The 2nd expert workshop on the implementation of soil doctors program in the region: Development and promotion of soil doctor program for sustainable land and agricultural management practices in Lancang Mekong Countries

Bangkor, Thailand, 19-22 September 2022

Innovative Extension Models toward Agroecoly and Safe Food System Transition in Cambodia

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Department of Agricultural Land Resources Management
General Directorate of Agriculture
Ministry of Agriculture, Forestry and Fisheries

CESRA
ศูนย์ความเป็นเลิศด้านการวิจัยดินแห่งภูมิภาคเอเชีย
CENTER OF EXCELLENCE FOR SOIL RESEARCH IN ASIA

Lancang-Mekong Cooperation Special Fund

Contents

Status and agriculture land land use of Cambodia

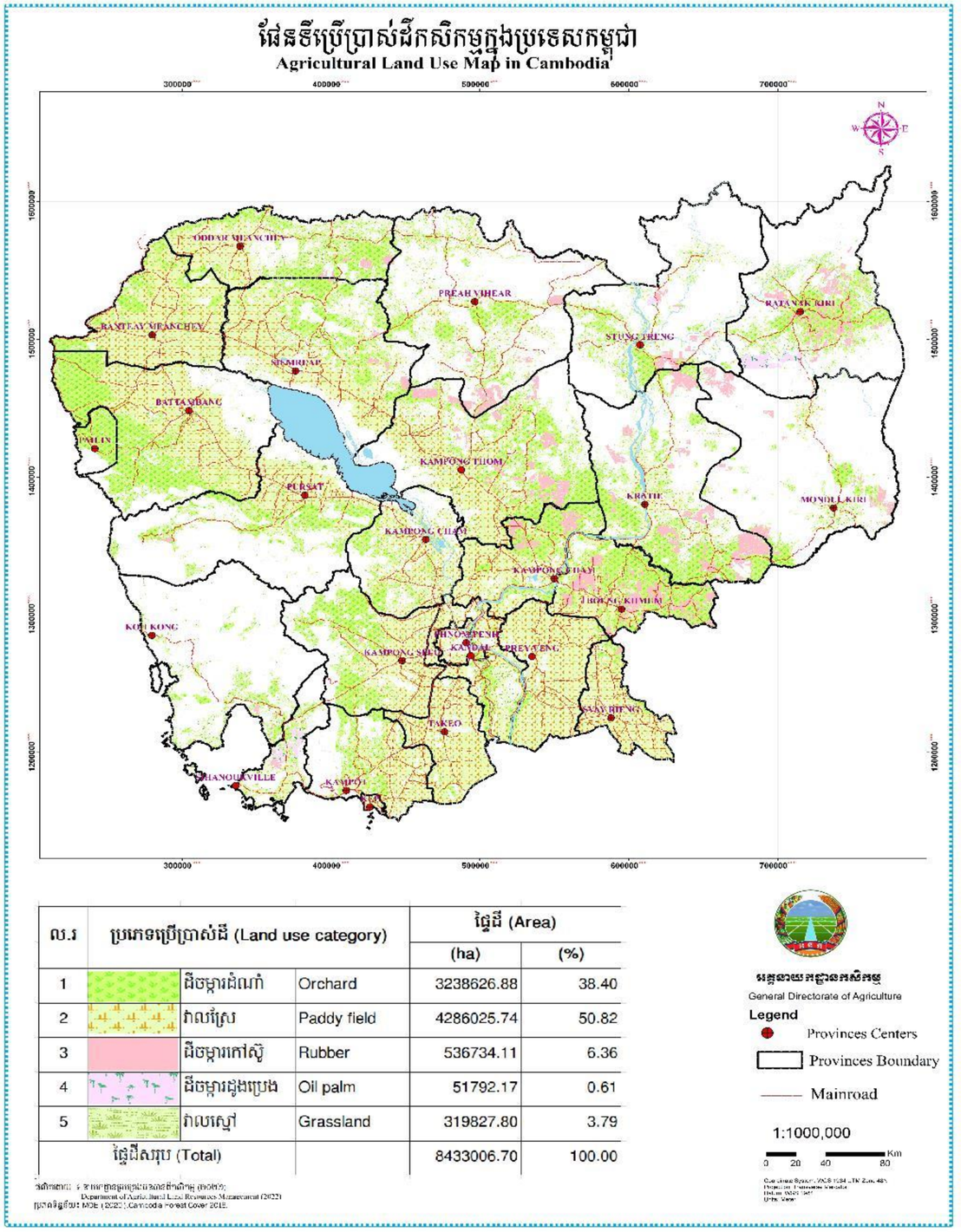
- Cambodia commits to achieve an economic growth rate of 7% per annum to reach an upper-middle income country by 2030.
- Agriculture is a key driver for economic development (23% of GDA in 2020).
- Achieving a sustainable agricultural growth at 5% per annum is essential to achieve the Royal Government of Cambodia's economic development goal by 2030.

National Forest Cover: 8,510,807 ha (46.86%)
(Included rubber and oil palm)

Agricultural land: 7,524,643 ha

Paddy field: 4.286 mill. ha
Non-rice : 3.238 mill. ha

(MOE, 2020)



Status and trends of land use and land cover in Cambodia (2010 – 2016)

Land Use/Cover Category	Area (ha)			Net area change (ha)
	2010	2014	2016	(2014-2016)
Forest land cover	10,451,912	8,518,173	8,181,901	-336,272
Oil palm plantation	5,055	36,311	51,276	14,965
Rubber plantation	137,307	484,316	509,224	24,908
Grassland	473,281	351,337	341,132	-10,205
Cropland	1,275,444	2,787,413	3,017,435	230,022
Paddy field	3,859,452	4,132,473	4,221,407	88,934
Rock	668	2,054	1,100	-954
Sand	10,459	40,581	41,245	664
Village	43,800	328,820	352,987	24,167
Build up area	296,512	42,167	42,930	763
Water	458,658	814,839	783,860	-30,979
Wood shrub	1,148,126	622,190	616,177	-6,013
Forest cover (%)	57.55	46.90	45.05	-1.85
Agricultural land (%)	29.06	40.97	42.95	1.98
Agricultural land (ha)	5,277,258	7,440,513	7,799,342	358,829
Total (ha)	18,160,674	18,160,674	18,160,674	18,160,674

