



Lancang-Mekong
Cooperation Special Fund

Workshop Report

The 2nd Expert Workshop on the Implementation of Soil Doctors Program in Lancang-Mekong Countries

20-23 September 2022
Bazaar Hotel Bangkok,
Bangkok and Ratchaburi Province
Thailand



**Development and promotion of
and agricultural management**

**soil doctor program for sustainable land
practices in Lancang-Mekong Countries**

**Land Development Department
Ministry of Agriculture and Cooperatives, Thailand
September 2022**



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Executive Summary

The 2nd expert workshop on the development and implementation of soil doctors program in Lancang-Mekong Countries under project “Development and promotion of soil doctor program for sustainable land and agricultural management practices in Lancang-Mekong Countries” was organized during 20-23 September 2022 at the Bazaar Hotel Bangkok, and a study visit to volunteer soil doctor and land development learning center in Ratchaburi province. Workshop participants were totaling of 50 people, including: 1) Officials from Land Development Department, including Land Development Regional Office 4 (Ubon Ratchathani), Land Development Regional Office 5 (Khon Kaen), Land Development Regional office 6 (Chiang Mai), Mae Hong Son Land Development Station, Land Development Regional Office 7 (Nan), Sukhothai Land Development Station, Land Development Regional Office 11 (Surat Thani), Land Development Regional Office 12 (Songkhla), Pattani Land Development Station, Research and Development for Land Management Division, Planning Division, Soil Resources Survey, Division of Land use Planning and Policy, Office of science for land development, Information and Communication Technology Center, Office of the secretary, 2) Educational Institute: Kasetsart University and 3) Experts in agriculture/ sustainable land management/ Network groups of member countries: Thailand, Cambodia, Laos, Myanmar, Vietnam, China, Sri Lanka and India.



Activities during workshop include:

1. Presentation

The presentation consisted of 7 topics:

1.1) A participatory approach ‘volunteer soil doctors’ for sustainable land management by Mr. Pramote Yemclee, Expert on Land Degradation Management, Research and Development for Land Management Division, Land Development Department.

1.2) Digital technology promoting land management for volunteer soil doctors in Thailand by Mr. Attaya Phinchongsakuldit , Director of Information and Communication Technology Center, Land Development Department.

1.3) Income generation-oriented marginal land management practices by Prof. Dr. Tang Ya, Sichaun University, China

1.4) Sustainable land management by smallholding farmers in the Northwest of Vietnam by Dr. Ngo Thanh Son, Vietnam National University of Agriculture, Vietnam

1.5) Innovative extension models toward agro-ecology and safe food system transition in Cambodia by Mr. Phy Chhin, Bureau of Agricultural Crop Zoning, DaLRM, Cambodia

1.6) Soil Doctors in India by Dr. Pawan Kumar, Patanjali Organic Research Institute, India

1.7) E-Service System for National Soil Quality Data by Mrs. Kamarin Nimnuanrat, Director of Soil Mineralogy and Soil Micromorphology Research Group.

2. Discussion and workplan formulation: Experts from each country exchanged problems and obstacles in implementing the project, the needs in building a network of soil doctors in member countries. Also, they formulated the workplan for implementation of soil doctors program in each member country, with sub-topics as follows: 1) activities and operations 2) duration of operation and 3) Requirements or recommendations from the Land Development Department. The discussion includes suggesting guidelines for creating academic cooperation between researchers and academics at the international level and a network of soil doctors and farmers. Experts exchange knowledge in agriculture to develop knowledge and technology on land and agriculture management and to support information on the development of volunteer soil doctor potential.

3. Study visit to volunteer soil doctors farms and the Land Development Learning Center in Ratchaburi province. This activities included 2 volunteer soil doctors, namely 1. Ms. Usa Pranpanas, a volunteer soil doctor in Rang Bua Sub-district, Chom Bueng District, Ratchaburi Province and 2. Ms. Kwanta Sriprasert, a volunteer soil doctor in Berkphrai, Chom Bueng District, Ratchaburi Province. During the study visit, knowledge was exchanged on the new theory of agriculture, mixed farming, including guidelines for applying the knowledge of agriculture, soil management and using the technology of the Land Development Department to apply in their own areas for maximum benefit. The participants learned and shared about the experience and success of the soil doctor and their network on land and agriculture management.

Knowledge exchange on sustainable land and agriculture management at international level

1.Thailand: A participatory approach volunteer soil doctors for sustainable land management by Mr. Pramote Yemclee, Expert on Land Degradation Management, Research and Development for Land Management Division, Land Development Department.



1.1.1) How is “Volunteer Soil Doctor” established? In 1995, LDD initiated the Volunteer Soil Doctors program and recruited outstanding farmers. Building their capacity in principle of soil science through multiple trainings and Land Development Department: LDD work with them for land management.

So, what are soil doctors? Soil doctors are a smart farmer who helps other farmers in the local to manage their land and improve their livelihood. This program is not only a participatory approach that the LDD wishes to shift from a traditional extension services, but also to response to the decreasing number of LDD staff, but what was the reason behind soil doctors establishment. It is well known that, with the increase in population, the land is under pressure to meet the rising demand for food production. The conversion of forests to other land uses, the use of unsuitable areas for agriculture are contributing to land degradation, by decline in soil productivity which in turn affect agricultural productivity and human well-being.

Soil constraints and land degradation in Thailand caused by natural factors and human activities.



Soil erosion

Shallow Soil

Acid Sulfate Soil





Figure 1 Problem soils and land degradation in Thailand

With the map of Thailand, we roughly divided Thailand into 5 subregions. The Soil constraints and types of land degradation differs from one to another subregion. Such as in the North, we face with soil erosion and shallow soil largely, while the Northeast, we face with drought, saline and sandy soils. The central, east and South experience acid sulfate, sandy and peat soils (Figure 1).

From these all constrains, land degradation was getting more concern and acknowledged by smallholder farmers in the past and Land Development Department as government organization could not respond farmers request in a timely manner. We then establish soil doctor program.

1.1.2) Status of Volunteer Soil Doctors at present. Volunteer Soil Doctors collaborate with Land Development Department systematically through an established network structured in accordance with the organization of the Thai territory. Soil Doctors are divided into 4 levels, provincial, district, sub-district and village levels, with a total number of soil doctors presently almost 80,000 people.

1.1.3) Who will be selected to be Volunteer Soil Doctors? Farmers who are in good health, own the land they farm, at least 20 years old, willing to work, keen on land development activities and reside in concerning areas are eligible to become Volunteer Soil Doctors. Another key factor for being selected to become a Volunteer Soil Doctor is ones who has leadership, willing to learn/train on sustainable soil management and willing to work with LDD staff and share knowledge with other farmers in the community.

1.1.4) The mission of Volunteer soils doctors 1) All soil doctors across the country will receive trainings on soil, land and agriculture management. They then will use such knowledge and technology of land management improving their own farmland in a sustainable manner (Figure 2).



Figure 2 Volunteer soil doctors activities in farming areas

2) After received well-trained, soil doctors will transfer knowledge and technology to other farmers in the community through farmer-to-farmer training. This allows other farmers to better understanding on soil conservation and sustainable soil and land management (Figure 3). You can see typical types of trainings and demonstration by soil doctors with LDD staff support. They are entitled to carry out public relation activities in making announcements; delivering messages to farmers; inviting farmers to participate in observation, study tour, workshop, and others.



Figure 3 Soil doctors' activities in transferring knowledge and technologies to other farmers.

3) soil doctors will guide and assist other farmers in the community to understand the principle of soil science. Volunteer Soil Doctors will be fully supported with tools, maps, and manuals that the LDD provides to help them perform their tasks effectively. Also, they can provide some recommendation on using applications for land management. We have many applications both mobile and computer to provide information and knowledge on land management to farmers (Figure 4).



Figure 4 Land management application and training of the use of soil test kits.

4) soil doctors use their own farm as demonstration centers for knowledge and technology of land development transfer to other farmers. They will receive privilege to carrying out demonstration farms in close cooperation with the LDD. Volunteer Soil Doctors will be able to give basic recommendations and answers to possible questions they may receive from farmers (Figure 5).



Figure 5 A demonstration center for knowledge and technology transfer of land development.

5) Soil doctors are also entrusted to distribute to farmer agricultural materials such as lime, fertilizers, green manure, etc. to the community and promote the utilization of organic materials for soil improvement and bio-extract products (Figure 6).



Figure 6 Agricultural materials and products by Land Development Department.

1.1.5) Demonstration center of Vetiver grass. The Vetiver grass is used for soil erosion protection, soil fertility improvement and soil moisture maintenance. Land Development Department is the major agency to operate soil rehabilitation by planting Vetiver grass in various styles such as to plants in row along the slope, up-side-down V-shaped style to solve deep gully conditions and for enhancement of soil fertility. The benefit of Vetiver grass utilization for degraded soil rehabilitation comes from the reason that the grass is one of Thailand's native plants which has been disseminated and well adapted in various ecological conditions around Thailand and be able to grow in any kinds of soil, regardless of poorly fertile soil, acid-sulfate soil, acid soil, sandy soil, shallow soil, lateritic soil, gravel-mixed soil, deserted mine soil or salt-affected soil. However, primary plantation also requires special care until the tillers can set themselves, the process needs no charge but delicate care taking by watering and adding manure to maintain the soil.



Figure 7 An example of a demonstration of planting Vetiver grass.

1.1.6) What are the benefit and honor of being soil doctors. After having completed the provided training course and being selected, 1) Volunteer Soil Doctors will be officially registered to LDD database and will be awarded with a certificate of competence and tools. This database links with differences platforms own by LDD for farmer benefits such as ID Din Dee (soil health card) (Figure 8).



Figure 8 ID Din Dee (soil health card)

2. In addition to the basic training, some specific training courses will be given to the Volunteer Soil Doctors in order to address specific problems affecting their area of competence. As appropriate, the LDD will organize additional capacity building courses for them (Figure 9).



Figure 9 Training of volunteer soil doctors.

3) One of very important, outstanding soil doctors will receive the Volunteer Soil Doctor Award and being invited to many public events (Figure 10).



Figure 10 Volunteer Soil Doctor Award.

4) Facilitate their roles and activities, the LDD provides them both in kinds and in cash for the following activities: free input for demonstration plots, payment for data gathering, expenditure for communication among themselves and with the LDD, payment for giving instruction, right to produce soil improvement and conservation materials (Figure 11).



input for demonstration plots



data gathering

Figure 11 Knowledge and technology provided by Land Development Department.

5) Soil doctors can develop their own products from the producer from their own land, resulting in additional income (Figure 12).



Figure 12 Products from the farms practiced by volunteer soil doctors.

1.1.7) Why soil doctors play a crucial role in SSM to ensure food security in the region?

1) Soil doctors are producers of food, many SSM practices are either discovered by them or developed in collaboration between research and soil doctors/farmers.

2) One practice that is being implement is soil and water conservation measure to protect, improve and restore land productivity.

3) There are numerous technologies and approaches used in soil and water conservation practices, such as cover crop, grass strip cropping, and green manure cultivation before the growing season (Figure 13).



***Vetiver grass* for soil erosion control and sediment traps**



***Crotalaria juncea* as green manure for soil nutrient improvement**

Figure 13 Various technologies and methods used to conservation soil and water.

4) Soil doctors as land-owner. The New Theory of land management is a production system based on Sufficiency Economy Philosophy where the land will be divided into 4 parts (reservoir, paddy rice, field crops and fruit trees, and residential area). Allowing farmers more self-reliant through a holistic management of the land, while living harmoniously with nature and within society. When no land is leased, the producer and owner is the same person. Decisions made by the producers who lease the land are often short-term and guided by profit optimization, while the owner decisions may be more linked with the long-term management of the land.

These are some example of land management by smallholding farmers in Thailand. This architecture not only allowing producers as owners more self-reliant through a holistic management of the land, but also providing a nice living space harmoniously with nature (Figure 14).



Figure 14 Land management and land use.

5) Training other farmers in the community to manage their land and successfully improve their livelihood. Becoming the focal points to associations involved in the program and work closely with government agencies and relevant organizations. Being the voice of the farmer in developing effective solutions to manage soils for sustainable production and raising awareness, knowledge, and skills of other farmers for sustainable soil management (Figure 15).



Figure 15 Training other farmers in the community to manage their land.

6) Lessons learned/best practices in sustainable soil and land management. Scale out of sustainable soil management by soil doctors – a case study: Plook Hug Organic Farming network, Thailand. This network has a strong collaboration among members and between farmers and stakeholders, capacity building on land management results in enhancement of land productivity. This improves farmer’s household income and raise an awareness in SSM and thus ensure food security in the community (Figure 16).



Figure 16 Plookhug Organic Farming network

1.1.8) Way forward in the adoption of soil doctors program in Lancang-Mekong countries: LMC. Strengthen collaboration among LMC agencies and between LMC and global soil partnership: GSP. Developing the capacity building platform for more efficient distribution of the program and Providing effective materials/ solutions for narrowing the knowledge gaps among smallholder farmers Pilot cases to upscaling the program at the country level. As now soil doctors has been scaled out in the region, What are the main way forward for soil doctors implementation in LMC.

2. Thailand: Digital Technology Promoting Land Management for Volunteer Soil Doctors

by Mr. Attaya Phinchongsakuldit, Director of Information and Communication Technology Center



1.2.1) A public speaker speaks best when transferring from their own knowledge and experience. So do the volunteer soil doctors, volunteer soil doctors will be the best at transferring technology when they talk from their own knowledge and experience in using land development technology. Then Land Development Department organized training and demonstrations, allowing the soil doctor to test and experiment by themselves to improve their knowledge and experience. Also, LDD use digital technology to support soil doctors work.



Figure 17 Public knowledge transfer.

Digital technology normally has a high cost, such as IoT Drone resulting in difficulty to bring it into operation/implementation. However, there is one digital technology that can be directly delivered to soil doctors and farmers, namely information technology (IT) (Figure 18).

