



# Project: Climate Smart Farming Project

Project Timeframe: October 2020 - June 2023

## Successful Story

### CAMBODIA CLIMATE CHANGE ALLIANCE

Implemented by:



Funded by:



ស៊ីយអែត  
Sverige

Empowered lives.  
Resilient nations.



# CULTIVATING A SUSTAINABLE FUTURE: IMPLEMENTING CLIMATE-SMART FARMING TECHNIQUES FOR SOIL REGENERATION AND RESILIENT AGRICULTURE

More than 40% of Cambodia's cultivated soils suffer from moderate to severe degradation caused by intensive tillage-based mono-cropping and the use of agrochemical inputs. According to Cambodia's Long-Term Strategy for Carbon Neutrality, in the agriculture sector, rice cultivation, livestock management (including enteric fermentation and manure management), nitrous oxide emissions from managed soils, and fertilizer use are the main contributors to emissions. Total emissions in the agriculture sector in the base year of 2016 amounted to 18 MtCO<sub>2</sub>e. Emissions are estimated to nearly double to 35 MtCO<sub>2</sub>e in 2050 assuming current trends continue, and no major mitigation actions are taken. The main drivers of the agriculture sector are population and economic growth, which result in increased rice and meat production and consumption.

This degradation significantly hinders Cambodia's ability to adapt to and mitigate climate change. Additionally, climate change itself exacerbates land degradation. As part of a commitment to ensure Cambodia's Long-Term Strategy for Carbon Neutrality, the Cambodia Climate Change Alliance Phase III (CCCA 3) with funding support from the EU, Sweden, and UNDP, has supported Hilfswerk der Evangelischen Kirchen Schweiz (HEKS) for implementing the Climate Smart Farming Project.

This project aims to assess and implement climate-smart farming techniques to boost farm productivity, strengthen farmers' resilience to climate change, and reduce greenhouse gas emissions while increasing soil organic carbon storage. The project was implemented in three provinces, including Tbong Khmum, Kratie, and Mondulakiri.

The adoption of climate-smart practices such as no-till farming, integrated cover cropping, and organic crop protection not only increases farmers' profits but also enhances the resilience of cropping systems. Furthermore, these practices reduce emissions, including chemical pollutants and greenhouse gases, by sequestering atmospheric CO<sub>2</sub>. Consequently, this approach improves food security and safety, water security, and energy security.

## The Climate-smart Farming Technique for Sustainable Agriculture:

The Smart farming technique refers to the adaptation of cropping systems to ensure the preservation of a healthy soil profile, biodiversity, and the efficient utilization of soil nutrients, with a particular focus on reducing emissions by



sequestering atmospheric CO<sub>2</sub>, according to [the World Bank](#). The purpose of smart farming techniques is to maintain the ecological balance of crops and their biological processes, thereby providing them with the most suitable natural conditions for growth. This approach is to preserve biodiversity, both above and below ground.

To implement these techniques effectively, [farmers must adhere to three main principles](#). Firstly, they need to ensure the permanent protection of the soil by implementing cover crops. Secondly, they should minimize activities that disrupt the soil profile. Lastly, they must maintain a diverse range of cultivated crops through practices such as crop rotation, succession, and crop association.

Utilizing cover crops is a combination of the biological functions of plants by increasing natural biomass, promoting nutrient formation, and maintaining soil's moisture and crop health to be resilient and strong. Cover crops play a crucial role in supplying organic nutrients to the soil, suppressing weed growth, improving soil structure, retaining moisture, and posing minimal risk to the main cash crop. This technique can be integrated into various agricultural systems, including orchards and annual crop production.

## Climate-smart Farming Technique Implemented by HEKS Cambodia:

Under the support of CCCA3, HEKS – Cambodia collaborates with SmartAgro, a Cambodian company engaged directly with 212 farming households, including 91 women, and 53 of these households were from ethnic minorities. These households are in four communities across the provinces of Tbong Khmum, Kratie, and Monduliri.