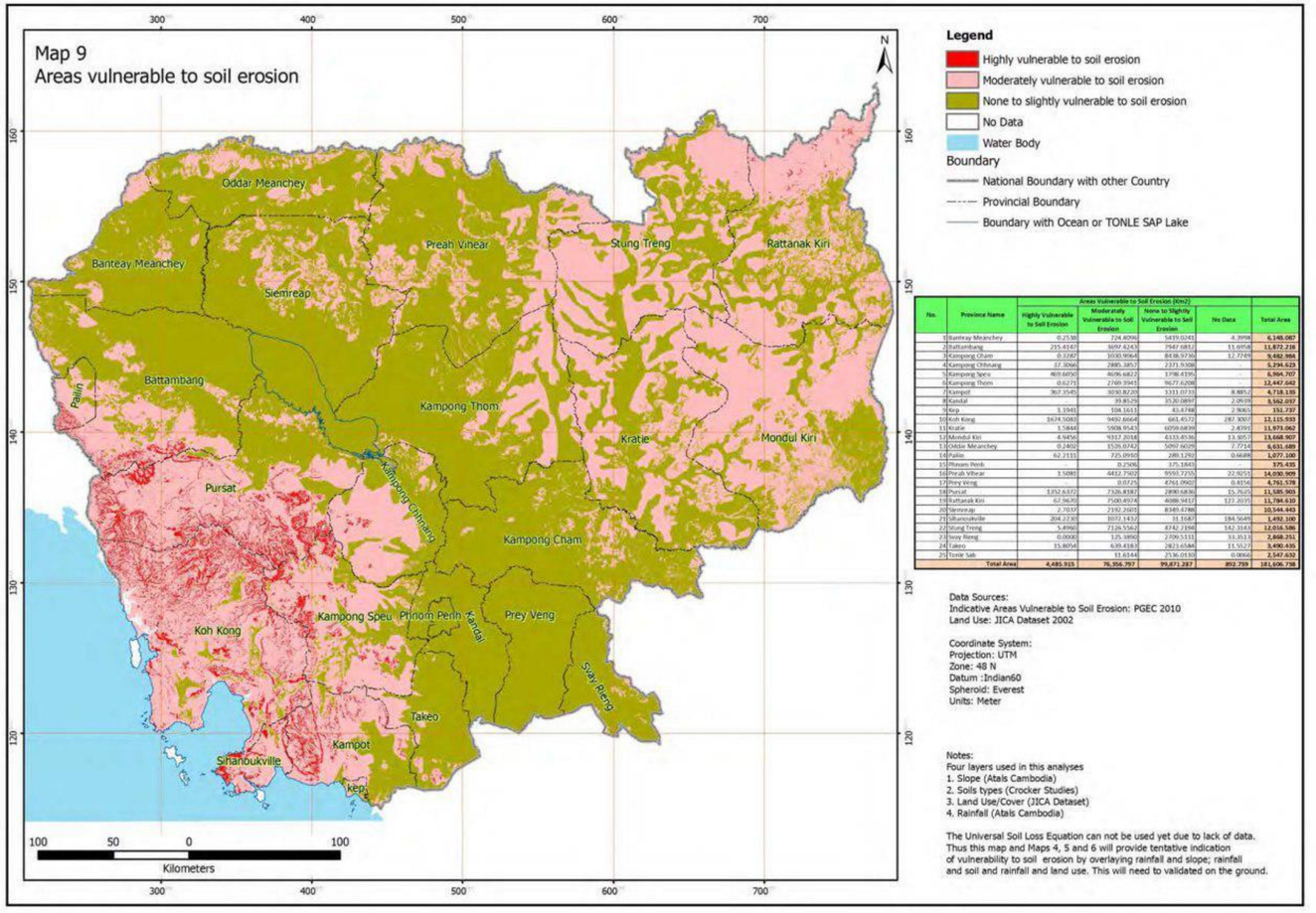
Source: MoE (2014, 2018)

Note: In this land use category, agricultural land includes oil palm, rubber, cropland and paddy field

1. Cambodia - Status of land degradation

Cambodia’s agricultural land is under threat of **degradation** and soil fertility depletion due to its expansion to degraded forest land.

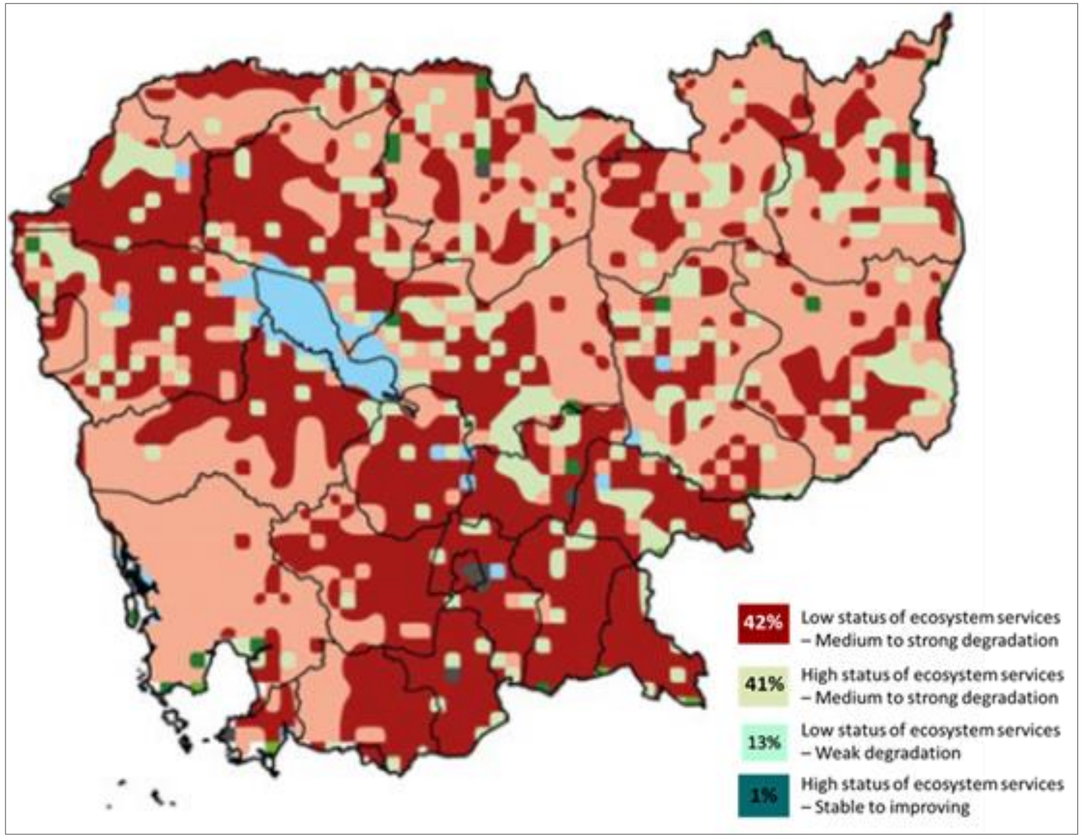
- Vulnerability to soil erosion:
  0.49 million ha – highly
  7.63 million ha – moderately
  9.73 million ha – low to none
- Small holder farmers are particularly **vulnerable** to **climate change** given their high **dependence** on rainfall and minimal crop diversification.
- 6.3 million Cambodians living on degrading agricultural land in 2010, practicing poor land management.