LDD has provided Information technology to soil doctors and farmers in various forms as follows :

- 1) AI Chatbot
- 2) Applications providing maps, data and knowledge
- 3) Applications accessing LDD services
- 4) Applications accessing LDD online learning



IoT

Drone

LDD Fertilizer

ID Din Dee

AI Chatbot

On farm Thai LDD

Figure 18 Digital technology applications.

What is an AI Chatbot? As I did mention, we developed AI Chatbot to provide information for soil doctors and farmers. This Chat system is function on the Application line, users can pin and check soil information. The system is filled with various types of information and knowledge, Users can access various services of the LDD. The system can connect to other applications. Users can contact LDD officers through the applications and users can send messages in chat box and having a Chatbot to respond to messages (Figure 19).



Figure 19 AI Chatbot

LDD on Farm is an information system that uses for land use planning by individual farmers. This application allows farmers to check the availability of the land for cultivation such as water sources and climate data at the plot. Farmers can create their plots through online and they can manage plots by themselves on online maps from planting to harvest. When the management is complete, the system will calculate the production cost, forecast the production of regular plots, income expenses, profit and loss, and summarize the information for farmers along with a QR code for farmers to easily scan and view the information quickly. Farmers can choose crops to suit the soil (Figure 20).



Figure 20 AI LDD on Farm

Agri map is information system that has so many maps about agriculture in Thailand, on agricultural land. It covers an area of 76 provinces and Bangkok. This system shows information of alternative economic crops. With the system, farmers can explore alternative crops to grow on their land, with important details such as cultivation, cost, and purchase sources. This system is easy to use, just pin to the map or specify coordinates. It can access main agricultural information at the national, provincial, district and sub-district level. This application show spatial details divided by color, it can display agricultural data analysis results in statistics, graphs and numbers (Figure 21).



Figure 21 Agri-Map

Land Development Department also provides a platform called **E-SERVICE**. Farmers can select many services from Land Development Department through this platform. For example, Agricultural Materials Service, Request a service for farm pond in the farmers' farm, Agricultural soil inspection service, Soil information and soil usage online service, Request map service, Initial permanent forest line inspection service and Electronic library. You can also inform us you your soil and land problems (Figure 22).



Figure 22 e-Services application

Currently, smartphone technology is accessible by farmers in Thailand, making it easier for people to access Chatbot and various applications. So it is easier to send messages directly to soil doctors and farmers via smartphones. Therefore, communication from the LDD to the soil doctors and farmers through smartphones, it is how to transfer land development knowledge and technology from the present to the future.

3. China: Income generation-oriented marginal land management practices

by Prof. Dr. Tang Ya, Sichuan University, China



1. Challenges of Chinese farmers China. Some basic information of agriculture in China has a total arable land of 128 million hectares with a population of 1,413 million. Cultivated areas are divided into flat terrain (31%) and sloping (69%) areas. Cultivated in irrigated areas (54%).

Small landholding averaging about 0.27 ha., by land allocated to each household, can be contracted only. Most of the cropland use for grain production. Emerging professional farmers: farm size 100-150 ha, farmers use agricultural machines and drones to help with their work. To reduce the use of human labor causing that labor to gradually disappear, including most of the workforce over 60 years old and the young or new generation is mostly in the city because farming has less income than expenditure, which is 10-42%, an average of 30%, which is caused by the higher cost of seed, agricultural chemicals use of machinery and labor, etc.

2. Management practices for income generation can be divided as follows

2.1 Land riser-based systems such as mulberry cultivation and silkworm rearing and fruit planting

2.2 Woods-based system that uses wood as the main product for processing

2.3 Cropland rotation based

2.4 Local ecotourism

3. Policy and institutional support

Policy recent national policy to improve farmers' life, agriculture and rural areas have been the annual No. 1 national policy since 1982. Rural vitalization. A national agency is established: National administration for rural revitalization by income generation is the key component.

Institutional regionalization national and provincial district level.

4. Future directions In the future, there is a tendency for the farming population to decline. Due to labor shortages, most of the young population is in the city. As a result, the agricultural occupation was reduced. because farming cannot support himself and his family Therefore, there should be improvement, development and promotion in agriculture to increase the quality of life of farmers to have a better life.

4. Vietnam: Sustainable land management by smallholding farmers in the Northwest of Vietnam

by Dr. Ngo Thanh Son, Vietnam National University of Agriculture, Vietnam



1.4.1 Sustainable land management by smallholding farmers in the Northwest of Vietnam Introduction to Vietnam and Northwest region, Drivers of unsustainable land management, constrain and challenge in adopt and lessons learned in sustainable land management models in Northwest.



Figure 23 Smallholder farmers in Northwestern Vietnam.

Spatial data in Northwestern Vietnam. Total area (mainland) ~ 33 mil ha, population (2021) ~ 98 mil people, total rainfall of Vietnam ~ 1900mm/year but varies spatially and in time, e.g. 75% of annual rainfall occurs during rainy season (Apr.-Oct.) and GDP: ~285 Bil USD (2021).

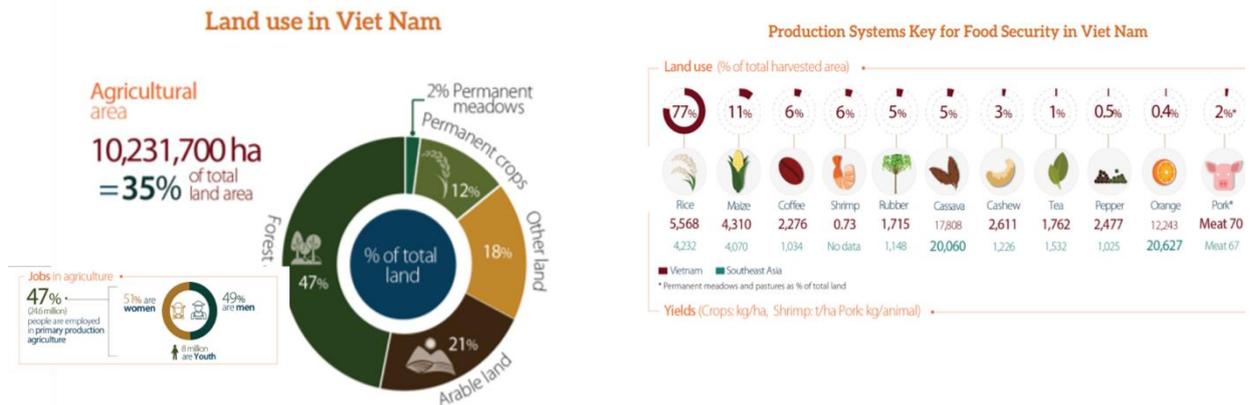


Figure 24 Land use in Vietnam.

Characteristics of the Northwestern Region of Vietnam. The Northern uplands of Vietnam form one of the largest ecological regions in the country, characterized by complex biophysical conditions and high diversity in ethnic minorities, cultures, and farming systems: resource use inefficiency and unsustainability leading to reduced crop productivity and land productivity in the Northwest Vietnam farmer welfare losses, and poor quality and unsafe foods poverty, low agricultural productivity, and land degradation are still major problems (Figure 25).

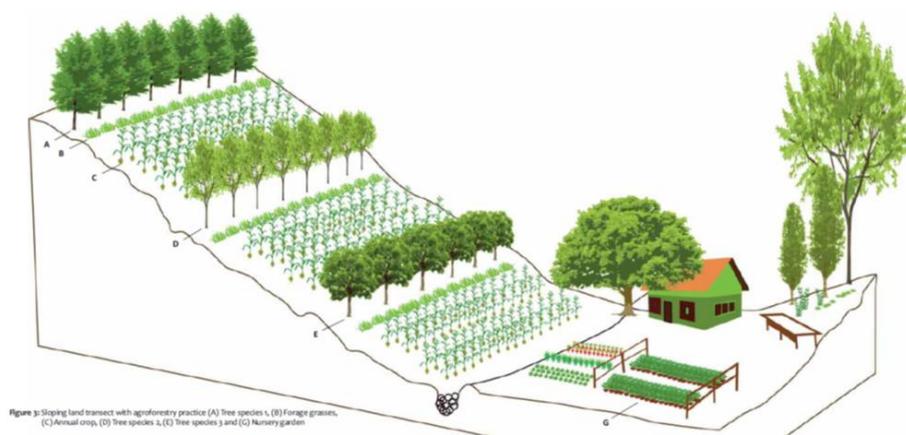


Figure 25 Northern uplands of Vietnam.

Direct impact on the ecosystem is deforestation for cultivation or conversion of land use from forest to other land leading to forest cover reduction; over-exploitation of natural forests leading to reduction in forest reserves, unsustainable cultivation practices on slope lands including tree clearance, pitting for seeding, non-application of erosion control measures and rotational cultivation. monoculture, deserted land, lack or faulty application of fertilizers, no weeding, degradation caused by pollution from wastewater, solid wastes, toxic chemicals, and the excessive use of pesticides.

Indirect impact on the ecosystem is caused by socio-economic drivers (population growth, immigration to the new economic zones, free immigration and poverty in the ethnic minority communities), agriculture and rural development policies, development policies for rural and mountainous areas and shortcomings in the land policies (Figure 26).

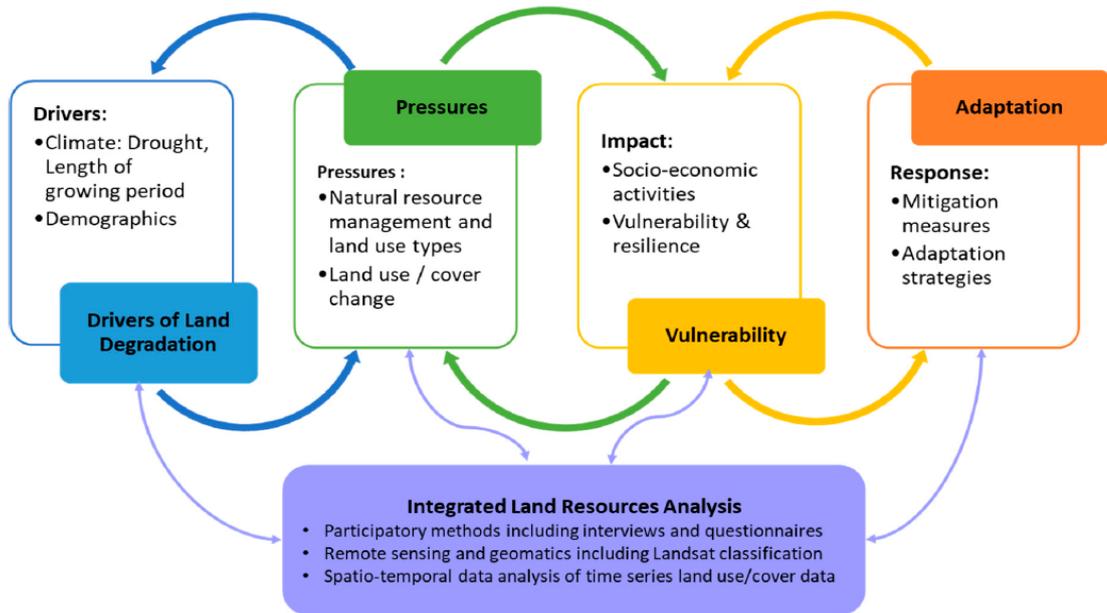


Figure 26 Vietnam of land use.

Strengthening the communication. Advising the community on the harmful effects of extreme weather events due to the effects of climate change. Develop appropriate land protection and suitable land use models with the participatory of farmers: field design, crop restructuring, use of appropriate varieties (Figure 27).

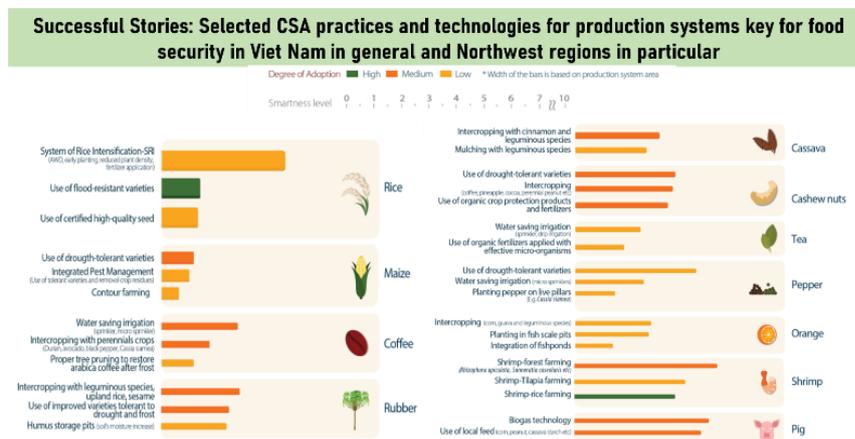


Figure 27 Selected CSA practices and technologies for production systems.

Training and transferring of technical advances to communities on the field. Soil erosion control techniques like afforestation, contour planting, terrace planting, integrated agroforestry models, integrated farming and husbandry models (Figure 28).



Figure 28 Training and the transfer of technological advances to the community.

Climate-resilient agriculture villages by farmer as the hearth of climate-resilient agriculture villages, transforming into climate-smart agriculture, learning by doing, participating agricultural production planning, towards a sustainable and high-value agricultural market (Figure 29).

