. Marc Eberle, CEO, SmartAgro Innovative Solutions


Dr. Thatheva Saphangihong, Deputy Director of Department of Agricultural Land Management

FIGURE 24. SESSION 4: DRIVING CA/SI DISSEMINATION PROCESS ADOPTION

3.5.1 Extension model for diffusion of laser land levelling

Mr. Mushtaq Gill, founder member of South Asian Conservation Agriculture Network (SACAN), had shared an experience from Pakistan about an extension model called “Agricultural Service Providers (ASPs) for diffusion of laser technology in Punjab of Pakistan. Farmers commonly level their farmland with draught animals and/or tractors attached with a long piece of wood. These land levelling practices are often not effective, and the field surface is not always flat well. In contrast, a laser land levelling technology is more effective and precise in making a flat surface field. Several substantial benefits of levelling farmland with a laser land leveler include improving crop yields, increasing incomes, saving on water and energy as well as reducing greenhouse gas emissions. To improve the current leveling activities of Pakistan farmers, the country had imported one laser land leveling unit from the US and tested the land leveling with this laser machine. The outcomes from the pilot testing activities were highly positive – and that was where the training and information dissemination began (Figure 25). Currently, there have been around 20,000 laser land levelers being operated by ASPs across Punjab of Pakistan (Figure 26).

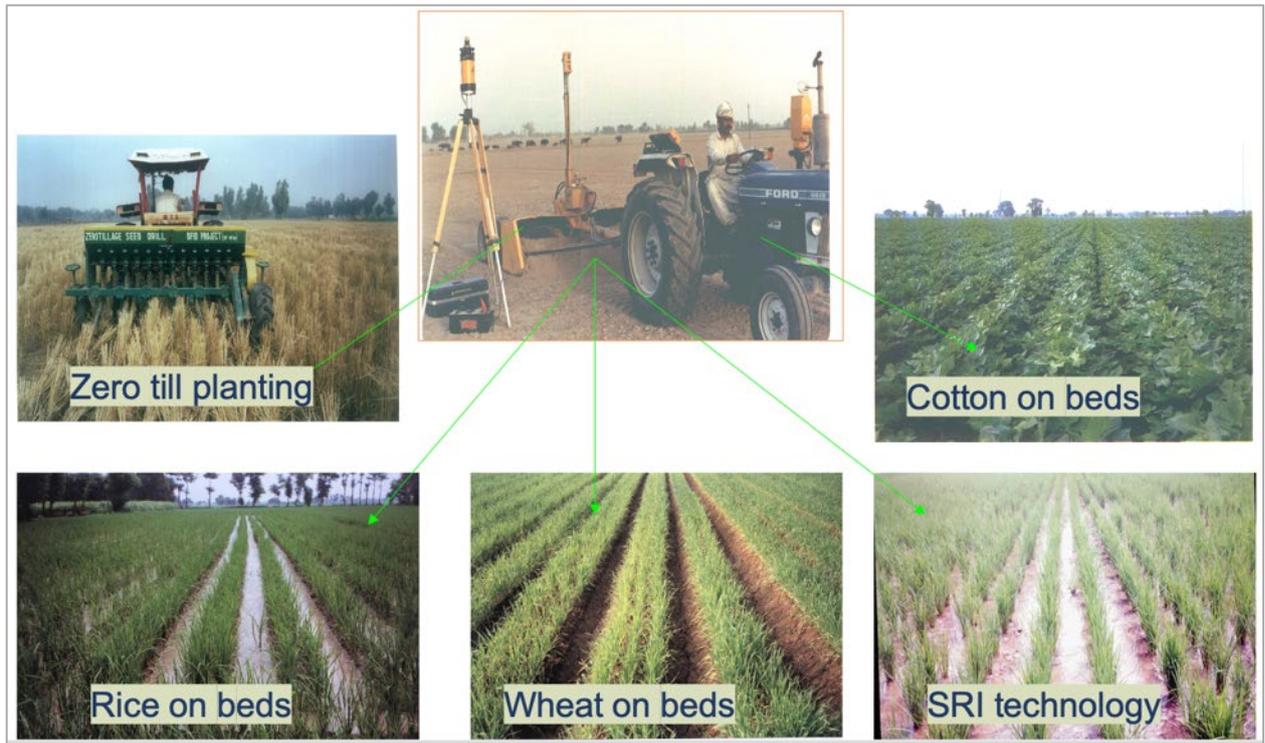


FIGURE 25. LASER LAND LEVELLING TECHNOLOGY: A PRECURSOR AND GATEWAY FOR CA/SI TRANSITION

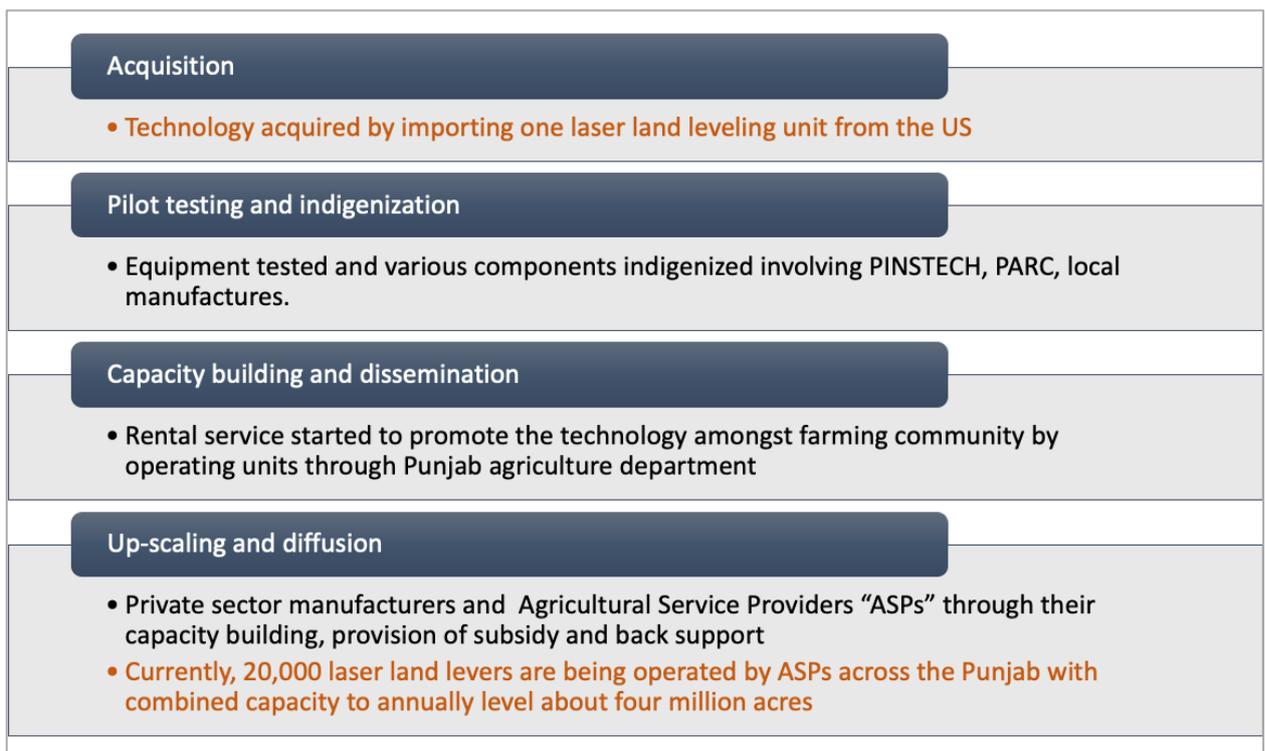


FIGURE 26. EXTENSION MODEL FOR THE DIFFUSION OF LASER LAND LEVELLING TECHNOLOGY IN PUNJAB OF PAKISTAN.

The following are key takeaways drawn from this presentation:

- Capacity building of stakeholders including farmers, ASPs and extension workers is key for successful technology transfer
- It is highly important that ASPs work as a linchpin between the researchers, extensionists, academia, service supply companies and farmers for successful technology transfer
- Supportive government policies through establishing linkages and engagement of civil society, NGOs and creating networks like SACAN in policy implementation, monitoring and evaluation process are critically important

3.5.2 Pilot project to introduce farmers to the carbon market

This was a joined presentation by Mr. Pierre VERNET, French international volunteer working with CIRAD, and Mr. Marc Eberle, CEO of SmartAgro Innovative Solutions; aiming to share an experience about the first Cambodian payment system rewarding farmers for carbon sequestration and ecosystem services production. The talk was divided into two parts:

- Part 1 was to demonstrate Conservation Agriculture as a solution for climate change mitigation and adaptation, as well as for promoting sustainable intensification (Figure 27).
- Part 2 was to introduce the concept of transitioning system for carbon farmers, the voluntary carbon market timeline and carbon certification process, and credit class and component.

