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DEUTSCHE ZUSAMMENARBEIT

Implemented by
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Fund for the Promotion of Innovation in Agriculture (i4Ag)

As part of BMZ's special initiative "Transformation of agricultural and food systems"

The Challenge

Innovations have been developed in partner countries that evidence a particularly high potential for success as they respond to local conditions and the needs of the future target group. At the same time, many promising ideas remain undiscovered and unexploited. This is where i4Ag comes in. In a cooperative partnership with all relevant stakeholders, these new solutions are supported in their development. As they mature and become established in one area, these innovations can then be transferred for use in new contexts and be scaled.

The i4Ag fund, on behalf of the BMZ and as part of the *Transformation of Agricultural and Food Systems* special initiative, identifies and promotes innovations in the agricultural and food sector. It also acts as an innovative implementation tool for the strengthening of food security over the long term, through, for example, new solutions in agritech, digitalisation and climate adaption.

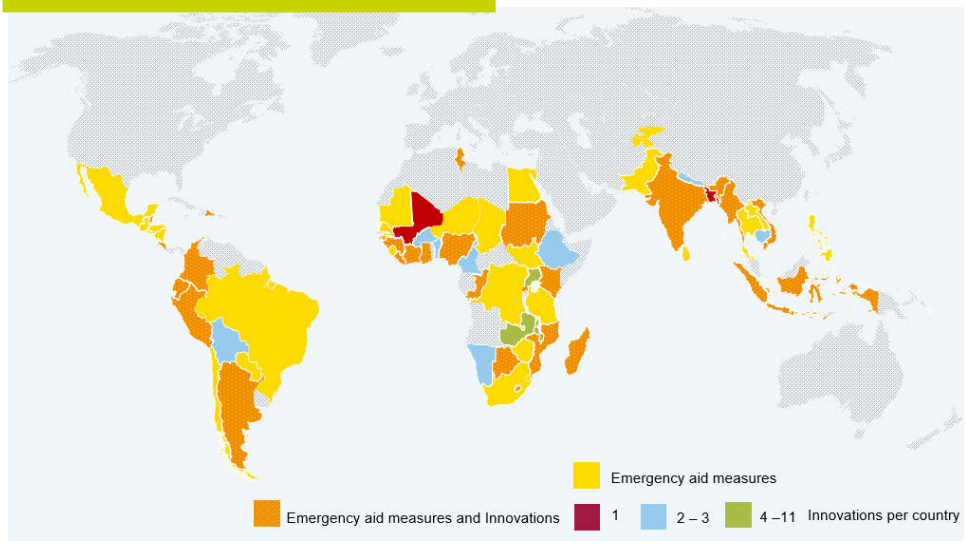
Promoting Innovation

The aim of the fund is to further develop innovations through partnerships with the broadest possible range of topics and to bring them to application in selected countries. Smallholder farms, their collectives and processing and production companies in the agricultural and food sector should be able to use and broaden the innovations' reach. Women and young people comprise an important target group, as they are not only users of the innovations but are also involved in their development.

Emergency Aid

Additional measures have been taken as part of the emergency aid programme to alleviate the consequences of economic and political crises, such as the the COVID-19 pandemic or the war of aggression against Ukraine.

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The global funds are aimed at achieving 15 of the Sustainable Developmeng Goals (SDGs).

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At A Glance

Implementation: BMZ Partner Countries 2030

Duration: 2020 – 2028

Project Volume: 224 million Euros, incl.:
25.3 million Euros from the COVID-19 funds
20.5 million Euros co-financed by the EU
20.3 million Euros of Food Crisis Emergency Aid

Funding categories:
Technology: Digitalisation, Mechanisation, Renewable Energy
Partners and processes: Agricultural research, extension, policy and trade, Cooperation with the private sector and international organisations

Funding Goals

- Gender-sensitive innovations for sustainable agriculture and food sciences will be supported.
- Innovation projects correspond to achieving at least two of the three sustainability sub-goals for No Hunger: nutritional security, employment and income promotion, climate resilience, and natural resources protection.

Our Approach

Innovations are identified through targeted networking and competitive formats. Potential innovation partners are advised during the application process on an individual basis. If there is a good prospect for success, the submitted projects will then, in cooperation with the partners, be conceived into sub-projects of the fund with a specific goal and a corresponding strategy.
The business models and gender strategies developed are intended to make the innovations self-supporting; gender equality should be taken into account. Knowledge and learning experiences will be continuously processed and distributed.

Selection of Innovations Funded

- Resource-conserving and climate-adapted practices that make more efficient use of harvest cycles and increase yields, e.g. by growing potatoes on rice paddy residues.
- Satellite and drone imagery that uses artificial intelligence to enable soil analyses on quality and carbon content.
- Mobile apps that make modern technologies accessible to smallholder farmers. These include digital harvest forecasts or intelligent cold chain systems.
- Participatory, applied research on agroecological pest management, e.g. with beneficial insects or fungi.
- Networks for the rental and use of agricultural equipment and machinery and the development of training platforms.

Selection of Emergency Aid Activities

- Emergency aid and resilience building against the impacts of the crises in partner structures of the Fair Trade Association in more than 30 countries.
- Procurement and distribution of production (e.g. seeds, organic fertilisers) and goods for the further processing of food (e.g. for preservation).
- Organisation and implementation of training (e.g. use and conservation of production inputs, use of local crops, diversification of cultivation and agribusiness).
- Support local production in more than 32 partner countries.
- Covid-19 emergency aid for small- and medium-sized companies in Africa.

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In cooperation with :
FAIRTRADE
FORUM FAIRER HANDEL
welt hunger hilfe

COVID-19 Emergency Aid for Fair Trade

The project was implemented by the *Fund for the Promotion of Innovation in Agriculture (i4Ag)* in cooperation with the *Initiative for sustainable agriculture supply chains (INA)* and is part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Agricultural markets have been heavily impacted by the COVID-19 pandemic

The Fair Trade movement has been campaigning for better working conditions in global supply chains for over 50 years. With its cost-covering minimum pricing standards and trade relations based on partnership, it provides a counterweight to conventional trade's price dumping, exploitative working conditions and highly fluctuating world market prices. Yet like many others, Fair Trade has been experiencing the consequences of the COVID-19 pandemic: health risks, ongoing export restrictions and border closures are leading to economic losses that are being felt particularly by smallholder farmers and their producer organisations.

Name of the Project	COVID-19 Emergency Aid for Fair Trade
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Global
Implementating Partner	Initiative for Sustainable Agricultural Supply Chains (INA), Forum Fairer Handel e. V., Deutsche Welthungerhilfe e. V., Fairtrade International
Project Volume	19.26 million Euros
Duration	10/2020 - 07/2024

The Fund Single Measure (EZM) is one of three COVID-19 EZMs of the Fund i4Ag; it goes beyond the fund's impact framework, and therefore does not directly contribute to the fund's impact matrix.

The Strategy

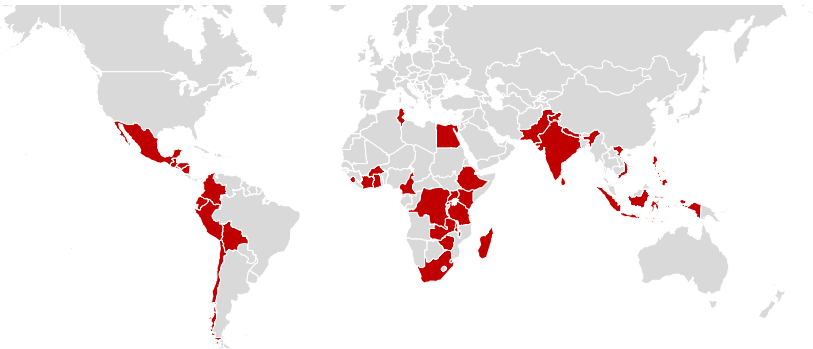
A strong network and fitted emergency aid solutions to the crisis

To support and strengthen smallholder farmers against the backdrop of the COVID-19 pandemic, the German Federal Ministry for Economic Cooperation and Development (BMZ) has commissioned the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH to implement the COVID-19 Emergency Aid for Fair Trade. The initiative, a cooperation between GIZ, the *Forum Fairer Handel e. V., Deutsche Welthungerhilfe e. V.* and *Fairtrade International*, is aimed at producer organisations in the Global South that are involved in Fair Trade agricultural supply chains. The activities are carried out as individual measures of the Fund for the Promotion of Innovation in Agriculture (i4Ag) which is financed via the special initiative "Transformation of Agricultural and Food Systems". The implementation of these single measures occurs in cooperation with the GIZ Initiative Sustainable Agricultural Supply Chains (INA).

Objectives and Methods

The objective of the individual measure is to alleviate the hardship of the relevant smallholder farmers caused by the COVID-19 pandemic through direct and rapid relief measures (recovery) and to implement preventive measures against the further spread of the virus (relief). Business continuity and the resilience of the producers and their organisations will likewise be ensured through the assumption of ongoing operating costs and capacity building (e.g. agricultural technical training) (resilience).





L.: Distribution of food packages, Vietnam, Photo: © Fairtrade International; R.: Project regions

The individual measure is divided into three implementation strands:

- The Fund for the Producer Partners of Forum Fairer Handel e. V. (FFH)
- The Funds for the Producer Partners of Fairtrade International (FI)
- The promotion of value chains through the Deutsche Welthungerhilfe e. V. (WHH)

The **Fund for the Producer Partners of Forum Fairer Handel e.V. (FFH)** addresses producer organisations (farmer cooperatives, processing companies, export companies) that are trading partners of members of the FFH (for example GEPA - The Fair Trade Company, El Puente or the Weltladen-Dachverband). Under the measure, producer organisations were eligible in the fund's first round to apply for funding of 50,000 euros and in the second, 35,000 euros. The measure aimed to alleviate the plight of smallholder farmers, prevent the further spread of COVID-19, and ensure the business continuity and resilience of the organisations. This allows for a particularly demand-driven implementation of the measures, such as writing articles for health protection and hygiene or the distribution of food packages as an emergency aid or prevention measure. Resilience measures range from the construction of greenhouses in Honduras to agricultural training and the purchase of a cinnamon milling machine in Sri Lanka.

The Fund for the Producer Partners of Fairtrade International (FI) addresses producer organisations (farmer cooperatives, processors, exporters) that have Fair Trade certification. In Latin America, emergency aid is coordinated through the Fairtrade Producer Network (CLAC), which is responsible for smallholder cooperatives in Latin America and the Caribbean. In Africa, emergency aid is coordinated through Fairtrade Africa and in Asia directly through Fairtrade International. In addition to the distribution of hygiene materials, educational radio broadcasts in local languages, for example, are being funded to prevent the further spread of COVID-19. Resilience activities range from income diversification measures in African countries to the renovation of kitchens for the production of coconut blossom sugar in Indonesia. Fairtrade International has also produced a documentary series as part of the single action showing the impact of COVID-19 on smallholder farmers in Peru, Kenya and Indonesia (https://farmers-documentary.fairtrade.net/).

Through **Deutsche Welthungerhilfe (WHH)**, projects are being implemented in three African countries to sustainably increase the income and employment of the rural population. In Sierra Leone, the cultivation and processing of organic cocoa is being supported and financed through such activities as the construction of storage facilities, drying and processing centres and the establishment of tree nurseries for cocoa seedlings. In Ethiopia and the DR Congo, the focus is on sustainability and productivity in coffee cultivation as well as value creation and quality in coffee processing. In parallel, WHH is implementing prevention measures against the further spread of COVID-19 in all of these countries .

Funding in Numbers

The measures reached producers and production organisations in over **30 Countries** *across Asia, South America and Africa.*

The cultivation of **25** *different raw agricultural goods, such as mangoes in Burkina Faso, herbs and tea in Nepal or coffee and cacao in Peru.*

375 *producers and production organisations were supported via the COVID-19 Emergency Aid for Fair Trade and strengthened in their resilience to the impacts of the pandemic.*

Over **650,000** *smallholder farmers and their families were reached via the measures.*

The BMZ supports the stand-alone COVID-19 Emergency Aid for Fair Trade measures and in doing so, contributes to the following sustainble development goals:



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Map
GIZ

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Implemented by
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In cooperation with:
ATSAF

Academy for International Agricultural Research (ACINAR)

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Ensuring German and international agricultural research agendas align during times of global change

Sustaining resilient rural livelihoods in times of global climate and environmental change requires new global partnerships for development-oriented research to promote agricultural innovation.

Reforming the global agricultural research partnership One CGIAR, formerly known as *Consultative Group on International Agricultural Research*, entails major changes in the way international agricultural research is conducted. This reformation concerns financing modalities — moving from bilateral to multilateral financing — and a thematic reorientation to global initiatives. Continued and improved exchange and cooperation between German agricultural research institutes and their international counterparts are paramount to ensuring the alignment of national and international research agendas. This cooperation will harness developmental benefits.

25 PhDs / 96 MScs *will be allocated*

50% women *(half from partner countries) conduct doctoral research or hold internships in the context of an international research project*

10 articles *peer-reviewed and open access, presenting PhD scholars' research findings*

20 social media *posts presenting results of the scholarship programme*

70% *of research partners in the cooperation confirm improved academic networks*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



The Innovation

A graduate scholarship programme allowing German and international agricultural researchers to better network

ACINAR is an innovative instrument for the promotion of development-oriented agricultural research. Through scholarship programmes for PhD and MSc students enrolled at German universities as well as students from OECD-DAC partner countries, it offers an institutionalised platform for networking German research institutions and international agricultural research centres*. These scholars conduct research attached to ongoing research programmes at one of the international research centres.

Under ACINAR, German and international research institutions and scholarship holders have joined forces to build a powerful, future-oriented network addressing urgent challenges and promoting innovation in the agricultural and food sector of Germany's partner countries. The broad scope of research disciplines addressed by the ACINAR-scholarships ensures a balance between applied and development-oriented research topics. The topics range across various thematic areas and are at different stages of innovation development – from the development of innovations through to the scaling and dissemination of such innovations via agricultural advisories.

** Including the CGIAR centres, the World Vegetable Center (WorldVeg), the International Centre of Insect Physiology and Ecology (icipe) and, potentially, members of the Association of International Research and Development Centers for Agriculture (AIRCA).*

Name of the Project	Academy for International Agricultural Research (ACINAR)
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Global
Implementing Partners	The Council for Tropical and Subtropical Agricultural Research (Arbeitsgemeinschaft für Tropische und Subtropische Agrarforschung (ATSAF) e.V.)
Duration	01/2021 – 12/2025

Methodological Approach and Innovation Partnership

ACINAR consists of two distinct but interlinked scholarship programmes: 1) a six-month internship programme for **MSc students** to gain insights into international agricultural research and 2) a three-year scholarship programme for **PhD students** to conduct their doctoral research in the context of an international research project. As a precondition for funding, students and supervisors from German universities and international research centres form a group of three called a tridem. Research proposals submitted by these tridems are evaluated by an independent expert committee consisting of representatives from German and international agricultural research centres. ACINAR ensures that ongoing research programmes from these international research centres along with cross-institutional learning and networking are embedded in the proposals. As such, it helps to improve the contributions of international agricultural research toward achieving the Sustainable Development Goals.

ACINAR scholarships for MSc and PhD students differ in terms of the amount and duration of monthly stipends as well as the number available. PhD scholars receive a monthly scholarship amount and a research grant for conducting their doctoral research as attached to ongoing research programmes at one of the international research centres. MSc scholars are organised as tandems between students enrolled at German universities and students from OECD-DAC partner countries. While MSc scholars enrolled at German universities conduct their internships at an international research centre, students from OECD-DAC partner countries conduct their internships at a German research institution. Tandems work on related research questions within the same international research project. Wherever possible, synergies are leveraged, for example by aligning MSc and PhD research topics. This way, PhD scholars can profit from additional in-depth MSc research, while MSc scholars can benefit from supervision and research infrastructure. ACINAR provides digital learning modules on state-of-the-art methods and emerging cross-cutting issues in development-oriented agricultural research. The partnership likewise offers opportunities for virtual and physical exchange as well as networking for the scholars and researchers involved.

Important Activities

- Digital promotion of ACINAR to raise awareness throughout the scientific community
- Establishing an international expert committee consisting of representatives from German and international research centres
- Defining relevant research topics and criteria for the evaluation of research proposals and selection of scholars
- Designing digital learning modules and establishing formats for virtual exchanges based on scholars' needs and preferences
- Implementing digital learning modules and conducting virtual and physical networking events

Sustainability and Scaling Strategy

Due to its innovative institutional design, ACINAR is much more than a programme for applied research promotion. Through scholarships granted to students who are embedded in tridems with researchers at German universities and international research centres, ACINAR incentivises and promotes the means for establishing long-lasting scientific networks. Students benefit from insights into their future working environments and can network with potential future employers. At the same time, researchers at international research centres profit from improved institutional and personal relationships with German research institutions; they can establish long-term professional connections. ACINAR provides an institutional lever for strengthening international scientific exchange and cooperation and serves as a fertile ground for innovation through development-oriented agricultural research.

The Main Objective

Improve scientific cooperation between German and international agricultural research.

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On behalf of
Federal Ministry for Economic Cooperation and Development (BMZ)

Machinery Rings as a Self-Help Concept

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Smallholders have only limited access to suitable mechanisation solutions

Most family farm operations in Western Kenya consist of just one to three hectares. For economic reasons, such small areas exclude self-mechanisation, leaving farming by hand or the hiring of machine operators the only options. These mechanisation service providers often use outdated technologies that result in low yields and subsequently, limited incomes. Soils are also subject to continuous degradation, something which is exacerbated by inappropriate farming techniques as well as climate change.

Meeting farmers´ demands and achieving economically viable utilisation rates remains a challenge. While the private sector plays an important role in mechanisation, a lack of regulation in mechanisation services and low capacity among tractor drivers can lead to quality outcomes that are deficient. As well, women are at a disadvantage when it comes to accessing agricultural machinery even though they account for up to 75 per cent of the agricultural labour force in Kenya.

Name of the Project	Machinery rings as self-help organisations for smallholder family farmers in Anglophone Africa
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Kenya
Implementing Partners	Sequa gGmbH Bundesverband der Maschinenringe e.V. (BMR)
Duration	02/2021 — 04/2024

The Innovation

A self-help business model to evolve the mechanisation sector

The introduction of a member-based self-help network that supported inter-farm mechanisation created a user-centred organisational innovation over Kenya´s existing contract models and government-provided services. As members of the so-called Machinery Ring (MR), farmers, service providers and other actors in the agricultural sector pursue the goal of increasing the use of agricultural machinery, expanding its capacity while promoting innovations and increasing the added value of agricultural production. As a core business, the MR brings farmers and service providers together, bundles demand for contractors, creates market transparency to counteract price fluctuations for services and supports the settlement of disputes between contractors and clients. The core business will run via a digital platform, which will offer demand-oriented services for farmers and enable the exchange of knowledge about climate resilient agriculture.

A key focus of the project is the introduction of innovative shallow to zero tillage implements to rehabilitate degraded soils and to increase yields. Farmers and mechanisation service providers will be able to rent these implements.

The Main Objective

Smallholder family farms and SMEs use innovative mechanisation solutions to increase sustainability in their business





L.: Introduction of the Machinery Ring Model in Western Kenya. R.: Project Region

Photos: © Bundesverband der Maschinenringe e.V.

2400 ***machinery ring members*** *have improved their income opportunities*

1 ***gender strategy*** *has been confirmed and implemented participatively by the members*

On 800 hectares *climate-resilient farming techniques have been introduced*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Methodological Approach and Innovation Partnership

The project builds on a cooperation with *sequa gGmbH* and *Bundesverband der Maschinenringe e.V.* (German Federal Association of Machinery Rings) providing expertise and human resources to introduce the machinery ring model in Western Kenya.

The strategy of capacity development aims to impart technical and entrepreneurial knowledge to smallholder farmers and entrepreneurs on the topics of agroecology (especially climate-resilient cultivation techniques), management, marketing and investment in machinery. The members of the MR will develop their own gender strategy which will be reflected in all decision-making processes and services offered through the MRs to ensure equal access for women and men to the services and related income opportunities.