No.	Province Name	Areas Vulnerable to Soil Erosion (Km2)				
		Highly Vulnerable to Soil Erosion	Moderately Vulnerable to Soil Erosion	None to Slightly Vulnerable to Soil Erosion	No Data	Total Area
1	Banteay Meanchey	0.2538	724.4096	5419.0241	4.3998	**6,148.087**
2	Battambang	255.4142	3697.6243	7947.6813	11.6958	**11,872.226**
3	Kampong Cham	0.3287	1030.9064	8438.9736	12.7749	**9,482.984**
4	Kampong Chhnang	17.3066	2885.3857	2371.9308	-	**5,294.623**
5	Kampong Speu	407.6450	4696.6827	1798.4396	-	**6,904.767**
6	Kampong Thom	0.6273	2769.3943	9677.6208	-	**12,447.642**
7	Kampot	367.3545	3030.8220	1331.0733	8.885.2	**4,718.135**
8	Kandal	-	39.8529	3520.0897	2.0939	**3,562.037**
9	Kep	1.1941	104.1613	43.6748	2.9065	**151.737**
10	Koh Kong	1624.5087	9492.6664	683.4572	287.3007	**12,115.933**
11	Kratie	1.5844	5908.9543	6059.6836	2.4391	**11,973.042**
12	Mondul Kiri	4.9456	9317.2018	6133.4536	13.3057	**13,668.907**
13	Oddar Meanchey	0.2402	1526.0742	5097.6029	7.7714	**6,631.089**
14	Pailin	62.2151	725.0993	289.1761	0.6689	**1,077.160**
15	Phnom Penh	-	0.2506	375.1843	-	**375.435**
16	Preah Vihear	3.5081	6412.7503	8955.2733	22.9253	**14,030.909**
17	Prey Veng	-	0.0725	4761.0960	0.8154	**4,761.578**
18	Pursat	1252.6372	7326.8187	2890.6830	15.2635	**11,585.903**
19	Ratanak Kiri	62.9635	1580.4974	4088.9417	122.2075	**11,784.610**
20	Siemreap	2.7037	2392.2602	8349.4788	-	**10,544.443**
21	Sihanoukville	204.2230	1072.1432	31.3587	184.5649	**1,492.100**
22	Stung Treng	5.4962	7126.5562	4742.2368	142.3143	**12,016.586**
23	Svay Rieng	0.0000	125.3890	2709.5333	33.3533	**2,868.351**
24	Takeo	15.8054	639.4183	2823.6584	11.5527	**3,490.435**
25	Tonle Sab	-	33.6344	2536.0359	0.0064	**2,547.652**
	Total Area	**4,485.915**	**76,356.797**	**99,871.287**	**852.759**	**181,606.758**

Land degradation - Impact

There is a need for the Cambodian agriculture sector to reinvent itself by shifting from increased production through land expansion and excessive use of inputs towards sustainable intensification.



Land Degradation Source: GLADIS-FAO16

- **Annual cost of land degradation** is estimated at USD 677 million or 3% of the country's GDP (GM/UNCCD, 2018)
- Conventional tillage practice (Maize) increased soil loss by 13 times more than CA practice on 5% slope (DALRM, 2020).
- Soil erosion resulted in losses of SOC (870 kg/ha), N (90 kg/ha), P (0.42 kg/ha), K (10 kg/ha) (DALRM/GDA 2020, unpublished data)

Economics of land degradation in Cambodia

Total annual cost of land degradation (Based year 2007)	677 million USD
Cost of LD due to decline in provisional ecosystem services (as % of total cost)	37%
Cost of LD as % of GDP	8%
Cost of action (30-year planning horizon)	12 billion USD
Cost of inaction (30-year planning horizon)	34.7 billion USD
Returns on action against LD per dollar invested	3 USD
GDP (As of 2016)	20 billion USD
Share of agriculture in total GDP (2016)	27%
GDP per capita (2016)	1270 USD

Source: Global Mechanism of the UNCCD (2018)

2. Initiatives towards the agroecological transition

Small holder rubber development project (SRDP II)

...2007

AFD, FFEM (PAMPA)

Projet d'Appui au Développement de l'Agriculture au Cambodge & PAMPA

2008 - 2013

Sustainable and Natural Resources

By R4D NW uplands CE SAIN/ SIIL (ASMC & WaGN)

2014 - 2019

USAID, Agropolis, AFD, CCCA

Cover crops & machinery CASF, (MIGIP)/SDC

2018...

CASIC Dialogue politique

2019 - 2020

Agroecology and Safe Food Systems Transition in SEA (ASSET), WAT4CAM, CE SAIN/SIIL (ASMC2, S3), ISA, MetKasekor Dei Meas Initiative

2021

USAID, AFD/EU/FFEM, SDC

19

RESEARCH

19

SERVICE PROVISION

20

ENGAGEMENT OF PRIVATE SECTOR

20

POLICY DIALOGUE AND EXTENSION

3. MetKaseKor Model (Extension)

មិត្តកសិករ

MetKaseKor

An ‘‘opening the market’’
early adopters led extension model

MetKasekor Supports Sustainable Intensification

មិត្តកសិករ

MetKasekor is an innovative extension model. **MetKasekor** focuses on opening the market for private sector investments. The model is a government resource for the future with the intention to improve the public agricultural extension service system in Cambodia.

Unique Features

Public sector

Involved in ‘’opening the market’’ for the private sector

Private sector

Accompany the public sector during the sensitization of the farmers and provide the services on a commercial basis