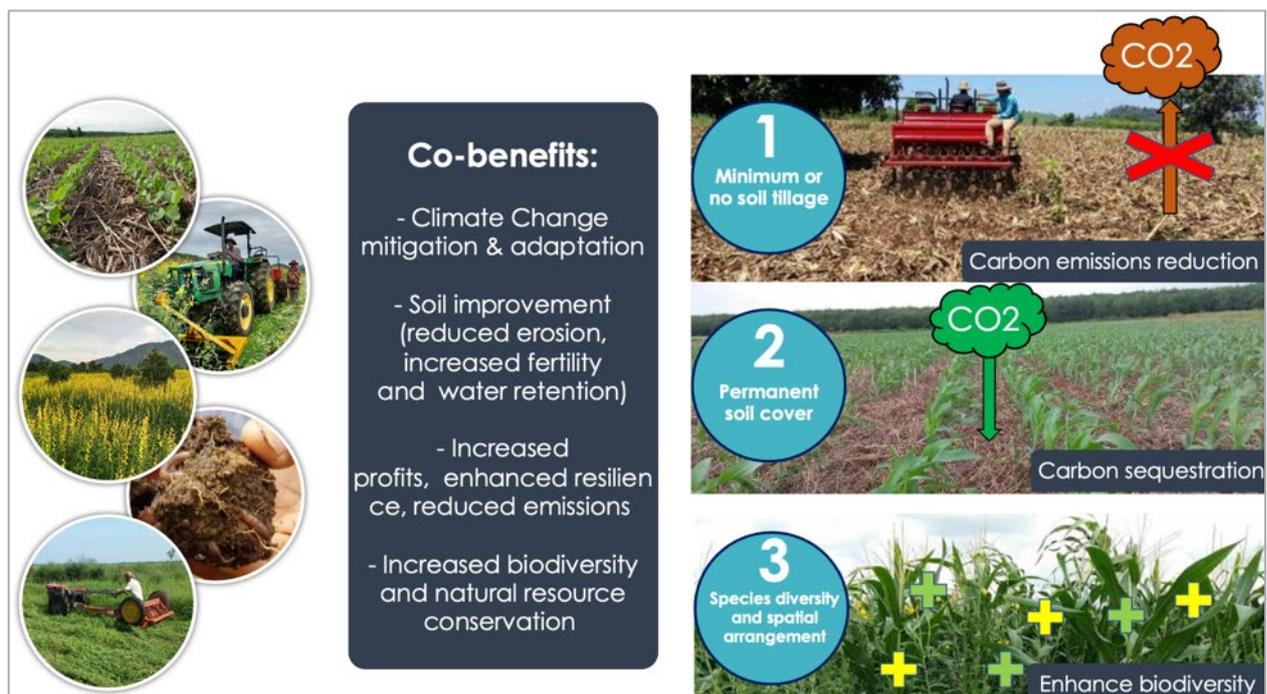


FIGURE 27. IMPACTS AND CO-BENEFITS OF CONSERVATION AGRICULTURE

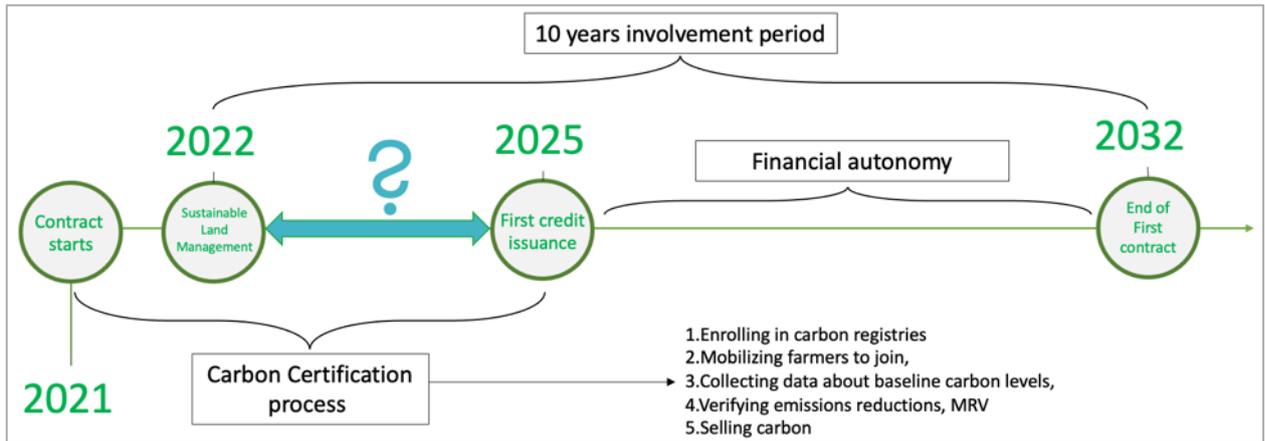


FIGURE 28. TIMELINE AND CARBON CERTIFICATION PROCESS OF THE VOLUNTARY CARBON MARKET.

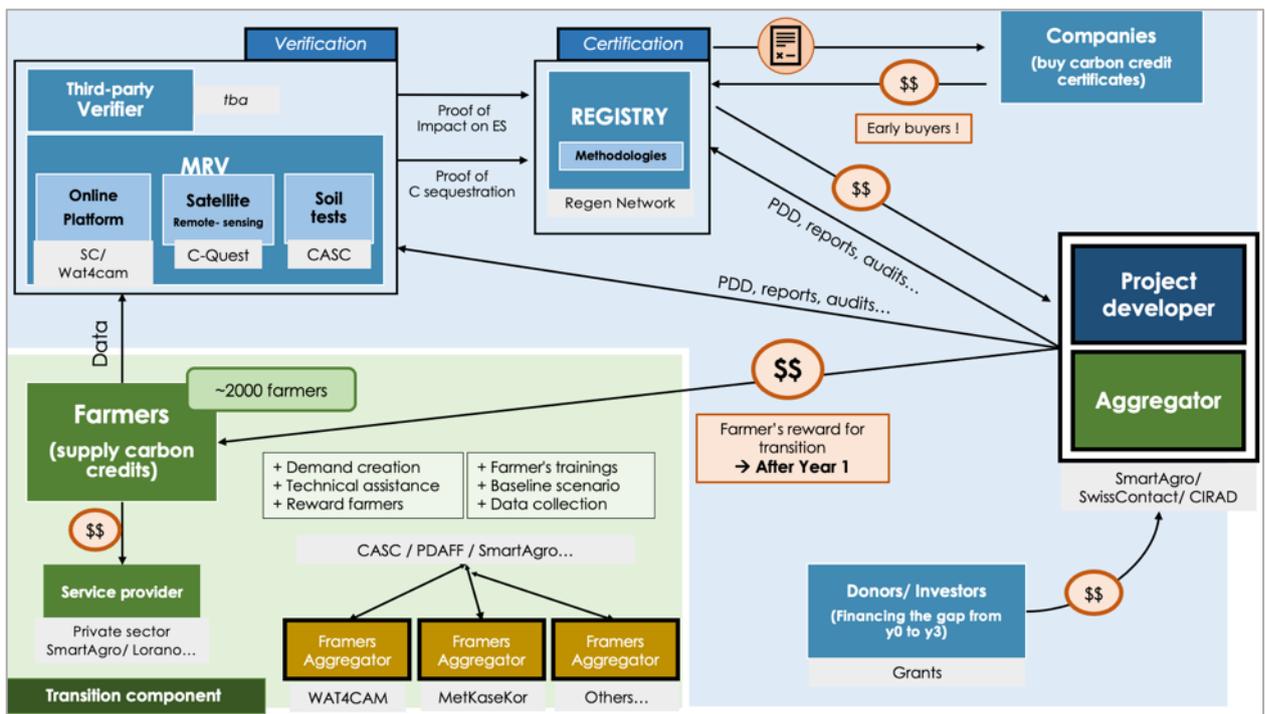


FIGURE 29. CREDIT COMPONENT.

The following are key takeaways drawn from this presentation:

- Land degradation and poor soil management has direct consequences on food security, climate change and livelihoods. Re-designed agriculture can be a solution.
- Transitioning to sustainable soil management increases profits, enhances resilience, and reduces GHG emissions.
- Farmers benefit from an additional revenue stream for carbon sequestration and ecosystem services production.
- Deï Meas (Golden Soil) bridges financing gap and pays farmers already in the first year of transition to incentivize adoption of regenerative practices.

3.5.3 Supportive policies

Dr Thatheva Saphangthong, Deputy Director General of Department of Agricultural Land Management had shared an experience on Lao Initiative for Conservation Agriculture and Agroecology in ASEAN (LICA). In recent years, most of ASEAN members countries agriculture has experienced profound and rapid changes. The joint process of land Conversion (deforestation), new land extension and conventional agricultural intensification has often led to high land degradation and carbon emission.