Important Activities

- Capacity-building measures for the formation of machinery rings and related bylaws
- Development of the digital machinery ring platform
- Introduction of innovative mechanisation solutions
- Capacity development on management, cultivation techniques, marketing, machinery profitability etc.
- Knowledge exchange through field demonstrations

Sustainability and Scaling Strategy

The MRs in Kenya will be enabled in building a business model that can be independently financed over the medium- to long-term through income from membership and service fees and other collaborations with the business community. Knowledge about agroecology, management, marketing and climate-resilient cultivation practices will be anchored in the MR service provision to secure an intergenerational agricultural income. Increasing income opportunities for MR members is an important component of more sustainable farming and leads to a sustainable growth in demand for mechanisation services in the region.

The empowerment of women in smallholder family farms realises additional potential for the farms' sustainable economic development. Social acceptance for this innovative organisational approach in Western Kenya is ensured by establishing appropriate exchange formats with relevant local associations and national governments.

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In cooperation with

Improved Water Cycle Systems for Sustainable Fisheries Production in Aquaculture

Implemented by the *Fund for the Promotion of Innovation in Agriculture (i4Ag)* as part of the special initiative *Transformation of Agricultural and Food Systems*

Context

Shrimp production has gained economic importance in Southeast Asia. There is great potential, as it has become a branch of the agricultural economy that generates jobs, income, food security and foreign exchange as an export product. Indonesia and Vietnam account for almost a quarter of global shrimp aquaculture production.

Shrimp has recently grown to be one of the most commonly consumed seafood products as it is low in calories but rich in nutrients. At the same time, the increasing demand for shrimp and other aquatic products is putting pressure on natural resources and ecosystems. Land is being converted for intensive, extensive and water extracting shrimp production. This has not only contributed to the decline of mangrove forests but has created wider issues of environmental pollution and food safety.

While the sustainability (or lack thereof) of the shrimp industry is receiving increasing attention at the political and operational level, innovations and technologies for shrimp production have not yet caught up. Unsustainable practices and water resource use prevail. Therefore, the adoption of innovative technologies for farming systems is the key driver of change towards the sustainable development of the shrimp sector, hence meeting global demand for fisheries products without harming local water resources and environment.

Objective

To safeguard jobs and improve environmental sustainability through more efficient and sustainable local value chains.

Name of the Project	Improved water cycle systems for sustainable fisheries production in aquaculture
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Viet Nam: Soc Trang and Ca Mau province Indonesia: North Kalimantan province
Implementing Partners	Ministry of Agriculture and Rural Development (MARD), Viet Nam Ministry of Environment and Forestry (MOEF), Republic of Indonesia
Duration	01.07.2021 – 31.07.2026

Approach

The Project “Improved Water Cycle systems for Sustainable Fisheries Production in Aquaculture” Viet Nam (i4Ag Viet Nam Project) strongly promotes innovations and technologies for sustainable farming systems. While the current format of farms ranges from intensive conventional farming to extensive farming, innovations in support of sustainability will only be as successful as the practices of the farmers themselves. How these farmers adopt the appropriate technologies and management practices to the specific farming systems and environment determines their success. Which is why the project’s approach is to test innovative farming systems to prove that most sustainable systems work successfully, even extensive or intensive farming systems that require a high level of farmer’s operational and management skills.

There is no unique system that can be identified as sustainable, and no single path to sustainability. Establishing a strong partnership between different actors in the shrimp value chain to achieve mutual economic and environmental benefits, the project works to meet demands for global food. Utilising the knowledge and expertise from academia and institutions, the innovations are tested before being disseminated through farmer education and training, advisory and information sharing.





Left: Mangrove-shrimp site in Mekong Delta, Right: Project Region

The Objectives in Figures

90 tons *of shrimp/ha/year (3 cycles of 30 tons/ha per year) are harvested.*

90% *of the wastewater is circulated.*

90% *of the resulting sludge is collected and used.*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Business models for women in shrimp farming households are initiated and implemented to secure the income of female farmers and promote gender equality. All project activities are designed to support in shifting the balance towards economic efficiency with environmental and social sustainability.

The i4Ag Viet Nam Project promotes sustainable alternatives for established technologies in the mangrove-shrimp production in Viet Nam and Indonesia. Specifically, it:

- **Further improves water circulation systems:** A Recirculating Aquaculture System (RAS) is used to recirculate farming water. This helps to minimise water use, disease transmission, and to reduce other negative environmental impacts. So far, RAS has mainly been used by large enterprises as it requires significant initial investment, understanding of, and experience with the technology. However, in the first, the project will test the usability of RAS for medium-sized enterprises.
- **Applies innovative mangrove shrimp production systems**: Innovations in water quality improvement for mangrove shrimp production which help to reduce diseases transmission and improve shrimp growth will be promoted towards economic development and sustainable mangrove ecosystems.
- **Tests shrimp larval production:** Technologies to improve water quality in shrimp hatcheries will be tested to increase the survival rate of post-larvae.
- **Redesigns extensive shrimp pond areas:** An innovative aquaculture system with traditional shrimp ponds and hatcheries for mangrove crabs will be developed. Through intercropping, the water surface of ponds is reduced, and mangrove forest area increased.

In Viet Nam, this project undertakes important activities such as:

- Developing and implementing RAS in the medium-sized shrimp farms and hatcheries;
- Monitoring environmental indicators through Information and Communication Technology (ICT) solutions;
- Testing innovations on water quality improvement for extensive sustainable mangroves shrimp production;
- Organising workshops, forums, and training courses for farmers and stakeholders on the technology's application and the dissemination of experiences;
- Developing and implementing an accompanying gender strategy to promote gender-sensitive business models for higher income opportunities for women.

Sustainability

Shrimp farming communities are concentrated in the coastal and river delta areas of Viet Nam and Indonesia. Vulnerable to the impacts of climate change, the area has also been impacted by the rapid expansion of aquaculture, which has contributed to the decline of mangrove forests and non-sustainable use of water resources. All these negative impacts make it difficult for shrimp farming households, both those headed by men and those headed by women, to secure their livelihood. As a result, laborers tend to quit production, change jobs, or even move to other areas to live, leading to a population imbalance as well as a lack of qualified human resources.

By successfully testing shrimp farming renovations and business models, and improving environmental quality, the social security and stabilisation of living conditions for residents of the coastal communities is supported. In documenting the lessons learnt, farmers and their families are able to build long-term capacities and pass on the agricultural innovations and disseminate them in the Asian region. The focus is not only on technical issues but also on socio-economic problems and the sustainable use of natural resources.

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March 2026

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On behalf of
Federal Ministry for Economic Cooperation and Development (BMZ)

Implemented by

In cooperation with:

AgriPath - Sustainable Agriculture Through Digital Pathways

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Lack of efficient and gender-responsive digital agricultural advisory services for smallholder farmers

Two-thirds of the food consumed globally is produced by 500 million smallholders. Yet these small farms struggle with low productivity and insufficient incomes; they are more vulnerable to climate change and other environmental challenges. They also typically lack access to information about practices that could help to improve their agricultural production, secure their livelihoods, and protect their resource base. Public rural advisory services are dwindling around the world, leaving millions of smallholder farmers without adequate support.

Digital advisory services provide an innovative way to address these challenges, yet the concept has only reached a small fraction of smallholders in the Global South. Technical and social innovations are rarely combined, and technology providers lack sufficient understanding of how to translate the provision of digital information into concrete behaviour change when it comes to sustainable agriculture. Digital agricultural extension services are also often ineffective and hence not scaled, as they are insufficiently adapted to the needs of smallholder farmers, especially women. Therefore, it is essential to know who has access to a mobile phone and how farming decisions are made in the household. Shared decision-making can empower women and reduce gender inequality.

Name of the Project	AgriPath: Sustainable agriculture through effective and efficient digital pathways
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Burkina Faso, India and Nepal
Implementing Partners	Centre for Development and Environment (CDE) at the University of Bern, University of Lausanne, Grameen Foundation USA, Grameen Foundation India Private Limited, International Centre of Insect Physiology and Ecology (icipe), University of Kathmandu, farmbetter Ltd
Duration	08/2021 — 08/2026

The Innovation

Inclusive, effective digital advisory services that reach men, women, and youth.

Digital advisory services can offer farmers access to crucial agricultural knowledge and support them in increasing their resilience. Reaching more women and youth can lead to substantial gains in farm outputs through equal access to resources.

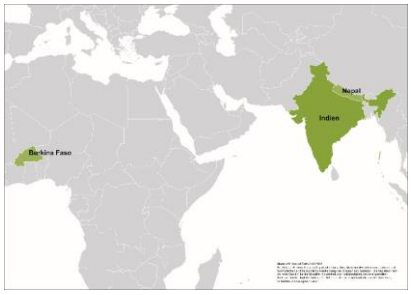
By providing farmers and extension services with tailored digital solutions focused on sustainable agricultural practices, female and male smallholders alike are supported in increasing their agricultural productivity, income, and climate resilience.

The project *AgriPath* is designed around one digital application – the *farmbetter* app – which is co-designed with, and tailored to, its users in the target countries. The algorithm of the *farmbetter* app matches farmers' needs with sustainable land management solutions.

The Main Objective

Smallholder farmers and agricultural extension workers make use of user-centred, gender-sensitive, digital advisory services.





L.: farmer learning to use the farmbetter App

Photos: © Guenay Ututuncok /laif

Methodological Approach and Innovation Partnership

AgriPath will examine intra-household decision-making processes, including processes that go beyond established social norms, to embrace more widespread access to information and knowledge. This may include looking at non-traditional gender roles or including youth and not only heads of household. It will provide evidence on sustainable pathways for the use of digital advisory services at scale and enhance uptake of sustainable practices.

AgriPath will provide causal evidence to help mainstream the application of tailor-made digital advisory services with the aim of supporting the scaling up of sustainable agriculture in Africa and Asia. Using a mixed-method approach, the project will run behavioural experiments and randomized controlled trial studies to disentangle the impact of digital solutions offered according to three different models, namely:

- self-service (farmers using it on their own)
- agent-based (extension workers using it with the farmers)
- hybrid (farmers using it on their own, with some support from extension workers)

Focus groups and lab-in-the-field experiments will provide country-specific knowledge on gender and youth involvement in sustainable agriculture relevant for contextualizing digital advisory services and facilitating their uptake. The mix of research methods will contribute to identifying the most efficient way of reaching farmers and contribute to behavioural change toward sustainable agriculture in different contexts. It will also look at how best to use digital technologies to increase the adoption of sustainable agricultural practices.

Important Activities

- Human-centred design for participatory development of the *farmbetter* app interface
- Analysis of data from the *farmbetter* app
- Development of policy recommendations and cross-regional analysis of research results to inform scaling
- Development and implementation of a scaling framework for target and neighbouring countries
- Capacity building and stakeholder engagement activities conducted through the Digital Agricultural Services Engagement Hubs

Sustainability and Scaling Strategy

Public and private extension services, research institutions and relevant ministries will be directly involved in the development and implementation of the digital solutions and extension models. Smallholder farmers and extension service providers will be trained in digital skills. The *farmbetter* app uses the existing agricultural practices and solutions taken from the knowledge management system of the global WOCAT (World Overview of Conservation Approaches and Technologies) database. A practical toolkit and policy recommendations will enable the implementation of the findings beyond the scope of the project. The *farmbetter* app will be available free of charge in the Google Playstore even after the project concludes; its business model will continue to develop on the basis of the research results. Interfaces with other service providers, such as input providers or digital platforms, are envisaged

The *farmbetter* App:

*used by **30,000** **smallholder farmers (50% women)***

***150** **public and private agricultural extension workers** employ its advisory services*

***150** **new agricultural solutions** based on smallholder needs have been added*

***3** **digital agriculture solutions** engagement hubs for scaling digital agricultural solutions established*

***10** **policy recommendations** on digital agricultural advisory services developed*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



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Photo credits Sylvia NGeno (farmbetter Ltd)

Text Dr. Elke Sümnick-Matthaei and AgriPath Consortium

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BASE Driving investment in sustainable energy

Empa Materials Science and Technology

Virtual Cold Chain Assistant for Smallholder Farms

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Reducing post-harvest losses by enabling access to sustainable cooling and to market information

Agriculture plays a vital role in the economies of Nigeria and India. In Nigeria, 70 % of the total workforce is engaged in agriculture; more than 40 % is in India. Yet agriculture's contribution to GDP is low and the agricultural sector in both countries faces significant risks, in part due to a lack of access to cooling. Only 6 % of food produced in India currently moves through the cold chain; in Nigeria, 40 % of the produce is lost or wasted. Besides the reduction in income caused by food loss, farmers face further income losses when they have to sell their produce directly after harvesting at a low price. Though climate friendly (e.g., solar-powered) local cooling systems are available for smallholders, their deployment has been limited by a lack of reliable access to energy, high upfront costs, unavailability of proper maintenance as well as limited
financing options and know-how. Local cooling service providers likewise face the challenge of ensuring the utilisation of their systems. The ability to scale up businesses is additionally limited by the mainly manual registration of customers.

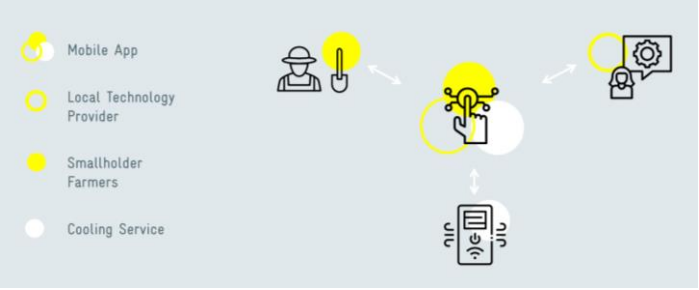
Name of the Project	Virtual Cold Chain Assistant for Smallholder Farms
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Nigeria, India, global
Implementing Partners	The Basel Agency for Sustainable Energy (BASE), The Swiss Federal Labs for Materials Science and Technology (EMPA)
Duration	07/2021 — 09/2024

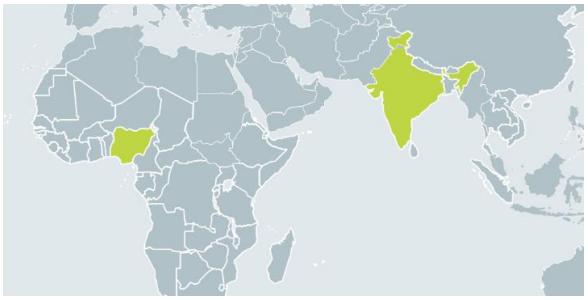
The Innovation

Pay-per-use sustainable cooling and data-driven decision-making via open-source app

An open-source, data-driven mobile application known as *Coldtivate* is being developed and rolled out to digitise servitisation business models for cooling processes. With this model, farmers gain access to efficient, reliable, and sustainable cooling while only paying for the food they store (pay per kg per day). Service providers own and maintain the cooling facilities, thereby covering the operational costs. This long-term commitment is an incentive for providers to install the most energy-efficient equipment and perform high-quality maintenance. Within this business model, *Coldtivate* serves as a decision-making tool for both smallholders and cooling service providers: providers:

- The app informs **smallholders** about the availability of -environment friendly cooling services for their produce, enabling them to keep track of their crop's quality and expected shelf-life in the cold rooms digitally. Farmers' decisions are further supported by information on market prices. Knowing the remaining life of the produce and the forecast market prices, smallholders can make informed decisions about when and where to sell.
- Digitising cold storage operations simplifies the scaling and monitoring for **clean cooling service providers**. Other decision-making tools, such as an interactive open-source map, supports them in optimising the positioning of new cold rooms. To reach customers without a smartphone, the app will enable cooling providers to send updates via SMS notifications.





L.: Concept of the Digital Cold Chain Assistant; R.: Project Region

Graphics: GIZ

The Main Objective

Reduce post-harvest losses and increase smallholder incomes while mitigating negative climate impacts

+ 15 % *income for smallholder farmers*
+ 10 % *turnover for cooling providers*
- 50 % *CO2 emissions*
- 20 % *post-harvest losses for smallholder farmers*

The project contributes to the achievement of these Sustainable Development Goals:



Methodological Approach and Innovation Partnership

The project, in cooperation with *The Basel Agency for Sustainable Energy* (BASE) and *The Swiss Federal Labs for Materials Science and Technology* (Empa), pilots the use of a virtual cold chain assistant in Nigeria. It scales the innovation in cooperation with GIZ´s *Green Innovation Centres for the Agriculture and Food Sector* (GIAE) in India (amongst others).

BASE provides in-house experience and its expertise with the development of innovative business models, financial mechanisms and data science to drive the adoption of climate smart solutions. Empa provides its knowledge in the analysis of post-harvest losses along the agricultural supply chain and the development of models such as those used to monitor crop shelf life based on sensor data and predict fruits' quality based on computer vision. The central implementation partners for pilot testing on the ground are local SMEs such as *ColdHubs* in Nigeria. In addition, the project builds on cooperation with international cooling alliances such as the *Cooling-as-a-Service (CaaS) Alliance* and *The Cool Coalition*.

An accompanying gender strategy, which is developed and implemented by the partners, ensures that women are strengthened in their position as producers, employees, or entrepreneurs.

Important Activities

- Developing and rolling out the virtual cold chain assistant in two regions of Nigeria, tailoring it to the local needs of smallholders and cold storage providers
- Conducting capacity development activities for smallholders with regards to the benefits and availability of cold storage as well as to the use of the app
- Establishing a business incubator for selecting, advising and supporting further clean cooling providers in rolling out the pay-per-use model and scaling the digital approach
- Collecting open-source data and mapping it into an interactive multi-layered map
- Surveying activities to monitor the impact in terms of post-harvest losses and increased income
- Launch of a digital information platform and implementation of digital event formats

Sustainability and Scaling Strategy

Through a supra-regional incubator, selected promising medium-sized enterprises offering sustainable cooling solutions will be advised and supported in tailoring their business model to local needs. They will be assisted in digitising key processes to facilitate scale-up of the solution.

Lessons learned from all locations will enable a sustainable scaling of the approach. Through the globally scalable, locally adapted concept, further cooling providers across countries can engage with the solution and address the challenge of post-harvest losses for smallholder farmers.

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STDF STANDARDS and TRADE DEVELOPMENT FACILITY

Strengthening the Recovery of Agricultural Markets after COVID-19 Pandemic

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Agricultural markets have been severely disrupted through impacts of COVID-19

The COVID-19 pandemic provides a clear reminder of the ease and speed at which pests and diseases can spread worldwide and of the inter-connectedness of our global supply chains. Its extraordinary disruption to the global economy and world trade underscores the importance of constructing food safety and plant and animal health capacities as a global public good. The consequences of COVID-19, such as shocks to agricultural production, distribution and trade, challenge the way the agri-food sector works and the mechanisms by which food safety can be ensured, including sanitary and phytosanitary (SPS) management functions such as inspection and surveillance.

Name of the Project	Strengthening the recovery of agricultural markets after Covid-19 through the Standards and Trade Development Facility (STDF)
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Global
Implementing Partners	Standards and Trade Development Facility (STDF)
Duration	08/2021 — 09/2027

The Strategy

Establishing global multi-stakeholder partnerships to stabilise post-pandemic recovery

The Standards and Trade Development Facility (STDF) is a global multi-stakeholder partnership for the facilitation of safe and inclusive trade and to contribute to sustainable economic growth, poverty reduction and food security. The STDF promotes the improvement of food safety as well as animal and plant health capacities in partner countries. This helps to meet SPS requirements for trade (import and export) based on international standards. By bringing together the SPS expertise with the skills of its founding partners, donors and other organisations, the STDF provides a unique forum to exchange information and encourage collaboration and synergies. Stakeholders involved are thus enabled to achieve more effective and sustainable results than would be possible on their own.

The Main Objective

Economic recovery from shocks of COVID-19 through improved sanitary and phytosanitary measures in agricultural trade





L: Quality assurance of beans for export; R: Apple production in Chile

Woman - ©STDF/José Carlos Alexandre; Man - ©COLEACP

Methodological Approach and Innovation Partnership

The project is implemented through basket funding, complementing ongoing support by the Federal Ministry for Economic Cooperation and Development (BMZ) and the Federal Ministry of Food and Agriculture (BMEL). The implementation strategy as well as the monitoring and evaluation of activities are guided by the operational guidelines of the STDF and its steering structure. Biannual meetings of the STDF working group, which consists of technical-level representatives of STDF's partners and donors, as well as the experts from developing countries, guide the implementation of activities and projects through the STDF secretariat.