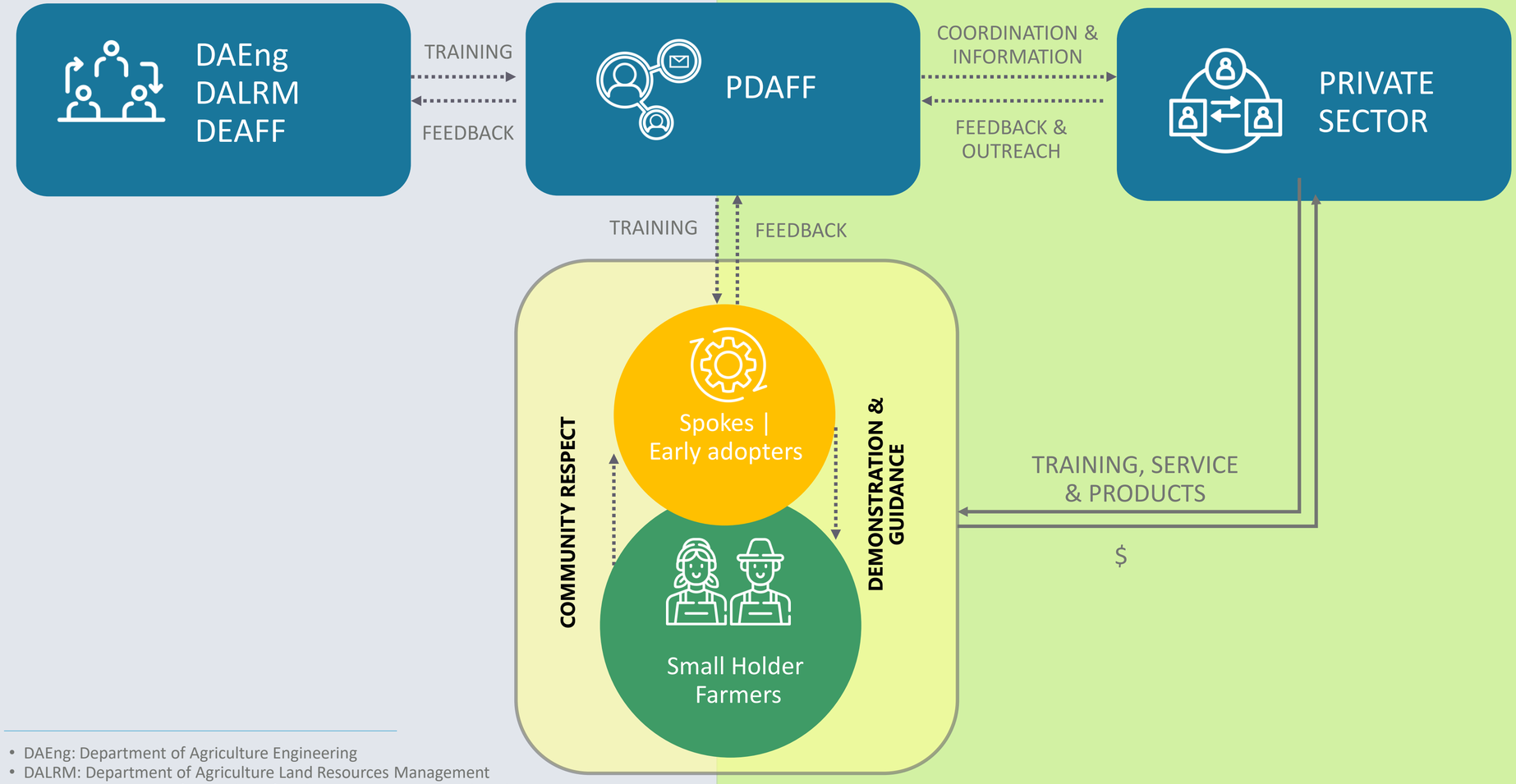
Early Adopters

Agree to take the SI services and use their land to showcase the results to other farmers

Government Extension

Embed MetKasekor into the Government Extension System

Model

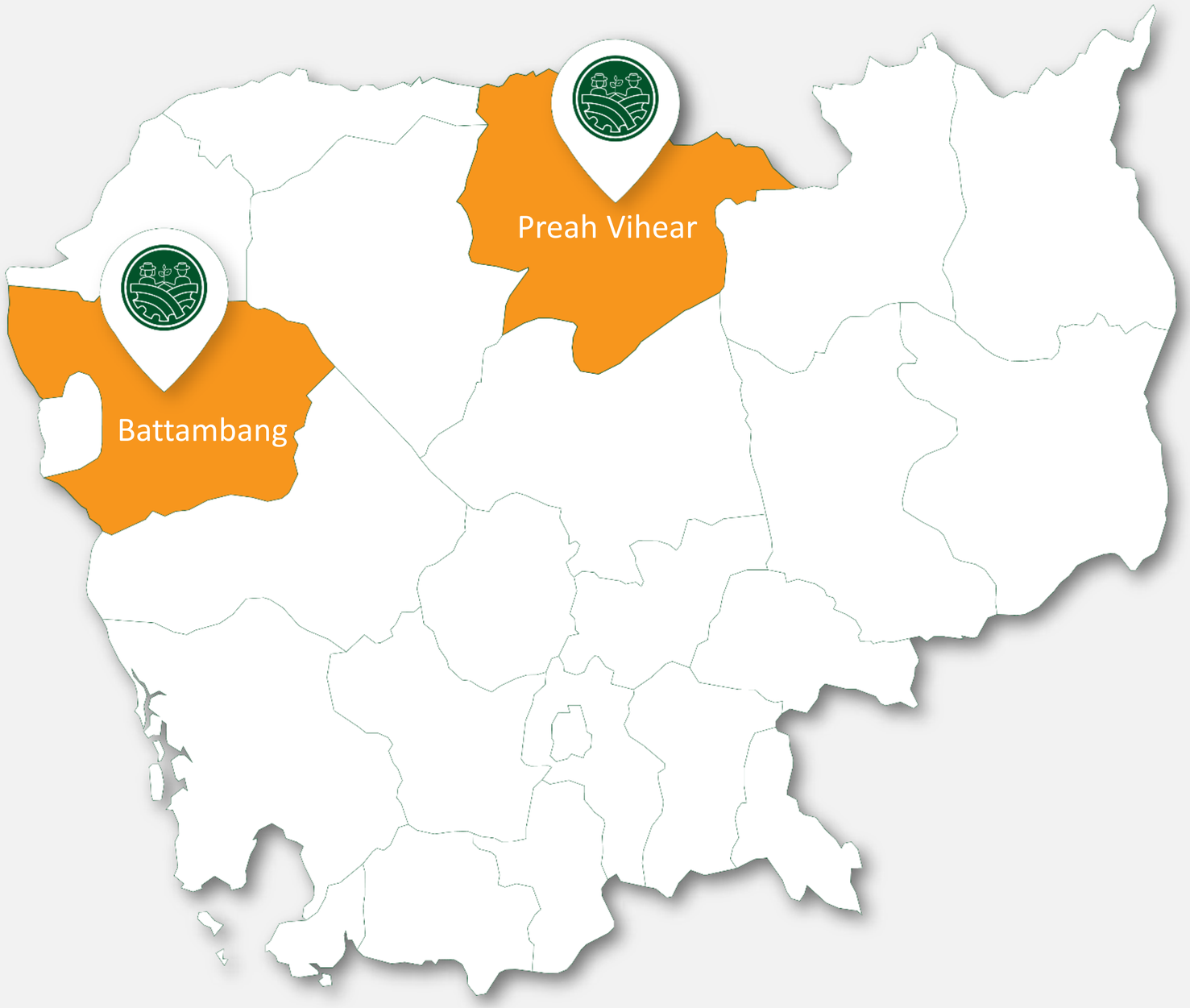


- DAEng: Department of Agriculture Engineering
- DALRM: Department of Agriculture Land Resources Management
- DEAFF: Department of Extension of Agriculture, Forestry and Fisheries
- PDAFF: Provincial Department Agriculture, Forestry, and Fisheries