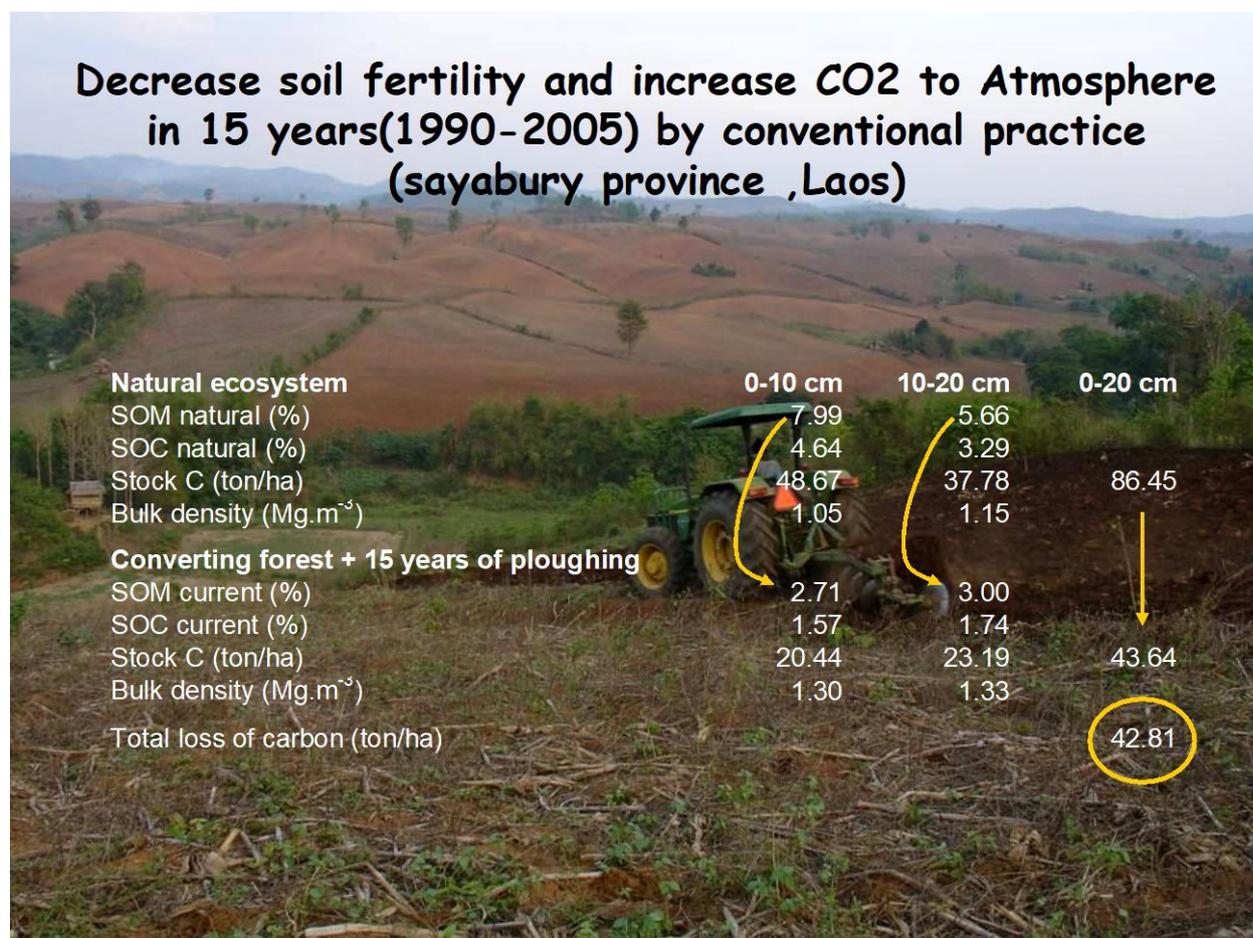


FIGURE 30. SAYABURY PROVINCE OF LAOS: THE JOINT PROCESS OF LAND CONVERSION (DEFORESTATION), NEW LAND EXTENSION AND CONVENTIONAL AGRICULTURAL INTENSIFICATION LED TO HIGH LAND DEGRADATION AND CARBON EMISSION.

In the context of Laos, LICA is contributing to improve livelihoods of farming communities, enhance food and nutrition security, enable for sustainable management of natural resources, and strengthen adaptive capacity to climate change. The following highlight some of the interventions of LICA:

- Co-identifying (project staff, ASWGC and ALISEA members) countries flagships.
- Experimenting research, advisory, policy mechanisms, and awareness methods in flagships, through linking producers, processors, traders, advisers, and consumers.
- Yearly workshops and field visits of LICA country taskforce (national staff of the country + ASWGC members) to monitor flagships' activities.
- Yearly workshop of ASWGC members ("LICA regional taskforce") to monitor and analyze LICA country taskforces outputs and proposals.

- Producing notes and briefs about farming practices, organizational and institutional mechanisms that could be relevant for a scaling out at the ASEAN level.
- Developing training, awareness, and communication supports to support agroecological transition process (social media, forum, networking, video: see <https://ali-sea.org>)



FIGURE 31. LANDSCAPE OF LAOS

Future directions and the way forward

- In 2020, a new project which is funded by AFD and EU, named ASSET, has included a support to LICA, through its policy dialogue sub-component. This project is focused on four ASEAN countries (Cambodia, Laos, Myanmar and Viet Nam). The project will support the Lao government (LICA focal point) in facilitating the four countries documentation and sharing of their innovative policy mechanisms, in order to nurture the LICA process at the ASEAN level.
- Between September and December 2021, the Lao LICA focal point will facilitate documentation of Lao best innovative institutional mechanisms in the country that are supporting agroecology transition, conservation agriculture and safe food systems (“Success and learning stories in policy support to agroecological transition”). These valuable Stories will then be shared and analyzed by a Lao policy task force that will be supported by ASSET project, and that will be facilitated by Lao LICA focal point.
- Before end of 2021, the Lao LICA focal point will set up a coordination process between ASSET policy dialogue focal points from Cambodia, Laos, and Viet Nam, and their respective country LICA focal points. The objective of this coordination will be to help the ASSET and LICA focal points of Cambodia and Viet Nam to document then share their own Success and learning stories in policy support to agroecological transition.

- During the 2022 1st six-monthly period, ASSET and LICA focal points of Cambodia and Viet Nam will launch a selecting then documenting process of the best innovative institutional mechanisms in their own country that are supporting agroecology transition and safe food systems (“Success and Learning Stories for LICA”).
- During the 2022 2d six-monthly period, the documented Success and Learning Stories from these countries will be shared with the LICA focal points of the different ASEAN countries, in order to get their comments and to propose them to select and document their own Success and Learning Stories.
- Then these documented Success and Learning Stories from ASEAN countries will be shared and analyzed in the 42th meeting of the ASEAN Sectoral Working Group on Crops that will be held on 2022.
- During 2023, ASSET and LICA focal points from Laos, Cambodia and Viet Nam will be supported by ASSET project to draw from all the Success and Learning Stories that are collected from ASEAN countries a first proposal of ASEAN guidelines for policy mechanisms that support agroecological transition that will be shared with the other countries LICA focal points.
- In late 2023, Lao LICA focal point will facilitate a collective work between ASEAN countries LICA focal points, in order to analyze and improve the first draft of ASEAN guidelines for policy mechanisms that support agroecological transition.
- The LICA focal points of ASEAN countries will be present together their recommendations on forthcoming ASEAN guidelines for policy mechanisms that support agroecological transition in the 43th meeting of the ASEAN Sectoral Working Group on Crops that will be held on 2023.



FIGURE 32. RICE FARMING LANDSCAPE IN LAOS

3.6 Support by development partners on enabling CA environment

This session aimed to showcase a long-term commitment from AFD in supporting CA/SI transition. In this session, the facilitator was Dr. Florent Tivet, Researcher of CIRAD and Technical Advisor of Department of Agricultural Land Resources Management (DALRM); and the presenter was Mr. Muong Sideth, Unit Head of Agriculture, développement rural, infrastructure, environment Agence Francaise De Development (Figure 33).

Facilitator	 <p>Dr. Florent Tivet, Researcher of CIRAD and Technical Advisor of Department of Agricultural Land Resources Management (DALRM)</p>
Speakers	 <p>Mr. Muong Sideth, Unit Head of Agriculture, développement rural, infrastructure, environment Agence Francaise De Development</p>

FIGURE 33. SESSION 5: SUPPORT BY DEVELOPMENT PARTNER.

Mr. Muong Sideth provided a very clear picture of different support and commitment from FDA for successful CA/SI transition (Figure 34).

The following are the key highlights of AFD long-term financial support for CA/SI transition in Cambodia.

- 1993: AFD establishment in Cambodia
- 1998-2007 (3 phases): Smallholders Rubber Development Projects, that included an agro-ecology component up to 1M€ grant.
- 2004: Support Bos Khnor CA/SI R4D
- 2007 – 2012: An agro-ecological dedicated project “Support to agricultural development (2.5 M€), implemented by CIRAD
- In 2014: AFD commissioned an external evaluation of 15-years AFD’s support in agroecology worldwide including Cambodia. This evaluation stated that agro-ecology is “A courageous and ambitious paradigm shift... Fifteen years of actions by AFD and our partners have represented a considerable effort.... But a questionable approach and mechanism, needs a technical,

methodological and operational synthesis including the communication to the public. Limited but promising future agro-ecological developments and initiatives”.

- 2015 – 2019: Agroecological transition ACTAE (2.5 M€), while in 2018, specific agro ecological practice were dedicated for the 1st time for rubber, before the pursuing this activity in the FORSEA project in 2021 (implemented by CIRAD) dedicated to assessment of climate change impact of natural rubber.
- 2020-2025: ASSET Agroecology & Safe Food Systems Transitions (11.54 M€). An intensive phase of supporting agro-ecology on both research and large-scale development. With WAT4CAM, we are supporting agro-ecological in irrigated rice production, and the dry season diversification for high value-added crop at rice field.
- 2019-2030: WAT4CAM (Water resource and agro-ecological transition): (200 M€): Phase 1 of 86.5 M€ (2020-2025) for supporting the agro-ecological in irrigated rice production, and the dry season diversification for high value-added crop at rice field.
- 2020-2025: Agricultural Value Chain Competitiveness and Safety Enhancement Project ACSEP) (US\$110 M): dedicated to supporting agro-ecological practice in cassava, mangoes, and cashew.
- 2021-2030: RAD4CAM (Rainfed Agriculture): (200 M€): that the 1st Phase of 55 M€ (2022-2027) will be approved later this year, we plan to support agro-ecological practice in territorial development approach for maize and rubber.
- In conclusion, we expected from our agro-ecological partners for a strong partnership around the large-scale development of agro-ecological practice for annual crop (cassava, maize, and soybean) and perennial crop (mango, cashew nut and rubber). It is understood that at least 2 programs WAT4CAM and RAD4CAM will last until 2030 in 4 different phases.
- This year 2021, AFD HQ has commissioned a report on *“Support in the development of a doctrine note: for better integration of the agro-ecological transition into AFD's development projects”* the 1st result will be available in early 2022 and I do believe that the consultant will reach you for inputs.
- After this doctrine note, we will incorporate recommendation, methods in the Phase 2 of WAT4CAM and Phase 1 of RAD4CAM. For those projects/programs, we will try to diversify our partners ADB in case of ACSEP, probable DFAT, KfW in the future. However, one thing that we could assure to our partners that all current and futures projects/programs, EU will be our permanent partners.
- In the final conclusion, time frame of AFD's intervention in agro-ecological transition could be resumed in 2 parts, prior and after 2014. Until 2014 a sporadic support and on-demand based support. After 2014: intensification of supports with special focus on development and dissemination of agro-ecological technique toward a large-scale adoption.