Over a 33-month period, the project tested and shared insights through trial demonstrations of cover and fodder crop techniques for two growing cycles of both pepper and cashew farming. The primary focus lies on implementing biological solutions to enhance soil management, yielding benefits for both climate change mitigation (such as carbon sequestration in soil) and adaptation (enhanced water and nutrient retention, and improved farm performance). Additionally, proposed solutions for cattle aim to reduce methane emissions.

The project included technical assistance through on-field demonstrations, a farmer field school program, and support for the business model of SmartAgro's cover crop seeds. The project also tested and adapted biological solutions from Germany, France, Brazil, and Thailand. SmartAgro has experimented with various traditional methods to enhance production without chemicals. Trials involving pest-reducing products like neem, garlic, chilli, and lemongrass yielded unsatisfactory results, prompting the importation of technology from abroad. This contributes to knowledge transfer in climate change response and adaptation of cropping systems. Bioproducts, coupled with appropriate techniques, play a significant role in organic pest control, enhancing plant and soil health, increasing soil water retention capacity, and providing micronutrients.

**Mr Seing Thorn**, a farmer in Memot district, Tbong Khmum province, has adopted the practice of planting cover crops on his pepper farm to combat weed growth, eliminate the need for herbicides, reduce labor required for weeding, and maintain soil's moisture during the dry season.



Mr Seing Thorn, a farmer in Memot district, Tbong Khmum province

*He explained that: "I decided to plant cover crops because excessive weed growth was a significant issue in previous cropping seasons, leading to increased labor costs for weeding. By introducing cover crops, I could reduce weed growth effectively."*

*During the dry season, he observed that "with the soil fully covered by the cover crop, we spend less time on weeding, allowing us to save water. As a result, I only need to irrigate twice a week, thanks to the benefits provided by cover crops."*

Moreover, cover crops serve as a crucial shield against soil erosion, enhance water retention by minimizing evaporation and runoff, naturally manage weed and pest populations, mitigate water pollution by preventing chemical leaching into rivers, and ultimately, restore soil health as a fundamental natural resource. Healthy soil fosters increased yields with reduced labor, fertilizer, chemical inputs, and overall costs.

Mr Lim Leang, a pepper farmer in Memot district, Tbong Khmum province, shared his experience with implementing cover crops on his farm. He explained, "I have implemented cover crops on a 500-pole section of my farm."

Mr Lim Leang, a pepper farmer in Memot district, Tbong Khmum province, shared his experience with implementing cover crops on his farm. He explained, "I have implemented cover crops on a 500-pole section of my farm."

He highlighted the benefits by stating, "Previously, without cover crops, we watered crops once every three days, approximately 30 times over three months, resulting in a high expenditure of around 120 USD on diesel. However, since implementing cover crops, I have observed significant water savings. Now, I only need to water once every five or six days."

Leang also mentioned that previously, his pepper plants had signs of malaise, as evidenced by yellowing leaves. However, since implementing cover crops, all pepper plants have shown improved moisture levels and increased underground biodiversity. Additionally, after organic fertilizing, the plants have demonstrated enhanced nutrient absorption and overall improved health compared to their condition before the introduction of cover crops.

A pepper farmer in Memot district, Tbong Khmum province, Mr Nut Phi shared his experience implementing smart farming techniques. He explained, "I can now maintain soil moisture much better and more consistently." Previously, when weeds were cleared, humidity disappeared quickly, causing the soil to dry out rapidly. However, after introducing cover crops, soil moisture has become more stable, resulting in healthier pepper plants.



Mrs Tey Srey Mao, a farmer in Kratie

Mrs Tey Srey Mao, a farmer in Kratie, mentioned that before she was involved in the project, she used conventional farming methods on her cashew nut farms, which required significant labor and time to deal with weeds. Her family invested heavily in pest control, and occasionally, she experienced illness after using pesticides on the farms. However, after engaging with the project and participating in activities like farmer field schools and field visits, she has acquired knowledge of new techniques such as cover cropping.