Current Status

MetKasekor will be piloted in two provinces: Battambang and Preah Vihear (2021-24)

The pilot will be monitored by a Steering Committee within the Ministry of Agriculture, Forestry and Fisheries (MAFF)



MetKasekor Technologies


soil cultivator


combine harvester


no-till planter


land leveller


seed broadcaster


roller crimper

Metkasekor Steps

IDENTIFICATION

Identification of potential agricultural cooperatives, farmers and service providers

DEMAND CREATION MEETING

Demand Creation with agriculture cooperatives, service providers and smallholder farmers

FIELD SHOWCASE

Field Showcase by early adopter farmers of SI Operational Sequences

COMMERCIAL DEMONSTRATION

Large scale demonstration led by private sector to showcase SI practices and technologies

ANNUAL MEETING

Annual Meeting to review progress of the model (during pilot phase)

PROMOTIONAL MEETING WITH PRIVATE SECTOR

Promotional Meeting to enlarge the pool of private sector

Results to Date

1000
farmers

25
machinery sold

4
private sector involved

15
service providers

2
provinces

17
tons of cover crop produced

1000
ha of land covered

Demand creation event for target farmers in Battambang province

4. Dei Meas Initiative

DEI MEAS - ដីមាស

"Golden soil"

A TRANSITIONING SYSTEM FOR A CHANGE TOWARDS AGROECOLOGICAL PRACTICES

cirad
AGRICULTURAL RESEARCH FOR DEVELOPMENT

SMARTAGRO
SUSTAINABLE INNOVATIONS

swisscontact

Agro-ecology in Cambodia: Impacts and co-benefits

Impacts and co-benefits:

- Improve soil fertility,
- Restore ecosystem services,
- Sequester and store carbon in the soil,
- Reduce pests and diseases pressure,
- Diversify food production,
- Preserve soil biodiversity,
- Reduce soil erosion and restore degraded land,
- Increase soil water retention,
- Reduce methane emissions,
- Improve water use efficiency.

DEI MEAS - ដីមាស

(GOLDEN SOIL)