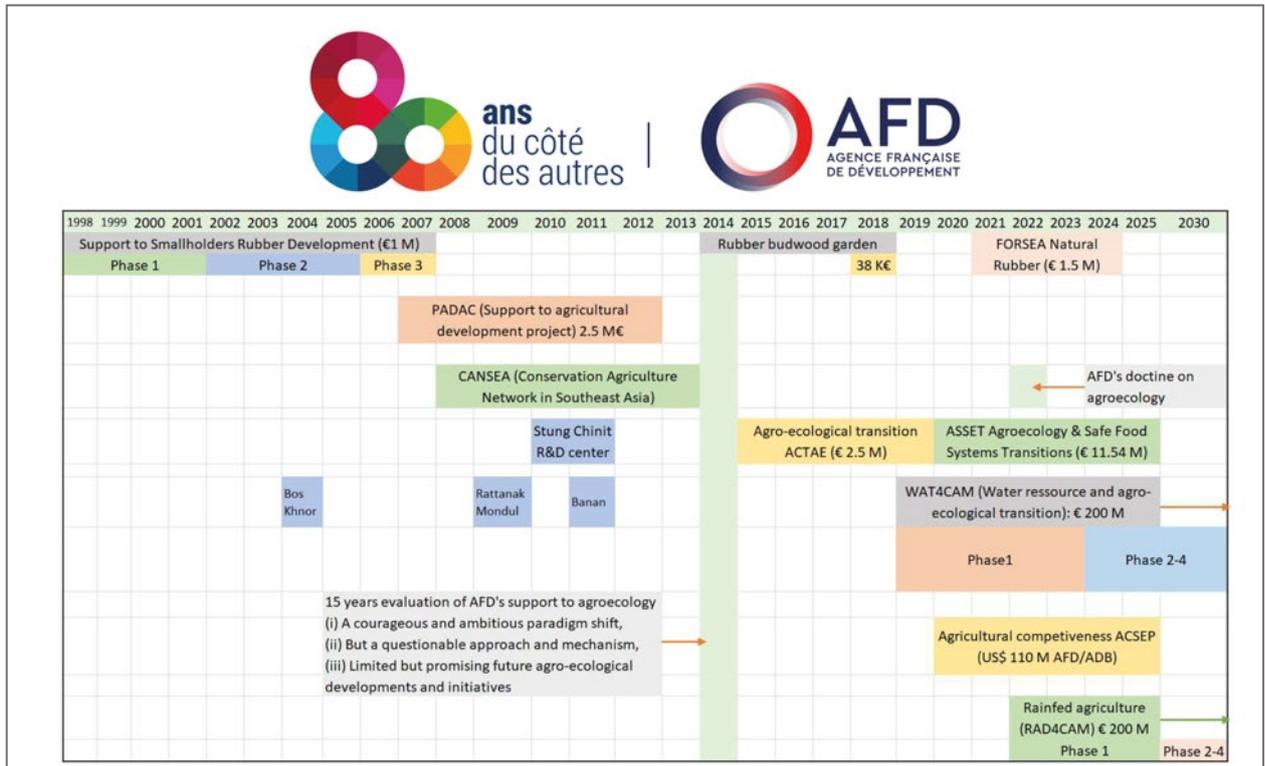


FIGURE 34. FDA'S LONG-TERM SUPPORT FOR CA/SI TRANSITION

3.7 Synthesising workshop outcomes and closing remarks

3.7.1 Synthesising workshop outcomes

Dr. Vang SENG, Director of Department of Agricultural Land Resources Management, Cambodian General Directorate of Agriculture of the Ministry of Agriculture, Forestry and Fisheries, synthesized in great details, and captured every important aspect and key take away messages from each presentation and discussion of the entire workshop.

Session 3: Managing diversity in CA/SI systems adoption

Key learnings:

- Developing policy and institutional support to bring people and actors to work together in interdisciplinary context
- Strengthening functional capacities of key national institutions and linkages among them to facilitate and promote uptake and scaling of sustainable agricultural intensification practices
- Capacity building and regional cooperation (Straw management, crop diversity)

The screenshot also shows a video call interface with five participants and a FAO logo in the bottom right corner.

FIGURE 35. SYNTHESISING WORKSHOP OUTCOMES.

The following highlighted some of the key learnings captured during this summarising session.

- It appears each country has spent decades, great deals of efforts and resources, ... to reach to this level.
- More patience, time, resources, efforts, ... are required to successfully promote large-scale adoption of CA/SI.
- On-going research, refinement and development of specialized equipment and machinery for local specifics
- Developing markets for CA farm inputs (seeds, bio-products, etc.) and machinery development and service contracting
- Fascinating technical processes of converting straw into fertilizer and returning manure to the field
- Developing policy and institutional support to bring people and actors to work together in interdisciplinary context
- Need for a socio-ecological accompaniment and support during the transition period
- Guiding the existing transitions rather than pushing for entirely new systems
- Capacity building of stakeholders is key for successful technology transfer

- Carbon Market: Deï Meas (Golden Soil) bridges financing gap and pays farmers already in the first year of transition to incentivize adoption of regenerative practices
- LICA – Lao Initiative for Conservation Agriculture

3.7.2 Closing remarks



Ms. Melanie Blanchard, Scientific Coordinator of ASSET Project and ASEA Platform Coordinator began her key learning remarks by expressing her warm thanks to all speakers, participants, workshop organiser team and CASIC for organising, contributing, and participating in this workshop. One of her key emphases was on promoting large scale adoption of

conservation agriculture and sustainable intensification does experience several changes; including limited access to resources, suitable farming tools and equipment, appropriate mechanisation, and other bio-products. Ms. Blanchard also highlighted other important areas which require our focused attention and support such as strengthening CA/SI technical and institutional arrangement support systems, on-going support and commitment from various actors including private sector, and so on in order to promote sustainable agriculture practices through Conservation Agriculture and Sustainable Intensification. We also need to promote and support biodiversity to increase functioning of agroecosystems. Building capacity of all stakeholders is critically important for successful transition of CA/SI. She ended her speech with sincere thanks to all participants.



In his closing remarks, H.E Dr. Bunthan NGO started by expressing his great pleasure and honour for being invited to join this regional workshop. He quickly went through all the workshop sessions and commended that we have learned so many important aspects of CA/SI from many countries. He expressed

great appreciation for distinguished guests, supporters, organizers, facilitators, presenters, and participants for supporting, organizing, sharing and participating in this 2nd CASIC regional workshop. He congratulated all for this very successful workshop and looked forward to meeting again in the upcoming events; and wished all safe from Covid 19. He then declared the workshop officially closed.

4. Conclusion and the way forward

Transformation of food production systems with conservation agriculture and sustainable intensification (CA/SI) has developed to a technically viable, sustainable and economic alternative to current food production challenges and threats; including depletion and losses of natural resources and biodiversity, soil degradation caused by unfriendly farming practices, and increasing pollution from the use of fertilizers and pesticides. Adoption of CA/SI practices has led to a reversion of this downgrading process, and introduced a new way of producing sufficient, safe and nutritious food to meet demand of a fast-growing population, while protecting the environment. This regional workshop does enable participants to share and discuss in a great detail of different important aspects of CA/SI research and large-scale adoption. There has been so much to be learned and taken away from this regional workshop. It is clearly shown that transitioning the current farming into CA/SI approach faces a number of different critical problems and challenges, and requires great deals of time, resources and effects. The main conclusion drawn from this workshop is undoubtedly the clear and long-term commitment, enthusiasm, and positive attitudes of relevant stakeholders toward promoting a broader scale CA/SI adoption. The following present a specific conclusion and the way forward.

1. Experience across many countries has shown that wider adoption of CA/SI technologies requires concerted effort of all the stakeholders in the expanded partnership with participatory approaches in which farmers experiment and provide rapid feedback. This would need to be actively supported and participated by government bodies, development partners, researchers, extensionists, farmers and private sectors along with machine manufacturers.
2. On-going research, refinement and development of suitable farming equipment, machinery, and technology for promoting the adoption of CA/SI at local specifics, as well as bio-products, seeds, etc. remain the top priority.
3. There are urgent needs for developing and supporting markets for CA associated with appropriate scale machinery, commercializing bio-products, seeds, and other CA product labelling.
4. Providing incentive support (subsidies) to machinery service providers to smallholders.
5. Promoting large scale CA/SI adoption requires creating and enabling environment; including:
 - Institutional and policy support to agroecological systems transitions (e.g., at regional, country level);
 - Innovative extension services to support and promote the transition; and
 - Education to increase human resources and to build capacity to support the transitions.
6. Plant diversification improves natural crop protection against pests. So, there is a strong need for promoting biodiversity in farming (vegetal biodiversity, associated biodiversity, animal diversity).
7. Building strong networks among farmers, researchers, extensionists, and private actors, as well as creating working groups to advocate CA/SI are the key to promote large scale adoption of CA/SI.
8. Building capacity of all stakeholders is the key to promote a successful transition of CA/SI.