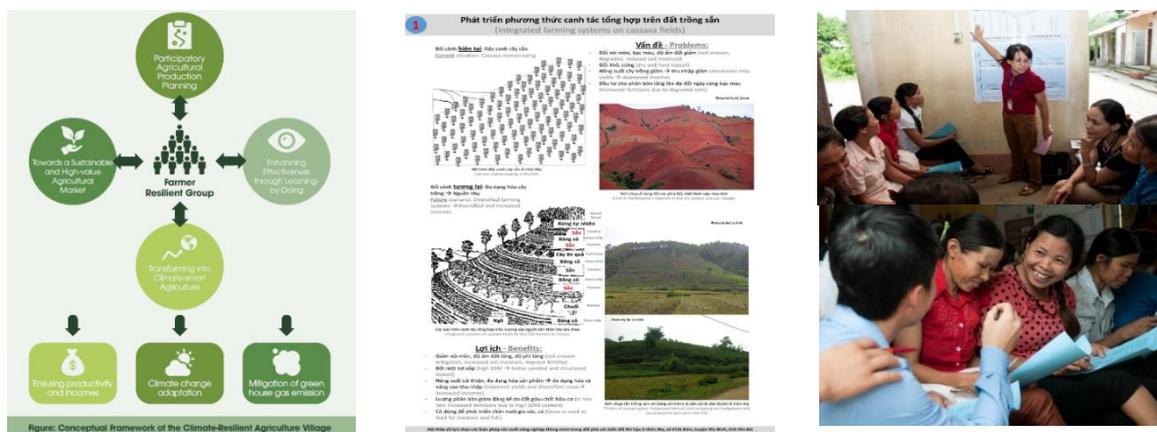


Figure 29 A group of village farmers conveying knowledge about the weather.

5. Cambodia: Innovative extension models toward agro-ecology and safe food system transition in Cambodia by Mr. Phy Chhin, Bureau of Agricultural Crop Zoning, DaLRM, Cambodia



Status and agriculture 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 covers 8,510,807 ha (included rubber and oil palm) (46.86%). Agricultural land covers 7,524,643 ha (MOE, 2020) (Figure 30).

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.

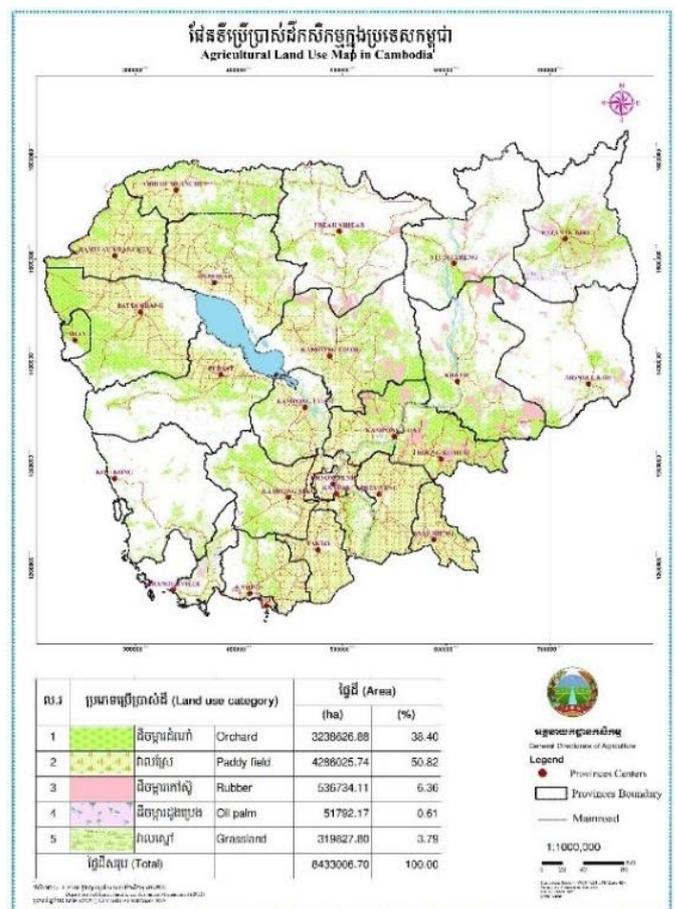


Figure 30 Status and agriculture land use of Cambodia.

The impact of land degradation. 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. 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).

Innovative extension models toward agro-ecology and safe food system transition in Cambodia

MetKasekor

MetKasekor supports sustainable intensification 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 (Figure 31).

Unique features that will be supported

The public sector is involved in ‘opening the market’ for the private sector. The private sector accompanies the public sector during the sensitization of the farmers and provides 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 and government extension, embed MetKasekor into the government extension system. 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).

Agro-ecology in Cambodia. 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 and improve water use efficiency.

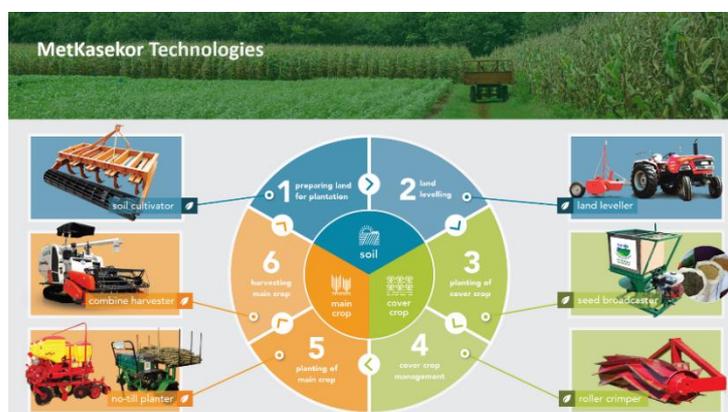


Figure 31 Cambodian agricultural land use technology.

Dei Means Project Initiative (golden soil)

Dei Means Project Initiative (golden soil) is transitioning system for smallholder farmers' change towards agroecological practices.

- 1) Creating a transitioning system that incentivize smallholder farmers for sustainable practice adoption.
- 2) Quantifying carbon and ecosystem services production with an effective and inexpensive mrv system.

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.

ASEET Project

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) and T4.2: Cassava (2023) - Stylo (2024) - Cassava on the mulch of the stylo (2025) (Figure 32).



Figure 32 Cropping system (cassava)

Cambodia Conservative Agriculture and Sustainable Intensification Consortium

Cambodia Conservative Agriculture and Sustainable Intensification Consortium (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/distributors, financial institutions, etc.), farmers, agriculture cooperatives, research organizations, and academic institutions.

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.

Overview of subcomponents of CASIC, 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.

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.

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.

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.

6. India: Soil Doctors in India

by Dr. Pawan Kumar, Patanjali Organic Research Institute, India



1. Organic agriculture and nature, organic seeds and natural, water conservation, pest and disease management, and marketing of organic products.
2. Results, changes in positive attitudes and actions at the micro level, Case study of 20 farmers, learning media for organic farming villages, consumers, and farmers with a focus on voluntary action (Figure 33).



Figure 33 Yogahaar Banner

7. Thailand: E-Service System for National Soil Quality Data

by Mrs. Kamarin Nimnuanrat, Director of Soil Mineralogy and Soil Micromorphology Research Group, Office of Science for Land Development, Land Development Department.



“E-Service System for National Soil Quality Data” is a system prepared for volunteer soil doctors for soil analysis, E-Service System for National Soil Quality Information also known as “Soil Doctors for soil analysis”. It is a system that provides information on nutrient mapping and soil analysis service by volunteer soil doctors nationwide, provides up-to-date information, is easy to use, fast, and keeps up with the needs or requests of farmers in the area, helps to optimize proactive soil and fertilizer management for optimal land use and develop and enhance the capability of volunteer soil doctors who are working in partnership with Land Development Department as well.



Goal in 2022: Land Development Department aims to select 1,800 volunteer soil doctors nationwide, provide them soil test kits for soil analysis services and analyze the soil and advise farmers at least 91,800 samples (Figure 34).



pH Test Kit



N P K Test Kit



Saline Soil Test Kit

Figure 34 LDD Soil Test Kits for Soil Doctors.

Service channel volunteer soil doctor for soil analysis can use the application to view the map to see the nutrients, and submit a request to make an appointment with a volunteer soil doctor in the farmer's planting area to perform a soil analysis, and the soil doctor can provide detailed advice on questions asked by farmers (Figure 35 and 36).

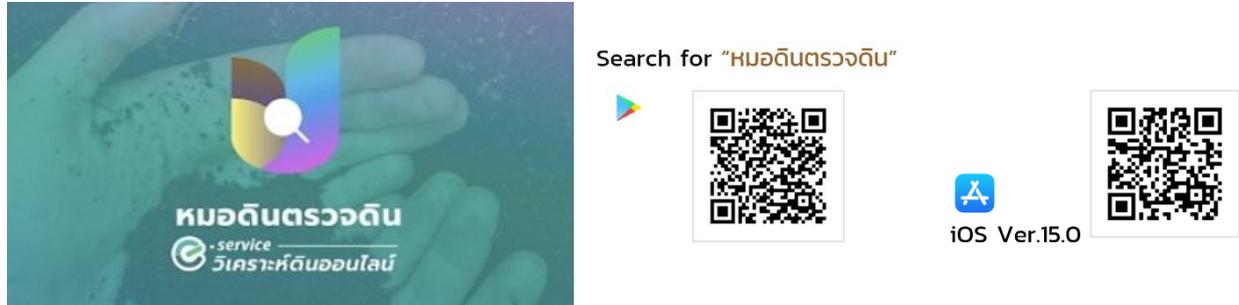


Figure 35 e-Service LDD application, Soil Analysis.

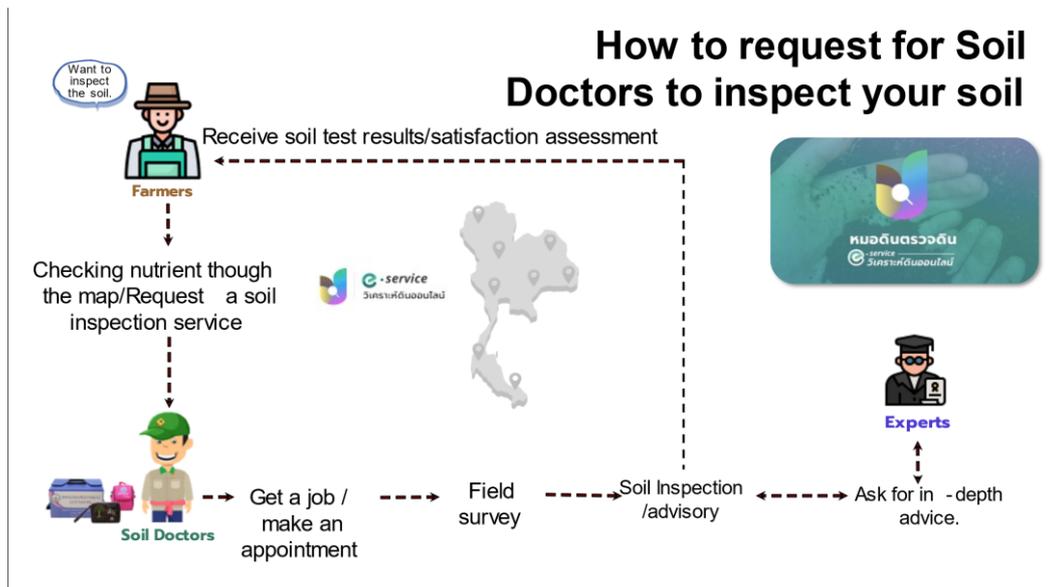


Figure 36 Process on the request for soil doctors to inspect soils.

Workplan of the implementation of Soil Doctors Program in Lancang-Mekong Countries

Group discussion on the implementation of soil doctors in LMC focuses on problems and obstacles in implementation of the program, including needs, and requests to Land Development Department on the creating a network of soil doctors in each member country.

The group is divided into 3 groups; group 1 Cambodia workplan; group 2 LAO PDR workplan; and group 3 Myanmar workplan. The main topic is to build a network of volunteer soil doctors in each member country and provide sub-topics as follows: 1. Activities and operations 2. Time of operations and 3. Requirements or recommendations from Land Development Department.

Group 1 members include:

- | | |
|------------------------------|----------------------------------|
| 1. Dr. Seng Vang (Cambodia) | 8. Mr. Surachet Naraphat |
| 2. Mr. Phy Chhin (Cambodia) | 9. Ms. Sasirin Srisomkeaw |
| 3. Mr. Pramote Yamklee | 10. Mr. Weera Pathakhinang |
| 4. Ms. Bunjirtluk Jintaridth | 11. Mr. Nuttawut Chulsong |
| 5. Ms. Apasiree Meeklang | 12. Ms. Pilatluk Liewrungcharoen |
| 6. Mr. Kridsophon Duangkamol | 13. Ms. Kanokporn Thongrod |
| 7. Ms. Saranya Norkaew | 14. Ms. Siriluck Sirisap |

Cambodia workplan formulation with 3 main activities, including:

Activity	Time period	Requests/Comments
1) Staff training and planning for the implementation of Soil Doctors Program <ul style="list-style-type: none"> ▪ Trained staffs (at least 5 staff from Cambodia will be trained as trainers) ▪ Implementation plan formulation ▪ Criteria of farmer selection as soil doctors 	Within 3 months	<ul style="list-style-type: none"> ▪ Training materials (poster, soil test kits) ▪ Experts from Land Development Department

- | | | |
|--|------------------------|--|
| <p>2) Farmer meeting and selection</p> <ul style="list-style-type: none"> ▪ 5 farmers/5 villages ▪ 10 farmers/10 villages | <p>Within 3 months</p> | <ul style="list-style-type: none"> ▪ Cambodia budget: travelling cost of 5 staffs ▪ Thai Budget: travelling cost of 5 staffs |
| <p>3) Soil Doctor Training on</p> <ul style="list-style-type: none"> - Roles of soil doctors - Fundamental of soil science - Etc. | <p>Year 2023</p> | <ul style="list-style-type: none"> ▪ 5 Soil test kits ▪ Training materials (posters, educational materials) ▪ Etc. |

Activity	Time	output	request/ comment
1. Staff training + planning (5 staffs)	1-2 weeks (with in 15 October)	- Trained staffs - Implementation - Criteria of SD selection	- Expert (LDD) - Training materials (poster, booklet)
2. Farmer Meeting & selection (5 farmers / 5 villages) (10 farmers / 10 villages)	the end of October	- List of 5 soil doctor	- Cambodia Budget Travelling cost of 5 staffs - Thai Budget : Travelling cost of 5 staffs
3. Soil Doctor Training - Role of soil doctor - Fundamental of Soil Science	The final 2 Weeks in Nov.	- Trained Soil Doctors	5 Soil Test kits