A TRANSITIONING SYSTEM FOR SMALLHOLDER FARMERS' CHANGE TOWARDS AGROECOLOGICAL PRACTICES

1

CREATING A

TRANSITIONING SYSTEM

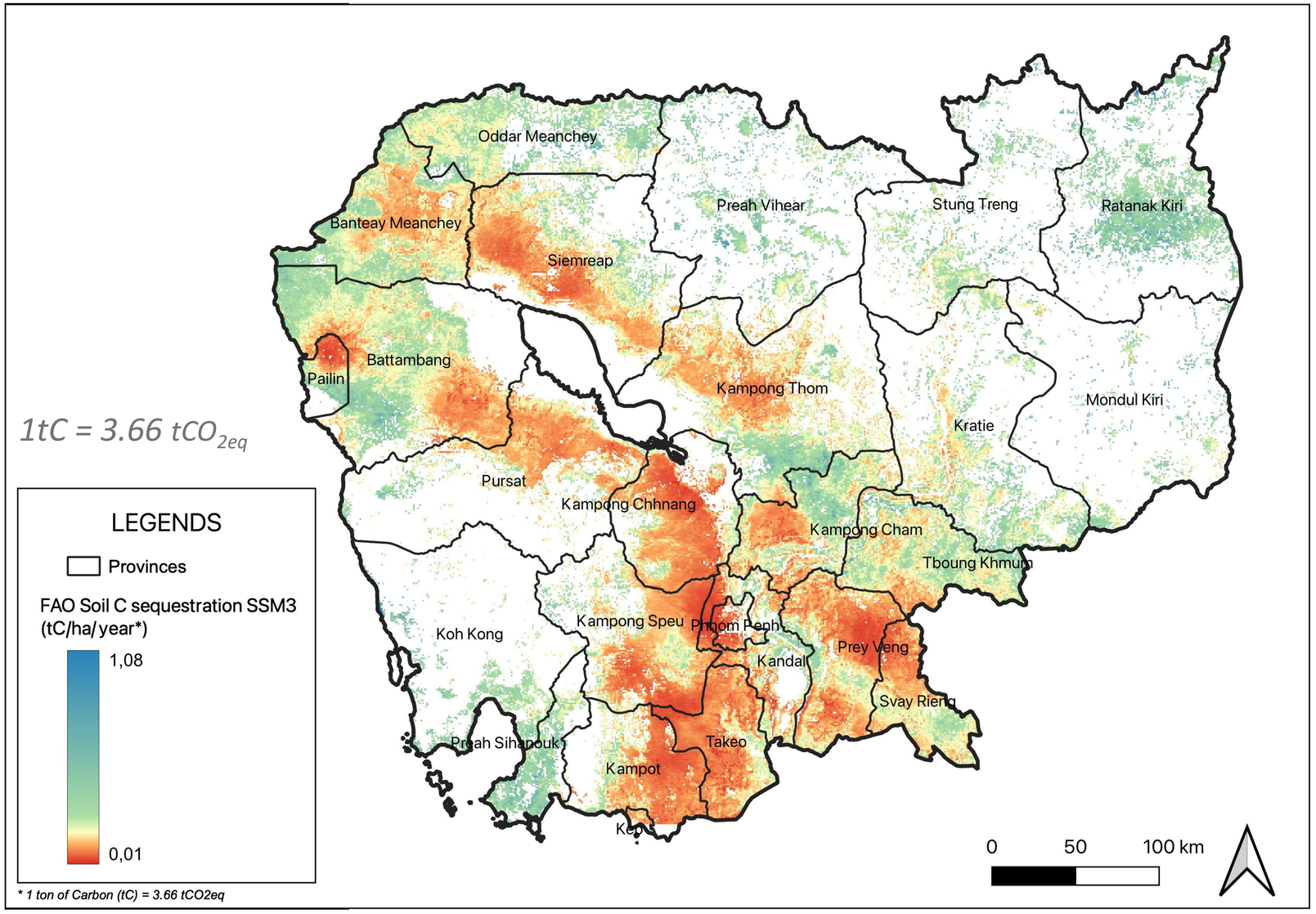
THAT INCENTIVIZE SMALLHOLDER FARMERS FOR SUSTAINABLE PRACTICE ADOPTION

QUANTIFYING CARBON AND ECOSYSTEM SERVICES PRODUCTION WITH AN EFFECTIVE AND INEXPENSIVE

MRV SYSTEM

2

To maintain and sequester SOC



Cambodia/FAO/GSP

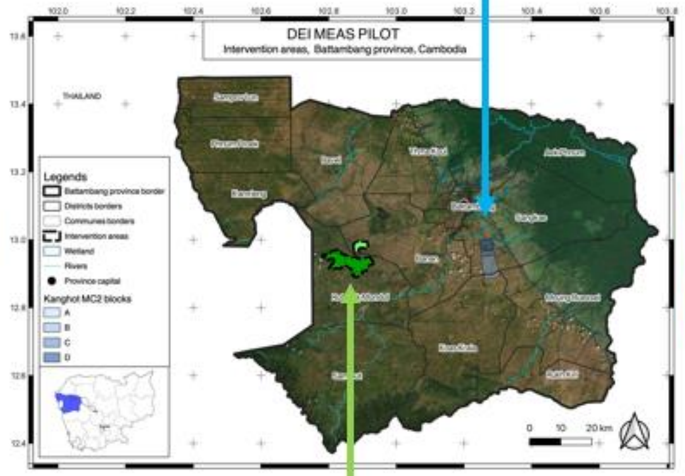
GSOCseq layers source:
National Submission
National Expert(s):
Phy Chhin;
Keo Nimol
Data-holding Institution(s):
Department of Agricultural Land Resources Management,
General Directorate of Agriculture,
MAFF

DEI MEAS: 2 pilot locations in Battambang province (NW)

Lowland:

Kanghot irrigation scheme

→ 200 Households on ~400ha

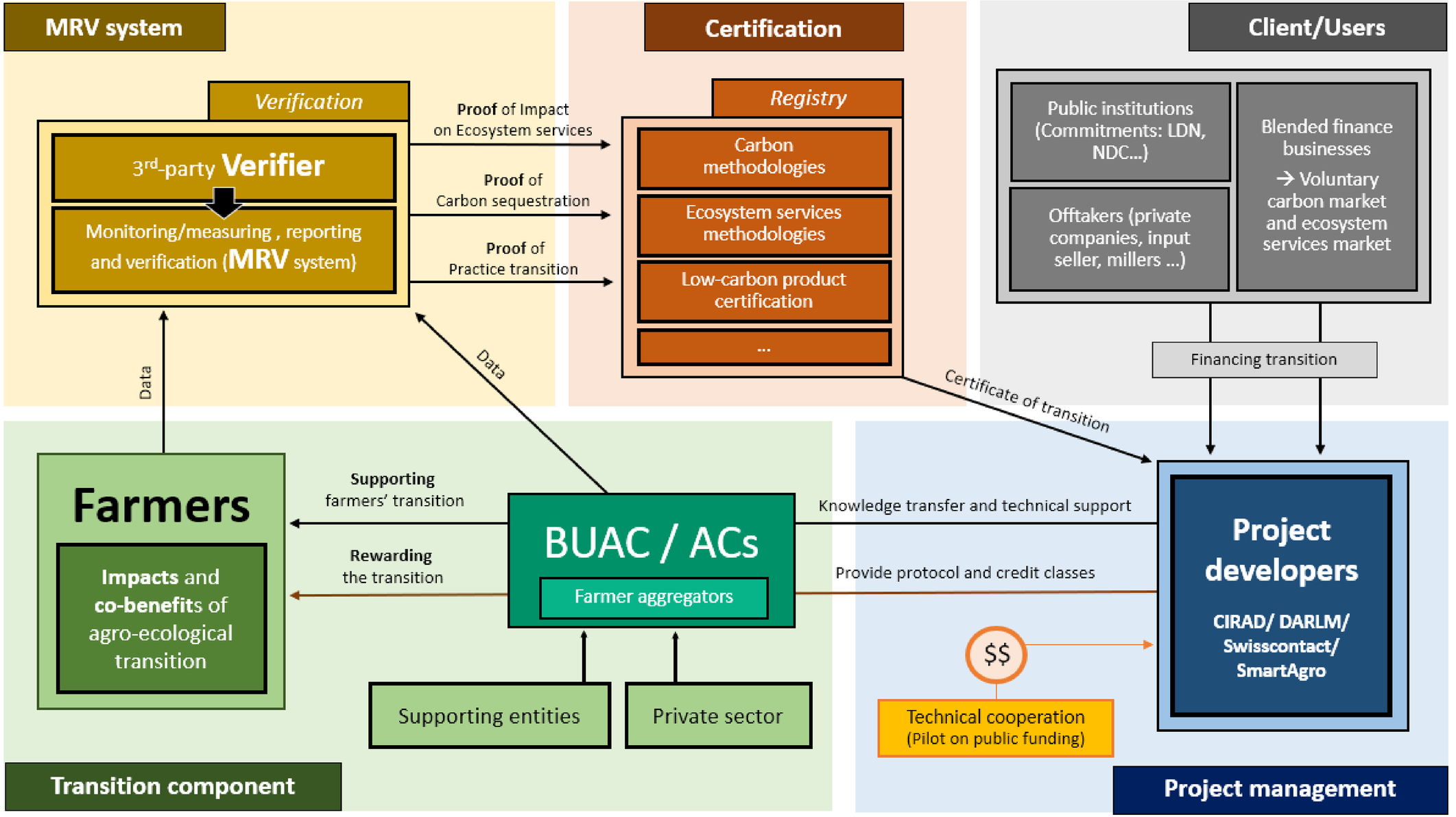


Upland:

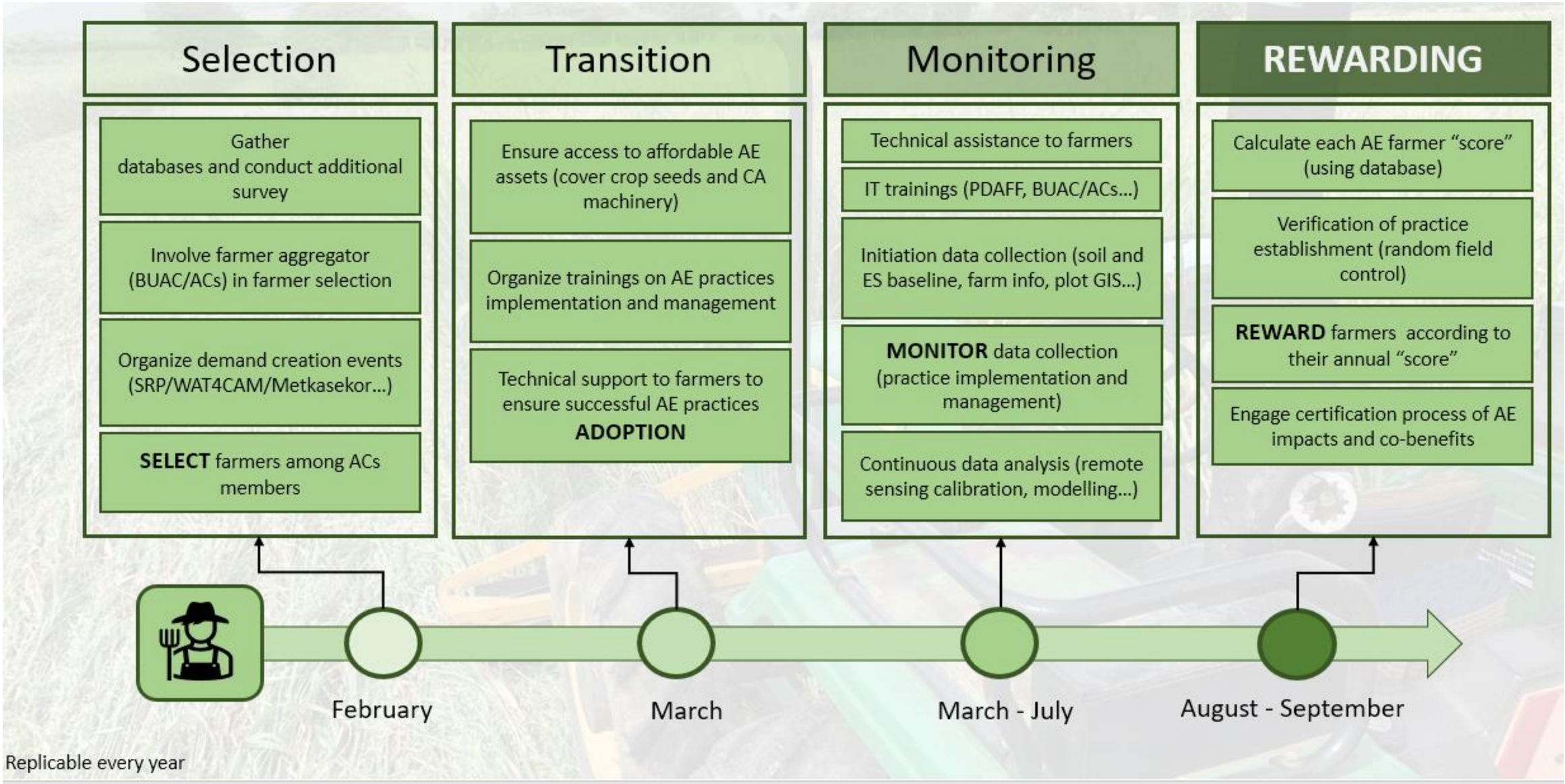
Pech Changvar and Sangha villages

→ 80 Households on ~150ha

The DEI MEAS system



Supporting farmers transition



Scoring system
Rewarding farmers for practice implementation

Rewarding system DEI MEAS: Scoring system			
Practice	Parameter	Scoring	Reward ($/ha)
Land preparation	Ploughing	0	**0**
	Subsoiling	1	**5**
	Land leveling	2	**10**
Cover crop establishment	Bare land	0	**0**
	Short cycle	1	**25**
	Long cycle	1	**30**
Residue management	Exporting or burning biomass	0	**0**
	Green manure	1	**5**
	Green sowing	2	**10**
Sowing method	Broadcasting	0	**0**
	No-till planter Cereals	1	**10**
	No-till planter Cassava	2	**20**
Crop diversification	Monocrop	0	**0**
	Other grain crop	1	**10**
	Cover crop seed production	2	**20**
	Pulse crop/ Mungbean	2	**20**
Water management	Rainfed	0	**0**
	Flooding	0	**0**
	AWD	1	**30**

Example:

~45$ reward

To be adapted to each cropping system (maize, cassava…)

Cropping systems and rewards – examples in LOWLAND

Double Rice cycles | Ploughing | Broadcast | Diversification Pulse crop (+20) | Green manure (+5) | Broadcast | Flooded

REWARD 25 $

Double Rice cycles | Land levelling (+10) | No-till planter (+10) | Cover crop Short-cycle (+25) | Green sowing (+10) | No-till planter (+10) | Flooded | No diversification

REWARD 65 $

Key points and outcomes of DEI MEAS pilot

The creation of a detailed **transitioning system**, incentivizing smallholder farmers to access and implement agro-ecological practices.

The quantification of carbon and ecosystem services production, with efficient and cost-effective **MRV protocols,** allowing international certification and recognition of practices impact.

Recognizing smallholder farmers as contributors of natural resources conservation and climate change adaptation and mitigation.

Co-benefits of the pilots

- Sustainably increasing agricultural productivity and incomes;
- Improving smallholder farmers' resilience to climate change;
- Maintaining or enhancing soil fertility, water resources, and other ecosystem services;
- Sequester carbon and reduce greenhouse gas emissions.

Case for ASEET Project: Design and assess a range of cassava-based cropping systems to reduce the environmental footprints and sustain productivity and profit.

T1 : traditional management (plough and ridge)

T2 : use of stylo on the inter-rows as a green manure management (plough and ridge)

T3 : use of stylo on the inter-row under flat planting of cassava under NT management

T4 : two years rotational sequence between stylo for seed production – cassava under NT management vertical stems planting:

- T4.1 : Stylo seed production (2023) – Cassava on the mulch of the stylo (2024) – Stylo (2025)
- T4.2 : Cassava (2023) – Stylo (2024) – Cassava on the mulch of the stylo (2025).


CASIC
Cambodia Conservation Agriculture and Sustainable Intensification Consortium
CAMBODIA CONSERVATION AGRICULTURE AND SUSTAINABLE INTENSIFICATION CONSORTIUM (CASIC)
Kansas State University
Collaborative Research on Sustainable Intensification
swisscontact
ASEA
Agroecology in SouthEast Asia
cirad
AFD
AGENCE FRANÇAISE DE DEVELOPPEMENT
USAID
FROM THE AMERICAN PEOPLE
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Agency for Development and Cooperation SDC

About CASIC

- Cambodia Conservation Agriculture and Sustainable Intensification (CASIC), endorsed by a decision letter from the Minister of MAFF in May 2020, is a national platform for the members to create network aiming to improve and promote Conservation Agriculture and Sustainable Intensification (CASI) practices in Cambodia.
- CASIC will take a lead role in bringing together all relevant stakeholders including public sector, private sector (seed producers/suppliers, machinery manufacturers/distributers, financial institutions, etc.), farmers, agriculture cooperatives, research organizations, and academic institutions.

Vision

The vision of CASIC is to become a platform for promoting conservation agriculture and sustainable intensification towards agroecological transition in Cambodia and Southeast Asia.