Ms Run Neang, a farmer in Mondulkiri

Ms Run Neang, a farmer in Mondulkiri, stated: “I’m excited about incorporating pasture on the farm because it helps control unwanted weeds, enabling me to decrease pesticide usage and save money.”

According to the end-line assessment, farmers using cover crops or fodder are experiencing improved farm performance in terms of yield, production costs, and income compared to those using conventional methods. This is attributed to the advantages of cover crops in weed management, enhanced soil fertilization, and reduced labor requirements. These findings highlight the positive changes at the farm level and the economic benefits for farmer households. Additionally, these agroecological practices improve soil health by boosting microbial activity, which enhances the farm's ability to adapt to climate variability.

13 CLIMATE ACTION



## The Key Milestone of the Climate-smart Farming Project:

The project successfully established 4 farmer field schools, and 43 demonstration farms, and provided training to 140 households, with 50% of women and 60 indigenous people households. The project assessment revealed that 70% of trainees passed the test on the introduced climate-smart techniques and products, resulting in reducing GHG emissions and increasing carbon stock in the soil. Climate-smart farming encourages the use of cover crops to enhance the farm's ecological functions and improve system resilience and these practices have shown positive effects on soil fertility. This, in turn, helps lower the farm's vulnerability to climate change impacts like drought and heat stress.



The project enhanced farm performance through climate-smart crop production techniques for pepper and cashew farms. Significant improvements were observed, including a yield increase of 15%-18%, a reduction in labor costs of 41%-70%, and a decrease in production costs of 16%-70%. Additionally, net income rose by 10%-92% for both pepper and cashew farms, largely due to a substantial reduction in production costs from the use of herbicides in cashew cultivation. To achieve environmental benefits, scaling up the adoption of climate-smart techniques among farmers is crucial. Within the project framework, 70%-80% of early adopters have expressed satisfaction with the desirability, applicability, and affordability of cover crops. Participants have found that investing in cover crops is valuable for improving soil health and economic returns, including savings on watering, weeding, and labor costs. This indicates a promising opportunity to encourage behavioral changes among farmers, supported by a business model ready to facilitate these agroecological advancements.

To advance sustainable agricultural development, the scale-up plan should also extend the assessment period for climate change impact and maintain monitoring of soil carbon dynamics. This involves validating concepts and measuring soil organic carbon changes every 3 to 5 years. As part of the scaling-up plan, it is vital to boost cover crop adoption by evaluating market prices to meet demand, benefiting SmartAgro and its stakeholders. It is required to conduct a thorough analysis of the cover crop seed value chain, market demand, and factors influencing adoption, and identify farming communities and suppliers to support cover crop promotion.

Additionally, as the current smart farming techniques haven't established a distribution channel with local retailers, the future project should redefine the cover crop seed distribution model and offer incentives to early adopters. To learn more about the project, click on [Smart Farming Project](#).

## CAMBODIA CLIMATE CHANGE ALLIANCE - PHASE 3 (CCCA 3)

The Cambodia Climate Change Alliance (CCCA)-Phase III builds on the achievements of the first and second phase (2010-2014, 2014-19) and provides a unified engagement point to pool resources for the mainstreaming of climate change in national and sub-national policies and programmes. CCCA is a joint initiative of the Royal Government of Cambodia and a partnership between UNDP, the European Union and the Swedish Government. It is implemented by the National Council for Sustainable Development (NCS D) and managed by its Department of Climate Change to address climate change in Cambodia.

TO READ MORE ON OUR  
PROJECT, PLEASE VISIT:



SUPPORTED BY

### CAMBODIA CLIMATE CHANGE ALLIANCE

Implemented by:



Funded by:



ស៊ីយអែត  
Sverige

Empowered lives.  
Resilient nations.

PROJECT IMPLEMENTED BY