Figure 37 workshop and group discussion by group 1

Group 2 members include:

- | | |
|---------------------------------|----------------------------------|
| 1. Mr. Sisavath Phimmason (Lao) | 8. Mrs. Kamarin Nimnuanrat |
| 2. Mr. Sinouane Souvong (Lao) | 9. Mrs. Chatnapha Promlongongwan |
| 3. Mr. Pawan Kumar (India) | 10. Ms. Naralak Tana |
| 4. Ms. Kamalapa Wattanaprat | 11. Ms. Mayuree Obsuk |
| 5. Ms. Kwanhathai Pansri | 12. Ms. Kanyaporn Sungkaew |
| 6. Ms. Pornpat Nopmalai | 13. Ms. Chotikarn Nichakosol |
| 7. Ms. Thanomkwan Thipawong | |

LAO PDR workplan formulation with 7 main activities, including:

Activity	Time	Requests/Comments
1) Translation of the global soil doctors programme materials to local language	3 months (Oct-Dec 2022)	Material of Global soil Doctor programme
2) Development of the criteria for Soil Doctors Selection	3 months (Oct-Dec 2022)	Guidelines, Manuals, Educational materials from Land Development Department
3) Training of selected farmers II (50-100 people)	Year 2023	Soil test kits
4) Invitation of soil doctor experts from Thailand to inspire selected farmer II	Year 2023	Soil Doctor expert and Land Development Department expert
5) Online/Onsite trainings for promoter of the soil doctors (Government officer)	Year 2023	Land Development Department expert
6) Development of application for promotion of sustainable soil management through soil doctors	3-5 years	Lancang-Mekong countries Project/CESRA
7) Pilot project initiation of capacity building of soil doctors	3-5 years	Lancang-Mekong countries Project/CESRA

②

Activity	Time	Responsibility
<u>Laos</u>		
1) Translate Global Soil Doctor program	3 month (Oct - Dec)	Material of Global Soil Doctor program
2) Develop criteria for selected Soil doctor	3 month (Oct - Dec)	
3) Training selected farmer II 50-100 people	Next year (2023)	Soil Test kit
<u>Myanmar</u>		
4) Invite expert Soil Doctor from Thailand to inspire selected farmer II	Next year (2023)	Soil Doctor expert and LDD expert
5) Online training for promoter of the Soil Doctor (Government officer)	Next year (2023)	LDD expert
6) Developing Application for sustainable Soil management	3-5 years	LDC/CESRA ..
7) Pilot project initiations after capacity building	7-8 years	LDC/CESRA ..



Figure 38 workshop and group discussion by group 2

Group 3 members include:

- | | |
|----------------------------------|-------------------------------|
| 1. Dr. Ngo Thanh Son (Vietnam) | 8. Ms. Panisara Thongtuam |
| 2. Mrs. Renuka Silva (Sri Lanka) | 9. Ms. Suwanpa Boonjongrak |
| 3. Dr. Zaw Naing (Myanmar) | 10. Mrs. Pornpana Phothinam |
| 4. Ms. Sansanee Aranyawas | 11. Ms. Churaiporn Kaewthip |
| 5. Ms. Apuntree Prueksapong | 12. Mr. Ekapop Kantup |
| 6. Ms. Nisuda Thongkampan | 13. Mr. Jirapat Tuntrachanida |
| 7. Mr. Sarunnop Inthasen | |

Myanmar, Vietnam and Sri Lanka workplan formulation with various main activities, including:

Activity	Time	Requests/Comments
Myanmar, Dr. Zaw Naing		
1) Online “Soil Doctor ” seminar with Myanmar stakeholders	year 2022	Lancang-Mekong countries Project/CESRA
2) Develop “Myanmar Soil Doctor Kit”	year 2022-2023	
Sri Lanka, Mrs. Renuka Silva		
1) Introduction of soil doctor kit among the farmers in Sri Lanka	3 months	Experts from Land Development Department/CESRA
2) Training of farmers for soil doctor kits	3 months	
3) Development of own soil doctor kits	6 months	
Vietnam, Dr. Ngo Thanh Son		
1) Introduction of soil doctors program to staff in extension on farmer union	year 2022	Vietnam
2) Testing soil at farmer field using soil test kits	year 2022	Vietnam/ Land Development Department
3) Evaluation of results by comparing soil test kits from Thailand and Vietnam	year 2022	Vietnam/ Land Development Department
4) Workshop/Consultation experts on the implementation of soil doctors program	year 2022	Vietnam/ Land Development Department

5) Development of soil test kits for field measurement

year 2023

Vietnam/ Land Development Department

6) Scale out of soil doctor program in Vietnam for sustainable soil and land management in Agriculture

year 2023

Vietnam

Group 3

Activity	Time	Request/Comments
- Introduce Soil Doctor program to Staff in Education or Farmer Union	1 month	VN
- Testing soil at farmer field using Soil test kit	2	VN/LDD
- Evaluation of Results by comparing Soil test kit from Thailand and VN	1	VN/LDD
- Workshop/Consultation	1	VN/LDD
- Develop own soil test kit	6	VN/LDD
- Scale up Soil Doctor program	6	VN

3

Activity	Time	Requests/comments
MYANMAR		
① ONLINE "SOIL DOCTOR" SEMINAR w/ MYANMAR Stakeholders	Nov. 2022	CECRA project - CECRA
② Field Deploy Myanmar Soil Doctor Kit	3 Months (07-Dec 22)	
Sri Lanka		
① Introduction of soil doctor kit among the farmer	3 months	LDD/CECRA
② Training of farmers for soil doctor kit	3 months	
③ Development of soil doctor kit	6 months	



Figure 39 workshop and group discussion by group 3

Lessons learned at the Land Development Learning Center

During the workshop, participants visited 2 volunteer soil doctors, 1. Ms. Usa Pranpanas, a volunteer soil doctor in Rang Bua sub-district, Chom Bueng district, Ratchaburi province and 2. Ms. Kwanta Sriprasert, a volunteer soil doctor in Berkphrai sub-district, Chom Bueng district, Ratchaburi province. They are outstanding soil doctors who implement new theory agriculture, integrated agriculture, including applying the knowledge of agriculture, soil management and technology of Land Development Department to their own farming areas for maximum benefit. During lessons learned processes, the participants realized how to transcribe lessons learned through storytelling and achieved success in the operation of volunteer soil doctors and knowledge exchange networks. The main takeaway messages from the lessons learns were:



Figure 40 Study visit at Ms. Usa Pranpanas, volunteer Soil Doctor Learning Center.

3.1 Ms. Usa Pranpanas, a volunteer soil doctor in Rang Bua Sub-district, Chom Bueng District, Ratchaburi Province, is a model volunteer soil doctors with a modern concept who applies what has been learned to her own farm. Ms. Usa changed from the monoculture farming to integrated farming and then apply the new theory agricultural, with a goal of being reduce production costs, being self-reliance and generating income all year round. The success factor in the operation consists of the application of knowledge through trial and error, an open mind to accept new theory agricultural, and adhere to the Sufficiency Economy Philosophy, with supported by family, government agencies and other networks. Currently, Ms. Usa has established a land development technology transfer learning center that is ready to transfer agricultural knowledge to other farmers and people who are interested in learning and creating a network of farmers to help and advice each other (Figure 40).



Figure 41 Study visit activity at Soil Doctor Kwanta Sriprasert Learning Center.

3.2 Ms. Kwanta Sriprasert, volunteer soil doctor of Berk Phrai sub-district, Chom Bueng district, Ratchaburi province, is a model volunteer soil doctors who systematically integrated farming and proportional area allocation. She also experiments with growing plants and fruits such as sweet vegetables, mulberry, and passion fruit, etc. In addition, knowledge about crop cultivation was also transferred to other farmers, so that farmers could apply the knowledge gained to further develop the land more efficiently. The success factor in the operation consists of the application of knowledge through trial and error, including supported by government agencies and farmer networks. Currently, Ms. Kwanta has established a land development technology transfer learning center that is ready to transfer agricultural knowledge to other farmers and people who are interested in learning (Figure 41).

The study visit with lessons learned is aiming to create academic cooperation between researchers and academics at the international level and volunteer soil doctors and farmers network. There was an exchange of knowledge in agriculture, public relations, and building international networks. To develop knowledge and technology on land management and agriculture and support information on the development of volunteer soil doctors potential under project Development and promotion of soil doctor program for sustainable land and agricultural management practices in Lancang-Mekong Countries.

ANNEX

1. The 2nd expert workshop on the implementation of soil doctors program in the region

1.1 Rationale

The agricultural sector of the Mekong Sub-region faces various problems and challenges, such as the deterioration of natural resources, high production cost, water scarcity and flooding, climate change and knowledge of farmers is limited. These factors affect the ability of agricultural production, leading to the problem of income inequality among farmers. Land Development Department, under the supervision of the Ministry of Agriculture and Cooperatives, Thailand, realized the importance of soil resources and land use for agriculture that affect regional and national economies in the Lancang- Mekong sub-region. Therefore, LDD increases efficiency and stability of the agricultural production in the country by developing farmers to have readiness, knowledge and expertise in agricultural occupation through the Soil Doctor Program. In the past of Land Development Department has supported knowledge, technology, equipment and established of soil doctors network. The network has been continuously developed to successfully improve soil fertility and increase agricultural productivity as well as increase the competitiveness and alleviate the poverty of farmers.

Land Development Department organizes a project to develop and promote soil doctor for sustainable land management and agriculture in the Lancang- Mekong sub-region which received a financial support from the Lancang-Mekong Special Fund, China. This project aims to exchange knowledge and discuss ways to strengthen the soil doctor program in the sub-region to be effective and can be extended to various countries in the region. The 2nd expert workshop on the implementation of soil doctors program in the region will be organized to formulate guidelines and plan the implementation of soil doctor of the Lancang- Mekong sub- region to promote sustainable land management and agriculture.

1.2 Objective

1.2.1) To create guidelines and work plan for the implementation of the soil doctor program at the Lancang-Mekong sub-region and regional levels.

1.2.2) To exchange knowledge and technology for sustainable land and agriculture management in the Lancang- Mekong sub-region through soil cooperation.

1.3 Participants

1.3.1 Workshop participants are personnel from various related agencies, totaling 24 people, consisting of

- 1) Experts in land management for agriculture from countries in the region
- 2) Experts from Global Soil Partnership (GSP) and Asian Soil Partnership (ASP)
- 3) Experts and officials from the Land Development Department and provincial

4) Experts and officials from agencies under the Ministry of Agriculture and Cooperatives

5) Representatives of educational institutions, organizations and farmers

6) Working Group on the Development and Promotion of Soil Doctors for sustainable land management and agriculture in the LMC

1.3.2 Keynote speakers

1) 4 foreign speakers

2) 2 speakers from the domestic

1.4 Operating modules

1.4.1 CESRA workshop

1.4.2 Presentations on soil doctor program in Thailand and draft workplan at the sub-regional and regional levels.

1.4.3 Sub-groups of participants to formulate guidelines for soil doctor at the national and the Lancang-Mekong sub-regional levels.

1.4.4 Exchange of knowledge on land management through the farm visit at soil doctors and their learning centers for land management

1.5 Duration and place

The workshop will be held from 20 - 23 September 2022, a total of 4 days (including travel date) in Bangkok, and Ratchaburi province, Thailand.



2. Participants

2.1 Experts and officials from the Land Development Department

No	Name-Surname	Position	Office
1	Mr. Prasert Thepnorapapai	Director of Research and Development for Land Management Division	Research and Development for Land Management Division
2	Mr. Pramote Yamcee	Expert on Land Degradation Management	Research and Development for Land Management Division
3	Ms. Bunjirtluk Jintaridth	Expert on improvement of acidic soil	Research and Development for Land Management Division
4	Ms. Sunsanee Arunyawat	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
5	Ms. Prapa Taranet	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
6	Ms. Kamalapa Wattanaprapat	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
7	Ms. Kwanhathai Pansri	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
8	Ms. Pornpat Nopmalai	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
9	Ms. Thanomkwan Thipawong	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
10	Ms. Isariya Meesing	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
11	Ms. Apuntree Prueksapong	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
12	Ms. Apasiree Meeklang	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
13	Ms. Nisuda Thongkampan	Agricultural Research Officer, Senior Professional Level	Research and Development for Land Management Division
14	Mr. Sarunnop Inthasen	Agricultural Research Officer, Professional Level	Research and Development for Land Management Division

No	Name-Surname	Position	Office
15	Ms. Panisara Thongtuam	Agricultural Research Officer, Professional Level	Research and Development for Land Management Division
16	Mrs. Kreeyaporn Devahastin	Plan and Policy Analyst, Senior Professional Level	Planning Division
17	Mr. Konphong Khanachaiwirut	Plan and Policy Analyst, Practitioner Level	Planning Division
18	Mr. Kridsopon Duangkamol	Soil surveyor, Senior Professional Level	Soil Resources Survey
19	Ms. Saranya Norkaew	Soil surveyor, Professional Level	Soil Resources Survey
20	Mr. Surachet Narabhat	Scientist, Senior Professional Level	Office of science for land development
21	Mrs. Kamarin Nimmualrat	Scientist, Senior Professional Level	Office of science for land development
22	Ms. Sasirin Srisomkeaw	Agricultural Research Officer, Professional Level	Policy and Landuse Planning Division
23	Mr. Weera Pathakheenang	Photogrammetrist, Professional Level	Information and Communication Technology Center
24	Mr. Worawat Sirisak	Dissemination Technical Officer	Office of the secretary
25	Ms. Onpreeya Changduangjit	Public Relations Officer	Office of the secretary
26	Mrs. Suwannapha Boonjongrak	Agricultural Research Officer, Senior Professional Level	Land development office 4
27	Ms. Kanyaporn Sungkaew	Agricultural Research Officer, Senior Professional Level	Land development office 4
28	Mrs. Pornpana Phothinam	Agricultural Research Officer, Senior Professional Level	Land development office 5
29	Ms. Juraiporn Kaewthip	Agricultural Research Officer, Senior Professional Level	Land development office 6
30	Mr. Ekapop Kantup	Agricultural Research Officer, Professional Level	Land development office 6
31	Mrs. Chatnapha Promlongongwan	Agricultural Research Officer, Senior Professional Level	Land development office 7
32	Ms. Naralak Tana	Agricultural Research Officer, Professional Level	Land development office 7