5. Appendixes

Appendix 5.1 Organizing committee

No.	Name	Position	Organization
1	HE Dr. Chan Saruth	Advisor	Under Secretary, MAFF
2	HE Dr. Ngo Bunthan	Chair	Rector, RUA
3	Dr. Ho Puthea	Vice Chair	Deputy DG, GDA
4	HE Lyda Hok	Member	Director, CE SAIN
5	Mr. Ngin Kosal	Member	Director, DAEng
6	Dr. Seng Vang	Member	Director, DALRM
7	Dr. Florent Tivet	Member	CIRAD
8	Mr. Rajiv Pradhan	Member/Moderator	Swisscontact
9	Dr. Pascal Lienhard	Member	CIRAD
10	Mr. Anshuman Varma	Member	CSAM

Appendix 5.2 Coordination team

No.	Name	Organization
1	Ms. Feng Yuee	CSAM
2	Ms. Melanie Blanchard	ASEA
3	Ms. Chakriya Soeun	CASIC Secretariat team
4	Mr. Tem Dary	
5	Mr. Chrea Cheabmeng	
6	Ms. Laing Thyda	CESAIN/RUA
7	Ms. Duong Ravy	DALRM
8	Mr. Seng Savath	DEAng
9	Mr. Heng Yulong	DEAFF
10	Mr. Premprey Dennamanith	Swisscontact
11	Ms. Vathana Chamroeun	
12	Mr. Vearyda Oeu	
13	Mr. Pritesh Chalise	

Appendix 5.3 Speaker profile

Session 1: Country Profile

Topic: Cambodia Country Presentation

Dr. SENG Vang (Ph.D.) is the Director of Department of Agricultural Land Resources Management (DALRM) of the General Directorate of Agriculture (GDA) of the Ministry of Agriculture, Forestry and Fisheries (MAFF). He obtained his Ph.D. in soil science and has over 25 years of experience in soil research, land management and crop nutrition, pre- and post-harvest handling of agricultural crops, crop protection, and rural livelihood assessment and technology adoption by farmers. He is a widely published author and co-authored on research themes such as agriculture and water, crop diversification, land resources, plant nutrition, and rice production systems under climate change impacts, which include a strong focus on the Cambodia farming systems.



Topic: China Country Presentation

Dr. Li Hongwen, Ph.D, Professor, is a Changjiang Scholar at China Agricultural University; Taishan Scholar, Shandong University of Technology; Director of Conservation Tillage Research Center (CTRC), Ministry of Agriculture and Rural Affairs (MOA), P.R.C; Director of China institute for Conservation Tillage in China Agricultural University. He is also the Chairman and leading expert of Conservation Tillage Expert Group, MOA, P.R.C; Chairman of Mechanical Soil Cultivation Professional Group, MOA, P.R.C; Chairman of Agriculture Mechanization and Equipment Committee of China Society of Agricultural Engineering; Leader of MOE (Ministry of Education) and MOA Innovative Research Team “Conservation Tillage Technology and Equipment”.



Dr. Li started conservation tillage research from 1991, he and his team have received 4 Awards of National second prize for scientific and technological progress, published more than 200 academic papers and achieved more than 100 patents, all on conservation tillage.

Topic: India Country Presentation

Dr. ML Jat is a principal Scientist/Systems Agronomist and Sustainable Intensification Strategy Leader for Asia & North Africa. He is currently working for International Maize and Wheat Improvement Center (CIMMYT). Dr. Jat holds a PhD in Agronomy from ICAR-Indian Agricultural Research Institute (IARI), New Delhi. With 23 years of impactful research and management experiences on agricultural sustainability in diversity of production systems and 11 years of research management experience in international agriculture, Mr. Jat has supported countries across Asia, Africa and Americas and is currently leading a multi-disciplinary (Agronomy, Farming Systems modelling, social scientist, breeder) team of international scientists and national research staff.



Session 2: Addressing Technical Challenges

Topic: Plant material

Dr. Florent TIVET (Ph.D.) is an agronomist from CIRAD, French Agricultural Research Center for Development, and an expert in agroecology, conservation agriculture, cropping system design, soil fertility management and assessment, appropriate-scale mechanisation, preservation of genetic banks, and seed production. He has been working for more than 12 years in South-East Asia and is currently providing support to the Conservation Agriculture Service Center (CASC) of the Cambodia of the Department of Agriculture Land Resources Management (DALRM), General Directorate of Agriculture (GDA).



Topic: Promoting on mechanization for conservation agriculture

Mr. Madhusudan Singh Basnyat is an independent consultant and agricultural mechanization specialist for TCP/FAO-Nepal. He was a former Deputy Director General of the Department of Agriculture, Ministry of Agriculture and Livestock Development. Mr. Madhusudan hold a bachelor's degree in Agricultural Engineering and a master's degree in Renewable Energy Engineering. As an independent consultant, Mr. Madhusudan has 32 years of professional experience with significant knowledge of planning, managing, organizing, and budgeting agricultural activities. He has extensive knowledge in implementing programs and projects for agriculture, agricultural engineering & mechanization, renewable energy, natural resource management and climate change adaptation, agricultural infrastructure, agricultural and machine market systems and procurement processes.



Topic: Bio-Product

Dr. Lionel Moulin is a microbial plant ecologist and research director at IRD (French National Research Institute for Sustainable Development), in the PHIM unit (Plant Health Institute of Montpellier) within which he heads a research team on plant-bacteria interactions (BRIO team, for Bacteria-Rice Interactions & BiO control). He obtained his doctorate in 2002 at the University of Lyon (France) on the diversity of rhizobia and then did a 2-year post-doctorate at Peter Young (Univ. York, UK) in bacterial genomics, before joining IRD. He is developing research on the genetic boundaries between mutualism and pathogenicity in bacteria interacting with cereals (wheat, rice), and the response of plants to various types of microorganisms (physiology, transcriptomics, proteomics). He is also working on cereal microbiomes (amplicons & cultivable approaches) in order to identify plant bio stimulants and biocontrol agents against phytopathogens.



Session 3: Managing diversity

Topic: Straw Management

Mr. Anshuman Varma is the Deputy Head of the Centre for Sustainable Agricultural Mechanization (CSAM), a regional institution of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) in Beijing. In this role, he is overseeing implementation of a wide range of programmes for sustainable agricultural mechanization in the Asia-Pacific region, and leading development of new programmes and projects. Prior to this, Mr. Varma worked with United Nations ESCAP's regional institutions in other countries: as Knowledge Management Coordinator at the Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA) in Indonesia (2013-2016), and as Programme Officer at the Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT) in the Republic of Korea (2009-2013). Mr. Varma graduated with a BA (Hons.) degree in Economics from the University of Delhi (India) in 1996 and completed his MA in Development Economics from the University of Sussex (UK) as a Commonwealth Scholar in 1998. In 2014, he also completed an Executive Education program in Development at the Kennedy School of Government at Harvard University (USA).



Topic: AE Crop Protection

Dr. Jean-Philippe Deguine is a senior scientist, agroecologist, and entomologist at CIRAD (UMR PVBMT). He has 36 years of experience in crop protection against pests and diseases and has worked in Africa, Oceania, Europe, the Indian Ocean and Southeast Asia. He is hosted by Can Tho University in Vietnam. In addition to research activities, he has in the past carried out research management activities (head of the CIRAD cotton program, deputy director in charge of scientific affairs in the CIRAD EMVT department) and scientific leadership activities (scientific advisor to the CIRAD General Management). He has participated and continues to participate in many scientific groups, councils and committees at the local, national and international levels. He is involved in teaching (including distance learning) and training activities. He has organized training workshops at international research schools in agroecology. Dr Deguine has strongly contributed to the conceptualization of agroecological crop protection and has coordinated many research and development projects and published numerous papers in this field. Currently, he is also co-leader of the Strategic Field "Agroecological Transitions" at CIRAD.



Topic: Tree Integration in Farming system

Dr. Clément RIGAL is a tropical agronomist working for CIRAD and seconded in ICRAF team in Vietnam. He specializes in coffee agronomy, specializing in the evaluation of coffee system performances, and in the transition towards more sustainable farming practices. He conducts his research using a mix of field measurements, modelling and participatory methods in South-East Asia (mostly Vietnam and China).



Topic: Strengthening agricultural innovation system for sustainable agriculture intensification

Dr Selvaraju Ramasamy is Head of the Research and Extension Unit, Office for Innovation of the Food and Agriculture Organization of the United Nations (FAO). He leads FAO's efforts in Agricultural Research and Extension for development, strengthening of Agricultural Innovation Systems (AIS) and out-reach of innovative agricultural technologies and practices. His work also focuses on partnership with International/national agricultural research centers and forums of extension and advisory services. He has over 30 years of experience in applied agricultural research and development. Dr Ramasamy is with FAO since 2007.



Session 4: Driving the dissemination process

Topic: Extension Model and Strategy: Laser Land Level

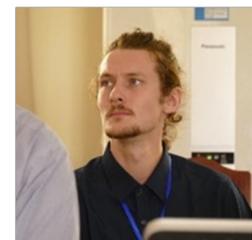
Engr. Mushtaq Ahmad Gill

Engr. Mushtaq Gill graduated in Agricultural Engineering from USA started his career with Agriculture Department and retired as Director General. He is amongst the pioneers in South Asia region for indigenizing and leading the diffusion of LASER Land Levelling Technology as a gateway to climate resilient Conservation Agriculture. He is the founder member of South Asian Conservation Agriculture Network (SACAN) and as Executive Director, executed different Conservation Agriculture research and capacity building projects in collaboration with CGIAR centers. In recognition of his meritorious services in Resource Conservation, civil award was conferred to him by President of Pakistan.