Sustainability and Scaling Strategy

Since its inception in 2004, the STDF has contributed to safe and inclusive trade through more than 85 projects worldwide. Due to its global partnership approach, the lessons learnt and networking exceed the impact of individual project grants. In support of the 2030 Agenda, the STDF constitutes a global platform for dialogue and learning on SPS capacity development. By convening and connecting diverse stakeholders from agriculture, health, trade and development across its knowledge and project work, and by piloting and learning from innovative and collaborative approaches, the STDF influences and catalyses SPS capacity development globally. In doing so, the STDF also addresses cross-cutting issues, such as gender-sensitivity and environmental protection, so that trade generates decent work and productive employment opportunities for women and men while benefiting the planet. Sector development projects that reach small producers along agricultural value chains contribute to enabling framework conditions for private sector development and investments in local value addition.

Important Activities

- Selection of three STDF projects through the STDF working group based on the project proposals received and the relevance of ongoing projects related to COVID-19 response
- Implementation and evaluation of project grants in at least three countries to strengthen capacities for a context-specific implementation of SPS measures in agricultural value chains
- Development and publication of global or project-specific knowledge products on SPS issues and climate change, environment as well as gender and inclusion in the context of the COVID-19 pandemic
- Support of the monitoring and evaluation of STDF activities in close coordination with BMZ, BMEL and the GIZ sectoral project Agriculture

14 actors in 5 countries
confirm safer trade through improved SPS-measures

5 STDF project grants
have been implemented and positively evaluated

20 knowledge products *are available*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



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CLAAS

Locally Adapted Mechanisation Concepts in sub-Saharan Africa

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Missing know-how of locally adapted mechanisation solutions

The potential to increase agricultural productivity in sub-Saharan Africa remains unlocked due to insufficient knowledge of production practices and economics as well as a lack of capital and the low availability of locally adapted agricultural technology. Mechanisation solutions corresponding to current and future challenges in the agricultural sector are needed.

When investing in agricultural machinery, local conditions are not sufficiently considered, leading to various difficulties. Oversized machines, for example, cause more soil compaction and increased fuel consumption; their fixed costs are too high. On the other hand, unadapted implements for soil and seedbed preparation lead to soil degradation. Yields remain low overall, leaving small scale farmers behind in their economic development.

Name of the Project	Promotion of locally adapted mechanisation concepts in sub-Saharan Africa (Ethiopia, Kenya)
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Ethiopia, Kenya
Implementing Partners	CLAAS Global Sales GmbH
Duration	09/2021 — 08/2025

The Innovation

A digital information and planning system

The digital information and planning system is an open-source tool for agricultural institutions and organisations both public and private. The planning system facilitates and improves their services to identify the most appropriate and viable mechanisation solutions for smallholder farmers.

The system is operated by trained experts who enter the necessary data, including agroecological conditions as well as economic factors. Based on this data, the system calculates the most appropriate mechanisation solution automatically.

To further strengthen their important position in agriculture, women actively contributed to the development process of the digital tool. Through this, women take leading positions in agricultural mechanisation, creating business opportunities that address their needs.







Left & Top: Trainings provided by CLAAS in Ethiopia, right: Project regions

Photos: © CLAAS Global Sales GmbH

The Main Objective

To increase the capacities of agri-cultural institutions to introduce gender-sensitive, locally adapted mechanisation solutions

Methodological Approach and Innovation Partnership

The project was implemented by CLAAS Global Sales GmbH, a manufacturer of agricultural machinery, with assistance from LEMKEN GmbH & Co. KG, a manufacturer of implements, as well as the Centre for Energy and Agricultural Engineering at the Edu-cation Centre Triesdorf (Fachzentrum für Energie und Landtechnik am Landwirtschaftlichen Bildungszentrum Triesdorf).

The project promoted an integrated multi-actor approach: A strong focus on the practical conditions in the development of the tool ensures its adoption by extension services and farmers. In addition, to raise awareness for the innovation, informative events and trainings were held that took into account the different roles, daily routines, commitments and needs of women and men.

Implemented Activities

- Development of a database with important technical and economic key figures for agricultural mechanisation
- Development of digital information and a planning system based on local conditions and the corresponding database
- Development of practice-oriented guidelines and video tutorials of the digital information and planning system
- Training experts in methodological aspects to formulate locally adapted mechanisation solutions
- Organise dialogue events with political and administrative decision-makers about evidence-based mechanisation concepts

Sustainability and Scaling Strategy

The aim was to anchor the approach in local structures and public institutions. To achieve this, the digital advisory tool and the prac-tice-oriented guidelines were made freely accessible to local and national consulting, training and research institutions as well as the agricul-tural projects of international donor organisations. Improving the quality and capacity of agricultural extension services leads to sustained growth in demand for locally-adapted mechanisation solutions — ergo to higher incomes for farmers.

To ensure the understanding and support for the project at all levels, political partners were closely involved. The goal was to have the digital information and planning system used by public entities in order to define their development strategies for agricultural mechanisation and for the use of the tool in their public service provision.

5 agricultural institutions

*have successfully used the digital information and planning system in **27 cases***

14 agricultural organisations

who have received advice regarding locally adapted mechanisation rate the service satisfaction as "very high"

1 political decision-maker

from Ethiopia and

1 political decision-maker *from Kenya, contributed recommendations for improving services on locally adapted mechanisation approaches at the national agricultural policy level*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



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PRODUCERS DIRECT
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Crop Yield Predictions for Smallholder Farmers (Croppie)

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Lack of data limits smallholders' abilities to react to climate change and increases their economic risks

80% of the world's coffee is grown by smallholders; most do not earn a living income. Data-driven approaches to improving yields, financial planning and the management of risk could contribute significantly to alleviating poverty and hunger. Yet they remain largely inaccessible to smallholders.

A major reason for this is the lack of efficient data collection methods as many farmers still keep paper records. Traditional data management methods are too costly, static and standardised to benefit smallholders who need actionable data to make real-time decisions on their farms. A limited generation of reliable on-farm data also means that smallholders can't fully profit from the benefits of big data and AI. It prevents financial institutions from accurately quantifying risk and offering farmers affordable financial services.

Name of the Project	Digital crop forecasts for smallholder farms
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Colombia, Peru
Implementing Partners	Producers Direct, Ideo.org, The Alliance of Bioversity and The International Center for Tropical Agriculture
Duration	09/2021 — 03/2024

The Innovation

Croppie allows smallholders to generate yield predictions using smartphone pictures and AI

The project uses gamification, an approach to data generation which is set up as a game to make it more engaging and fun, to incentivise farmers to upload photos of their coffee plants into the Croppie App: Croppie's artificial intelligence (AI) algorithm then recognises and counts the coffee cherries on the images. It uses this count and additional data, such as GPS or weather data, to generate multi-seasonal yield forecasts.

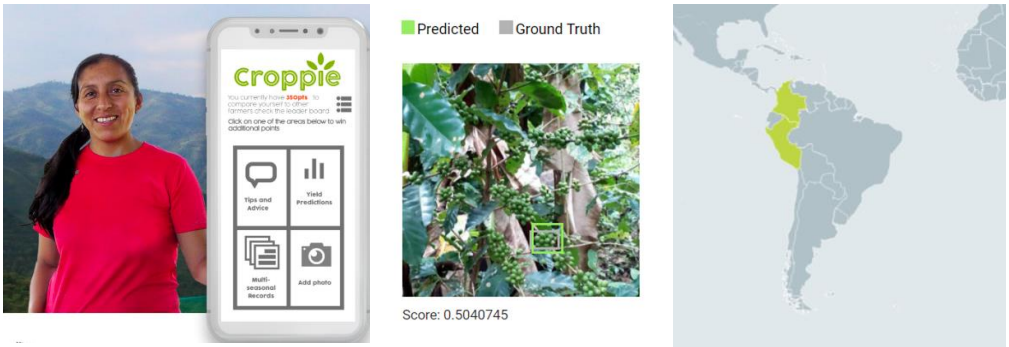
The Croppie app will then provide farmers with actionable agronomic advice as to how best to adapt to these forecasts. Examples include reducing or increasing expenditure on down payments for equipment to dry and store the coffee. Farmers can also make decisions to diversify into other crops. Croppie can provide advice and tips for earning extra income. Equally important, Croppie provides guidance on how to prevent lower yields by suggesting mitigation interventions.

The insights and advice will be sourced from both agronomic experts and fellow farmers; it will be tailored towards individual farmers based on the data collected. Farmers will have the chance to rate the advice they received and will be connected to farmers with complimentary profiles who are facing similar farming problems.

During the second season of using Croppie, farmers will be able to receive more personalised advice based on their crop's performance during the previous year. This is where Croppie will be able to give advice on how to improve long-term coffee yields. For

The main objective

Empower farmers to generate and analyse the data they need



L.: Croppie App, M.: Counting coffee cherries, R.: Project Region

Photos: ©Producers Direct, The Alliance of Bioversity and CIAT

example, if a farmer is deciding to invest in new coffee bushes, a prediction could be provided based on different coffee varieties and the number of seasons required to achieve a return on investment.

Methodological Approach and Innovation Partnership

The project is based on a partnership between the smallholder farmer-led NGO *Producers Direct*, the research for development centre, *The Alliance of Bioversity,* and CIAT and Ideo.org, a non-profit design studio.

Croppie's capacity development strategy ultimately empowers farmers to use their own data to improve the profitability of their farm and achieve more equitable market access.

The results of the research and practical application of Croppie will be shared with relevant national and supra-regional partners. Croppie adheres to the Principles for Digital Development as well as to EU data protection standards. An open-source solution, this unique data resource can be accessed by organisations worldwide.

Though designed as a smartphone app, Croppie will ensure famers without smartphones and with limited digital skills can benefit from their data. This is reached by using extension workers as intermediaries to encourage the shared use of smartphones and by conducting trainings to build confidence in using digital tools among smallholders, especially women.

Sustainability and Scaling Strategy

Croppie will initially work with a small number of app users to drive the photo and data collection. Existing partnerships with NGOs, government agencies, private sector companies and UK supermarkets will subsequently be used to scale the app with more users. Croppie will simultaneously be working to develop a sustainable business model, testing different potential revenue streams such as:

- Farmers willing to pay a very small fee for using Croppie
- Financial service providers willing to pay for anonymised aggregated risk mitigation data or a small referral fee
- Or the private sector, such as supermarkets, who may pay for aggregated data insights

2,300 ***smallholder*** *farmers use Croppie*

700 ***women*** *improved digital skills for farm management*

10 ***financial institutions and companies*** *have applied Croppie in their services*

1 ***tested model*** *for scaling Croppie to other crops*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Important Activities

- Conducting user-centred app-design with farmers
- Collecting pictures of coffee cherries by farmers via their smartphones using gamification
- Additional seasonal data collection overlayed with real-time and historical climate and soil data
- Development of tailor-made agronomic advice based on yield predictions, also in peer-to-peer and networking formats
- Conduct training for smallholder farmers on the application of digital farm management solutions as well as financial management
- Optimisation of Croppie's AI yield prediction model using the collected data which is fed into a deep learning algorithm
- Pilot project 1: Extend the yield predictions to additional crops (e.g., plantain, citrus fruits, cocoa)
- Conduct user-centred workshops with smallholder farmers on challenges and opportunities in accessing financial services
- Pilot project 2: With financial service providers, develop concepts and services based on available yield predictions.

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Department G530
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On behalf of
Federal Ministry for Economic Cooperation and Development (BMZ)

Implemented by

In cooperation with:

Potato Zero Tillage Under Rice Straw Cultivation

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

To foster social, economic, and environmental development without overexploiting arable land and water resources

Despite their rich soil, regions with extensive agricultural production that function as "food baskets" for entire countries are often challenged by high poverty rates. The over-exploitation of natural resources (as can be seen, for example, in the form of intensive rice-wheat rotation) and the effects of advancing climate change have triggered land degradation and water scarcity. This threatens the livelihoods of smallholder farmers and their food security. Non-sustainable practices such as rice stubble-burning add to the environmental damage, as they impinge on air quality not only in rural areas, but also in urban centres (e.g., New Delhi). Resource-conserving agroecological alternatives are needed to address these growing issues. Sustainable intensification (SI) practices such as crop rotation and zero-tillage soil management practices that have proven successful elsewhere and with other crops are only marginally available to smallholder farmers in India, Bangladesh, Cambodia, and Peru.

Name of the Project	Innovative Potato Zero Tillage Under Rice Straw Cultivation for Smallholders (PZTM)
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	India, Bangladesh, Cambodia, Peru
Implementing Partners	International Potato Center (CIP), Wits University, Digital Green, Central Potato Research Station (ICAR-CPRS), Bangladesh Agricultural Research Institute (BARI), Prodipan, Mekong Institute (MI), Royal University of Agriculture (RUA), Asociación Pataz, Dr. Rajendra Prasad Central Agricultural University
Duration	10/2021 — 12/2025

The Innovation

Potato production through zero-tillage and rice straw or other mulch

This applied research project initially promoted an innovative approach to potato production in rice-based crop systems (*"potato production through zero-tillage and rice straw mulching (PZTM)"*) to smallholder farmers in India and Bagladesh. The technology has now been scaled in Cambodia and Peru. Unlike conventional approaches, PZTM does not require soil preparation. In the case of rice, potatoes are brought out on the unworked soil and covered with rice straw after the rice has been harvested. The potatoes then mature within the rice straw rather than in the soil; hence, at the end of the season they will then be harvested without tillage.

There are various benefits associated with this innovation. Zero-tillage results in increased soil fertility and higher carbon stocks. The soil moisture remaining after the rice harvest can be used for plant growth without the need for any downtime while waiting for ploughing; this extends the potato growing season and allows the cultivation of potato varieties that require longer times to mature. Using rice straw as mulch retains water and suppresses weeds, pests and diseases, reducing the need for harmful agrochemicals. PZTM thus increases the input-use efficiency and minimises environmental damage. In addition, PZTM allows farmers to create value for residual rice straw which would in many cases otherwise be burned — a major cause of CO2-emissions and air pollution. Besides agronomic and climate-relevant benefits, PZTM is associated with several socio-economic benefits, including reduced costs for machinery and inputs. It also comes with tradeoffs: mulching requires labour that could be used for other household activities during fallow periods or the rice straw might be used for alternative purposes (e.g., as animal feed).







Bringing out potatoes on the unworked soil before covered by rice straw mulch, Project Region, India

Photos: © CIP

The Main Objective

Innovative approaches to sustainable rice-potato farming systems are established at a smallholder level

3,000 ***smallholders (50% women)*** *successfully complete trainings in PZTM*

2,000 ***smallholders*** *increase gross margin by 15%*

50 % *of soil samples indicate* ***improved soil quality***

1,000 ***women*** *improve their position as agricultural producers*

850 ***smallholders*** *participate in trainings on practice fields*

200 ***women*** *self-sufficiency groups qualify as multipliers of PZTM*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Methodological Approach and Innovation Partnership

This applied research project builds on a broad partnership between CIP, MI, NGOs, and national research institutes: Digital Green, Dr. Rajendra Prasad Central Agricultural University and the Central Potato Research Station India; Prodipan and the Bangladesh Agricultural Research Institute in Bangladesh; the University of the Witwatersrand, South Africa; the Royal University of Agriculture in Cambodia and Asociación Pataz in Peru.

Based on participatory and digital tools, this project incorporates gender-sensitive trainings to build the capacities of female and male smallholders to apply and benefit from PZTM. In India, partners work via women's self-help groups and by means of short videos produced locally for and by farmers. In Bangladesh, trainings on PZTM will be provided through "Nutrition Scholars" — local female farmers educating their contemporaries on health and nutritional issues. In Cambodia and Peru, the tested cultivation methods are scaled into new socio-ecological contexts and with new crops for mulching.

Soil samples derived from field trials on research stations as well as on farmers' fields allow for the monitoring of soil health and soil carbon content. In addition, randomized controlled trials conducted with smallholder household representatives help disentangle the socioeconomic effects of PZTM for female and male farmers alike. The studies add to the evidence on the effectiveness of video-based advisory approaches for promoting the adoption of complex resource-conserving technologies. Based on this comprehensive data, the project will distill gender-sensitive recommendations on the promotion of PZTM as a means of sustainable intensification and agroecological transformation.

Important Activities

- Conducting gender-sensitive trainings on PZTM based on participatory and digital tools
- Conducting field trials / establishing demonstration plots (on farmers' fields)
- Qualifying women's self-help groups to act as multipliers of PZTM
- Analysis of agronomic, climate-relevant, and gender disaggregated socio-economic effects of PZTM
- Distilling gender-sensitive recommendations for the promotion of PZTM and awareness-raising through social media and events with representatives of advisory services and political institutions

Sustainability and Scaling Strategy

This project works towards perdurabilty and scalability through a variety of means. The establishment of demonstration plots in combination with a training-of-trainers approach, allows for the local building of capacity and knowledge. In addition, women self-help groups are qualified to act as PZTM multipliers, ensuring the continuation of knowledge-sharing beyond the project. Existing training materials and digital tools will be updated to include PZTM. Gender-sensitive recommendations for the promotion of PZTM will be made available to relevant national and regional stakeholders in policy, research, and advisory to lay the groundwork for national and international up-scaling.

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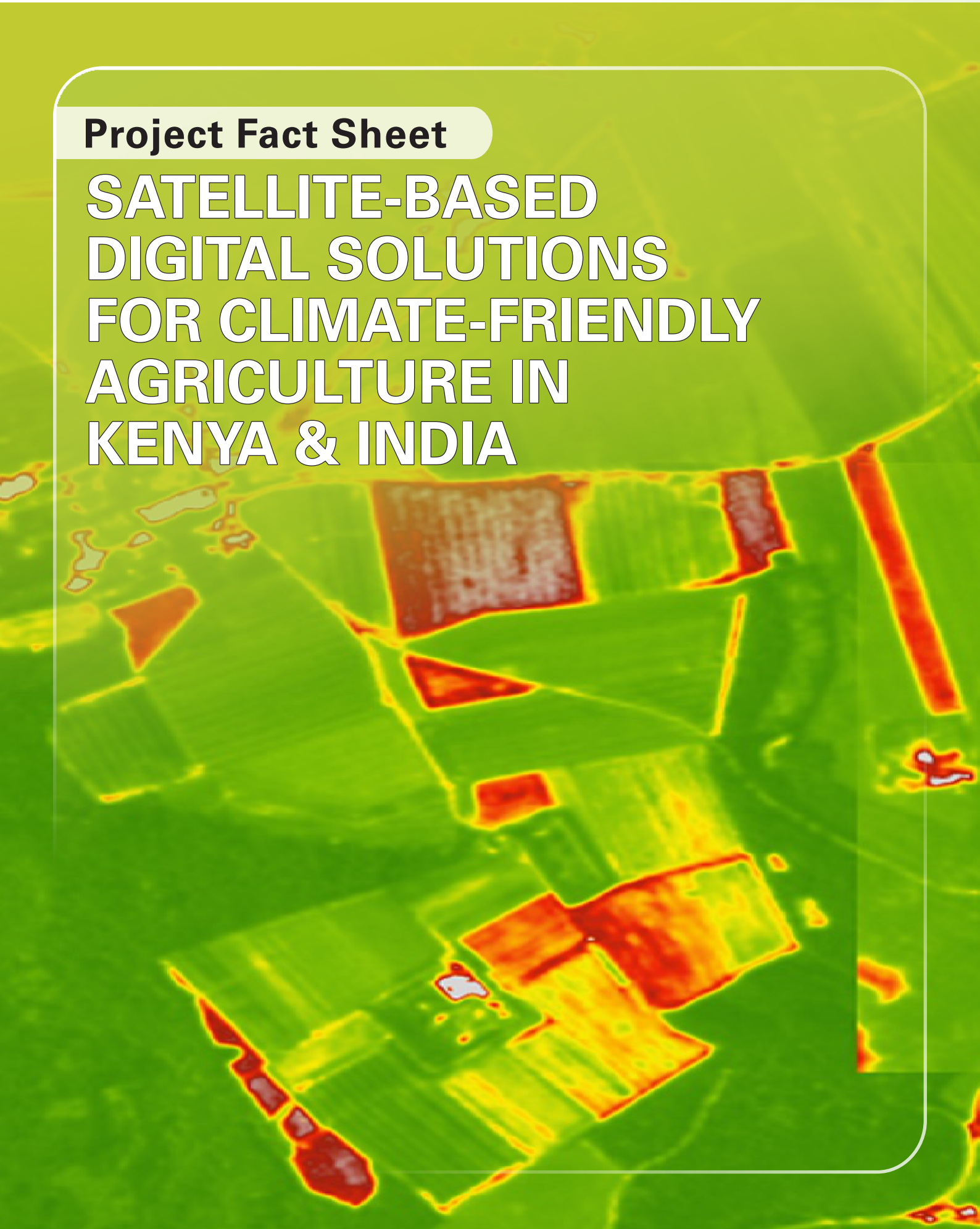
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Project Fact Sheet

SATELLITE-BASED DIGITAL SOLUTIONS FOR CLIMATE-FRIENDLY AGRICULTURE IN KENYA & INDIA



Satellite-Based Digital Solutions for Climate-Friendly Agriculture in Kenya & India

The Project was implemented by the Fund for the Promotion of Innovation in Agriculture (i4Ag) and part of the Special Initiative “Transformation of Agricultural and Food Systems” (SI AGER).