No	Name-Surname	Position	Office
33	Ms. Mayuree Obsuk	Director of Sukhothai Land Development Station	Land development office 9
34	Mr. Natawoot Jounsong	Agricultural Research Officer, Senior Professional Level	Land development office 11
35	Ms. Pilatluck Lioroongcharoen	Agricultural Research Officer, Professional Level	Land development office 12
36	Ms. Kanokporn Thongrod	Agricultural Research Officer, Practitioner Level	Land development office 12
37	Ms. Sirikarn Koedporn	Agricultural Research Officer	Research and Development for Land Management Division
38	Ms. Siriluck Sirisap	Agricultural Research Officer	Research and Development for Land Management Division
39	Ms. Chotikarn Nichakosol	Agricultural Research Officer	Research and Development for Land Management Division
40	Mr. Jirapat Tuntrachanida	Agricultural Research Officer, Practitioner Level	Research and Development for Land Management Division
41	Mr. Apisit Boupai	Agricultural Research Officer, Practitioner Level	Research and Development for Land Management Division

2.2 Experts from other organization and partner countries

No	Name-Surname	Position
1	Dr. Seng Vang	Department of Agricultural Land Resources Management (DALRM)
2	Mr. Phy Chhin	Department of Agricultural Land Resources Management
3	Mr. Pawan Kumar	Patanjali Organic Research Institute
4	Mr. Sisavath Phimmasone	Department of Agricultural Land Management (DALaM)
5	Mr. Sinouane Souvong	Department of Agricultural Land Management (DALaM)
6	Dr. Zaw Naing	Mandalay Technology Co.,Ltd
7	Mrs. Renuka Silva	Department of Agriculture
8	Dr. Ngo Thanh Son	Vietnam National University of Agriculture (VNUA)
9	Mr. Saowanuch Tawornpruek	Head of Department of Soil Science, Faculty of Agriculture
10	Ms. Usa Pranpanas	Volunteer Soil Doctors
11	Ms. Kwanta Sriprasert	Volunteer Soil Doctors

3. Activities during workshop



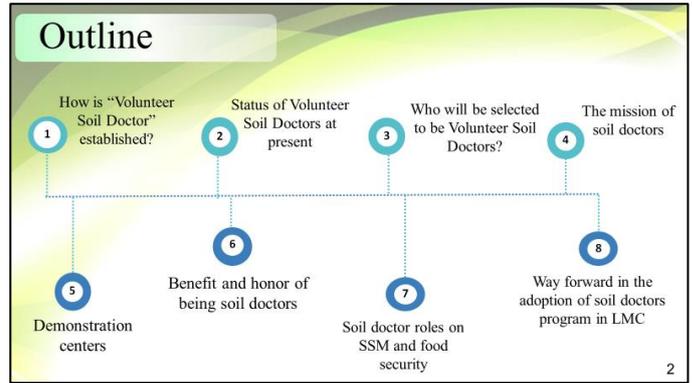
4. Activities during lessons learned at the Land Development learning center





5. Presentations during the workshop

1. Mr. Pramote Yemlee, Expert on Land Degradation Management, Research and Development for Land Management Division, Land Development Department.



1. How is "Volunteer Soil Doctor" established?

- Improper land use
- Soil constraints/Land degradation
- Crop yield reduction
- Low household income
- Poverty and food insecurity

1. How is "Volunteer Soil Doctor" established? (Cont.)

2. Status of Volunteer Soil Doctors at present

There are presently 77,676 Volunteer Soil Doctors working with LDD

Soil doctors are divided into 4 levels as follow

3. Who will be selected to be Volunteer Soil Doctors?

- Farmers who are in good health
- At least 20 years of age
- Who has leadership and live in local areas of agriculture
- Who is willing to learn/train on sustainable soil management
- Who is willing to work with LDD staff
- Who is willing to share knowledge with other farmers in the community

4. What are their mission?

Soil doctors received the knowledge and technology for land and agriculture management to improve their own land in a sustainable manner.

Mulching Green manure Water management

Plant management Farm inspection Composting

7

4. What are their mission? (cont.)

Soil doctors will transfer knowledge and technology to help other farmers in the communities manage the land and agriculture sustainability.

8

4. What are their mission? (Cont.)

Mobile Applications for soil and land management

Demonstration of the basic plant nutrient inspection to farmers with a LDD Soil test kit.

9

4. What are their mission? (Cont.)

Being extension service centers for information and technology transfer to other farmers through demonstration farms

10

4. What are their mission? (Cont.)

They are also entrusted to distribute to farmer agricultural materials such as lime, fertilizers, green manure, etc. to the community.

Promote the utilization of organic materials for soil improvement and bio-extract products.

11

Demonstration center of vetiver grass

12

6. What are their benefit and honor?

"Volunteer Soil Doctor" will be officially registered.

13

6. What are their benefit and honor? (Cont.)

Additional capacity building courses

14

6. What are their benefit and honor? (Cont.)



Volunteer Soil Doctor Award



15

6. What are their benefit and honor? (Cont.)

LDD provides both in kinds and in cash for some activities such as




- ❖ input for demonstration plots
- ❖ data gathering

16

6. What are their benefit and honor? (Cont.)

Volunteer soil doctors can develop their own products from the produces from their own land, resulting in additional income



17

7. Soil doctor roles on SSM and food security

Soil and water conservation

Soil doctors as producers of food

SSM practices are either discovered by farmers or developed in partnership between agricultural research and local people.




Source: Dr. Ngo Thanh Son, Vietnam, 2022

18

Land management

Soil doctors as land-owner

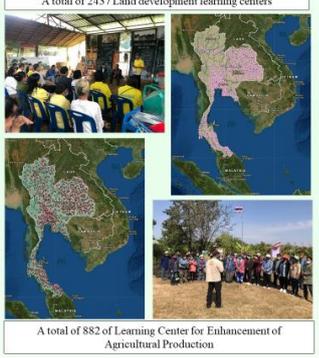
- The New Theory of land management is a production system based on Sufficiency Economy Philosophy where the land will be divided into 4 parts (reservoir, paddy rice, field crops and fruit trees, and residential area).
- Allowing farmers more self-reliant through a holistic management of the land, while living harmoniously with nature and within society

19

Soil doctors as a trainer: capacity building

- Training other farmers in the community to manage their land and successfully improve their livelihood.
- Becoming the focal points to associations involved in the program and work closely with government agencies and relevant organizations.
- Being the voice of the farmer in developing effective solutions to manage soils for sustainable production.
- Raising awareness, knowledge, and skills of other farmers for sustainable soil management.

A total of 2437 Land development learning centers



A total of 882 of Learning Center for Enhancement of Agricultural Production

Lessons learned/best practices in sustainable soil and land management

Scale out of sustainable soil management by soil doctors – a case study: Plook Hug Organic Farming network, Thailand

- Strong collaboration boosts land productivity
- Organic produces and market platform improve farmer's household income,
- Increase farmers' awareness in SSM/SLM



Plook Hug Organic Farm

21

8. Way forward in the adoption of soil doctors program in LMC

- Strengthen collaboration among LMC agencies and between LMC and GSP.
- Developing the capacity building platform for more efficient distribution of the program
- Providing effective materials/solutions for narrowing the knowledge gaps among smallholder farmers
- Pilot cases to up scaling the program at the country level



22

2. Mr. Attaya Phinchongsakuldit, Director of Information and Communication Technology Center



Digital Technology Promoting Land Management for Volunteer Soil Doctors



Mr. Attaya Phinchongsakuldit
Director
Center of Information and Communication Technology

Public speaker speaks best when transferring from their own knowledge and experience



So does the volunteer soil doctor





ID Din Dee

AI Chatbot

LDD Fertilizer

LDD has provided Information technology to soil doctors and farmers in various forms as follows :



AI Chatbot



Applications providing maps, data and knowledge



Applications accessing LDD services and learning online

What is AI Chatbot?

A chat system that is functioned via the application line



➤ Users can pin and check soil information

➤ The system is filled with types of information and knowledge

➤ Users can access various services of the LDD
➤ The system can connect to other applications

➤ Users can contact LDD officers through the applications

➤ Users can send messages in chat box and having a Chatbot to respond to messages

How to Add Line and search for information and knowledge Using AI chatbot



Friend Search and Press Add button > You can type line ID in the text box @dindee

LDD on Farm

- Is an information system that use for land use planning
- Allows farmers to check the quality and availability of the land for cultivation such as soil type, water sources and climate data
- Farmers can use information to manage the plot by themselves from planting to harvest
- The system show the production cost, forecast the production, income -expenses, profit and loss, etc.
- Summarize the information to a QR code
- Farmers can choose crops to suit the soil.



Agri-map

- Providing information on agricultural land
- Showing information on cultivation of alternative economic crops, with important details such as cultivation, cost and purchase sources.
- Users can explore alternative crops to grow on their land
- Easy to use, just pin to the map or put coordinates.
- Users can access information at the national, provincial, district and sub-district levels.



E-SERVICE
 a service that LDD provides information online as follows :



Agricultural Materials Service	Request a service for farm pond in the farmers' farm.	Agricultural soil inspection service	Soil information and soil usage online service
Request map service	Initial permanent forest line inspection service.	Electronic library	Informative information

Why Chatbot and Why Application?



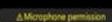
Digital technology in the future



3. Prof. Dr. Tang Ya, Sichuan University, China

Income generation-oriented
marginal land management
practices

TANG, Ya
Sichuan University
Chengdu, Sichuan, China



1. Challenges of Chinese farmers

Some basic information of agriculture in China

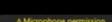
- Total cropland: 128 million ha
 - Govt baseline: > 120 million ha
- Population: 1 413 million
 - Per capita cropland: 900 m²
- Cropland composition
 - Cropland in flat topography: 31%
 - Cropland in sloping topography: 69%
 - Sloping cropland: 33.4%
 - Land prone to wind erosion: 5.3%
 - Irrigation: 54%




Challenges of Chinese farmers

- Small landholding
 - Small farm: Average size: 0.27 ha
 - Land allotted to each household, can be contracted only
- Basic cropland for grain production only
- Emerging professional farmers: farm size 100-150ha
 - Machinery and drone assisted farming

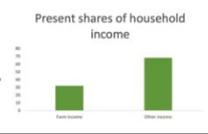




Challenges of Chinese farmers

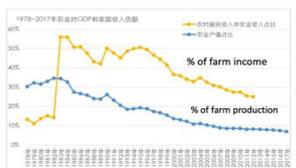
- Labor shortage
 - Labor force characterized by > 60 years old
 - Most young population in cities
- Low share of farming in household income: 10-42%, average 30%
 - Increasing costs: seeds, agro-chemicals, use of machinery, labor
 - Small farm → Low household total yield, though high per unit land productivity

Present shares of household income




2. Management practices for income generation

- Land riser-based systems
 - Mulberry - sericulture
 - Fruit trees
- Woods-based
 - Medicinal plants
- Cropland rotation based
 - Mushrooms
 - Vegetables
- Area-based
 - Rural tourism



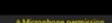

2.1 Land riser-based systems (Land riser economy)

- Sericulture




- Ningnan County
 - Area: 1670 km²
 - Pop: 202 548, in 52518 households; <4/household
 - Cropland: 23 953 ha; per capita: 0.12 ha; 90% sloping land
 - Annual cocoon yield: 14, 700 t, 2490 t raw silk (highest 1510 t of Thailand in 2001)
 - Income from cocoon: US\$ 4,300/household



- Fruit Trees – pears
- Hanyuan County
 - Area: 2382 km²
 - Pop: 330 000
 - Cropland: 28 533, per capita: 0.086 ha, sloping land: 83%
 - Area under pears:






Hanyuan: income

- One pear tree: \$120/year
- Tourism: \$30 000/household
- Garlic (flower stem and tuber): \$3000
- Rice: \$500
- Other fruits





Microphone permission

2.2 Woods-based systems

- Medicinal plants
 - Large scale cultivation of 200 species out of 600 ones used in large quantity
 - 3 million ha
 - Land used
 - Cropland
 - Marginal land







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Birds: chicken, wild pheasant

- Higher price
- Attraction to local tourists






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2.3 Rotation

- Rice + mushrooms






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- Fruits + vegetables





Microphone permission

Bird watching in Mount Gaoligong

- Farmers identify and manage a locality with many birds
- Provide all service to birders
 - Guide
 - Lodging
 - boarding
- 2018: Annual income: up to over \$2 million for a village

Many places in SW and SE China



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Bird watching in Mount Gaoligong

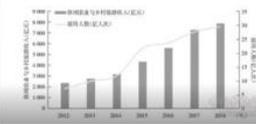
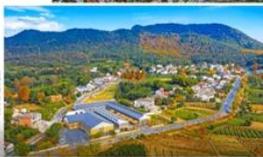
- Farmers identify and manage a locality with many birds
- Provide all service to birders
 - Guide
 - Lodging
 - boarding
- 2018: Annual income: up to over \$2 million for a village

Many places in SW and SE China



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- Fruits-based
 - Pears, plums, apples
- Natural forests-based
 - Red, yellow leaves
- Local foods-based
 - Farmhouse cuisine
- Nature education based


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3. Policy and institutional support

3.1 Policy

- Recent national policy to improve farmers' life
 - Agriculture, rural areas and farmers have been the annual No 1 national policy since 1982
 - Rural rural vitalization. A national agency is established: **National Administration for Rural Revitalization.**
 - Income generation is the key component