Topic: Funding Mechanism: CASIC Pilot Carbon Fund

Pierre VERNET is a French international volunteer working with CIRAD on scaling-up agro-ecology and climate change mitigation practices in Cambodia. Currently involved in the ASSET project, he is working on a rewarding system to incentivize farmers for carbon sequestration and ecosystem services production through the carbon market.



Rajiv PRADHAN is the Country Director of Swisscontact Cambodia. He has over 21 years of experience in Inclusive Market/Sector Development, including training practitioners, enabling environment and network development. Furthermore, he has over 30 years of experience in Small & Medium Enterprises Development, both in the private and development sector. He led a number of private companies, development organizations and projects both in Nepal and Bangladesh in the past, thereby gaining over 27 years of experience in Program Management. He specializes in strategic management; designing projects; building teams to implement projects; deal making with the private sector; business modelling; and providing innovative scaling/expansion methods in various market segments.



Mr. Marc Eberle has been living in Cambodia since 2002. He studied Agroecology and in 2018 founded SmartAgro Sustainable Innovations Co. Ltd. to create a driver for change. SmartAgro's mission is to re-design agricultural practices and change the paradigm of how we add long term value to people, smallholder communities and the ecosystem in the farming sector.



Topic: Supportive Policy: Synthesis of LICA, TPP, TAFS Initiative in the Region

Dr. Thatheva Saphanthong is the Deputy Director General of the Department of Agriculture Land Management and also in charge of LICA coordination for the Lao PDR. Dr. Thatheva Saphanthong obtained his Ph.D in Southeast Asian Area Studies with in depth study on Dynamics and Sustainability of Land Use System in the Northern Laos from the Kyoto University, Japan 2007. With vast experience in integrated watershed management planning, monitoring, environmental and social impact assessment, and participatory upland development, Dr. Thatheva initiated coordination on the information knowledge creation and management for the rural development focusing on creation of the MAF Information Systems, GIS/RS Data Analysis and connect to cross-sectoral data on sustainable natural resource management and rural development in the country for the past 20 years.



Session 5: Support by the developmental partner

Development Partner: AFD

Mr. Muong Sideth is the Head of Unit for agriculture, rural development, infrastructure, environment at French Development Agency (AFD). Mr. Sideth hold two master degrees from University of Nice-Sophia Antipolis, Nice, France, one on Hydrology and physical environment and another one on Environment and Sustainable Development. He is currently in charge of several AFD grant projects, but the 2 regional one is forecasting impacts of climate change and workforce availability on natural rubber commodity chain in Southeast Asia (FORSEA) and Agroecology and Safe Food Systems Transitions in South-East Asia (ASSET).



Appendix 5.4 Agenda

Time	Topic	Description	OIC/Facilitator
Day 1			
1:45 – 2:00 (15 mins)	Zoom open to participants		Ms. Vathana Chamroeun
2:00 – 2:30 (30 mins)	Opening Session	<ul style="list-style-type: none"> ➤ Welcome Remark by Mr. Ho Puthea, Vice Chair of CASIC EB ➤ Keynote Remark by Dr. Li Yutong, Head of UN CSAM ➤ Opening Remark by HE. Dr. Chan Saruth, MAFF Under Secretary of State and Chair of CASIC EB 	Mr. Rajiv Pradhan
2:30 – 3:30 (60 mins)	Session 1: CA/SI Status in Asia:	<ul style="list-style-type: none"> - Cambodia Update: Dr. Seng Vang, Director of Department of Agriculture Land Resources Management - China Update: Dr. Li Hongwen, Director of Conservation Tillage Research Center - India Update: Dr. Mangi Lal Jat, Principal Scientist of International Maize and Wheat Improvement Center 	Mr. Anshuman Varma
10 mins video break - One video will be shown during this break			
3:40– 4:40 (60 mins)	Session 2: Addressing Technical Challenges Related to CA/SI Broad-Scale Adoption	<ul style="list-style-type: none"> - Cambodia Experience on Plant Material: Dr. Florent Tivet, Technical Advisor, CIRAD - Nepal Experience on Promotion of Mechanization for Conservation Agriculture: Mr. Madhusudan Singh Basnyat, Independent Consultant Agricultural Mechanization Specialist - Regional Experience on Bio-Products: Dr. Lionel Moulin, Researcher of Institute de Recherche pour le Développement (TBC) 	Dr. Pascal Lienhard
4:40 – 5:00 (20 mins)	Recap and Agenda for Day 2	Moderator	Dr. Delgermaa Chuluunbaatar
Day 2			
1:45 – 2:00 (15 mins)	Zoom is open to participant		Ms. Vathana Chamroeun

<p>2:00 – 3:10 (70 mins)</p>	<p>Session 3: Managing Diversity in CA/SI Systems</p>	<ul style="list-style-type: none"> - Regional Experience on Straw management: Mr. Anshuman Varma, Deputy Head of Centre for Sustainable Agricultural Mechanization (CSAM), United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) - Vietnam Experience on promoting vegetal biodiversity in Agroecological Crop Protection: Dr. Jean-Philippe Deguine, Researcher of CIRAD, Can Tho University - Vietnam Experience on Tree Integration in Farming Systems: Dr. Clément Rigal, Researcher of CIRAD, ICRAF - Regional Experience on Strengthening Agricultural Innovation System for Sustainable Agriculture Intensification: Dr. Selvaraju Ramasamy, Head of Research and Extension Unit, Office of Innovation FAO 	<p>Dr. Hin Lyhour</p>
<p>3:10 – 4:00 (50 mins)</p>	<p>Session 4: Driving CA/SI Dissemination Process</p>	<ul style="list-style-type: none"> - Pakistan Experience on Promotion of Laser Land Leveling: Mr. Mushtaq Ahmad Gill, Executive Director of South Asian Conservation Agriculture Network - Cambodia Experience on Pilot Project to Introduce Farmers to the Carbon Market: Mr. Marc Eberle, Executive Director of SmartAgro; Mr. Pierre-Antoine Vernet, Researcher of CIRAD and Mr. Rajiv Pradhan, Country Director of Swisscontact - Regional Experience on Supportive Policies: Dr. Thatheva Saphanthong, Deputy Director of Department of Agricultural Land Management 	<p>Ms. Lucie Reynaud</p>
<p>4:00 – 4:20 (20 mins)</p>	<p>Session 5: Support by Development Partners on Enabling CA Environment</p>	<ul style="list-style-type: none"> - Mr. Sideth Muong, Head of Unit of AGENCE FRANÇAISE DE DÉVELOPPEMENT (AFD), Cambodia 	<p>Dr. Florent Tivet</p>
<p>5 mins video break</p>			
<p>4:25 – 4:50 (30 mins)</p>	<p>Consultative Discussion on the Workshop</p>	<p>This session aims at synthesizing the outcomes of the workshop that will also feed into the ASEAN level ASSET regional workshop (to be organized in November 2021)</p>	<p>Dr. Seng Vang</p>

<p>4:50 – 5:00 (10 mins)</p>	<p>Closing remarks</p>	<ul style="list-style-type: none"> ➤ Key-Learning Remarks by Ms. Melanie Blanchard, ASEA platform coordinator ➤ Closing Remarks by HE Dr. Ngo Bunthan, Rector of RUA and Vice Chair of CASIC EB 	<p>Mr. Rajiv Pradhan</p>
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Appendix 5.5 About CASIC

5.5.1 History of CA/SI and CASIC in Cambodia

The development of CA in Cambodia has benefited from the technical and financial support from various development projects and programs with particular institutional support and commitment from the RGC through the MAFF since the commencement of the design and testing of CA-based cropping in different agroecological systems in Cambodia in 2004 (referring to the project documents and Kong et al, 2020). With reference to the indicative timeline of CA development and the transition phases timeline, presented below, the first CA-related research activities in Cambodia started in 2004, with service provision being offered in 2013 through the various projects and government support. The private sector enters the CA domain in 2018 and in 2021, we see CA being discussed as part of policy dialogues and extension mechanisms.

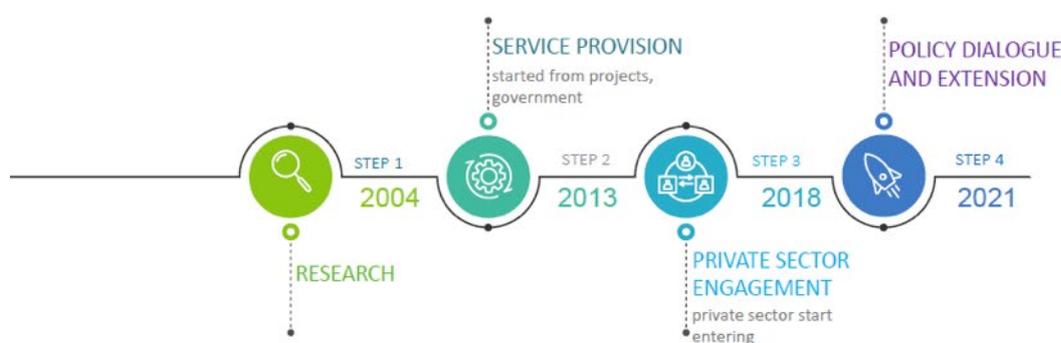


FIGURE 36. CONSERVATION AGRICULTURE TRANSITION PHASES TIMELINE

In 2004 CA related research activities were being discussed in as part of the Crop Diversification and Smallholder Rubber Development Project (SRDP) Phase 2, funded by the French Agency for Development (AFD) and implemented by the General Directorate of Rubber of MAFF in partnership with the French Agricultural Research Centre for International Development (CIRAD). Since then, Cambodia has capacitated necessary human resources with CA technical knowledge and experiences through the experiments and testing of cropping systems of upland annual crops as well as the development of a cover crop genetic bank leading to the start of crop genetic conservation in Bos Khnor commune, Chamkar Leu district, Kampong Cham province.