Name of the Project	**Satellite-based digital solutions for the valorisation of climate-friendly agriculture**
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	India, Kenya
Implementing Partners	Agricultural Ecosystem Services Trading Initiative (aESTI), VAA-Impact, Spatialise, Earth Analytics India (EAI), Partners in Prosperity (PnP)
Duration	10/2021 - 07/2024

The Challenge

Including smallholder farmers in the business of validating, protecting, and up-building of soil organic carbon (SOC).

Small and medium-sized farms are severely affected by soil degradation and the effects of climate change. At the same time, agricultural practices, such as the burning of crop residues or deep cultivation, exacerbate the release of greenhouse gases and the degradation of soils. Climate-friendly, soil-conserving cultivation methods such as minimal or no-plow tillage, the addition of mulch and organic fertilizers or application of cover crops can help stop soil degradation and secure productivity in the long term. As these practices increase carbon sequestration in the soil, they directly contribute to lowering the concentration of carbon dioxide equivalents (CO_2 - eq) in the atmosphere.

The Challenge

Rapid rate of soil degradation and climate change demand urgent and immediate action.

25% of the earth's surface is already degraded. To limit global warming to below 1.5 °C, global greenhouse gas emissions would have to be drastically reduced by 2030.

However, there is a slow uptake of regenerative agriculture practices.

This is due to the absence of affordable and easily accessible tools for ensuring adequate soil nutrition based on soil health.

Traditionally established methods of soil sampling and SOC monitoring are expensive and time consuming.

To obtain robust soil data, these methods rely on regular collection and validation of soil parameters and information on agricultural activities through visits to the field and complex laboratory tests.



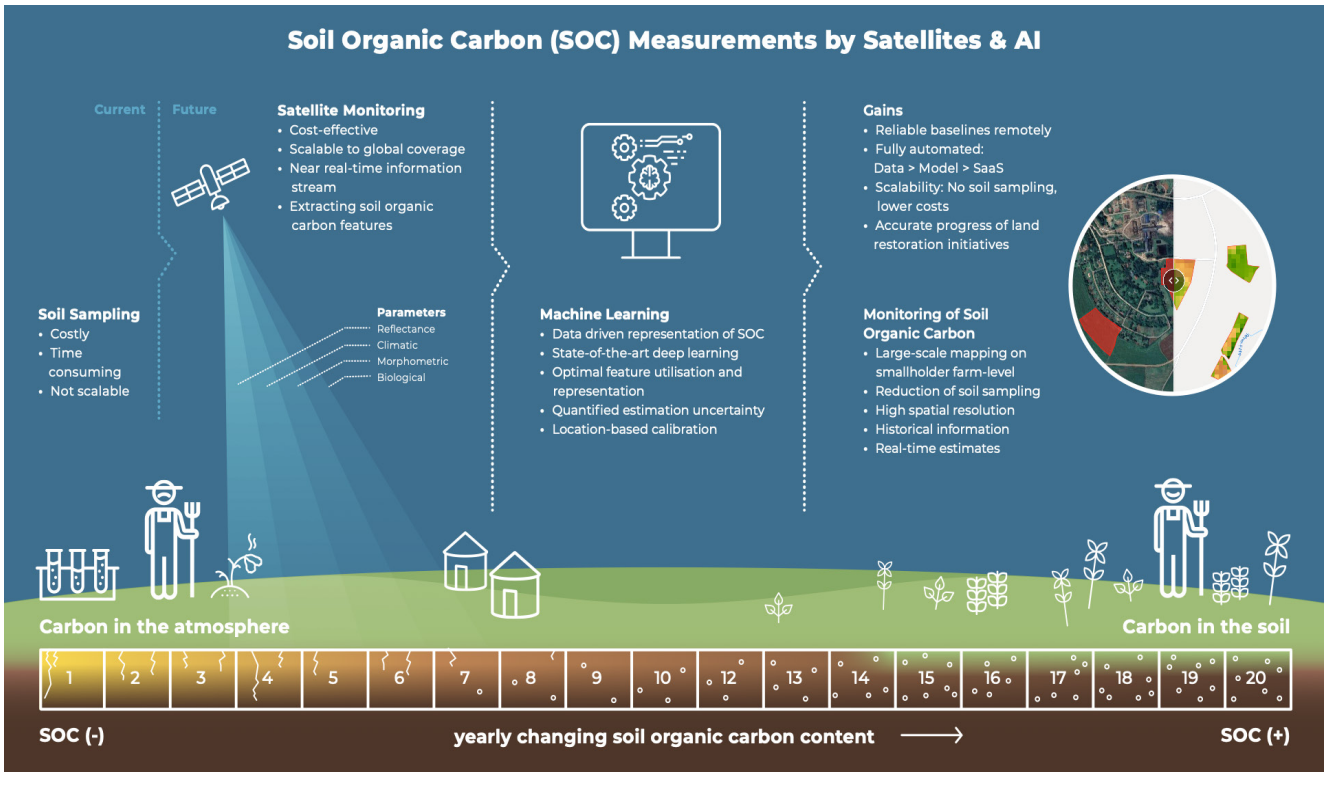
Soil organic carbon (SOC) refers to the carbon component of soil organic matter. It is an indicator of soil health and productivity. Regenerative agriculture practices that retain and increase the amount of SOC, improve soil productivity, by increasing its water and nutrient retention capacity, and also sequester atmospheric carbon.

The Main Objective

To design and test out open-source digital remote sensing and satellite-based monitoring approaches (algorithms) for capturing organic carbon stored in the soil, along with regenerative agriculture practices for climate change mitigation.

Major Achievements of the Project

- An open-source algorithm for satellite-based monitoring of soil organic carbon (SOC) and regenerative agriculture practices on the field level.
- 80% -90 % reduction in the cost of measuring soil carbon build-up per hectare of agricultural land with the digital satellite-based method, compared to established methods.
- A digital control platform to automate the recording and administration of carbon dioxide equivalent (CO_2-eq) savings.
- Outreach to more than 14.000 smallholder farms and medium-sized enterprises, 65% of which are run by women, around training on potentials of regenerative agriculture practices, soil organic carbon and carbon credits.
- 8 use cases relevant for public and private sector stakeholders.
- Technical documentation of the innovative technology submitted for accreditation, to recognized standard-setting organizations in Voluntary Carbon Markets.
- 23 events to share learnings and experiences among relevant actors in the target countries.
- 13 high-profile communication materials for disseminating knowledge and information among the stakeholders.



The Innovation

Reliable, affordable, and openly accessible capturing of soil organic carbon and regenerative agriculture practices, through remote sensing and satellite-based data and digital machine learning.

Conventional soil sampling and measurement of soil organic carbon (SOC) and regenerative agricultural practices is not only expensive but also time consuming. To overcome this barrier, an open-source tool was developed with the objective to integrate non-invasive remote sensing technologies and innovative machine learning approaches.

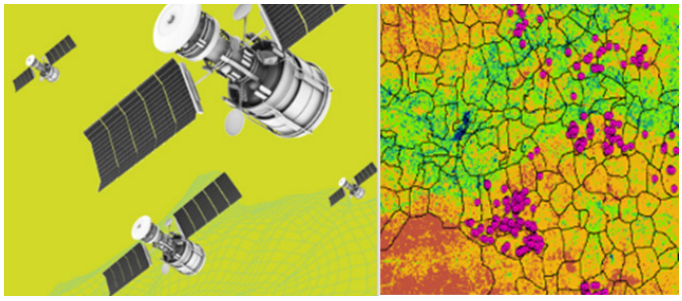


FIGURE 1: Monitoring SOC Using Satellite-Based Machine Learning Platform.

Key initiatives and activities of the project

Development of an Open-Source Algorithm for Satellite-Based Monitoring of Soil Organic Carbon (SOC)

The project focuses on the development of an open-source algorithm for satellite-based monitoring of soil organic carbon (SOC) at field level. The collection of soil samples and their in-depth analysis is a prerequisite for measuring the carbon stored in soils using remote sensing technologies. Ground truth data in the form of soil samples and laboratory analyses were collected in the intervention areas and served as reference points for calibration and adjustment of the satellite monitoring tool. At the same time, other historical data points were collected, analysed, and verified by the project partners and used to complement the ground truth data.

Leveraging satellite data and machine learning technology, an open-source algorithm was developed to utilise free satellite-based data (Sentinel-2 satellites, among others) for measuring soil carbon content and other soil parameters, such as soil type, nutrient level, and soil moisture in agricultural soils.



FIGURE 2: Sentinel-2 Satellite Utilised For Data Collection.

In both India and Kenya, extensive testing in selected geographies of partners at different levels has been conducted to test the efficacy of digital approaches in monitoring soil carbon build-up and agricultural practices on field level. Data accuracy and reliability are highly dependent on the quality and quantity of soil data (sample size) available for verification and ground truthing.

TABLE 1: Soil sample collected and accuracy level in India & Kenya

Project component	Sample size	Reliability/ Accuracy level
Africa Pilot (Including larger dataset of Africa Soil Information Service AfSIS)	~ 100,000	approx.. 80%-85%
India Pilot	~ 4000	60% - 65%

Development of an Open-Source Algorithm for Satellite-Based Monitoring of Regenerative Agriculture Practices

In addition to soil organic carbon, an open-source algorithm was developed to capture and quantify regenerative agriculture practices that lead to build-up of soil organic carbon namely tillage, cover cropping, crop residue/ biomass burning, crop health and crop type.

Tillage practices influence soil properties and surface roughness, affecting the spectral response of fields observed by satellites. Sudden backscatter value lowering was observed in certain regions when analyzed using

Sentinel-1 SAR, indicating land surface change. Therefore, these regions were classified as tillage.

The analysis of Sentinel 2 time series data indicated low health vegetation growth in the intermediate time frame between rabi and kharif seasons. This shows the presence of cover crops, as indicated in the images by green colour. A false colour image was provided for reference, showing vegetation cover in bright red.Temporal analysis was performed by using spectral bands from remote sensing technologies to accurately identify and map the extent of and changes in cover crops, in the study area.

The extent of crop residue burning in the study area, was monitored through remote sensing using normalised burn ratio (NBR) index. The Normalized Burn Ratio (NBR) index, with a 10-meter resolution, was validated through the integration of data from various sources including NASA's Fire Information for Resource Management System (FIRMS), MODIS (Moderate Resolution Imaging Spectroradiometer) active fire data, and VIIRS (Visible Infrared Imaging Radiometer Suite) data for burnt areas at a 375-meter resolution. This multi-source validation approach enhanced the reliability and accuracy of the NBR index, thus leveraging the strengths of each dataset to provide a comprehensive understanding of fire events and their impacts.

Crop health assessment using the Normalized Difference Vegetation Index (NDVI) was conducted. NDVI provides insights into vegetation vigor and health.The Sentinel 2 NDVI dataset was employed to monitor crop health, specifically during the flowering and fruiting stages when crops set and develop fruits.

Remote sensing technology plays a pivotal role in identifying and classifying crop types over large agricultural areas. A supervised classification method was used to develop a crop type map with Sentinel-1 SAR imagery. In the examined study area, a significant presence of crops like paddy, maize, and cotton was observed during the kharif season, and these findings were thoroughly corroborated with ground truth data.

Cost Reduction in Measuring Soil-Carbon Build-Up

The project aimed to achieve 50 percent reduction in the cost of measuring SOC build-up per hectare using a digital satellite-based method compared to established methods. A study conducted in both India and Kenya to compare the cost of different methods of soil sampling and analysis shows promising results that monitoring of soil carbon using Remote Sensing could reduce the cost of soil analysis by more than 80 to 90 per cent, depending on the ratio between on-ground soil data, remote sensing analysis and levels of accuracy. The graphs show a comparison of soil sampling and analysis using the different methods in both India and Kenya.

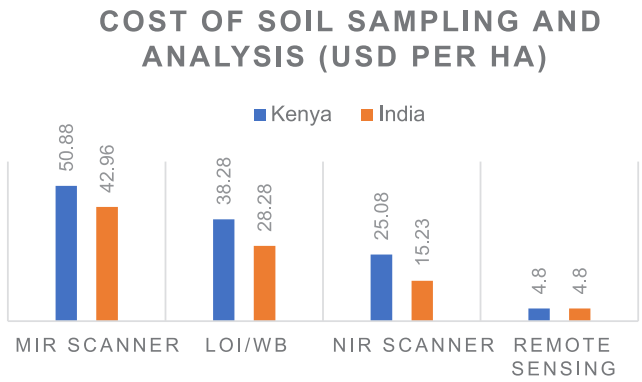


FIGURE 3: Cost of Soil Sampling in Different Methods.

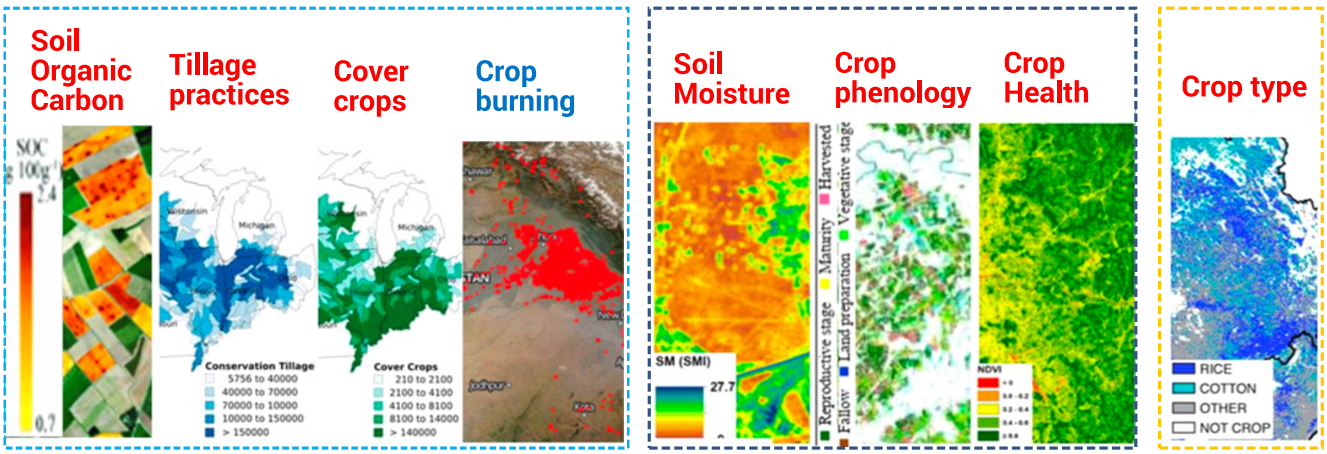


FIGURE 4: Regenerative Agriculture and other Practices Monitored using Remote Sensing.

Remunerating Farmers for Sequestering Carbon

The goal is to renumerate farmers for adopting regenerative agricultural practices. Monitoring carbon sequestration of soil would help generate carbon credits, that not only offset carbon emissions but also provide an income for smallholder farmers.

Raising Interest of International Standard-Setting Organizations

To remunerate smallholder farmers with resources from the voluntary carbon market, the assessment of carbon sequestration to generate carbon credits requires a very thorough and trustworthy monitoring tool. The monitoring and recording of soil carbon parameters using satellite-based technologies is currently not recognized by any of the standard-setting organizations in the voluntary carbon market. A concept note describing the technical documentation of the innovative technology was developed and submitted for review to the standard-setting organization "Regen Network". Along with Regen Network, consultations, meetings, and communications were also established with other standard-setting organizations and carbon credit registries such as Verra, Gold Standard, Plan Vivo among others.

Knowledge Dissemination through Multi-Stakeholder Engagement and Events

During the project period, GIZ and other partners have organized and participated in 23 different knowledge events in India, Germany, and other parts of the World to share the learnings, experiences, challenges, and technical breakthroughs with a diverse range of stakeholders including multilateral agencies, carbon credit setting organizations and registries, the scientific community, private sector players, civil society organizations, research institutions and farmers.

Outreach to Farmers for Awareness of Regenerative Agriculture Practices and Carbon Credit Mechanism

To raise awareness among smallholder farmers on soil health, regenerative agricultural practices and carbon credit projects, training sessions were held for farmer groups in India and Kenya. More than 14.000 farmers were sensitized on carbon credits generated on farmer-owned land through the adoption of regenerative agricultural practices.

In addition, master trainers were trained to support the dissemination of regenerative agricultural practices to project farmers in India. To ensure that women farmers benefit from incentive schemes, including the monetization of soil carbon storage, special effort was made to promote their participation in training and decision-making processes on regenerative agriculture.



FIGURE 5: Training of Master Trainers for Dissemination of Regenerative Agriculture Practices in India.



FIGURE 6: Training on Carbon Rights Transfer in Bungoma County, Kenya.





FIGURE 7: aESTI team pitching for a large audience during the Feike Sijbesma Sustainable Innovation Award and Workshop held in Bonn on Digital Solutions for Climate-friendly Agriculture in Asia and Africa.

Research Papers and Knowledge Documents

Sharing the learnings and experiences has been one of the main approaches during the project. In total, 13 knowledge documents and high-profile communication material were developed and shared with appropriate stakeholders. These knowledge documents include concept notes, high-end research studies, research papers, use cases, user guides and newsletters. Use cases were developed along with government institutions and civil society organisations to investigate and scale up the use of geospatial-based monitoring, reporting and verification (MRV) tools for regenerative agricultural practices and carbon sequestration.



8 Use case capturing different applications of satelite based soil health monitoring.



Multiple Research reports to stregthen to support and validate the innovation.



User guide detaling the key steps and process for public stakeholders.

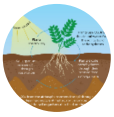


Technical papers and concept notes on technology for dissemination among the scientific community and other stakeholder.

Use Cases for Satellite-based Digital Solutions For Climate-friendly Agriculture



1 Promoting circular sugarcane production, by developing high quality, low-cost solutions for measuring soil organic carbon of agricultural soils and enabling smallholder farmers to participate in carbon credit markets.



2 Supporting state governments in India for planning and implementing State Action Plan on Climate Change, by building their understanding on carbon sequestration potential from agriculture, and measuring year-on-year changes in carbon biomass.



3 Collaborating with NABARD's JIVA programme on natural farming to improve the reliability of the MRV tool for measuring soil organic carbon and regenerative agriculture.



4 Developing monitoring tools to measure the carbon storage potential of forests and soils so as to encourage an increase in the uptake of nature based solutions in India's Nationally Determined Contributions.

5 Streamlining certification of sustainable cotton production by supporting global procurers and certifiers of sustainable cotton in their first mile of cotton supply chain, to verify soil and water related parameters with the help of geospatial data.



6 Supporting Ministry of Agriculture and Farmers' Welfare, India to ensure high quality and updated soil data while reducing cost, time and labour, and provide integrated advisories to farmers based on soil health.