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3.2 Institutional

- Regionalization
 - National
 - Provincial
- County level
 - Most important planning on what to development
 - Recommendation from professional scientists and technicians on prioritization of development based on local biophysical and socio-economic background
 - Setup of local support system
 - solve any problems from farmers
 - Update new development
 - Training



Microphone permission

- Research institutions and universities
 - Crop selection
 - Technique
 - Management
- Extension institutions at provincial, prefecture and county levels
 - Specific: mulberry, medicinal plants, mushrooms, economic crops/plants
- Financial support
 - Government
 - Industries/business
 - Corporate + production bases



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- Economic factors
 - Sufficient scale
 - Reliable markets
 - Medicinal plants
 - Fruits
 - Vegetables
 - Rural tourism: close to cities
 - Diversities/avoiding copying and repeating
 - Accessibility
 - Good areas for mass production
 - Poor areas high value, low volume, like Dendrobium



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4. Future directions

- Who will farm?
 - Declining rural population
- Farm size to support a family with similar living standards
- Professional farmers



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4. Dr. Ngo Thanh Son, Vietnam National University of Agriculture, Vietnam

HỌC VIỆN NÔNG NGHIỆP VIỆT NAM
VIETNAM NATIONAL UNIVERSITY OF AGRICULTURE

CESRA
Center for Environmental Science and Resource Assessment

Sustainable land management by smallholding farmers in the Northwest of Vietnam

Dr. Ngo Thanh Son
Faculty of Natural Resources and Environment
Vietnam National University of Agriculture

The 2nd expert workshop on the implementation of soil doctors program in the region

Contents

1. Introduction to Vietnam and Northwest region
2. Drivers of unsustainable land management
3. Constraint and Challenge in Adopt
4. Lessons learned in sustainable land management models in NW

Northwest of Vietnam

HVN Học viện Nông nghiệp Việt Nam

Introduction: Vietnam Profile

- Total area (main land) ~ 33 mil ha
- Population (2021) ~ 98 mil people
- Total rainfall of VN ~ 1900mm/year
- But varies spatially and in time, e.g. 75% of annual rainfall occurs during rainy season (Apr. - Oct.)
- GDP: ~285 Bil USD (2021)

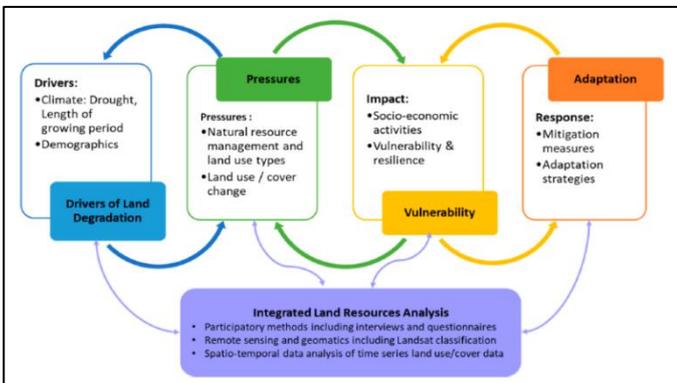
Land use in Viet Nam

Agricultural areas: 10,231,700 ha = 35% of total land area

Production Systems Key for Food security in Viet Nam

Northwest regions in Vietnam

- Northern Uplands of Vietnam form one of the **largest ecological regions** in the country, characterized by complex biophysical conditions and a high diversity in ethnic minorities, cultures, and farming systems:
- **resource use inefficiency and unsustainability** leading to reduced crop productivity and land productivity in the NW Vietnam
- **farmer welfare losses**, and
- **poor quality and unsafe foods**
- **poverty, low agricultural productivity, and land degradation** are still major problems



Direct drivers

- Deforestation for cultivation or conversion of land use from forest to other land leading to forest cover reduction; over-exploitation of natural forests leading to reduction in forest reserves;
- **Unsustainable cultivation practices** on slope lands including tree clearance, pitting for seeding, non-application of erosion control measures and rotational cultivation;
- **Monoculture, deserted land, lack or faulty application of fertilizers, no weeding;**
- **Degradation** caused by pollution from wastewater, solid wastes, toxic chemicals, and the excessive use of pesticides

Indirect drivers

- **Socio-economic drivers** (population growth, immigration to the new economic zones, free immigration and poverty in the ethnic minority communities);
- **Agriculture and rural development policies** ;
- **development policies** for rural and mountainous areas;
- **shortcomings** in the land policies

Successful Stories: Selected CSA practices and technologies for production systems key for food security in Viet Nam in general and Northwest regions in particular

Degree of Adoption: High, Medium, Low

Smartness level: 1-10

System of Rice Intensification (SRI)	Intercropping with citrus and leguminous species	Cassava
Use of flood resistant varieties	Mulching with leguminous species	Cashew nuts
Use of certified high-quality seed	Use of drought-tolerant varieties	Tea
Use of drought-tolerant varieties	Use of organic crop protection products and fertilizers	Pepper
Integrated Pest Management	Water saving irrigation	Orange
Contour farming	Use of organic fertilizers applied with effective micro-organisms	Shrimp
Water saving irrigation	Use of drought-tolerant varieties	Pig
Intercropping with perennial crops	Water saving irrigation	
Proper tree pruning to improve rubber coffee after forest	Planting pepper on tree pillars	
Intercropping with leguminous species, upland rice, sesame	Intercropping (corn, cassava and leguminous species)	
Use of crop-resilient varieties tolerant to drought and frost	Planting in fish scale pits	
Humus storage pits	Integration of fish ponds	
	Shrimp-based farming	
	Biogas technology	
	Use of local feed	

Constrain and Challenge in Adopt

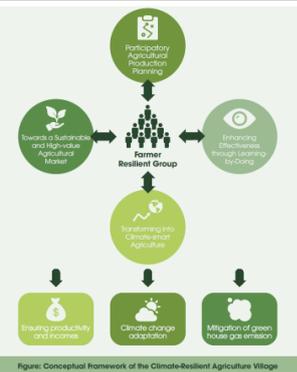
- Climate change and environment degradation
- Lack knowledge and skills on the production and management. In need of training for farmers to be soil doctor
- Fragmented and scattered agriculture production caused problems in applying large scale technology and practices (i.e., planting, harvesting, land leveling, etc.). Cost of agricultural inputs and price of agricultural products
- Lack of market information and market forecast (i.e., quantity, variety, price, quality, processing requirement, and potential market).
- Policy to attract investment from private sector in agriculture, and establish an information exchange platform to update information on market issues (i.e., demand, quality, amount, price, and potential buyers)
- Farmers have limited access to services and finance
- Linkage between production and consumption is weak
- Low product quality and unsafety food, and less competition

Solution of social-propaganda advised the community

- Strengthening the communication, advising the community on the harmful effects of extreme weather events due to the effects of climate change
- Develop appropriate land protection and suitable land use models with the participatory of farmers: Field design, crop restructuring, use of appropriate varieties,
- Training, transferring of technical advances to communities on the field: Soil erosion control techniques like afforestation, contour planting, terrace planting, integrated agroforestry models, integrated farming and husbandry models



Climate-resilient agriculture villages



1. Farmer as the hearth of climate-resilient agriculture villages
2. Transforming into climate-smart agriculture
3. Learning by doing
4. Participating agricultural production planning
5. Towards a sustainable and high-value agricultural market

Figure: Conceptual Framework of the Climate-Resilient Agriculture Village

Farmers as the hearth of climate-resilient agriculture villages

7 Phát triển chăn nuôi cho năng suất và hiệu quả kinh tế cao
(Promoting high value-added livestock production)

Mô hình NEMM Chăn nuôi trâu bò, chăn thả trên nương rẫy chuyên, giống bò sữa hiệu quả, năng suất cao, chất lượng sữa cao, thích ứng với điều kiện chăn thả.

Vấn đề - Problems:

- Hiệu quả kinh tế thấp
- Chất lượng sữa thấp
- Chăn thả trên nương rẫy chuyên, giống bò sữa hiệu quả, năng suất cao, chất lượng sữa cao, thích ứng với điều kiện chăn thả.

Lợi ích - Benefits:

- Chăn nuôi trâu bò chuyên nghiệp, năng suất cao, chất lượng sữa cao, thích ứng với điều kiện chăn thả.

8 Chuyển đổi từ sản xuất rau sạch cho sản lượng và hiệu quả kinh tế cao
(Vegetable cooperative for high productivity and economic value)

Mô hình NEMM Sản xuất rau sạch cho sản lượng và hiệu quả kinh tế cao.

Vấn đề - Problems:

- Chất lượng rau sạch thấp
- Hiệu quả kinh tế thấp

Lợi ích - Benefits:

- Chất lượng rau sạch cao, hiệu quả kinh tế cao.

9 Các mô hình nông lâm kết hợp trên đất đỏ, Macca và Cây ăn quả
(Agro-forestry models on red soils, Macca and Fruit trees)

Mô hình NEMM Nông lâm kết hợp trên đất đỏ, Macca và Cây ăn quả.

Vấn đề - Problems:

- Đất đỏ nghèo dinh dưỡng
- Chăn thả trên nương rẫy chuyên, giống bò sữa hiệu quả, năng suất cao, chất lượng sữa cao, thích ứng với điều kiện chăn thả.

Lợi ích - Benefits:

- Đất đai màu mỡ, năng suất cao, chất lượng cao.

10 Các mô hình Chè và cà phê + cỏ chăn nuôi + cây ăn quả
(Agro-forestry model tea + coffee + forage + fruit trees)

Mô hình NEMM Chè và cà phê + cỏ chăn nuôi + cây ăn quả.

Vấn đề - Problems:

- Đất đai nghèo dinh dưỡng
- Chăn thả trên nương rẫy chuyên, giống bò sữa hiệu quả, năng suất cao, chất lượng sữa cao, thích ứng với điều kiện chăn thả.

Lợi ích - Benefits:

- Đất đai màu mỡ, năng suất cao, chất lượng cao.



3. MetKaseKor Model (Extension)

មិត្តភក្តិ
MetKaseKor

An "opening the market" early adopters led extension model

MetKasekor Supports Sustainable Intensification

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

Involves 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, DALRM, DCAFF → TRAINING, SERVICE & PRODUCTS → PDAFF → COOPERATION & INFORMATION → PRIVATE SECTOR → TRAINING, SERVICE & PRODUCTS → Small Holder Farmers

Small Holder Farmers → FEEDBACK → PDAFF → TRAINING, SERVICE & PRODUCTS → Small Holder Farmers

Small Holder Farmers → COMMUNITY RESPECT & CONSULTATION & GUIDANCE → Small Holder Farmers

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

Metkasekor Steps

IDENTIFICATION: Identification of potential agricultural cooperatives, farmers and service providers

DEMAND CREATION MEETING: Demand Creation with agriculture cooperatives, service providers and small holder farmers

FIELD SHOWCASE: Field Showcase by early adopter farmers of SI Operational Securities

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 involve 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



4. Dei Meas Initiative

DEI MEAS - ដីមាស

“Golden soil”

A TRANSITIONING SYSTEM FOR A CHANGE TOWARDS AGROECOLOGICAL PRACTICES

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)

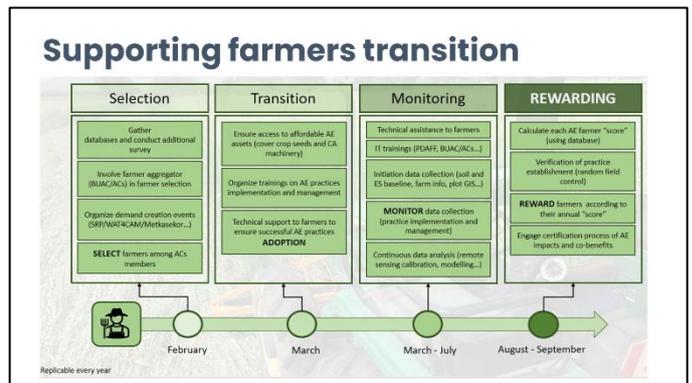
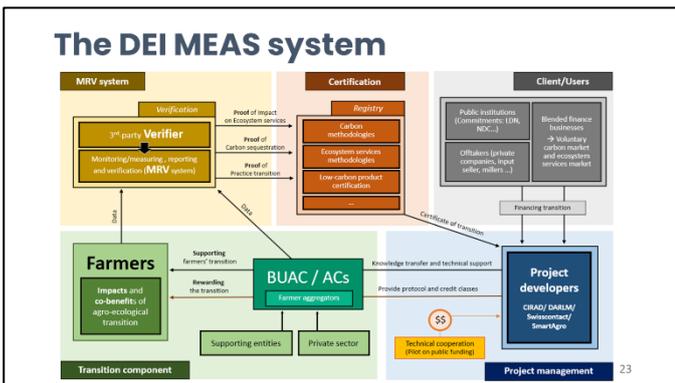
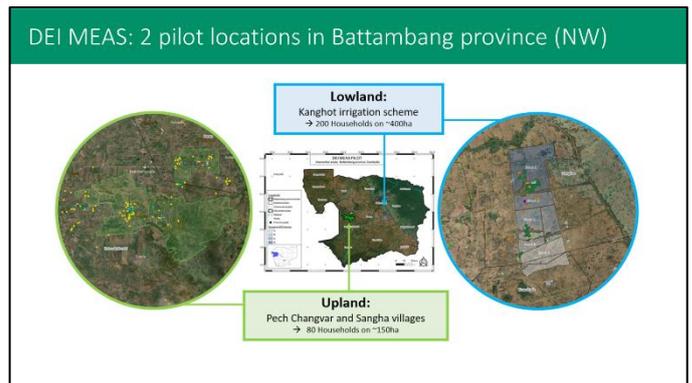
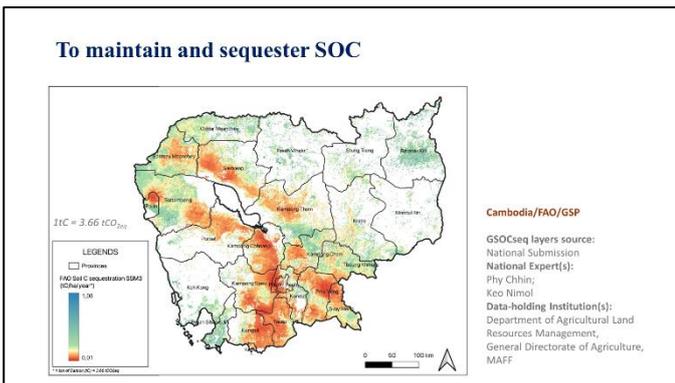
A TRANSITIONING SYSTEM FOR SMALLHOLDER FARMERS' CHANGE TOWARDS AGROECOLOGICAL PRACTICES

1

CREATING A
TRANSITIONING SYSTEM
THAT INCENTIVIZE SMALLHOLDER FARMERS FOR
SUSTAINABLE PRACTICE ADOPTION

2

QUANTIFYING CARBON AND ECOSYSTEM
SERVICES PRODUCTION WITH AN
EFFECTIVE AND INEXPENSIVE
MRV SYSTEM



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 levelling	2	10
Cover crop establishment	Base seed	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
Water management	Pulse crop Mungbean	2	20
	Handed	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

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 styro on the inter-rows as a green manure management (plough and ridge)

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

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

- o T4.1 : Styro seed production (2023) – Cassava on the mulch of the styro (2024) – Styro (2025)
- o T4.2 : Cassava (2023) – Styro (2024) – Cassava on the mulch of the styro (2025).