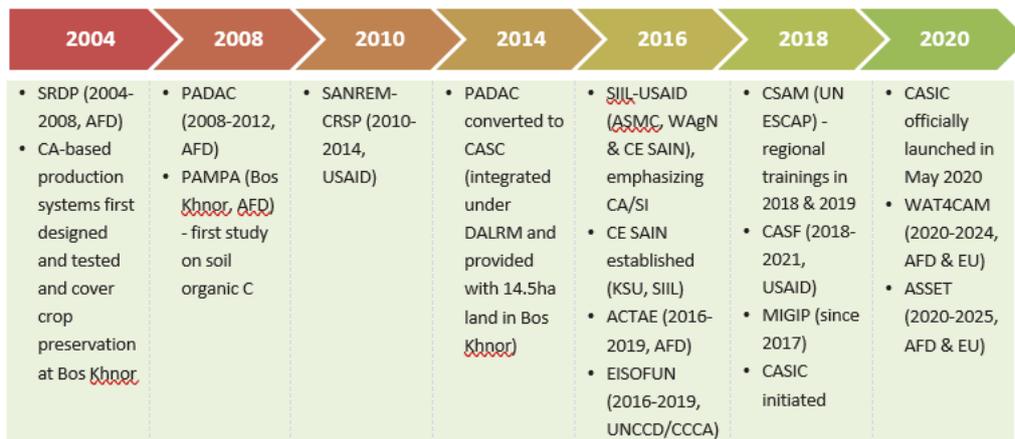


FIGURE 37. INDICATIVE TIMELINE OF CA/SI DEVELOPMENT IN CAMBODIA

From 2008, CA was implemented by the General Directorate of Agriculture (GDA) under the AFD-funded 5-year PADAC project (Projet d’Amélioration de l’Agriculture Cambodgienne) with technical support from CIRAD. The main target areas were in Kampong Cham and Battambang provinces with focus on design, promotion and assessment of CA-based cropping systems for annual crop production in both upland and lowland areas. In addition, some other activities were also implemented in Battambang under the Sustainable Agricultural and Natural Resources Management - Collaborative Research Support Program (SANREM-CRSP) funded by United States Agency for International Development (USAID) in 2010-2014 under the partnership between Department of Agricultural Land Resources Management (DALRM) of GDA, CIRAD and North Carolina Agriculture and Technology State University (NC A&T). In 2009, long-term experiments have been implemented and research studies on soil organic C initiated at the Bos Khnor Station under the Multi-country Agroecology Action Program (PAMPA) funded by AFD.

Following the assessment of institutional arrangement at the end of PADAC project, the Conservation Agriculture Service Center (CASC) was established in 2014 as a unit of DALRM and with the support of CIRAD. In 2016, GDA provided to DALRM an area of 14.5 hectares located in Chamkar Leu Upland Crop Seed Production Station in Chamkar Leu district, Kampong Cham province. This parcel of land, widely known as Bos Khnor Conservation Agriculture Research Station since 2016, has been used for CA-related research, training and the maintenance of a genetic bank of staple and cover crops that is unique in Cambodia. Since 2014, CASC has extended its CA-related services (including no-till planters) to rice, maize and casava farmers in Battambang province.

In 2016, the Sustainable Intensification Innovation Lab (SIIL) funded by USDID and coordinated by Kansas State University (KSU), supported the cooperation between different projects (Appropriate-scale Mechanization Consortium – ASMC, and Women in Agriculture Network – WAgN and contributed to the establishment of the Centre of Excellence for Sustainable Agricultural Intensification and Nutrition (CE SAIN) at Royal University of Agriculture (RUA), aiming at extending CA and SI in different agroecosystems of the country.

ASMC with the support of the USAID under the Feed the Future program was initiated in 2016 on a research study on design and development of machinery prototype seed planters for farmers, under

the management of RUA in partnership with Department of Agricultural Engineering (DAEng), DALRM/CASC and CIRAD. The overall objective of the project is to intensify smallholder farmers' cropping systems and on-farm operations through mechanization in a sustainable manner.

On the other hand, WAgN Cambodia project aims to empower women and improve nutrition by promoting women's participation in SI-based horticulture and rice value chains. To achieve this end, the project targets to improve socioeconomic and nutritional status of women and their families, and to identify and strengthen existing and potential SI technologies, practices and policies that promote production of nutritious and marketable food while protecting agroecological resources.

In addition, other projects contributing to CA and agroecology promotion in Cambodia included Towards Agroecological Transition in South-East Asia (ACTAE) funded by AFD in 2015-2018 and Ecological Intensification and Soil Ecosystem Functioning (EISOFUN) under United Nations Convention to Combat Desertification (UNCCD) and Cambodia Climate Change Alliance (CCCA) in 2016-2018.

Apart from these initiatives and projects, the Centre for Sustainable Agricultural Mechanization (CSAM), a regional institution of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), in partnership with GDA and other partners, organized an Asia and Pacific regional workshop in 2018 and another regional training in 2019 on topics related to mechanization in CA. The regional trainings in 2019 which gathered over 37 participants from 18 countries in the Asia-Pacific region and initiated the identification of needs for future trainings to be offered by DALRM/CASC and its partners taking advantage of the long history of Bos Khnor Station.

Over the course of CA & SI and agroecological development towards a sustainable outlook, it is crucial to engage private sector actors along the agriculture value chains in providing technologies, inputs, operation know-how and access to finance in order to support the transition process of farmers in addition to the services already offered by DALRM/CASC. Therefore, Conservation Agriculture Services with a Fee (CASF) funded by USAID and implemented by CE SAIN in partnership with DAEng, DALRM/CASC, CIRAD and Swisscontact in 2018-2021, together with Mekong Inclusive Growth and Innovation Program (MIGIP) funded by Swiss Agency for Development and Cooperation (SDC) and implemented by Swisscontact since 2017, have facilitated the engagement of private sector and contributed to the commercialization of CA-related machinery and cover crop seed production.

Furthermore, Water Resources Management and Agro-ecological Transition for Cambodia (WAT4CAM) is a four-year (2020-2024) project funded by AFD and EU, aiming to upgrade irrigation infrastructure and to support innovative, climate-friendly farming in five provinces. One of its four component focuses on innovative farming practices and rice value chain, which is managed by MAFF and GDA. Under this agriculture component, one sub-component focuses on Research for Development (R4D) on agroecology, led by CIRAD. The R4D sub-component aims to explore new methods of interventions and cropping systems that match with the principles of agroecology for irrigated rice.

Most importantly, CA and SI relevant projects and programs stakeholders discussed and initiated in 2018 the establishment of Cambodia Conservation Agriculture and Sustainable Intensification

Consortium (CASIC) which was endorsed by the Minister of MAFF and officially launched in mid-2020. Detailed profile and structure of CASIC will be presented in Section 4.

At the regional level, Cambodia has been active in a number of regional platforms and initiatives including Agroecology for Southeast Asia (ASEA), CSAM of United Nations ESCAP, and Agroecology Learning alliance in Southeast Asia (ALiSEA). Most recently, the European Union (EU) and AFD have funded the Agroecology and Safe food System Transitions (ASSET) in four Southeast Asian countries including Cambodia, Laos, Myanmar and Vietnam in 2020-2025. ASSET is a project co-implemented by GRET and CIRAD under the partnership with a number of local organizations, including in Cambodia, Institute of Technology of Cambodia (ITC), DALRM of GDA/MAFF, Swisscontact, UNI4Coop, and CIRAD. The main objective of ASSET is to “harness the potential of agroecology in Southeast Asia to transform food and agricultural systems into more sustainable systems, notably safe and inclusive” (ASSET project information).

5.5.2 CASIC Formation

The establishment of the Cambodia Conservation Agriculture and Sustainable Intensification Consortium (CASIC) was initiated in August 2018 by a group of organizations sharing common interest in CA & SI and agroecology based on the understanding that collective effort is needed in order to turn CA & SI and agroecological practices into commercial ventures and to be rooted into the policy agenda. These two objectives are complementary to the existing efforts of cropping system design, soil fertility assessment, and agriculture engineering, and goes beyond the domain of RGC and development practitioners. As a result, CASIC establishment is sufficiently justified to take a lead role in bringing together all relevant stakeholders including public sector, private sector (seed producers/suppliers, machinery manufacturers/distributors, financial institutions, etc.), farmers, agriculture cooperatives, research organizations, and academic institutions.

This important role of CASIC will help create a platform for the network of organizations that have interest in CA & SI and agroecology to come together. This will help address the issues of duplication of activities, improve communication between stakeholders, promote awareness of CA & SI and agroecological practices and access to necessary supporting resources, which will ultimately help farmers to speed up their technology uptake. Since then, the initiative was discussed and the processes were planned, leading to the official endorsement of CASIC by MAFF's Decision No. 201.SSR.KSK, dated 21 May 2020, and its official launch in June 2020.