7 Collaborating with Space Application Centres for driving sustainable soil monitoring and environmental monitoring.



8 Supporting NGOs to enhance uptake of regenerative agriculture, by measuring impact at both output and outcome levels, using geospatially integrated digital tools.



Sustainability and Scaling-up Strategies

One of the project's objectives was to translate the learnings generated during the project into products that can be offered to market participants both for-profit and non-for-profit business models. The sustainability of the platform developed during the project would be achieved if the developed solution is being used and accepted by a range of stakeholders. Additionally, the cost-saving benefits of the digital satellite-based method for measuring SOC build-up could attract agricultural actors, civil society organisations and government institutions seeking affordable solutions for monitoring soil health and carbon sequestration.

Substantial efforts were initiated to integrate the tool with government schemes and other programs by facilitating state governments to utilise the tools and implement them at the scale.

Exploring Opportunities to Collaborate

PHASE 1: Pilot to monitor Soil Health Card jointly with Soil and Land Use Survey of India (SLUSI): GIZ India is in discussion with the Ministry of Agriculture and Farmers' Welfare (MoAFW) to pilot and establish scalable model/s for open-source digital and remote sensing-based solutions for enhancing efficiency and use of soil health information at the national scale, aligned to achieving green and sustainable development in India, through integration with the Government's Soil Health Card Scheme.

To kickstart the process, GIZ proposes to conduct a pilot test to gauge the accuracy of the tool. This test would aim to conduct a comprehensive breakdown of parameters and activities relevant to the MoAFW. Based on the insights garnered from this pilot, a Remote Sensing-based portal would be developed. Technical experts from MoAFW would play an active role in this developmental phase. Throughout this process, GIZ would provide support to integrate the tool into the MoAFW system and ensure its smooth operation for an additional two years. The purpose of this extended support would be to facilitate ongoing enhancements until the tool seamlessly transitions into a fully managed internal process within MoAFW. By harnessing remote sensing technology, this initiative would aim to enhance the accuracy and reliability of soil testing while simultaneously driving down costs. Ultimately, the goal would be to make soil testing accessible and affordable to a vast number of farmers across India.

PHASE 2: Efficient use of soil health information and integrating advisories for farmers: GIZ proposes to collaborate with technical experts from MoAFW to develop a Remote Sensing-based portal. This platform would leverage the existing soil data collected by MoAFW and other associated government agencies. Initially, this data would be utilized to train the AI algorithms, and subsequently, it would be continuously used for algorithm improvement and reference checks.

Once the portal is established, it would efficiently utilize satellite-based data to gather soil health information. This information would then be utilized to provide precise agricultural advisory services to farmers.

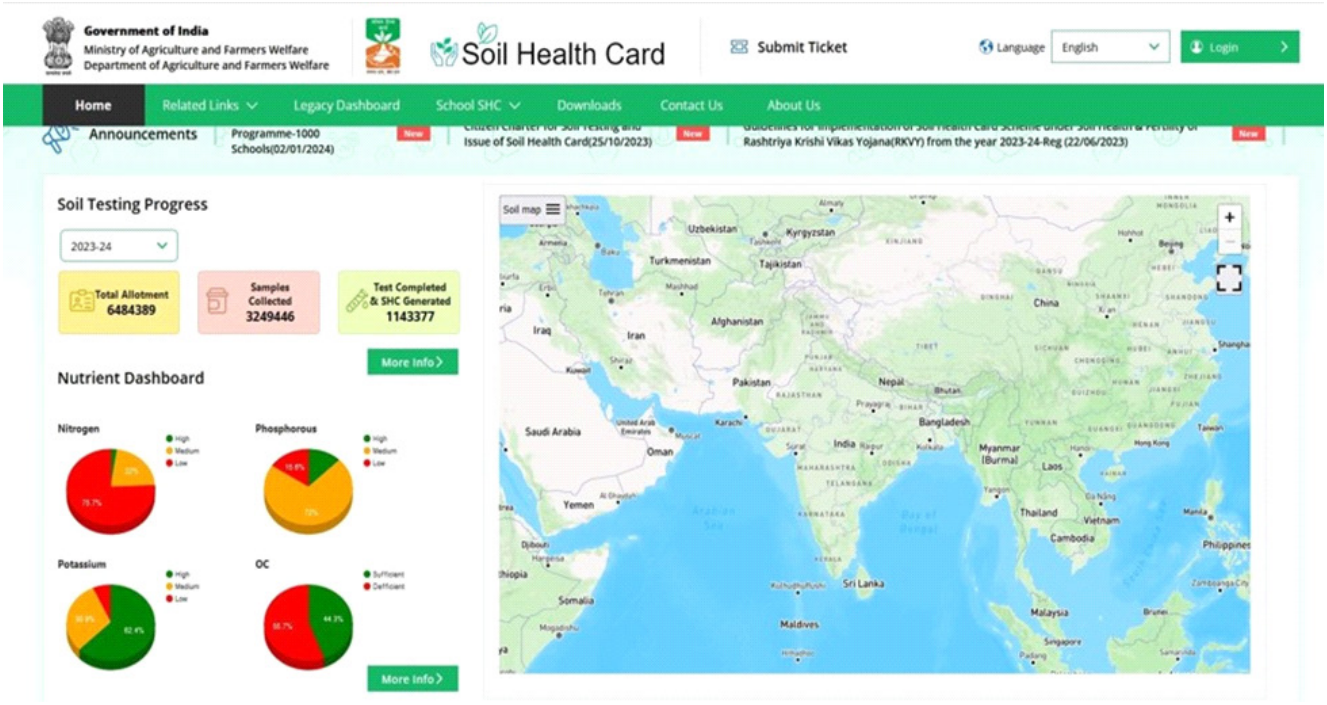


FIGURE 8: Soil health card database of GoI

Supporting State Government in Developing Climate Action Plan

GIZ and Project Partners are also in discussion with Governments of Maharashtra and Telangana among others, to understand the carbon sequestration potential from agriculture using remote sensing-based technology and measuring year-on-year changes in carbon biomass. Measuring of the carbon sequestration potential from different agriculture practices can support state Governments in developing an informed climate action plan for their respective states

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Sustainable Agriculture for Forest Ecosystems (SAFE)

The Context

Our planet needs forests, and millions of people live in and protect them. The expansion of agricultural areas drives up to 90% of global deforestation. The European Union (EU) is an important import market for these commodities. For this reason, the EU has adopted a new regulation for reducing its contribution to deforestation and forest degradation caused by its consumption (EU Regulation on Deforestation-Free Products, EUDR).

Operators who are placing on or exporting from the EU market palm oil, cattle, soy, coffee, cocoa, rubber, wood and certain derived products will need to ensure through due diligence that the products are

(1) "deforestation-free" – meaning, not produced on land that was deforested or degraded after 31 December 2020, and
(2) legal – meaning, produced in accordance with the relevant legislation of the country of production.

About the SAFE Project

By implementing activities in ten countries, Brazil, Burundi, Cameroon, the Democratic Republic of the Congo (DRC), Ecuador, Indonesia, Peru, Uganda, Vietnam and Zambia, SAFE aims to support a just transition towards deforestation-free and legal value chains. SAFE provides technical assistance, strengthens capacities, scales up traceability systems, and supports reliable and stable partnerships, including through exchange and learning amongst a wide range of actors.

Project Name	Sustainable Agriculture for Forest Ecosystems (SAFE)
Co-Financed by	European Union, German Federal Ministry for Economic Cooperation and Development (BMZ), and the Ministry of Foreign Affairs of the Netherlands (MinBuza)
Project Region	Brazil, Burundi, Cameroon, DR Congo, Ecuador, Indonesia, Peru, Uganda Vietnam, Zambia; regional and global activities
Political Partners	Ministry of Agriculture and Livestock, MAPA (Brazil), Ministry of Agriculture and Rural Development, MINADER (Cameroun), Ministry of Environment and Sustainable Development, MEDD (DRC), Ministry of Agriculture (Ecuador), Ministry of National Development Planning, BAPPENAS (Indonesia), Ministry of Agricultural Development and Irrigation, MIDAGRI (Peru), Uganda Coffee Development Authority, UCDA (Uganda), Ministry of Green Economy and Environment, MGEE (Zambia), Ministry of Agriculture and Rural Development, MARD (Vietnam)
Budget	65.55 Mio EUR
Duration	01/2022 to 03/2028

The project is part of the GIZ Fund for the Promotion of Innovation in Agriculture (i4Ag) and is part of the German Special Initiative "Transformation of Agricultural and Food Systems"



Activities

- In **Brazil,** SAFE works with family farmers to strengthen the sustainability and legality of their agricultural land use systems of cocoa and beef; improve market access; value creation and access to finance; and integrate farmers into traceability systems.
- In **Ecuador,** the project works with smallholder farmers along the value chains of cocoa, coffee, and palm oil, particularly with women, youth, and indigenous communities, on promoting multi-stakeholder dialogue, and improving data management and traceability systems.
- In **Indonesia**, SAFE partners up with stakeholders from the palm oil, natural rubber, and cocoa sectors to ensure an inclusive transition of smallholders' practices to sustainable, legal and deforestation-free production. Relevant and scalable interventions are developed together with the idea submitters under a public competition, the SAFE Challenge.
- In **Zambia,** farmers are supported to produce soy in line with the EUDR, increase productivity, and implement transparency and traceability pilots. Community forest management groups are supported in the sustainable management of natural resources and livelihood creation.
- In **Vietnam,** SAFE helps actors in the coffee value chain to prepare through activities such as testing digitalised traceability systems, registering farm plots, and strengthening capacity on climate-resilient production and business skills. The projects facilitate multi-stakeholder dialogues and the implementation of respective action plans at provincial and national level.
- In the **Democratic Republic of the Congo (DRC),** SAFE focuses on coffee, cocoa, and natural rubber, engaging with the private sector, as well as with national and local authorities, and supporting small-scale farmer and producer organisations, following gender-transformative and do-no-harm principles in all efforts.
- In **Burundi**, **Cameroon**, **Peru** and **Uganda**, SAFE has recently initiated the inception phase. Further information will be available soon.





At **regional level,** SAFE supports the facilitation of two regional dialogue processes in South America and South-East Asia with actors from relevant value chains to enhance understanding of the technical requirements of the EUDR and their implementation.
At **global level,** SAFE supports the operationalisation of EUDR objectives through the establishment of coordination structures for knowledge dissemination and the financing of global initiatives and partner organisations working on traceability, public data infrastructure, forest monitoring, green financing, and gender, equity and social inclusion, amongst others. Good practices will be made visible to scale solutions.

The Approach of the EU and Team Europe Initiative

The EU and its Member States – Team Europe – support the inclusive and just transition of sustainable value chains to the EU, especially for smallholder farmers and low-income countries, by scaling agro-ecological practices, reducing risks in value chains, and crowding in public and private investments in sustainable agri-businesses.
Producers will benefit from this support in line with the EU's Global Gateway offer: trustworthy connections with partners around the world, based on sustainable values and standards that work for people and the planet.

With the newly established Team Europe Initiative on Deforestation-free Value Chains, the aim is to bring together the expertise of EU and EU Member States for a positive partnership offer at scale to partner countries.

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On behalf of	The European Commission and the German Federal Ministry for Economic Cooperation and Development (BMZ), and the Ministry of Foreign Affairs of the Netherlands (MinBuza)
Learn more	About SAFE: www.zerodeforestationhub.eu/projects/safe/, about the Team Europe Initiative on deforestation-free Value Chains: https://zerodeforestationhub.eu/
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In cooperation with:
COMUNIDAD ANDINA SECRETARÍA GENERAL
Alliance Bioversity & CIAT
IICA

Innovations for the Prevention and Management of the Banana Fungal Disease Foc TR4 (ALER4TA)

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Preventing and strengthening the banana sector's resilience to Foc TR4 fungal disease

Bananas are crucial for food security, employment and exports in Latin America and throughout the world. Most Musaceae grown in Latin America are bananas, followed by plantains or cooking bananas. Vital to the region's economy, bananas produced in Ecuador, Colombia and Peru combined represent 35.5% of global export quantities. Over 90% of all imported bananas in Germany come from Latin America, the majority from Ecuador and Colombia.

The emergence of Fusarium wilt tropical race 4 (TR4) poses a serious threat to 80 % of the global banana production. Outbreaks of TR4 have been recorded in the region of Colombia (2019) and Peru (2021); it risks spreading within those countries and throughout the world. Its dissemination would result in major economic, social and environmental impacts for small scale producers and other stakeholders within the entire sector.

Name of the Project	Innovations for the prevention and management of the banana fungal disease Foc TR4 (ALER4TA)
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Ecuador, Colombia, Peru, Bolivia
Implementing Partners	Alliance of Bioversity International (CIAT), Inter-American Institute for Cooperation on Agriculture (IICA), Andean Community (CAN)
Duration	03/2022 – 12/2026

The Innovation

Prevention, management and monitoring of Foc TR4 through digital solutions

Prevention strategies

Using innovative tools based on artificial Intelligence (AI) and drone-image analyses, data collected from the phytosanitary surveillance systems will be uploaded to a global digital platform.

Integrated management

Scientists cooperate with banana growers to validate good agricultural practices based on agroecological principles for the integrated management of Foc TR4 in national and regional contexts. Based on this knowledge, crop and disease management tactics are developed and disseminated through small-scale farmers and SMEs. Considering transboundary scenarios, the expertise gained will be shared by incorporating experience from all countries to further develop site-specific approaches.

Research and development

The combination of measures is simultaneously embedded in scientific accompanying research, within which Foc TR4-tolerant banana varieties will be released, evaluated and disseminated.

The Main Objective

Increase the resilience of the banana sector in Ecuador, Colombia and Peru to the fungal disease







L.: Banana production in Ecuador; R.: Project Region

Photos: © GIZ / Ecuador

Methodological Approach and Innovation Partnership

The project sees stakeholders from the public and private sector, national and international research partners and banana growing communities from banana producing countries in Colombia, Peru and Ecuador working together towards an overall goal of reducing the risks to food security and the livelihoods of small-scale farmers in banana-based agricultural systems. The aim is to lessen the impact on these communities by preventing the further spread of TR4 and by generating scientific knowledge for improved grower management of banana. Three specific pillars have been proposed to achieve these objectives:

- Contain existing cases of Foc TR4 in Colombia and Peru to avoid its dissemination
- Strengthen capacities that allow for the identification of and rapid response to contain new TR4 outbreaks
- Expand and strengthen research projects to generate solutions in the short-, medium-, and long-term

These efforts need to be better coordinated to create synergies and make better use of available resources. As an example, preventing new introductions and spread of TR4 into pathogen-free areas, such as Ecuador, is essential. Therefore, measures are being taken to exclude pathogens and strengthen quarantine and surveillance. In parallel, disease management strategies, including the use of tolerant cultivars, are strengthened. For the success of the project, the development and implementation of regional strategies and policies are essential.

Important Activities

- Adaptation of artificial intelligence (AI) and drone images for the local early detection of infested banana trees
- Development of a virtual platform to exchange information on a regional level
- Development of tailor-made information material for the prevention of Foc TR4 for banana producers and other stakeholders
- Dissemination of good practices by the private sector
- Introduction, evaluation and selection of available tolerant genotypes of Foc TR4 in field experiments

Sustainability and Scaling Strategy

Along with participating partners and national institutions, the project will create the conditions for sustainable regional cooperation to address Foc TR4. This involves the standardisation of contingency plans, protocols and regulations, which will create a unified framework for the management of Foc TR4 at the regional level. Establishing a collaborative system based on a digital platform will promote networking between the relevant actors and institutions. The involvement of the private sector for piloting and adapting tolerant varieties provides a strong incentive for the application and continuation of innovations developed under the project. Given the magnitude of the threat to the banana sector from Foc TR4 infestation and the resulting economic consequences, all partners and stakeholders are interested in the continuation and upscaling of measures beyond the project duration.

260,000 ha *between Ecuador, Colombia, Bolivia and Peru are under active phytosanitary supervision*

8,500 *farmers and agricultural workers trained to manage Foc TR4 in banana farms*

Signed agreement *to combat Foc TR4 by all members of the regional cooperation network in Ecuador, Colombia, Bolivia and Peru*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



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Photo credits GIZ/ Sustainable Supply Chains Commodity Hub Ecuador

Text Ralf A. Buß

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Structural Measures to Mitigate the Global Food System Crisis

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

Global Challenge

A significant increase in the number of people facing hunger due to the impact of the war against Ukraine on global agri-markets

The war against Ukraine has not only had a devastating impact on the local population, but it also continues to affect global food systems worldwide, hitting agricultural markets that are already under pressure. Extreme weather events caused by climate change, the COVID-19 pandemic and high input prices have led to an increase in food prices leaving more people affected by hunger. The annual SOFI report outlines that though the number of hungry people dropped slightly in 2022, down to 735 million from 739 the previous year, hunger levels have stagnated at a high number far above the figures from before the COVID-19 pandemic. Countries that import large amounts of food from Russia and Ukraine – who are among the biggest exporters of wheat, maize, and sunflower oil – are those most directly affected by the global food system crisis. The blockade of the Ukrainian seaports, through which 95 per cent of grain exports are shipped, has led to shortages and rising prices. In addition, higher production and transport costs due to increased energy prices have worsened the crisis. Meanwhile, the global community has put measures in place to decrease vulnerability. A limited-term free trade agreement between the EU and Ukraine has been agreed, with the EU supporting the development of alternative freight routes (rail, truck, inland waterways) through EU territory, so-called "solidarity lanes," and strategic investments have been made in the sustainable transformation of agricultural and food systems.



L: Sunflower farming in Tanzania.

The Project Strategy

The project combines emergency aid with measures to support the transformation towards resilient food systems

The global food system crisis requires additional development cooperation efforts in order to mitigate its negative impacts in a quick, efficient, and goal-oriented manner. Hence, the project identified vulnerable target groups, local needs, and the potential to jointly implement activities and measures that not only alleviate the immediate consequences of the food system crisis, but also contribute to increasing the resilience of local people in the medium-term against external shocks. Structural measures which enhance smallholder farmers' skills and capacities to increase local prodcution of food and agricultural inputs are supported, enabling them to mitigate the consequences of current and future crises that affect food security.

Name of the Project	Structural measures to mitigate the global food system crisis
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commisioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Global, 37 countries
Implemented by	9 GIZ projects with several local and international partners
Project Volume	17 million Euros
Duration	05/2022 - 06/2025

The Fund Single Measure (EZM) is one of four i4Ag projects commissioned by BMZ responsible for the implementation of an emergency food aid; it goes beyond the fund's impact framework and therefore does not directly contribute to the fund's impact matrix.

Photo: © Fabiana Woywod/ GIZ

Most Important Activities

- Distribution of inputs for agricultural production such as seeds, organic fertilisers, and pesticides
- Distribution of machinery for harvest processing
- Conducting gender-sensitive capacity-building measures on topics such as the production and use of organic fertilisers, good agricultural practices and diversification
- Preparation of studies to strengthen local food systems by improving a gender-sensitive knowledge base

Methodological Approach & Sustainability

Building on existing GIZ projects and partnerships, the project aims to implement additional activities and measures that contribute to the mitigation of the global food systems crisis' impacts. The Fund for the Promotion of Innovation in Agriculture (i4Ag) channels the financial resources (known as Ukraine special cash funds) that BMZ provides for emergency aid and serves as a vehicle to implement structural measures to assist those most affected by war against Ukraine. In total, nine GIZ projects along with fifteen partner organisations have reached over 350,000 people in 37 countries. As the measures are embedded in ongoing GIZ projects, they contribute indirectly to achieving the respective objectives of the participating projects. This ensures that impacts already achieved are not lost due to the consequences of the war against Ukraine.

The Main Objective

Increase the resilience of smallholder farmers against the challenges of the global food system crisis through a combination of emergency aid and capacity-building measures

The implementing projects are the global projects "Alliances for Trade Facilitation", "Rural Employment with Focus on Youth", "Green Innovation Centres in the Agricultural and Food Sector", "Knowledge for Nutrition (K4N)", "Sustainable Fisheries and Aquaculture", "Strategic Development of the Global Crop Diversity Trust" and the programme "Sustainability and Standards in global Agriculture Value Chains", as well as the projects "Rural Governance in Southsudan" and "Support of Agroecological Transformation Processes in India".