CAMBODIA CONSERVATION AGRICULTURE AND SUSTAINABLE INTENSIFICATION CONSORTIUM (CASIC)

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/distributors, 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.

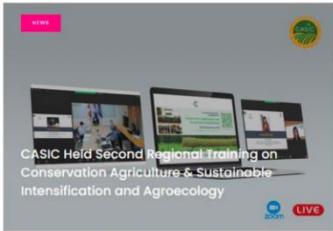
Mission
The mission of CASIC is to coordinate and support research for development; invest into knowledge management; create an enabling environment for policy dialogues and public-private partnerships; value creation; and explore market opportunities and enhance collaboration between various stakeholders 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>



CASIC Held Second Regional Training on Conservation Agriculture & Sustainable Intensification and Agroecology



A Roadmap for Regenerative Agriculture Modernization in Cambodia



CASIC Hosted a Validation Workshop on its 5-Year Roadmap Development Plan



Engaging Cambodia Private Sector in Conservation Agriculture

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](https://www.facebook.com/CASIC.Cambodia)



Thank you for your attention!

6. Dr. Pawan Kumar, Patanjali Organic Research Institute, India

VOLUNTARY YOGAHAAR UTSAV

500+ Yoga Teachers & 500+ Chief Guests

- Theme:** Yoga, Organic and natural farming, Organic and Natural Seeds, Water Conservation, Pest and disease management, marketing of organic products.
- Participants:**
 - Chief Guests
 - Yoga teachers
- States Covered:** Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Himachal Pradesh, Jharkhand, Karnataka Haryana, Punjab, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Telangana, Uttarakhand, Uttar Pradesh, West Bengal,
- Results:**
 - Positive changes in attitude and actions at micro level
 - Case studies of 20 farmers, learning material on organic village, consumers and farmers.
 - Focused on voluntary actions.



Yogahaar Chief Guest



वैभव अमतराव ठाकरे
 विककी यादव योगेन्द्र कुमार मिश्रा
 विवेक कुमार कश्यप चंदेश्वरी प्रसाद यादव धनंजय कुमार सिंह
 शिवेंद्र कुमार कश्यप
 भारत सिंह चौधरी Prakash Singh Raghuvanshi डी डी शर्मा विनोद कुमार भट्ट
 Vandana Joshi Bhatt Kalyan Singh Rawat अनिल कटियार
 अनिल जागलान Bharat Singh Choudhary Sumar Singh चौवालजोड
 पूर्वा जिंदल प्रदीप कुमार महता Krishan Bover Choudhary
 Prem Chand Sharma Hukum Chand Patidar Kusum Joshi शंकरजी मारोतराव तोटवार
 वीजी सिंह Kunwa Singh Rajni Manish Shah Janki Patil विनला वेकट रेड्डी
 शिवदर्शन मलिक Munish Ganga Anil Kumar Kamal Toari Heera Lal Vishal Singh
 Sundaram Verma Shri Madhuri Barthwal रमेशचंद्र मेहरा
 सतीश सिंह राजपूत Krishan Murari Shradad Verma Prakash Patwar
 जयेश ठाकुर अजित कुमार Archana Manoj Nasare Shri Sethpal भूपेंद्र शास्त्री
 कृष्ण मुरारी Kishor Gangasagara Dube जयेंद्र सिंह राणा
 रूप सिंह राजपूत ठाकुर दास Ranjan Kumar Sahoo नीलम चौधरी
 राजुभाऊ ईगळे किशनलाल देशमा भगवानदास कुशावाहा
 प्रकाश सिंह रघुवंशी रघुवीर सिंह रावत
 राजु कृष्ण रेड्डी

Yogahaar Yoga Teachers



Maheshwar Pralhad Halde
 Parmeshwar Pralhad Halde Ambika Khantwal शैलाना जीवाणु सोडके
 रीना गजानन नागते Rina Gajanan Nagate Ashwini Shivashankar
 Sumit Sharma Sumit Sharma
 ज्योती शेख केवाघमरे ज्योती अशोक देवायंडे हेमा राजपूत कृति यार्मा सतीश मारोतराव कुशावाही
 Snehal Ravindra Kale Jaba Hazarika Bimla Kumari स्वाति धपलियाल
 ज्योती शेख केवाघमरे नेहा सोमनाथ परदेशी स्वर्णा पाटिल
 विद्या पैडके Hitesh Kapoor कीर्ति वरसेया जयदीप सिंह PreetiLata Tiwari
 Margeena Khaloon विद्या देवी शेरा वर्मा Kavita Rani Anshu Thakur
 Nikita Chauhan Babita Roy Nabamallika Konwar Sheela Yadav Anshu Thakur
 Mukesh Malviya Sumar Singh Kumar Ranju Pandey
 रुचि सराडे Kalindi Pal दर्शना चरणदीवार शीता मनोज जगो Gayatri Prasad Yadav Mamta Pal
 Rinku Das Anita Bhati शकुंतला प्रकाशअंबीलकर Priyanka Saini Neeru Gupta
 गगन निखन सन देवान प्रमोदयोग Yogacharya Bharat Gupta Poonam Tiwary
 Suma Joshi Mayuri Manoj Pardeshi Sarika Ankam Dhaneshwari Singh
 नूनन दत्तात्रय लोहप Nandani Joshi Kamleshwari Sahu Shailendra Prasad
 स्वति जैन किशोरी मंगरु सुजाताजी भाऊसाहेब मेहेरे
 चवला प्रसाद आर्षु Mahua Dolly Shankar Deepthi Juyal
 Sarangdar Bhanudas Devaadh Tripathi Varsha Anand Sandip Dattatray Nalge
 शकुंतला प्रकाश आंबीलकर Pushpa Murgad
 राजकुमार पंढरनाथ शर्मा

Participation Certificate For Chief Guests & Yoga Teachers



VOLUNTARY YOGAHAAR UTSAV

Do you want to know about Organic Farming and Food ?

Do you want to do Yoga regularly?

Would you like to voluntarily share your thoughts and questions on Yoga, Organic Farming & Food ?

If your answer is YES, and you want to join the Yogahaar family voluntarily, then send "OM" on WhatsApp number.

WhatsApp No. - +917217010197

The 500th day of the Voluntary Yogahaar Utsav concluded on 14.09.2022.

525th **Voluntary Yogahaar** Day being organized

Organizers

Farmers and members of **Voluntary Yogahaar** Family

Venue: Itarsi, MP Date: 09.10.2022

Supported by:

Patanjali Organic Research Institute, Haridwar; Patanjali Farmers Samriddhi Program; Divya Yoga Mandir Trust; Kisan Seva Samiti etc

Thank You



Demystifying soil sampling results for decision making by stakeholders at individual & community level

PROCESS EVOLVED BY:
PATANJALI ORGANIC RESEARCH INSTITUTE
AGRICULTURE RESEARCH CAMPUS, HARIDWAR

PILOT PROJECT, SOIL HEALTH CARD UNDER NATIONAL MISSION ON SUSTAINABLE AGRICULTURE

- An initiative by Patanjali Organic Research Institute with support by Agriculture Dept, GoUK & MoAFW, GoI.
- Soil Samples from farmers field are collected and analyzed using the Dharti Ka Doctor kit. Major three outputs are:
 - Soil test recommendations for individual field are provided to farmer through the Soil Health Card.
 - Village soil nutrient status is collated & shared with Village Pradhan & other persons for promotion of Good Agriculture Practices & convergence with Govt/other agencies.
 - Soil test combinations and suggestions help to take corrective actions at various levels.

Output 1: Soil Health Card

Cont....

पतंजलि जैविक अनुसंधान संस्थान, हरिद्वार कृषि एवं किसान कल्याण मंत्रालय भारत सरकार एवं कृषि विभाग, उत्तराखंड सरकार का संयुक्त प्रयास

मृदा स्वास्थ्य कार्ड

मृदा स्वास्थ्य कार्ड संख्या: _____ फार्म आई सी: _____

किसान का विवरण		मृदा नमूना विवरण	
किसान का नाम:	अजय	नमूना संख्या की तिथि:	13/09/2022 12:55:25 PM
पिता/पति का नाम:	बाबुराम	सर्व/खसरा/संग संख्या एवं क्षेत्रफल:	304 / 4.34 (एकर)
पता:	पति Shantarakshah, तहसील: राउली, जिला: हरिद्वार	सिंचाई का प्रकार:	नालबूज
तहसील:	राउली	सिंचाई फसल:	
जिला:	हरिद्वार	भूमि की स्थिति (सी पी एस):	

Lat: 29.90303134, Ion: 77.99560915

Output 1: Soil Health Card

Cont..

मौकादत नम्बर: 7217010165 आधार नम्बर: 685063669388
 तिथि: 13/09/2022
 किसान मास्टिक की श्रेणी: अन्य विकटता वर्ग

मृदा परीक्षण परिणाम

पीएच (pH) कवर रेटिंग चार्ट		पीएच (pH)		ऑक्सीजन डेमंड (OD)	
5.8	7.8	>8.5	अत्यधिक क्षारीय	<0.25	बहुत कम
5.6	7.6	7.1-8.5	मध्यम क्षारीय	0.25-0.50	कम
5.4	7.4	7.0	साधारण	0.50-0.75	मध्यम
5.2	7.2	6.6-6.9	कम क्षारीय	0.75-1.0	उच्च
5.0	7.0	5.6-6.5	मध्यम अम्लीय	>1.0	बहुत उच्च
4.8	6.8	4.6-5.5	अधिक अम्लीय		
4.6	6.6	3.5-4.6	अत्यधिक अम्लीय		
4.4	6.4	4.6	अत्यधिक अम्लीय		
4.2	6.2	<4.6	अत्यधिक अम्लीय		
4.0	6.0				

न्यूट्रियन्ट (N)		फॉस्फोरस (P)		पोटैशियम (K)	
एक (कि.ग्र./हे.)	राज	राज	राज	के. (कि.ग्र./हे.)	राज
< 140	बहुत कम	< 5	बहुत कम	< 60	बहुत कम
140-280	कम	5-10	कम	60-120	कम
280-560	मध्यम	10-25	मध्यम	120-280	मध्यम
560-700	उच्च	25-40	उच्च	280-560	उच्च
>700	बहुत उच्च	>40	बहुत उच्च	> 560	बहुत उच्च

Output 1: Soil Health Card

Cont..

उर्वरक अनुयायि

औद्योगिक 100%						
उर्वरक	मेहूँ	मग्न	धान	सरसो	आलू	चना
एक.आई.एम. (किन्टल)	34.69	34.69	34.69	34.69	34.69	34.69
आर पी (किन्टल)	4.34	4.34	4.34	4.34	4.34	4.34
पी.एस.बी. (मिली)	2,168	2,168	2,168	2,168	2,168	2,168
के.एस.बी. (मिली)	2,168	2,168	2,168	2,168	2,168	2,168

रसायनिक 100%						
उर्वरक	मेहूँ	मग्न	धान	सरसो	आलू	चना
यूरिया (किग्रा)	486	486	373	404	577	26
डी.ए.पी. (किग्रा)	200	200	200	130	265	130
एम.ओ.पी. (किग्रा)	117	143	117	117	230	56
एस.एस.पी. (किग्रा)	243	243	243	165	326	165

कर्मिक 75% - रसायनिक 25%						
उर्वरक	मेहूँ	मग्न	धान	सरसो	आलू	चना
यूरिया (किग्रा)	122	122	93	101	144	7
डी.ए.पी. (किग्रा)	50	50	50	33	66	33
एम.ओ.पी. (किग्रा)	29	36	29	29	58	14
एस.एस.पी. (किग्रा)	61	61	61	41	82	41

कर्मिक 50% - रसायनिक 50%						
उर्वरक	मेहूँ	मग्न	धान	सरसो	आलू	चना
यूरिया (किग्रा)	243	243	187	202	289	13
डी.ए.पी. (किग्रा)	100	100	100	65	133	65
एम.ओ.पी. (किग्रा)	59	72	59	59	115	28
एस.एस.पी. (किग्रा)	122	122	122	83	163	83

Output 1: Soil Health Card

उर्वरक	मेहूँ	मग्न	धान	सरसो	आलू	चना
यूरिया (किग्रा)	365	365	280	303	433	20
डी.ए.पी. (किग्रा)	150	150	150	98	199	98
एम.ओ.पी. (किग्रा)	88	107	88	88	173	42
एस.एस.पी. (किग्रा)	182	182	182	124	245	124

कर्मिक / के.एस.बी. / के.एस.बी.