The vision of CASIC is to become a platform for promoting conservation agriculture and sustainable intensification towards agroecological transition in Cambodia and Southeast Asia. The mission of CASIC is to coordinate and support research for development; invest into knowledge management; create an enabling environment for policy dialogues and public-private partnerships; value creation; and explore market opportunities and enhance collaboration between various stakeholders in conservation agriculture, sustainable intensification, and agroecology

CASIC is governed by a Steering Committee chaired by MAFF with members from Ministry of Interior (MoI), Ministry of Environment (MoE), Ministry of Women's Affairs (MoWA), Ministry of Water Resources and Meteorology (MoWRAM), and Cambodia Chamber of Commerce (CCC) and led by an Executive Board chaired by MAFF and consisting of representatives from the Royal University of Agriculture (RUA) and the General Directorate of Agriculture (GDA) as the vice chairs, and members from the Department of Agricultural Engineering (DAEng), the Department of Agricultural Land Resources Management (DALRM), the Cambodian Agricultural Research and Development Institute (CARDI), the Department of Extension for Agriculture, Forestry and Fisheries (DEAFF), Swisscontact and CIRAD.

5.5.3 Brief overview of the CASIC Roadmap

To guide the coordination of priorities in CA and SI development and the operation of CASIC, a roadmap for the years 2022-2026 was initiated and developed under the technical and financial support from Swisscontact and Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD).

The key relevant policies of the Royal Government of Cambodia (RGC), CASIC's vision and mission, and SWOT analysis shape the strategic direction and priorities of the 5-year roadmap of CASIC. As a result, the overall objective of CASIC for the period of 2022-2026 is to **strengthen coordination and support stakeholders in order to promote conservation agriculture and sustainable intensification in Cambodia towards agricultural modernization and agroecological transition.**

With this overall objective, CASIC, through the implementation of the activities by its sub-committee members, intends to achieve the following milestones by 2025:

1. Broader coverage of CA & SI and agroecology awareness, education and extension efforts reaching out to farmers and relevant stakeholders.
2. Increased agricultural land area under full or partial CA & SI and agroecology practices.
3. Agricultural land zoning priority for CA & SI and agroecology application identified; and
4. CA & SI and agroecology integration into the RGC policy agenda (including national and sub-national policies, strategies and plans) further strengthened.



To achieve this overall objective, CASIC defines three main strategic objectives, which are interrelated and mutually supportive.

1. To strengthen CASIC and coordinate relevant stakeholders: aims to strengthen CASIC and its members, to support the activities of the sub-committees, to foster policy dialogues for greater CA & SI and agroecology integration/uptake by policy makers, to deepen regional collaboration, and to ensure financial sustainability.
2. To enhance knowledge and research on CA & SI and agroecology: aims to enhance knowledge management and R4D on innovative CA & SI and Agroecology related technologies and innovations for easy access and adaptation by relevant stakeholders. In addition, each of sub-committee will be strengthen in order to mobilize members and partners to join CASIC.
3. To improve and scale up CA & SI and agroecology services: intends to improve the services pertinent to CA & SI and agroecology through an extension model, awareness raising among relevant stakeholders, and investment from private sector to support and speed up the transitional processes of farmers.

The Executive Board of CASIC is supported by a **Secretariat**, which assists and supports the overall operation of CASIC and internal coordination across four sub-committees, namely (1) Knowledge Management, (2) Coordination and Networking, (3) Promotion, and (4) Research for Development (R4D). Each of the sub-committees is led by different government institutions and co-led/supported by either a private sector or development organization. Each sub-committee has specific roles and responsibilities (as outlined below). CASIC serves and supports the members of its sub-committees and does not implement any activities under the functions and authorities of its members.

- **Sub-committee on Knowledge Management**, led by CE SAIN/RUA, is responsible for developing a repository of all relevant data, information, and knowledge regarding CA & SI and agroecology, as well as a one-stop center for relevant stakeholders to access to such repository.
- **Sub-committee on Coordination and Networking**, led by DAEng with support from Swisscontact, is responsible for identifying and connecting CA & SI and agroecology related stakeholders and market actors to pool together all available resources which will further strengthen CA & SI and agroecological development.
- **Sub-committee on Promotion**, led by DEAFF with support from Swisscontact, is responsible for activities that will support research, trainings, and CA & SI and agroecology related practical support at the local communities.
- **Sub-committee on Research for Development (R4D)**, co-led by DALRM and CARDI with support from CIRAD, is responsible for bringing together several research organizations active in the field of CA & SI and agroecology to identify research priorities (cropping systems, cover crops, mechanization, and water management), to improve the visibility of scientific knowledge and to bring science-based evidence to support policy dialogue (MAFF, MoE and NCSD) and engagement of private sector, and to support the improvement of infrastructures and resources at Bos Khnor.

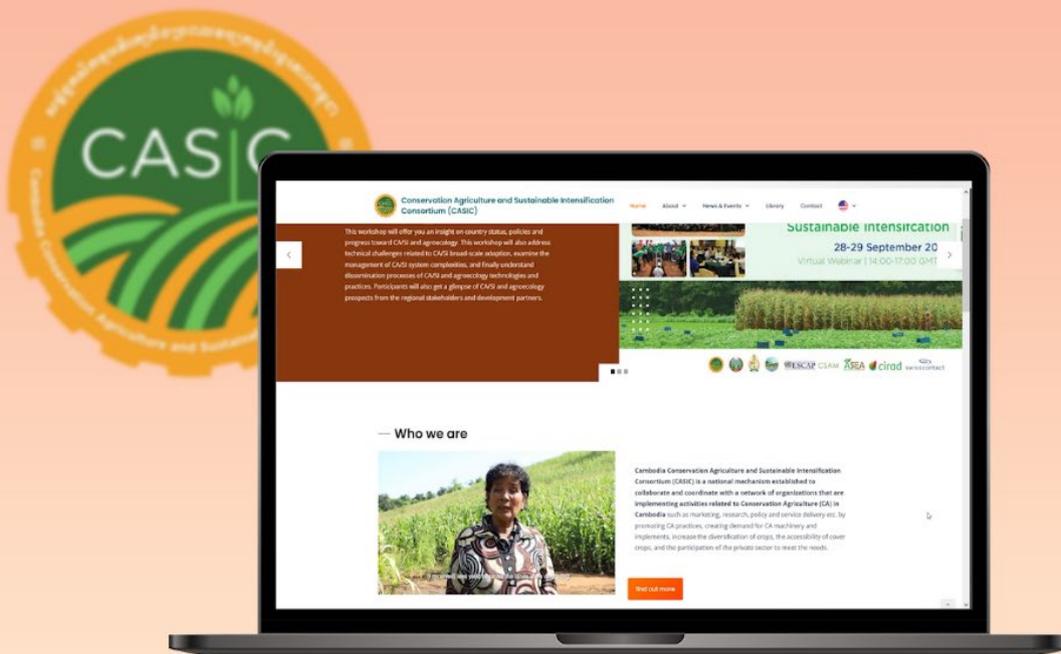
In addition, the Executive Board also receives support from the **Technical Reference and Support Unit**, which will consist of a number of experts and professionals from various organizations. Some of the organizations that will be asked to part of the Unit include CIRAD, Swisscontact, European Conservation Agriculture Federation (ECAAF), US CA Association, International Maize and Wheat Improvement Center (CIMMYT), FAO, UN CSAM, China Institute for Conservation Tillage (CICT), etc. On the other hand, CASIC keeps liaising with key Development Partners including AFD, USAID, SDC, EU, FAO, and Australian Centre for International Agricultural Research (ACIAR), etc., who have been active in supporting CA & SI and agroecological development in Cambodia and the region.



5.5.4 CASIC Brief Progress

After the endorsement of CASIC in 2020, the immediate objective of the consortium was to align the understanding and expectations of the Steering Committee and the Executive Board with regards to the history of CA/SI in the country and the next steps that would follow through the consortium. CASIC then developed a workplan and carried out a series of activities and as a result, 90% of the objectives targeted in the CASIC's 2020 Workplan were completed. Despite the Covid-19 situation in the country, CASIC was able to host a field visit for private sector members of Cambodia Chamber of Commerce, an institute members of CASIC Steering Committee, to Bos Khnor research station. CASIC also held regular coordination and update meetings with its member on the progress of the workplan. Meetings with the Executive Board on a monthly basis and with the Steering Committee every semester was also conducted, in order to keep them informed on the progress of the initiative.

During this time, CASIC also developed its official website (www.casiccambodia.net) and a Facebook page, CASIC Cambodia (www.facebook.com/CASICCambodia), and commenced on the development of the consortium's 5 years roadmap. Furthermore, CASIC also signed three Memorandum of Agreements with CE SAIN, Swisscontact (through MIGIP) and CIRAD to secure funding for 2021. In December of 2020, CASIC was able to host a bilateral meeting with HE. Veng Sakhon, Minister of the Ministry of Agriculture Forestry and Fisheries, Cambodia, to discuss the progress of CA/SI and CASIC activities.



Appendix 5.6 CASIC 1st Regional Training

The Regional Training on Appropriate Scale Mechanization for Conservation Agriculture held in 2019 in Siem Reap and Bos Khnor aimed to understand the mechanization aspect for conservation agriculture, understand the importance of market systems analysis and the engagement with the private sector along with policy issues favoring appropriate-scale mechanization for conservation agriculture and to identify needs for future training that could be offered by the Bos Khnor Research Station.

The training was attended by over 37 participants from 17 countries including Azerbaijan, Bangladesh, Cambodia, China, France, India, Laos, Malaysia, Mongolia, Nepal, Pakistan, Philippines, South Korea, Russia, Sri Lanka, Thailand and Vietnam. Seventeen national and international trainers, all experts in their field, facilitated the training sessions regarding conservation agriculture for the 4-day training sessions. During the 4 days training, the participants greatly benefitted from 17 presentations from different trainers and two demonstration sessions at Bos Khnor research station.

The training aimed to understand the mechanization aspect for conservation agriculture, understand the importance of market systems analysis and the engagement with the private sector, the policy issues favouring appropriate-scale mechanization for conservation agriculture and to identify needs for future training that can be offered by the Bos Khnor Research Station.