Mission

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.

Overview of subcomponents of CASIC

1) **Subcommittee 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.

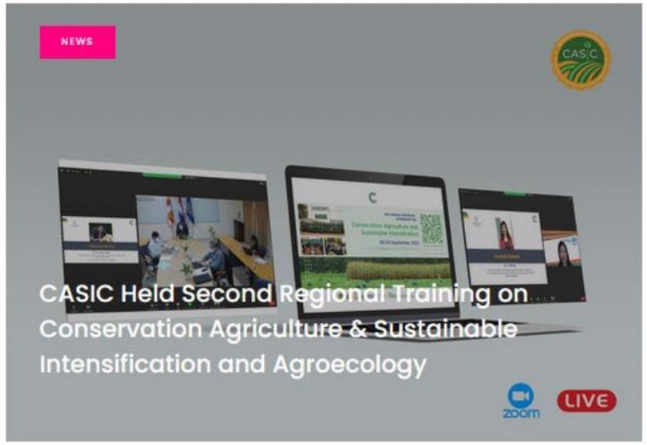
2) **Subcommittee on Coordination and Networking**, led by DAEng with support from Swisscontact, is responsible for identifying and connecting CA & SI and agroecology related stakeholders and market actors to pool together all available resources which will further strengthen CA & SI and agroecological development.

3) **Subcommittee 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.

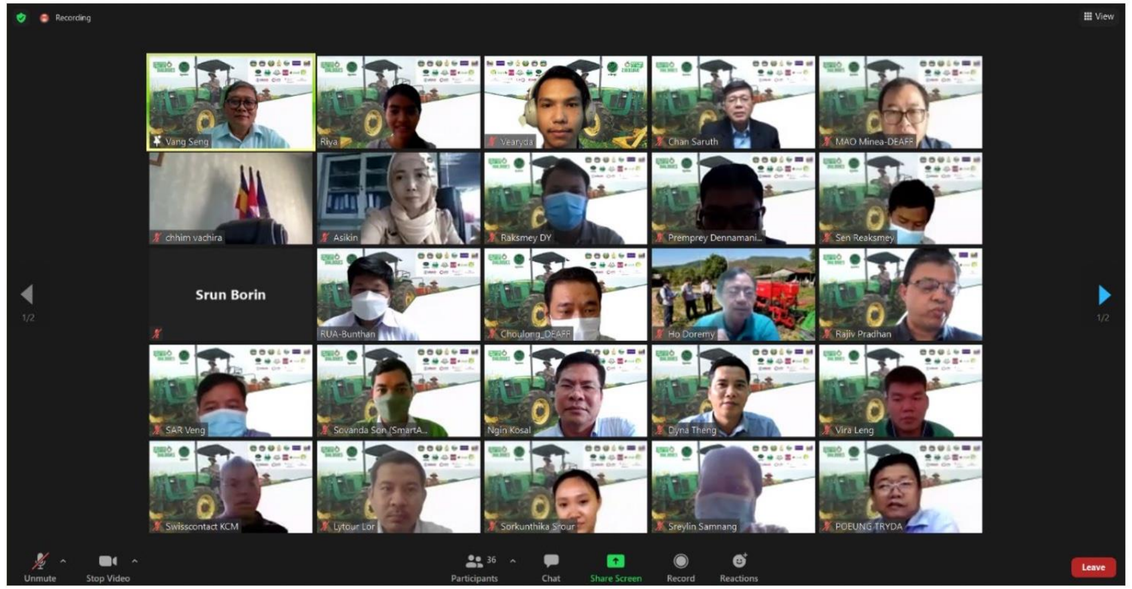
4) **Subcommittee on Research for Development (R4D) ,** co-led by DALRM and CARDI with support from CIRAD, is responsible for bringing together several research organizations active in the field of CA & SI and agroecology to identify research priorities (cropping systems, cover crops, mechanization, 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.

The roadmap document is approved by His Excellency Minister of MAFF, and it is available for both Khmer and English versions. The document is published and distributed to relevant stakeholders.

You can download CASIC Roadmap document from CASIC Library:
https://www.casiccambodia.net/library

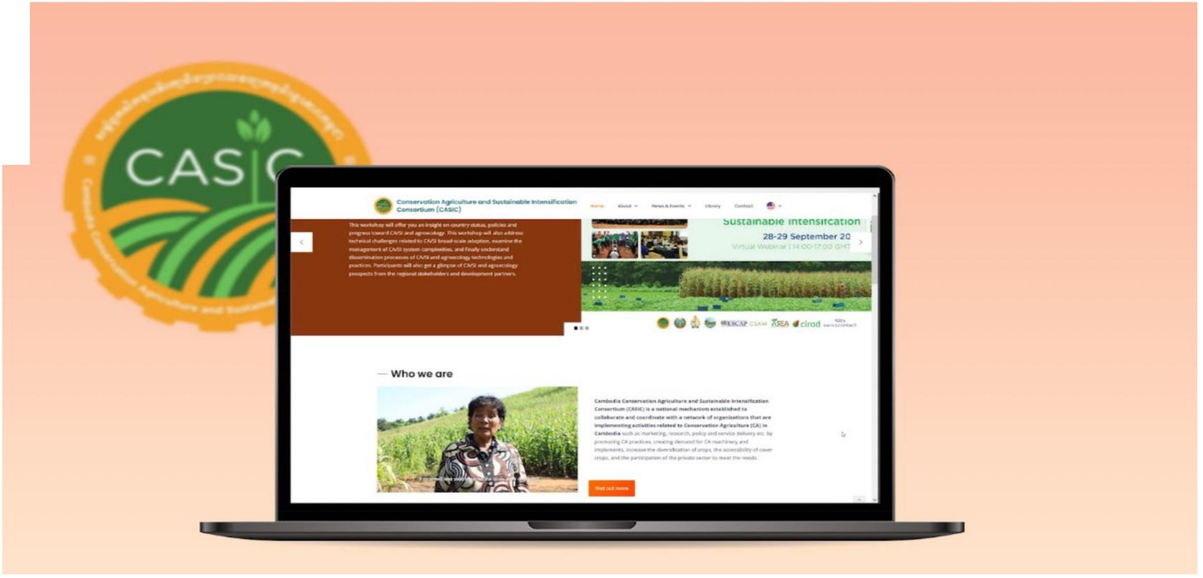


The Consultation Meeting on MetKasekor Agriculture Extension Model was held on the 5th August 2021. This event was also included in the Food System Dialogue.



The two key promotional platforms successfully developed and are being operating to promote and share the progress of CASIC and CA/SI implementation:

- Website: **www.casiccambodia.net**
- Facebook page: **CASIC Cambodia**



Thank you for your attention!