उर्वरक	मेहूँ	मग्न	धान	सरसो	आलू	चना
एक.आई.एम. (किन्टल)	8.67	8.67	8.67	8.67	8.67	8.67
आर पी (किन्टल)	1.08	1.08	1.08	1.08	1.08	1.08
पी.एस.बी. (मिली)	542	542	542	542	542	542
के.एस.बी. (मिली)	542	542	542	542	542	542

एक.आई.एम., - डी.ए.पी. का बंधन पी.एस.बी. - पोस्टमिडियम फुलनिलीस के प्रतिरक्षा के एम.बी. - पोस्टमिडियम मोडिफाइंग केमिस्ट्रीस एम.पी. - रोक फॉस्फेट

अनुसंधान संस्थान, पतंजलि, उत्तराखण्ड, उत्तराखण्ड के जैविक कृषि एवं किसान कल्याण मंत्रालय भारत सरकार एवं कृषि विभाग, उत्तराखण्ड सरकार का संयुक्त प्रयास

1. जैविक कृषि अपनाने पर कृषक को फार्मोसिस और पोस्टमिडियम की आर्गुनिज करने वाले जैविक उर्वरक का उपयोग करने की सलाह दी जाती है। हालांकि इन मामलों में के क्षेत्र में उपयोग करने के पहले जैविक उर्वरक का विश्लेषण कर लेना चाहिए।
 2. रसायनिक उर्वरक अपनाने पर यदि किसान कुल फॉस्फेट (एक एस पी) उपयोग नहीं है, तो डी पी की मात्रा को अनुमानित दरारों की 1/3 भाग से बढ़ा दें और यूरिया वाइडोवैन की मात्रा वाइडोवैन की अनुमानित मात्रा के 1/3 से कम करें।
 3. N (यूरिया) उपयोग: फसल का 1/2 भाग फसल की बुवाई के समय डालें, शेष आधा भाग बुवाई के 20-25 दिन बाद (पहली सिंचाई के साथ) गले को छोड़कर सभी फसलों में देना चाहिए। गले की फसल में 1/2 मात्रा बुवाई के समय और शेष 1/2 भाग को दो धारा में, बुवाई: 60-70 दिन और 105-115 दिन की बुवाई के बाद।
 नोट:
 यह मृदा परीक्षण रिपोर्ट, पोस्टमिडियम के अंतर्गत, कृषक को सिखाए कि कैसे फसल को उर्वरक के साथ देना चाहिए।
 मृदा परीक्षण रिपोर्ट के परिणाम को देखते हुए किसान को अनुसंधान रिपोर्ट को देखना चाहिए।
 यह मृदा परीक्षण रिपोर्ट, मृदा नमूने प्रेषित करने के अनुसार तैयार की गई है तथा कुछ रिपोर्ट को किसी भी जैविक मामलों में प्रयुक्त नहीं किया जा सकता है। इसमें किसी प्रकार की कानूनी जवाबदारी नहीं है।
 पोस्टमिडियम के अंतर्गत सिंचाई तथा मृदा नमूने प्रेषित करने के लिए पोस्टमिडियम के लिए ध्यान देना चाहिए।
 किसान की सुरक्षा के लिए पोस्टमिडियम का उपयोग करने के लिए पोस्टमिडियम के साथ ध्यान देना चाहिए।

संपर्क करें

पतंजलि जैविक अनुसंधान संस्थान (PANI) कृषि एवं किसान कल्याण मंत्रालय भारत सरकार एवं कृषि विभाग, उत्तराखण्ड सरकार का संयुक्त प्रयास

कृषि अनुसंधान परिसर, पतंजलि जैविक अनुसंधान संस्थान, पतंजलि, उत्तराखण्ड, उत्तराखण्ड के जैविक कृषि एवं किसान कल्याण मंत्रालय भारत सरकार एवं कृषि विभाग, उत्तराखण्ड सरकार का संयुक्त प्रयास

फोन: 01334-610161 | 91-721 701 0178

Output 2 : Village soil nutrient status and suggestions

Pilot Project, Soil Health Card under National Mission on Sustainable Agriculture
 Implemented by: Patanjali Organic Research Institute in collaboration with the Department of Agriculture, Government of Uttarakhand and supported by the Ministry of Agriculture and Farmers Welfare, Government of India

Village specific details
 Block : Bahadradad
 Village : Kutubpur
 Cropping Pattern Kharif : Paddy, Vegetables, Sugarcane
 Cropping Pattern Rabi: Wheat, Sugarcane, Mustard, Potato, Cauliflower, Cabbage

Total Khasra in identified village : 84
 Total collected sample : 76
 Total analysed soil sample in the village : 76
 Total pending soil sample in the village : 8

As per soil test nutrients status and suggestions are given below which can be used by public representatives to support convergence of government and other schemes and programs to improve nutrient status of the soil in the village.

S.N.	Name of Nutrient	Status	Number of soil samples	Percentage	Suggestions
1	pH	Moderately Alkaline	42	55.26%	-
		Neutral	25	32.89%	-
		Slightly Acidic	9	11.84%	-
2	OC	Very Low	43	56.58%	Increase 25% of recommended N fertilizer.
		Low	33	43.42%	
		Medium	Nil	N/A	Apply recommended fertilizer N dose.
		High	Nil	N/A	Reduce 25% of recommended N fertilizer.

Output 2 : Village soil nutrient status and suggestions *Cont..*

S.N.	Name of Nutrient	Status	Number of soil samples	Percentage	Suggestions	
3	N	Very Low	Nil	N/A	The fertilizer N recommendations are given on the basis of Soil organic Carbon status	
		Low	19	25.00%		
		Medium	57	75.00%		
		High	Nil	N/A		
4	P	Very Low	10	13.16%	Increase 25% of recommended P fertilizer.	
		Low	34	44.74%		
		Medium	31	40.79%		Apply recommended fertilizer P dose.
		High	1	1.32%		Reduce 25% of recommended P fertilizer.
5	K	Very Low	Nil	N/A	Increase 25% of recommended K fertilizer.	
		Low	43	56.58%		
		Medium	32	42.11%		Apply recommended fertilizer K dose.
		High	1	1.32%		Reduce 25% of recommended K fertilizer.

Output 2 : Village soil nutrient status and suggestions *Cont..*

General Recommendations for convergence with government and other agencies:

- Awareness of periodic soil testing of each field at the village level to be prompted by gram panchayat.
- Regular sangosthi at village level on importance of soil health through department of agriculture/KVK/University/other institutions etc.
- Gram panchayat members to update themselves on various central & state government scheme reg soil health / other related issues.
- Various government and other agencies can be approached to conduct soil health demonstrations in the village.

Good Agricultural Practices:

- Use waste decomposer / microorganism (e.g. *Trichoderma* / Jeevamrit etc. to decompose the crop residues.
- Choose at least one legume/ oil seed cropping pattern in a year.
- Use green manuring and agroforestry based cropping system to reduce erosion, maximize infiltration and improve the nutrient cycle.
- Promote natural farming/ organic farming in the village.

5. To learn more about good agricultural practices scan the given code or click on the link.
<https://drive.google.com/file/d/1IM9bo0GlyYTNzmxrFEzFci2XkCOANp/view?usp=sharing>

Name of village representative: _____ Signature : _____
 Date : _____ Place: _____



Output 3 : Soil test combinations and suggestions *Cont..*

Patanjali Organic Research Institute
Suggestions for nutrient management based on soil test results

S.N.	Category (OC, P, K)	Suggestions
1	L L L	a) Apply 25 % in excess of recommended fertilizers for a crop.
		b) Add 6 to 8 tons FYM/ Compost/ Vermi-Compost per acre.
		c) Follow legume based crop sequences.
2	L L M	a) Apply 25 % in excess of N and P, recommended K. b) and c) are the same as in case of SNo 1.
3	L L H	a) Apply 25 % in excess of N and P, Reduce K by 25 %. b) and c) are the same as in case of SNo 1.
4	L M L	a) Apply 25 % in excess of N and K and recommended P. b) and c) same as in case of SNo 1.
5	L M H	a) Apply 25 % in excess of N, recommended P and reduce K by 25 %. b) and c) are the same as in case of SNo 1.
6	L M M	a) Apply 25 % in excess of N alone and recommended P and K. b) and c) are the same as in case of SNo 1.
7	L H L	a) Apply 25 % in excess of N and K, Reduce P by 25 %. b) and c) are the same as in case of SNo 1.
8	L H M	a) Apply 25 % in excess of N, Reduce P by 25 %, recommended K. b) and c) are the same as in case of SNo 1.
9	L H H	a) Apply 25 % in excess of N. Reduce P and K by 25 %. b) and c) are the same as in case of SNo 1.

Output 3 : Soil test combinations and suggestions *Cont..*

Patanjali Organic Research Institute
Suggestions for nutrient management based on soil test results

S.N.	Category (OC, P, K)	Suggestions
10	M L L	a) Apply recommended N. Increase P and K by 25 %. b) and c) are the same as in case of SNo 1.
11	M L M	a) Apply recommended N and K. Reduce P by 25 %. b) and c) are the same as in case of SNo 1.
12	M L H	a) Apply recommended N, 25% excess use of P and reduce K by 25 %. Follow legume based crop sequences.
13	M M L	a) Apply recommended fertilizers N and P. 25% excess use of K fertilizers. Follow legume based crop sequences
14	M M M	a) Apply recommended fertilizers. Follow legume based crop sequences
15	M M H	a) Apply recommended N and P. Reduce K by 25 %. Follow legume based crop sequences.
16	M H L	a) Apply recommended N. Reduce P by 25 % and increase K by 25 %. Follow legume based crop sequences
17	M H M	a) Apply recommended N and K. Reduce P by 25 %. Follow legume based crop sequences
18	M H H	a) Apply recommended N. Reduce P and K by 25 %. Follow legume based crop sequences

Output 3 : Soil test combinations and suggestions *Cont..*

Patanjali Organic Research Institute
Suggestions for nutrient management based on soil test results

S.N.	Category (OC, P, K)	Suggestions
19	H L L	a) Reduce N by 25 %. Increase P and K by 25 %. Follow legume based crop sequences
20	H L M	a) Reduce N by 25 % and increase P by 25 %. Apply recommended K fertilizer. Follow legume based crop sequences.
21	H L H	a) Reduce by 25% N and K, Increase 25 % by P fertilizer.
22	H M L	a) Reduce by 25% N, apply recommended P, Increase 25 % by K fertilizer. b) and c) same as in case of SNo 1.
23	H M M	a) Reduce N by 25 %. Add recommended P and K.
24	H M H	a) Reduce N and K by 25 %. Apply recommended P.
25	H H L	a) Reduce by 25% N and P. Increase 25 % by K fertilizer. b) and c) same as in case of SNo 1.
26	H H M	a) Reduce N and K by 25 %. Apply recommended P.
27	H H H	a) Reduce recommended fertilizers by 25 %

Note : Abbreviation
 Nutrient availability : L = Low, M = Medium, H = High
 Category : OC = Organic Carbon, P = Phosphorus, K = Potassium

7. Mrs. Kamarin Nimnuanrat, Director of Soil Mineralogy and Soil Micromorphology Research Group, Office of Science for Land Development, Land Development Department.



E-Service Soil Doctors for Soil Analysis



- “E-Service System for National Soil Quality Data ” also known as **“Soil Doctors for soil analysis”**
- System that provides information on nutrient mapping and soil analysis service by **volunteer soil doctors** nationwide
- Provides up -to- date information, **easy to use, fast** , and keep up with the needs or requests of farmers in the area
- Helps to optimize proactive soil and fertilizer management for optimal land use
- **Develop and enhance the capability of volunteer soil doctors** who are working in partnership with Land Development Department as well

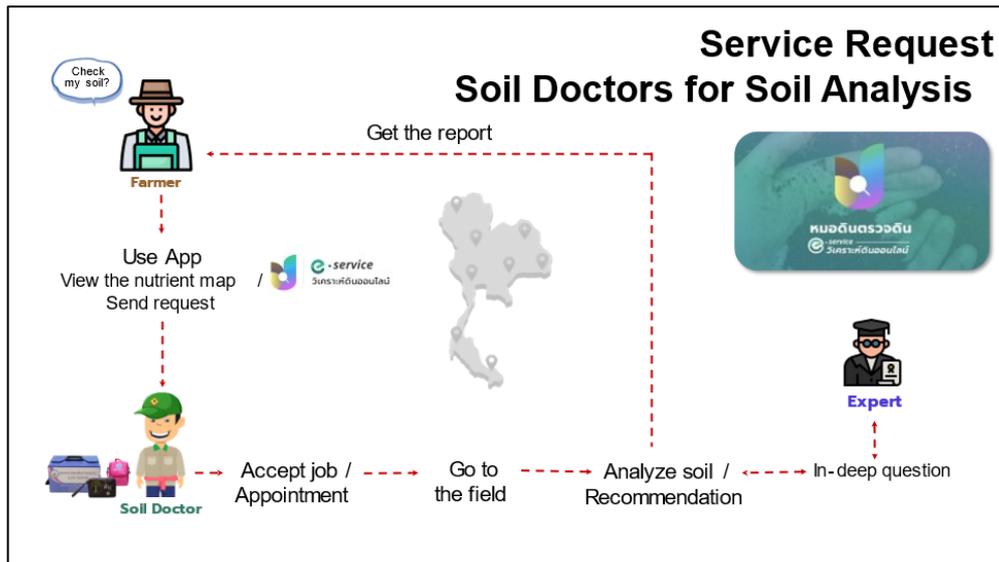
E-Service Soil Doctors for Soil Analysis



Goal of project in 2022

1. Select **1,800 Volunteer Soil Doctors** nationwide and provide them soil test kits for soil analysis services
2. Analyze the soil and advise farmers at least **91,800 samples**





Service channel

Soil Doctors for Soil Analysis

Android Operating System Ver. 11
Search for “หมอดินตรวจดิน”

iOS Ver.15.0
<https://soilservice.ldd.go.th/EServiceApp>





**Development and promotion of soil doctors program
for sustainable land and agricultural management practices
in Lancang-Mekong Countries**