The activities are divided into short-term, medium-term, and long-term measures to strengthen the resilience of smallholder farmers against the impacts of the global food system crisis. Short-term measures, such as the procurement of means of production, have been used to cushion acute shortfalls, bottlenecks, and sudden price increases. This ensures the continuity of economic activities and thus income and employment for the target groups. In addition, activities have been implemented that increase the resilience of the target groups in the medium term (e.g., through training on the goods procured, sustainable soil cultivation, production of organic fertiliser) and make them less dependent on crises and high global market prices. In Burkina Faso, for example, dependence on imported fertilisers was reduced through the local production of compost. The measure can be continued independently by the target group after the implementation period of the fund. In the long term, smallholder farmers can benefit, for example, from the inclusion of sunflower production in the crop rotation in Kenya. Since oilseed cultivation is very profitable, it can be used as start-up financing for further production.

140,000 people with better access to input for agricultural production

56,000 people with improved knowledge on how to mitigate negative impacts of the global food system crisis

207,500 people with access to measures which enhance their resilience against external shocks affecting global food systems



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Digital Climate Services for Smallholder Farmers in Zambia and Malawi (E-PICSA)

Implemented under the *Fund for the Promotion of Innovation in Agriculture (i4Ag),* as part of the special initiative, the *Transformation of Agricultural and Food Systems.*

The Challenge

Smallholder farmers in Zambia and Malawi play a critical role in ensuring food security and reducing poverty. However, they face multiple challenges, including climate variability and change. In addition, uptake of climate-smart agricultural practices remains low, partly due to the limitations of traditional, top-down approaches to technology transfer in agricultural extension. Many farmers lack access to relevant, timely climate information and transparent decision-making tools that would enable them to identify, evaluate, and plan the most appropriate farming strategies and practices for their individual farm contexts.

Our Approach

E-PICSA (Digital Participatory Integrated Climate Services for Agriculture) is a climate services and agricultural extension support tool that empowers smallholder farmers to make informed decisions based on their own farm and household conditions. It builds on the **PICSA approach**, a farmer-centred, participatory method that enables farmers to analyse their resources, livelihood activities, and historical climate data to identify suitable agricultural and livelihood options.

This approach contrasts with many conventional extension models that primarily focus on providing recommendations or prescribing actions for farmers. Using a set of participatory tools, farmers first assess their existing resources and livelihood activities. They then work in groups to explore and analyse historical climate data from weather stations, and to identify potential crop, livestock, and other livelihood options to address the challenges they face. Farmers subsequently evaluate and plan these options in detail for their individual farms and households, supporting the development of sustainable, longer-term coping and adaptation strategies. Just before and during the season, farmers use seasonal and short-term weather forecasts to adapt plans and make timely, shorter-term decisions.



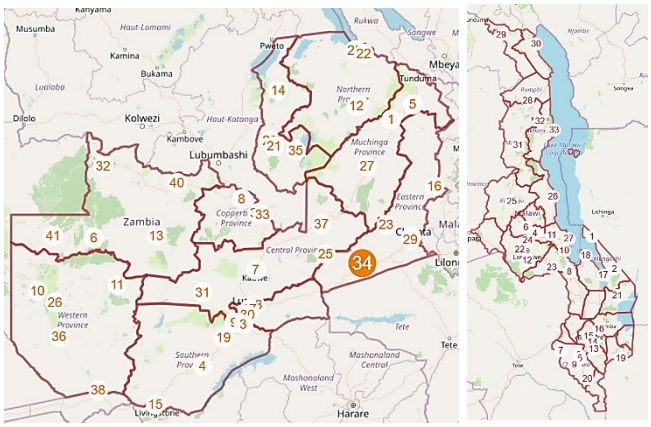
PICSA Extension App demonstration to smallholder farmers

Project Title	Digital Climate Services for Smallholder Farmers in Zambia and Malawi (E-PICSA)
Commissioned by	German Federal Ministry for Economic Cooperation and Development (BMZ)
Project region	Zambia and Malawi
Political Partners	Ministry of Green Economy and Environment Ministry of Agriculture in Zambia and Malawi Department for Climate Change and Meteorological Services (DCCMS) in Malawi
Budget	3.88 million EUR
Lead executing agency	The University of Reading
Duration	01.07.2022 – 28.02.2027

The Main Objective: *Empower smallholder farmers in making better decisions for their individual farms and households to improve yields, food security, incomes, and resilience*

Key Achievements

Climate Information Availability: Zambia and Malawi are the pioneering countries implementing E-PICSA, with the E-PICSA app co-developed over two years through collaboration between the Ministries of Agriculture, National Meteorological Services, and farmers. The initiative has improved access to climate information by enabling the Zambia Meteorological Department and Malawi's Department of Climate Change and Meteorological Services to make historical rainfall and temperature data available nationwide, covering **41 stations in Zambia and 33 in Malawi**. This data has been used to develop key climate products, including seasonal rainfall totals, onset dates, season length, crop risk probabilities and temperature trends, to support informed agricultural decision-making.



Weather stations in Zambia and Malawi available on the app

E-PICSA App Development: The app features user-friendly, step-by-step video guides that explain each stage of the PICSA process and how to access and use historical climate data, seasonal forecasts, and short-term forecasts. All stages and videos are available in English, Zambia's seven official languages, and two local languages in Malawi





Training of Extension Officers and Farmers: In Zambia, the project established and trained a team of 25 Master Trainers drawn from partner ministries, academia and NGOs. These Master Trainers have led the scaling of the approach.

To date, 360 Camp Extension Officers and lead farmers trained through E-PICSA have subsequently trained more than 22,200 farmers. Most of the training initially took place in Eastern Provinces, with more recent expansion to Luapula and Southern Provinces through the BMZ-funded and GIZ-implemented Climate Resilient AgriFood Systems (CREATE) project. In Malawi, 64 extension officers were trained, who subsequently trained more than 12,600 farmers.

The Benefits

Evaluation studies demonstrate substantial impacts:

- *Over 90% of trained farmers made adaptation changes in crops, livestock and/or livelihood enterprises, most commonly through changes in crop varieties or land management practices.*
- *95% reported that the training helped them adapt their agricultural activities to climate-related challenges.*
- *79% of trained women farmers reported improved household decision-making power.*
- *Food security improved for more than 85% of women and men.*
- *Income improved for more than 85% of women and men.*
- *94% of farmers who introduced new maize varieties reported increased yields (average increase = 2.2 t/ha).*

*Evidence from studies by the **Potsdam Institute for Climate Impact Research** indicates that the PICSA approach is a highly cost-effective climate service, yielding up to **$3.5 in benefits per $1 invested.** By enabling farmers to make climate-informed decisions, the approach improves productivity and yields, enhances input efficiency, reduces climate-related risks, and strengthens resilience and livelihoods among smallholder farmers.*

The program contributes to achieving the following Sustainable Development Goals:



Scaling E-PICSA

Growing Partnerships for Scaling: Several organisations, including WFP, CIAT, IFAD, UNDP and the World Bank have begun support in the scaling of E-PICSA in Zambia and Malawi.

Foundations for Expansion Established: Key groundwork for scaling has been laid through: Co-production of the E-PICSA app, strengthening national climate data systems, development of local-language support videos and training of Master Trainers from government institutions and partner organisations

Current Actions to Support National Scaling

- Improving climate data quality by strengthening decentralised data entry and management systems and integrating voluntary weather station data.
- Strengthening the institutional capacity of existing Master Trainers and ICT teams responsible for maintaining and updating the E-PICSA dashboard and app.
- Expanding geographical coverage by training additional Master Trainers and engaging the private sector to support sustainable scaling models.

Future International Scaling: Development of a global scaling strategy for E-PICSA, including a scaling plan based on different implementation models for adoption in other countries

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WFP World Food Programme
INNOVATION ACCELERATOR

Start-up Support for Agricultural Innovation for Climate Resilience

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Giving agropreneurs access to the capacities, networks and funding they need to realise their potential and contribute to food production in the face of climate change

The number of people affected by hunger worldwide is continuously increasing; global demand for food keeps rising. The pandemic has pushed these numbers even higher, and the current global food crisis is expected to force an additional 100 million people into hunger. On top of the violent conflicts closely intertwined with hunger, climate change is also exacerbating the situation. Its consequences are becoming increasingly clear and severe. At the same time that food systems are strongly influenced by environmental degradation and climate events, agriculture itself is a major driver of climate change. Improving efficiency in the use of scarce resources in agricultural production systems is important in building robust livelihoods and climate resilience. Innovative solutions by local entrepreneurs who are proximate to the problem can contribute to the pace of change in their local context and beyond. However, they often lack the necessary support, networks, and funding to develop a viable venture.

The Main Objective

Develop innovative solutions for resource-efficient farming by supporting start-ups that strengthen climate resilience

The Innovation

Sizing the innovation potential of start-ups for resource-efficient farming solutions that can contribute to climate resilience

The World Food Programme (WFP) Innovation Accelerator will launch a start-up competition and sprint programme. The goal is to identify and support high impact agropreneurs whose innovations will enable resource-efficient farming in partner countries. The selected agribusinesses may include space-efficient solutions, soil- or water-saving approaches, or ideas for renewable energy. They can be products, services, processes, or models that solve a problem in a replicable and scalable way. Within this diversity, their shared feature is their potential to contribute to climate resilience at the local and regional level.

Name of the Project	Start-up support for agricultural innovation for climate resilience
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Global
Implementing Partners	World Food Programme Innovation Accelerator
Duration	07/2022 — 12/2025



The Different Phases of the Competition and Sprint Programme

Graphic: © WFP Innovation Accelerator

15 ***high potential start-ups sourced***

55% ***led by women***

8 selected for 12-month sprint programme *each with access to funding of up to* ***USD 150,000***

3 ***gender-sensitive learning opportunities*** *for start-ups within the sprint programme*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Methodological Approach and Innovation Partnership

After launching a call for innovations to identify relevant start-ups, a sourcing campaign will follow that will result in 15 start-ups being invited to an innovation bootcamp. The bootcamp includes a pitch event to showcase the innovative solutions. Following this, 10 of the eligible start-ups with the highest potential will be given the opportunity to participate in a nine-month sprint programme. They will benefit from coaching, mentoring and support in refining their solutions to advance the feasibility and viability of their ventures. They will get access to a community full of resources, tools, news and contacts and funding of up to USD 150,000 each.

The programme will be realised through the WFP Innovation Accelerator with its extensive experience in the design and implementation of such formats, leveraging existing best practices. Further stakeholders with expertise in the fields of agriculture and climate resilience will be involved in a targeted, needs-based manner.

Important Activities

The project implementation is designed through complementary selection and promotion steps:

- Design: Onboarding of relevant stakeholders and setup of the overall programme, including communications strategy and call for innovations
- Source: Promotion of the call for innovations and proactive sourcing of relevant start-ups leading to the selection of 15 bootcamp participants
- Boost: Implementation of a bootcamp for the selected start-ups including workshops, networking opportunities and a pitch event
- Award: Select 10 start-ups for the nine-month sprint programme and access to funding
- Accelerate: Implementation of sprint programme with coaching, mentoring, networking, etc., with a midterm and final share out event

Sustainability and Scaling Strategy

As part of the sprint programme, the selected local start-ups are supported with knowledge and networks that will enable them to scale sustainably. A special focus is set on the feasibility, viability and replicability of their innovative solutions. Tests will be carried out to validate assumptions about key elements of their business models. A human-centred design approach will be pursued and local and international support networks will be mobilised. Through coaching on business modelling, partnerships, funding and scaling options, as well as the knowledge and personal skills gained, along with the organisational development and embeddedness in the ecosystem, the start-ups will be strengthened beyond the scope and timeline of the programme.

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Promoting Innovative Solutions for Digital Agriculture

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Local organisations with digital innovations lack individual support services to scale their solutions

Smallholder households produce about one-third of the food on which the world's population depends. These farmers face increasing challenges that affect their productivity, income, and food security, such as environmental degradation, climate events and, currently, rising food and fertilizer prices caused by wars. This is particularly true for women, as female farmers have a lower agricultural productivity than their male counterparts.

Access to information, markets, capital, infrastructure, and services is severely limited for these farmers, especially female smallholder farmers. Local organisations lack access to individual technical advisory services, preventing innovative digital solutions from further developing into profitable business models or presentation to investors. At the same time, the number of mobile phone users is rising continuously and a large proportion of telephone and data connections run via mobile networks. Mobile network operators thus occupy a central position in digitalization by providing a platform through which digital services can be offered.

Name of the Project	Promoting innovative solutions for digital agriculture
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commisioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Global
Implementing Partners	Mobile for Development Foundation of the Global System for Mobile Communications Association (GSMA)
Duration	09/2022 - 02/2026

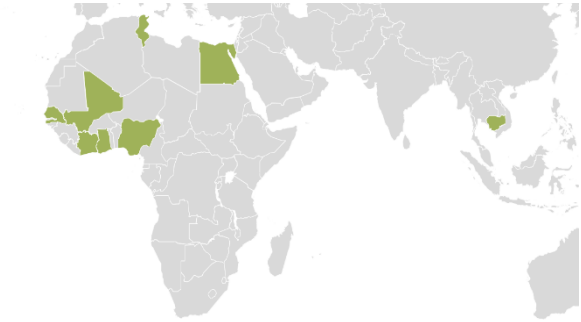
The Innovations

The promotion of business-driven digital solutions for agriculture identified through an open competition

The organisations targeted by an open competition are primarily established local or regional businesses whose reach is to be expanded and diversified. The innovation's relevance lies in the special role of the foundation of the Association of Mobile Network Operators (GSMA) and in the medium of mobile communications. The foundation will advise the selected organisations with its expertise to further develop and professionalise their services. In addition, via the i4Ag-Fund innovation criteria, business models and gender strategies are developed to generate self-supporting innovations. The criteria ensure that smallholder farmers can benefit from the innovative solutions by contributing to food security, productivity, income, and environmental/climate protection.

The Main Objective

Selected implementing partners have scaled their innovative solutions for digital agriculture in a user-centric and gender-sensitive way.



Methodological approach and innovation partnership

In the first phase, an open call for local organisations was conducted. These organisations include agribusinesses, financial and advisory services and networking organisations who offer digital solutions in the agricultural sector. The selection of ten applications for further support thus took place on two levels: initial qualification based on the conditions of participation followed by their innovative solution, business model and approach to gender equality. In particular, the gender composition of the project and management teams is considered.

The selection is made in three steps: A written application process is followed by interviews and, finally, the selection has been done by a panel of experts. In the implementation phase, a program of technical assistance is agreed upon, in the areas of marketing, user-centered design, product development and investment readiness with a key focus on gender and inclusion.

Important Activities

- Following an open competition, the selection of implementation partners is made by a panel of experts
- Iterative advisory and coaching of the companies in e.g. product development, marketing, user-centered design and investment readiness
- Development of communication materials
- Processing of learning experiences from the innovation promotion
- Presentations of the learning experiences

1,500,000 *new active users of the innovative solutions*

20 % *of new active users are women*

65 % *of female users report improved access to services*

2 out of 10 *solutions have external investments*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Sustainability and Scaling Strategy

The measure promotes the development of skills and knowledge both at the individual level regarding management and employees and at the institutional level in view of the companies, thus ensuring that knowledge is anchored regionally. In addition, exchange formats support networking between the companies and with other key players of the sector.

The development of strategies for sustainable business models that extend beyond the project period furthermore ensures that the strengthened technical capacities lead to positive results in the long term.

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In cooperation with:
AKADEMIYA 2063

Digitally Enabled Resilience and Nutrition Policy Innovation (DERPIn)

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*) as part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Assertive and gender-sensitive resilience building needs policy and decisions made based on data and evidence

According to the Intergovernmental Panel on Climate Change (IPCC), Africa is one of the continents most threatened by climate change. Increasing extreme weather events (e.g., droughts, storms, floods, irregular rainfall, and temperature spikes) are disrupting production sectors such as agriculture, destroying assets and hampering livelihoods. This affects both smallholder farmers and people living in rural areas.

The vulnerability of rural communities is exacerbated by severely limited access to user-friendly information based on timely, reliable, and spatially disaggregated data, including future forecasts. National systems and mandated institutions of agricultural statistics and agricultural extension systems are not prepared for the expected frequency and severity of future climatic and economic shocks and often do not adequately capture gender-specific or intersectional disadvantages.

Name of the Project	Digitally Enabled Resilience and Nutrition Policy Innovation (DERPIn)
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Benin, Ghana, Malawi, Senegal, Uganda
Implementing Partners	AKADEMIYA2063
Duration	10/2022 - 12/2025

The Innovation

An open access, web-based tool which incorporates machine learning for the prognosis of nutritional status, agricultural production and crop specific yields

AKADEMIYA2063's Africa Agriculture Watch (AagWA) platform is an open access, web-based portal built on the Africa Crop Production (AfCP) model. It applies machine learning techniques (AI) to model biogeophysical processes. The AAgWa platform currently provides production and yields forecasts for eight crops in 47 African countries, considering factors such as vegetation, rainfall, land surface temperature, biomass, and soil moisture. The primary innovation is the country-specific combination of data and analytical tools for vulnerability, nutrition, and biophysical modelling. The country-specific harvest estimation by means of satellite data and AI will represent a digital innovation in the selected countries. This enables comprehensive and detailed data- based decision-making, which is made widely accessible via an integrated digital infrastructure.

Early identification of particularly vulnerable communities paired with gender-specific data enables the development of differentiated prevention strategies and response measures. Additionally, the tool provides a better understanding of the nature and extent of the communities' exposure to digital data. By these means, this digital innovation serves as a fundamental element of assertive resilience policy. An improved data basis in the context of global crises also offers opportunities to improve the allocation efficiency of state resources. Data-based analyses can help to understand vulnerability factors at a disaggregated level of rural communities and across social strata in order to design and implement tailor-made







Biomonitoring for Higher Crop Yields

Photos: © Johannes Funk

and resilience-enhancing policies, strategies, measures, and services.

The Main Objective

Stakeholders in the agri-food sector are empowered to develop gender-sensitive and resilience-building strategies

250 selected actors (50% women) *confirm the productive use of digital platforms regarding gender sensitivity and resilence building*

80 % of selected actors *state that the specific needs of women were considered in the development of gender sensitive resilence building strategies*

70 % of selected actors attending dialogue formats *attest that these formats offer a positive contribution to the development of gender-sensitive resilience-building strategies*

10 private sector actors *use data from a platform for the development of gender-sensitive resilience-building strategies*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Methodological Approach and Innovation Partnership

The open access AAgWA platform developed by AKADEMIYA2063 will be adapted and expanded for the project´s specific needs. Production-specific data can be coupled with nutrition and vulnerability indications before being analytically incorporated into strategic decisions at the policy level. This is made possible by data disaggregation, country-specific models, and the integration of additional crops at national and sub-national levels.

At the same time, training courses will be held with platform users. The aim of these trainings is to build user capacity, giving them the skills to be able to incorporate the information from the platform into their strategic decision-making. On the one hand, this is aimed at representatives of relevant state institutions, especially women, as well as private-sector actors and associations. On the other hand, the aim is to create the basis for better decision-making for smallhold farmers through improved skills for data use. The trainings offer initial starting points for broader scaling. In addition, the data-based approach of the platforms will be complemented by dialogues and consultations. These can tie in with country-specific political processes on agricultural and food systems or the dialogue processes for the United Nations Food Systems Summit (UNFSS).

Most Important Activities

- Establishment of partner networks for each country
- Country-specific data collection
- Development and implementation of trainings
- Collection of evidence and identification of scaling options
- Development of inclusive dialogue processes and scientific symposia, of policy briefs and country-specific analysis.

Durability and Scaling Strategy

Capacity building at the individual level (human capacity development) as well as at the institutional level among the intermediary institutions ensures that the knowledge acquired is anchored in the countries. In addition, the dialogue formats along with the establishment of partner networks support networking within the country and beyond. Through data, analyses and built competencies as well as the establishment of necessary processes for the use of the platforms in decision-making, the intermediary institutions are strengthened beyond the scope and schedule of the project.

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In cooperation with
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PROJECT
INSPIRED – Agri-PV: Sustainable Use of Agrivoltaics

GLOBAL FUND
Fund for the Promotion of Innovation in Agriculture (i4Ag)

COMMISIONED BY
Federal Ministry for Economic Cooperation and Development (BMZ)

IMPLEMENTING PARTNER
Fraunhofer Institute for Solar Energy Systems (ISE)

PROJECT REGION
Namibia

DURATION
10/2022 – 03/2027

AS PART OF:
i4Ag
FUND FOR THE PROMOTION OF INNOVATION IN AGRICULTURE

INSPIRED – Agri-PV: Sustainable Use of Agrivoltaics in Namibia

As part of the Special Initiative *Transformation of Agricultural and Food Systems*

THE CHALLENGE

For about 70 % of Namibia's population, agriculture is a direct or indirect source of livelihood, but primary agricultural and forestry production accounts for only 4 % of GDP. Although classified as a middle-income country, food and nutrition security and unemployment are pressing development challenges for Namibia, especially in rural areas. Besides this, the country is strongly affected by climate change. Droughts and floods are becoming more frequent and have detrimental effects on agriculture. Over one third of the population suffers from a high level of acute food insecurity due to severe droughts. Namibia covers around 60 - 70 % of its national electricity demand through costly imports from neighbouring countries. Furthermore, only about 25 % of the rural population has access to electricity and due to the low population density and vastness of Namibia, rural electrification comes at a high price for grid operators and consumers alike. The lack of access to (affordable) electricity leads to low producti vity, high crop losses and affects the competitiveness of agri culture, as solar-powered irrigation systems (application of solar-powered borehole pumps), cooling and processing of agricultural products remains a challenge. At the same time, Namibia records more than 300 sunny days per year. Consequently, the country has an enormous solar energy potential to electrify rural areas, to foster local food production and to create employment along green value chains as a driving force for rural transformation.

THE INNOVATION

Agrivoltaics – Combining Agriculture, Livestock and Solar Power Generation

Agriphotovoltaics (Agri-PV), or Agrivoltaics as it is commonly referred to, offer an innovative approach to address the challenges of the water-energy-food nexus in Namibia. It makes an exemplary contribution to the productive use of solar energy for promoting food security, increased productivity, and income in rural areas, including both crop production and livestock systems. Agri-PV systems are highly adaptable and can be designed to meet the needs of local farming communities. While PV mo dules provide shelter to protect plants and livestock from high radiation and extreme weather events, the solar energy can serve to power a number of processes, such as:

- irrigation systems;
- drying and cooling facilities for improved post-harvest handling;
- processing machinery for on-farm value addition and
- digitalisation for business and marketing purposes.

In addition to the availed electricity for productive use, experiments conducted with Agri-PV in other countries have shown an increase in yields of up to 20 % for certain crops, due to optimised irrigation, shade and soil nutrient conservation.

Methodological Approach and Innovation Partnership

The project is being implemented by the Global Fund for the Promotion of Innovation in Agriculture (i4Ag) in close cooperation with the bilateral Farming for Resilience (F4R) Project,

INSPIRED – Agri-PV: Sustainable Use of Agrivoltaics in Namibia

a joint initiative of GIZ and the Namibian Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR). It is being carried out with the Fraunhofer Institute for Solar Energy Systems (ISE), Europe's largest solar research institute. The Fraunhofer ISE Agrivoltaics Group comprises expertise from a variety of disciplines to explore the many aspects of combining agriculture and photovoltaics. The project also involves partnerships with national education and research institutions, in particular with the University of Namibia (UNAM), relevant government institutions in the agricultural and energy sectors, public and private financial institutions, solar energy companies, agricultural cooperatives, (smallholder) farmers and civil society organisations.

The pilot phase of the Agri-PV initiative involves the installa-tion of seven context-adapted Agri-PV demonstration sites accompanied by scientific research in order to generate evidence- based information on the effectiveness and suitability of Agri-PV systems. At the outset and throughout implementation, information sessions, lectures, technical workshops, and specialised training courses are organized for interested farmers, representatives of relevant Government institutions, commercial banks, solar companies, and other industry stakeholders. This inclusive approach aims to promote locally produced Agri-PV systems as an innovative, climate-adapted, and profitable solution for agricultural production in Namibia.

THE OBJECTIVES IN FIGURES

- **7 Agri-PV demonstration systems** are operational
- **20 % average productivity** increase
- **80 %** of participating smallholders **improve their income**
- **1,500 people** participate in Agri-PV-related trainings or information events

The project contributes to the achievement of the following **Sustainable Development Goals** (SDGs):



IMPORTANT ACTIVITIES

- Installation of 7 Agri-PV demonstration systems adapted to the local context.
- Cooperation with local research institutes for data collection and analysis.
- Conducting practical training courses on Agri-PV with researchers, teachers and students as well as policy makers, entrepreneurs and farmers.
- Awareness-raising about the potential of Agri-PV through events and publications.
- Organising and participating in cross-border exchange programmes to promote South-South cooperation

THE MAIN OBJECTIVE

Increasing food security, productivity, and income in rural areas through Agri-PV, a climate resilient technology.

Sustainability and Scaling Strategy

The project is centered around several key components to ensure sustainable impact and stimulate demand for Agri-PV technology. It focuses on raising awareness and providing targeted training measures across crop and livestock systems. Collaborations with national education and research institutions are vital as knowledge multipliers. The project emphasizes adapting Agri-PV technology to local conditions and specific user needs, with special attention to women and youth. Developing viable business models is crucial to attract investors and engage solar industry companies and associations. Sensitizing relevant government institutions is another strategy to ensure long-term success. By implementing Agri-PV in various agro-climatic zones across Namibia and testing different crop, livestock and PV system designs, the initiative aims to generate practical, evidence-based insights. At the same time, cross-country exchange on Agri-PV is strengthened to foster knowledge sharing and replication. These outcomes will support the scaling of locally produced Agri-PV systems of different sizes.

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Implemented by

In cooperation with:

Strengthening Climate Resilience in Smallholder Cotton Farming

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (*i4Ag*)
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

Smallholder cotton farmers are confronted with climate change, degraded soils, expensive inputs and low, stagnant yields

About 95 per cent of African cotton farms are rainfed, rendering smallholder farmers extremely vulnerable to the increasing effects of climate change. Shifts in rainfall and warming, with greater severity of degraded soils as a result of low water-holding capacity and high evapotranspiration losses, negatively affect the already low and stagnant lint yields in countries like Cameroon. These degraded soils, with low fertility and low soil organic carbon content, require synthetic fertilizers, yet such fertilizers are unaffordable for many smallholder cotton farmers and can harm the environment. Also, the indiscriminate use of insecticides and mixtures leads to a loss of biodiversity, long-term increased pestilence, and disruption of natural biocontrol. While innovative approaches already exist in countries such as China and India, there is a lack of availability of the appropriate technologies in Cameroon.

Name of the Project	Innovations to strengthen climate resilience in smallholder cotton farming
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Cameroon
Implementing Partners	International Cotton Advisory Committee (ICAC), Centre de coopération internationale en recherche agronomique pour le développement (CIRAD), Institut de Recherche Agricole pour le Développement (IRAD), Société de développement du coton (SODECOTON)
Duration	10/2022 — 04/2027

The Innovation

Validate, adapt and disseminate three innovations to improve climate resilience and increase income

The project aims to adapt and establish three scientific innovations in smallholder farms across Cameroon that have been successful in other locations. These innovations are new agricultural inputs and practices that are sustainable and environmentally-friendly and have the potential to increase farmers' income substantially while fostering entrepreneurship. They include climate-resilient, non-genetically modified varieties adapted to innovative high-density cropping systems, the use of biochar fortified with agricultural biowaste (manure, biofertilizer and legume biomass) and the use of botanical biopesticides encapsulated in zein (a protein extracted from maize) nanoparticles.

The Main Objective

Strengthening the climate resilience of smallholder cotton farmers through sustainable innovations



Harvested cotton in Subsaharan Africa

Photo: © Elke Peiler

33,750 trained smallholders *confirmed that they will apply innovative inputs and practices to strengthen climate resilience in cotton farming*

50 *young entrepreneurs have generated additional income*

40 % *increase in yields for 3,000 smallholder farmers*

15 % *increase in soil organic carbon content*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Methodological Approach and Innovation Partnership

Extension workers, lead farmers, women and youth are trained to apply the described practices as well as in the production of innovative agricultural inputs and in knowledge transfer using interactive digital approaches. A network will further be established between lead farmers with a role model function and smallholder cotton farmers, as well as between the smallholders themselves who participate in farmer field schools and learning forums. An exchange of information with experienced employees of local research institutes will be enabled for them. As a local innovation partner, IRAD will expand their research areas and, where appropriate, their curricula to include climate-resilient cotton production. The leading innovation partners, ICAC and CIRAD, will also foster an exchange with the respective governments to support the adoption of the innovations in government initiatives and planning. The private company SODECOTON will also be encouraged to incorporate the innovative agricultural inputs and practices into their future strategic approaches. SODECOTON will further contribute to the partnership by providing extension staff as well as facilities and by participating in the on-farm trials and farmer-participatory trials coordinated and supervised by their field staff.

Important Activities

- Import and multiplication of varietal seeds
- Multilocation testing and upscaling of farmer participatory demonstrations
- Setting up production units for innovative agricultural inputs at local research institutes
- Conducting trainings for youth and women entrepreneurs on the production of biochar and biopesticides
- Conducting trainings for extension workers and lead farmers on innovative agricultural inputs and practices and the implementation of farmer field schools

Sustainability and Scaling Strategy

Interactive knowledge transfer and participatory exchange formats ensure that the added value awareness of innovative inputs and practices is raised and that they continue to be applied beyond the duration of the project. The production of innovative agricultural inputs from local resources and with local capacities also increases the sustainable effectiveness of the measure.

Capacity building at the individual level for the extension workers and at the institutional level, e.g., at the research institute, ensures that the knowledge and competences built up are anchored in the region. Through the cooperation with cotton companies like SODECOTON, the project results are finding their way into the private sector as well. The exchange with the partner government also offers the opportunity to improve framework conditions for cotton farming and to exchange knowledge and experiences within the sector.

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On behalf of Federal Ministry for Economic Cooperation and Development (BMZ)

Implemented by

In cooperation with:

MiCacao – Digital Traceability Solution for the Cocoa Supply Chain

Implemented by the *Fund for the Promotion of Innovation in Agriculture (i4Ag)*
As part of the special initiative *Transformation of Agricultural and Food Systems*

The Challenge

To generate comparative advantages for the sustainable production of cocoa in Colombia and Peru

Small-scale farmers produce around 90% of the world's cocoa. If appropriate agricultural practices are not applied, cocoa is a crop that indirectly contributes to deforestation and, therefore, to climate change. Global demand for sustainably grown and deforestation-free cocoa is rising. Yet this demand has not generated significantly higher incomes for cocoa farmers who practice climate-friendly farming, in part because there is a lack of access to information as how to make their products visible and place them in that marketplace. Therefore, many producers remain unaware of the opportunities that digitalization offers to trace their products in a transparent and verifiable manner. Women cocoa producers experience an additional disadvantage as a result of their social status and condition, as they are also less likely to have access to digital tools.

When digital tools are applied in production processes and along the supply chain, they offer a comparative advantage when it comes to improving the placement of cocoa produced in a sustainable, climate-friendly and deforestation-free manner. This could generate numerous economic, social and ecological advantages.

Name of the project	The Open Cocoa Chain: Promoting interoperable traceability solutions for the cocoa sector
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	German Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Colombia, Peru
Implementing partners	Helvetas Swiss Intercooperation, Federación nacional de cacaoteros Colombia (FEDECACAO)
Duration	12/2022 – 12/2025

The Innovation

A digital, interoperable and freely accessible traceability system for the cocoa chain

The European Union recently approved a new regulation preventing the trade of products that generate forest loss; cocoa is among these products. This new standard requires companies to trace the origin of products to ensure they are free of deforestation. The use of digital tools by producers will allow data to be captured even without an internet connection. The data will be synchronised when there is connectivity. This allows for the gathering of information on the characteristics of the unit produced, of any existing voluntary certifications and other specific attributes of the product. The information collected will also allow for the establishment of traceability of the cocoa produced.

The project has two aims:

- To improve the market position of cocoa farmers who apply climate-friendly and deforestation-free agricultural practices.
- To establish the necessary infrastructure for the dissemination and implementation of an interoperable and freely accessible digital traceability solution, to be named *MiCacao*

The Main Objective

Validate a traceability tool to strengthen the market position of cocoa farmers who apply climate-friendly and deforestation-free agricultural practices







From left to right:

-Cocoa Agroforestry System in Peru
-Cocoa producer in Colombia
-Digital tool, MiCacao

Photo credits: © GIZ | *MiCacao* Perú y Colombia

2688 ***male cocoa farmers*** *and* **672** ***female cocoa farmers*** *apply the traceability tool*

1008 ***male cocoa farmers*** *and* **252** ***female cocoa farmers*** *improve the price of their product by 10% over market price*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Methodological Approach and Innovation Partnership

Cocoa producers will use a scalable traceability solution based on the openly accessible, interoperable blockchain technology developed by the global partner Open Food Chain Foundation. This will enable them to gain greater visibility and thus a comparative advantage for their sustainably produced, climate-friendly and deforestation-free cocoa throughout the production and supply chain.

The methodology will take into special consideration the specific situation and condition of cocoa farmers, who produce 23% of cocoa-growing areas in Colombia and 12% in Peru. The traceability tool, *MiCacao,* will facilitate the necessary conditions to ensure that women producers have equal access to the services and benefits of the project.

To enable small-scale producers to make use of this innovative digital technology, local partners such as FEDECACAO (in Colombia) and Helvetas (in Peru) are implementing the project in cooperation with other partners such as the *École des entrepreneurs du Québec* in Colombia and the *Centro de Conservación, Investigación y Manejo de Areas Naturales* in Peru. Based on their specialisation, all partners will accompany the entire project, collaborating in the following stages: diagnosis, design and adjustment of the traceability tool, as well as during its implementation, integration and permanence.

Important Activities

- Training in the application of traceability solutions for 840 female cocoa farmers and 3360 male cocoa farmers.
- Creation of a first prototype of the digital solution based on blockchain technologies, in cooperation with implementing partners. 200 farmers in Colombia and Peru (100 in each country) will be involved in this pilot phase of the project.
- 6 informative events for the socialisation and dissemination of the digital traceability solution, aimed at key actors in the chain.

Permanence and Scaling Strategy

The design of the *MiCacao* solution aims at the sustainability (permanence) of impacts, based on the trust generated by transparency and free access to truthful and verifiable information throughout the production and supply chain.

In the medium term, the capacity building strategy, designed for all stakeholders, generates the acquisition of digital competencies necessary for this technological innovation to be scalable to other crops and sociocultural contexts. The exchange of experiences and knowledge with other projects implemented by GIZ, such as ProAmbiente, BioInvest and INCAS Global+, will support the horizontal scalability of the innovation in Colombia and Peru. In the long term, the integration (competencies) and institutionalization (capacity) of the acquired knowledge on digital traceability will be stimulated and incorporated by the various implementing partners.

Finally, the permanence and scalability of the traceability solution *MiCacao* will be driven by key players in the cocoa sector: international brands, local retailers, multi-stakeholder platforms and non-profit organizations. This creates good conditions for the continuation of activities in the implementing countries. Further progress will also be made in the development of the digital tool, for easy coupling with other freely available information technology platforms.

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On behalf of

Federal Ministry for Economic Cooperation and Development (BMZ)

Carbon Offsetting Rice Emissions (CORE), India

Implemented by the *Fund for the Promotion of Innovation in Agriculture* (i4Ag).
As part of the Special Initiative *Transformation of Agricultural and Food Systems.*

Background

Rice is the staple food for 3.5 billion people worldwide. 91 percent of rice is harvested in Asia; India is the second largest rice producer in the world. A significant share of the world's rice harvest is produced by **wet rice cultivation**. Besides its significant water footprint, wet rice cultivation is a large contributor to methane emissions (CH_4), which is produced when organic matter decomposes in the absence of air. As methane is nearly 28 times more harmful to the climate than CO_2, wet rice cultivation is a relevant driver of the **global climate crisis**. At the same time, rice cultivation itself is strongly affected by climate change, especially due to the increasing volatility of precipitation and extreme temperatures and droughts. **Smallholder** women and men farmers produce most of the rice harvest, leaving them particularly vulnerable to the consequences of climate change. Moreover, **women** take on a large share of the work in rice cultivation and post-harvest activites. With a lack of their recognition as farmers by themselves and by institutions, limited access to productive resources, agricultural knowledge and trainings regarding innovative cultivation methods, they are often unable to make sufficient use of new technologies and economic opportunities.

Purpose

The project aims to create the conditions and mechanisms for smallholder farmers to valorise the reduction of greenhouse gas (GHG) emissions that occur in the rice value chain through the use of **climate-sensitive technologies** and practices in cultivation and post-harvest handling while adopting a **gender transformative approach**. A promising model is to introduce climate-sensitive technologies and have official standard setters for **carbon credits** and emissions trading recognize them. In this way, economic incentives can be set for the agroecological transformation and the diversification of smallholder business models.

Project name	Carbon Offsetting Rice Emissions (CORE), India
Project region	Haryana, Madhya Pradesh, Andhra Pradesh
Consortium Partners	International Rice Research Institute (IRRI) Olam Agri UN Entity for Gender Equality and the Empowerment of Women (UN Women) GIZ
Duration	12/2022 - 09/2027
Impact	• **20,000 smallholder farmers** trained in the use of technolgies and practices to reduce GHG • **90,000 tons** of **CO_2 equivalents** saved • **2,500 female smallholders** strengthened as leaders and entrepreneurs

The Innovation

Public and private sector research is looking closely at the development of climate-sensitive rice cultivation and post-harvest methods (fewer GHG emissions, greater resilience to rainfall and temperature fluctuations). **Alternate Wetting and Drying (AWD)** is one example for climate-friendly rice cultivation where the fields are flooded only periodically. The positive impact of AWD is scientifically proven and recognised by international standard setters. There are comparable climate-sensitive methods, but these have not yet been recognised by standard-setting organisations. As a central innovation, new methodologies for the accreditation of carbon credits for **low-emission rice farming practices** will be outlined and assessed for their scientific validity, gendered impacts, scope and potential for acceptance. Methodologies with a positive assessment outcome will be submitted to a carbon certification standard organisation. The pool of methods for **carbon-mitigation** to **boost credit generation** will thereby be widenend, contributing to resilient cropping systems to hedge against future GHG emissions.





From left to right: Smallholder women farmers in Haryana ©Olam Agri; Rice field in India ©Olam Agri



Static gas chamber for GHG sampling: Rice fields in Haryana ©Olam Agri



Mastertraining on AWD (Alternate Wetting and Drying) ©IRRI

*In line with our purpose to transform agriculture for a food-secure future, through CORE, we are actively working with GIZ and consortium partners, IRRI, and UN Women, to introduce climate-smart farming practices and promote gender equality in rice farming in India. As one of the largest rice merchants globally, our goal is not only to make the rice supply chain more resilient and environmentally sustainable, but to also enable and empower more women farmers to achieve success by providing equal access to resources and opportunities as men," said **Paul Nicholson**, Vice President for Rice Research and Sustainability, **Olam Agri***

Project Activities

To reach the project objectives the following measures will be implemented:

- **Technical trainings** for farmers and multipliers on climate-sensitive technologies and practices in rice cultivation and post-harvest activities
- **Women empowerment** through increased participation of women farmers in the project, entrepreneurial skills, and business development as well as integration of an overall gender transformative approach
- The identification and testing of **new innovative methodologies** to reduce GHG emissions
- Development of **Project Design Document** for the generation of emission certificates under a carbon accreditation methodology
- Improving national framework conditions for **generating** and **trading carbon credits**
- **Memorandum of Understanding** for **Scaling** of project results and learning experiences.

Through the division of responsibilities, the consortium partners will make their contributions alongside their key strengths and expertise, which ensures they are complementary and allow for an efficient implementation.

Consortium Partners

UN Women

UN Women is the United Nations entity dedicated to gender equality and the empowerment of women. A global champion for women and girls, UN Women was established to accelerate progress on meeting their needs worldwide. www.unwomen.org

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Olam Agri

Olam Agri is a market leading and differentiated agribusiness, focused on high-growth markets with a global origination footprint, processing capabilities and deep understanding of market needs for over 33 years. Focused on transforming food, feed and fibre for a more sustainable future, the company aims to create value for customers, enable farming communities to prosper sustainably and strive for a food-secure future. www.olamagri.com

International Rice Research Institute (IRRI)

IRRI, an international agricultural research and training organisation, is dedicated to abolishing poverty and hunger among people and populations that depend on rice-based agri-food systems. Through their work and partnerships, they aim to improve the health and welfare of rice farmers and consumers; promote environmental sustainability in a world challenged by climate change and support the empowerment of women and the youth in the rice industry. www.irri.org

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Olam Agri



PROJECT
Carbon Offsetting Rice Emissions (CORE)

GLOBAL FUND
Fund for the Promotion of Innovation in Agriculture (i4Ag)

COMMISSIONED BY
Federal Ministry for Economic Cooperation and Development (BMZ)

IMPLEMENTING PARTNERS
Olam Agri and GIZ GmbH

PROJECT REGION
Nigeria (Benue, Nasarawa & Kano States)

DURATION
09/2024 – 09/2027

AS PART OF:
i4Ag
FUND FOR THE PROMOTION OF INNOVATION IN AGRICULTURE

Carbon Offsetting Rice Emissions (CORE), Nigeria

As part of the Special Initiative *Transformation of Agricultural and Food Systems*

THE CHALLENGE

Rice is the staple food for over 3.5 billion people worldwide.

In Africa, Nigeria is the largest rice producer, playing a pivotal role in regional food security. In 2024, the Nigerian rice Industry reported a paddy rice production of about 8.1 million metric tons (AFEX, 2024).

Despite its critical role in food security, rice cultivation in Nigeria faces significant challenges from climate change. Increasingly unpredictable rainfall, extreme temperatures, and recurring droughts threaten productivity.

In addition to being impacted by climate change, rice cultivation is itself a major contributor to it. Traditional flooded rice paddies create anaerobic conditions that emit large amounts of methane (CH_4), a potent greenhouse gas that significantly accelerates global warming. Smallholder farmers, who produce most of the rice in Nigeria, are particularly vulnerable to the consequences of climate change. Furthermore, women smallholders contribute significantly to cultivation and processing but often lack formal recognition, access to productive resources, agricultural knowledge, and training in modern farming techniques. This disparity limits their ability to adopt new, more environmentally friendly technologies and improve their economic opportunities.

THE INNOVATION

Low-emission rice cultivation with carbon credit methodologies tailored for smallholder farmers.

The project CORE promotes climate-smart rice cultivation and post-harvest practices that reduce greenhouse gas (GHG) emissions while enhancing resilience and sustainability. These practices include alternate wetting and drying (AWD), biochar production and application to soils. The project will also create new evidence in the field of integration of Azolla, and strategies to reduce post-harvest losses (PHL). AWD, for instance, optimizes water use and significantly cuts methane emissions. Biochar improves soil health and enables long-term carbon sequestration. Azolla, a fast-growing aquatic fern, naturally fixes nitrogen in rice paddies, thus reducing the need for synthetic fertilizers and boosting productivity. PHL reduction methods comprise improved harvesting, drying, and storage, minimizing losses and food waste. In all practices, the feasibility of women's empowerment through entrepreneurship is being explored. Together, these approaches modernize rice cultivation to be more climate-friendly, sustainable, and resource-efficient.

A core innovation of the project is the development of new carbon certification methodologies for measuring and certifying GHG reductions in rice farming. These methodologies are being submitted to international carbon certification standard-setting bodies.

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Carbon Offsetting Rice Emissions (CORE), Nigeria

Their approval for new methodologies is a prerequisite for preparing carbon projects, which enables the generation of carbon credits. Through an equitable benefit-sharing system, smallholder farmers are rewarded for adopting climate-smart practices, supporting both environmental sustainability and rural livelihoods.

Methodological Approach and Innovation Partnership

The CORE Nigeria project is being implemented by the Global Fund for the Promotion of Innovation in Agriculture (i4Ag) in partnership with Olam Agri. The project aligns with Nigeria's agricultural transformation agenda, working closely with relevant ministries and institutions. The innovation focuses on leveraging partnerships with local agricultural cooperatives, civil society organizations, research institutions, extension agencies, farmers' associations and financial stakeholders to drive sustainable impact on GHG emission reduction.

THE MAIN OBJECTIVE

Create the conditions and mechanisms for smallholder farmers to valorize the reduction of GHG emissions that occur in the rice value chain.

To reach the project objectives the following measures will be implemented:

- Technical training for farmers and multipliers on climate-sensitive technologies in rice cultivation and post-harvest activities
- Women empowerment through increased participation, entrepreneurial skills development, and business opportunities
- Identifying and testing of new and innovative methodologies to reduce GHG emissions
- Development of a Project Design Document for carbon accreditation methodology
- Improving national frameworks for carbon credit generation and trading

THE OBJECTIVES IN FIGURES

- 60,000 tons of CO_2 equivalents saved (estimated)
- 12,000 smallholder farmers trained in technologies and practices to reduce GHG emissions
- 3,000 female smallholders strengthened as leaders and entrepreneurs
- 1 PDD submitted to an international standard setter
- 2 MoUs signed with relevant stakeholders to scale project outcomes and learnings

The project contributes to the achievement of the following **Sustainable Development Goals** (SDGs):



SUSTAINABILITY AND SCALING

CORE Nigeria promotes long-term impact and resilience by aligning with the GIZ agriculture cluster's focus on "Life without Hunger – Transformation of Agricultural and Food Systems", thus contributing to a climate-friendly economic diversification in Nigeria. Collaboration with relevant ministries and institutions ensures strong policy alignment and institutional support.

Key elements include close cooperation with national organizations, research institutions, and private sector partners like Olam Agri, which serve as knowledge hubs, implementation drivers and multipliers. By building on existing initiatives in the transformation of agri-food systems, the project draws from past experiences in the rice sector to strengthen domestic competitiveness along the entire value chain. Through the development of scientifically validated carbon credit methodologies, the project supports the emergence of reliable carbon markets and resilient cropping systems that reduce greenhouse gas emissions. Evidence-based data and proven practices will enable replication, attract further investment, and support the shift towards a sustainable, low-emission rice production in Nigeria.

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International Trade Centre | SheTrades



PROJECT
Promoting Gender-Responsive Public Procurement in the Agri-Food-Sector

GLOBAL FUND
Fund for the Promotion of Innovation in Agriculture (i4Ag)

COMMISIONED BY
Federal Ministry for Economic Cooperation and Development (BMZ)

IMPLEMENTING PARTNERS
International Trade Centre (ITC)

PROJECT REGION
Ecuador

DURATION
12/2022 – 12/2027

AS PART OF:
i4Ag
FUND FOR THE PROMOTION OF INNOVATION IN AGRICULTURE

Promoting Gender-Responsive Public Procurement in the Agri-Food-Sector

As part of the Special Initiative *Transformation of Agricultural and Food Systems*

THE CHALLENGE

Women face significant discrimination and barriers related to public procurement in the agri-food sector.

Governments spend 12 % of global GDP on public contracts, but women-led businesses account for only 1 % of public procurement. Yet women represent about half of the adult population and in many countries are predominantly engaged in agri-cultural activities.
There is a common perception that public procurement is largely focused on non-agricultural sectors. However, governments also source inputs from the agriculture and food sector. For instance, school feeding projects, social security programs and food services for hospitals and prisons require procurement of agricultural products. This presents opportunities for women-led businesses. In general, women-led businesses face several barriers when competing for public tenders. On the one hand, governments often lack targeted outreach to women-led or women-owned businesses, while public procurement systems are typically complex and fail to integrate gender considerations into their approach. On the other hand, women are missing tender opportunities because of limited information and tendering experience. Also, they tend to experience corruption and sexual harassment more than men. In the agricultural sector, these challenges may be intensified for women because many work in remote or underserved areas, and women-led businesses are often smaller and less formalized compared to male-led businesses, making it harder for them to meet the requirements for public procurement.
Gender-responsive public procurement or incorporating a gender equality perspective into the public procurement process, is key to addressing these issues.
Promoting gender-responsive public procurement in agri-culture can help women expand their networks, improve their competitiveness, and generate higher incomes.
Promoting gender-responsive public procurement in agri-culture can help generate local jobs and enhance livelihood opportunities for women, which can alleviate rural poverty.
By harnessing women's potential, governments can enhance their contributions to the economy, promote fairer and more diverse competition, and ultimately drive overall economic growth.
Furthermore, gender-responsive public procurement for school feeding and social security programs provide an important mechanism to promote food and nutrition security in times of crises. However, there is a lack of information to understand the specific challenges faced by women and their capacity building needs to successfully participate in public procurement markets for agricultural products. More information is also needed to identify entry points for an improved competitiveness of women in public procurement.

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Promoting Gender-Responsive Public Procurement in the Agri-Food-Sector

THE INNOVATION

Potentials, methods, and instruments as innovative approaches in policy advice.

Through gender-responsive public procurement (GRPP), governments can increase the participation of women-led/-owned businesses in public procurement markets.
The benefits of awarding more government contracts to women-led/-owned businesses go beyond the corporate level. Apart from facilitating the growth of women's businesses, GRPP can be transformative at three levels:

1. **Benefits from a development perspective:**
   Including more women in the agricultural sector brings a wide range of skills, experiences, and perspectives ultimately advancing the achievement of Sustainable Development Goal 5: Promoting gender equality and empowering women and girls. By enabling the growth of women-led businesses through GRPP, governments can achieve sustainable and widespread impact.
2. **Benefits from an economic perspective:**
   When women-led/-owned agribusinesses win more contracts, they have more resources to grow and increase farm productivity. At the country level, this creates jobs in the agricultural sector.
3. **Benefits from a public procurement perspective:**
   Encouraging the participation of more women entrepreneurs in public tenders fosters competition that is both fierce and diverse.

Methodological Approach

The project plans to:

- Identify public procurement opportunities in the agri-cultural sector and capacity-building needs in the selected country to address current gaps of women's participation in government procurement;
- Build capacities of public, private and civil society sectors in an attempt to enhance successful participation of women-led SMEs in public tenders;
- Facilitate multi-stakeholder discussions on potential areas for policy reform and build a network of practitioners;
- Contribute to the improvement of the regulatory framework for gender-sensitive public procurement systems.

In the pursuit of GRPP, it is essential to recognize that the responsibility for its success extends beyond governments alone. The active involvement and commitments of all stakeholders are fostered through various innovative participation processes (expressions of interest, collaborative analyses that include input from diverse stakeholder partnerships, etc.).

IMPORTANT ACTIVITIES

- Awareness raising campaign
- Creating knowledge resources on leveraging inclusive procurement strategies for economic development
- Analysis of barriers and opportunities for women's participation in public procurement in agricultural value chains
- Training for women and government stakeholders on identified opportunities
- Creating national-level dialogues and sharing of experiences and good practices across countries.

Public procurement can be an important tool to promote local economic development opportunities for women.

The project contributes to the achievement of the following **Sustainable Development Goals** (SDGs):



THE MAIN OBJECTIVE

Promoting gender-responsive public procurement for agricultural products, through research, advocacy, and capacity-building for policy-makers and women's organizations.

INNOVATION PARTNERSHIP

The International Trade Centre (ITC) is a joint agency of the World Trade Organization and the United Nations. It assists small and medium-sized enterprises in developing and least developed countries to become more competitive in global markets, thereby contributing to sustainable economic development.
With its SheTrades Initiative, ITC targets all stakeholders across the trade and business ecosystem to create the right conditions and build capacities for woman.

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Support for scaling sustainable agricultural innovations (SCALE)

As part of the special initiative *Transformation of Agricultural and Food Systems*

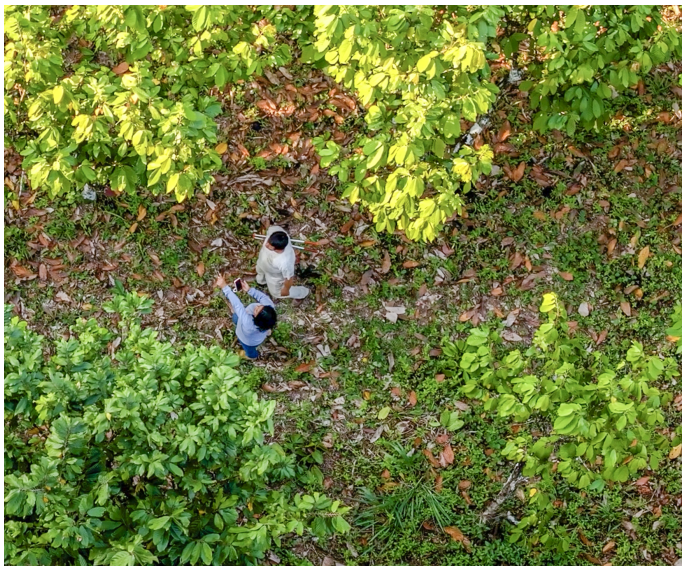
The Challenge

The Agenda 2030 has set ambitious goals for socially, economically and ecologically sustainable development. However, the mid-term review of the Agenda 2030 is sobering: if continued at this pace, none of the 17 Sustainable Development Goals (SDG) will be fully reached by 2030. In view of the insufficient progress made to date, coupled with escalating needs and diminishing resources for development investments, a strategic re-orientation seems inevitable. A shift is needed towards a systemic and holistic approach capable of addressing complex and multidimensional challenges. In fact, the international development community is increasingly paying attention to the need to sustainably scale development impact. Agricultural innovations in particular are key enablers for transforming agri-food systems, which directly or indirectly contribute to almost all 17 SDGs. In many cases, suitable innovations already exist, yet their uptake remains limited, localised, and disproportionate to the scale of the challenges they are meant to address. To move from innovation to impact, the scaling process must become faster, more effective, more cost-efficient, and more equitable.

Methodological Approach

Since 2020, the Fund for the Promotion of Innovation in Agriculture (i4Ag) has supported a diverse portfolio of agricultural innovation projects worldwide. To bring high-impact innovations into broader use, a favourable scaling ecosystem must be put in place, comprising suitable scaling methods and tools, conducive local framework conditions, capacity development offers, resource mobilisation strategies, coordination mechanisms, professional networks and community growth. Our approach recognises the need for collective action through global partnerships and institutional mainstreaming of innovation scaling, whilst unlocking the full potential of agricultural and food innovations by supporting responsible scaling efforts.

Name of the Project	Support for scaling sustainable agricultural innovations (SCALE)
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Global
Implementing Partners	ILRI, FAO, Kiva
Duration	07/2023 - 06/2028



The project is structured around **three pillars**:

Pillar 1: Support to the preparation and implementation of scaling projects for innovations piloted by i4Ag and other initiatives. SCALE provides targeted technical assistance for the scaling of agricultural innovations. We tailor scaling methodologies and tools to specific needs, based on developed standard products. These include innovation profiles, scaling readiness assessments, economic analyses, data-driven assessment of impact and scaling potentials. We also design scaling strategies, plans and processes together with our partners. Capacity development on innovation scaling at various levels and for different target groups constitutes another cornerstone we focus on. Emphasis is placed on conceptually incorporating scaling principles into innovation projects from the very outset, thus paving the way for scaling activities later on. Climate and gender equity objectives are integral components of our work.

Pillar 2: Participation in international multi-stakeholder partnerships to build a global scaling ecosystem.
SCALE is a founding member of the Scaling Coalition – a growing alliance of international actors which currently comprises CGIAR, FAO, GIZ, and the World Bank – to jointly advance the global scaling ecosystem. The coalition unites partners to address collective challenges that no single organisation can address alone. The aim is to accelerate the scaling and impact of agricultural and food innovations globally, ensuring they reach those who need them faster, more effectively, and at lower cost.

Pillar 3: Institutional mainstreaming of innovation scaling. Mainstreaming of innovation scaling is understood as the systematic, organisation-wide incorporation of support for sustainable outcomes at scale, reflected in mission and strategy statements, organisational structures, operational policies and guidelines, financial allocation decisions and time horizons, staffing practices and incentives, as well as monitoring and evaluation practices. If scaling is not institutionalised, it rarely moves beyond small pilot projects. Systematically embedding scaling into the organisational DNA ("mainstreaming") increases the likelihood that successful innovations from the pilot phase will be brought to impact at scale. In 2023, the Mainstreaming Scaling Initiative of the Scaling Community of Practice (SCoP) conducted a case study of GIZ. One major finding was that scaling has not yet been explicitly made an organisational priority for GIZ in general, resulting in a limited attention to scaling as well as a limited use of scaling framework and tools. According to study results, GIZ is not leveraging its potential to achieve the impact at scale that it could. The i4Ag SCALE project works with various GIZ projects and technical departments like the Competence Center "Innovation, Learning, Knowledge Management" of the Sectoral Division (FMB) to promote mainstreaming of scaling principles and practices at GIZ. SCALE links the theoretical and practical dimensions of impact scaling.



Example for collaborative partnership: SCALE contributes to the further development of FAO's AI-enabled ATIO Knowledge Base, an innovation platform which provides access to information on validated agri-food innovations for a variety of stakeholders, ranging from researchers to end-users. The GIZ commitment focuses on the integration of grassroots innovations developed by local farming communities, thus linking the informal with the formal innovation system for enhanced global sharing.

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



Main objective

Improving the framework for scaling sustainable, gender-sensitive agricultural innovations.

Outputs

- Support services for scaling sustainable, gender-sensitive agricultural innovations are available for stakeholders
- Improved access to finance accelerates the scaling of agricultural innovations
- A digital innovation platform facilitates the sharing of locally developed grassroots innovations
- A global multi-stakeholder partnership format for scaling ecosystems strengthening is operational

Important Activities

- Development and provision of appropriate methods, tools, advisory services and trainings for innovation scaling
- Support to the preparation and implementation of scaling projects
- Facilitation of finance for scaling projects and innovation adopters
- Provision of financial literacy trainings and strengthening of local financial intermediaries
- Support to enhance a digital innovation platform for effective innovation and knowledge sharing
- As an active member, contributions to shaping an international multi-stakeholder scaling coalition

Sustainability

SCALE follows a multifaceted approach to ensure the sustainability of its results. Capacity development on innovation scaling is one of our focal intervention areas, vesting knowledge and skills in people that will continue applying innovation scaling methodologies, approaches and tools. Capacity sharing builds a growing community of capable individuals and organisations committed to scaling of impacts. Besides, the initial capital investment and possibly financial needs for the use of innovative solutions are facilitated by improving the access to financial services, a critical condition in resource-poor environments. The SCALE project also contributes to various elements of a global scaling ecosystem that are being developed by the scaling coalition. It is expected that the coalition will exist far beyond SCALE's lifetime and therefore perpetuate what was jointly developed. The organisational mainstreaming of innovation scaling principles and practices, including within GIZ itself, anchors the focus and approaches of innovation scaling for impact within institutions over the long term.

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In cooperation with:

Sustainable Mechanization of Value Chains through Innovative, Gender-Sensitive Business Models

A project of the Fund for the Promotion of Innovation in Agriculture (i4Ag) of the special initiative of the Federal Ministry for Economic Cooperation and Development (BMZ) 'Transformation of Agricultural and Food Systems'

Challenges and potentials in agriculture and food production in Kenya and Rwanda

Agriculture and food production are of great importance in Kenya and Rwanda and employ around 70 per cent of the total population. Despite their significant share of gross domestic product, 31 per cent in Rwanda and 33 per cent in Kenya, these sectors face numerous challenges: Outdated production methods and lack of access to modern technologies lead to low yields, soil degradation and soil acidification.

The procurement of agricultural technology and processing machinery poses challenges for farmers and private and public agricultural institutions: Mechanisation at individual farm level is difficult due to small areas and limited capital. Services in the downstream agricultural sector are limited, which restricts value creation. Renewable energies are only used to a limited extent in agriculture. In Kenya and Rwanda, electric tractors are not available as an alternative to diesel, and operating costs are rising due to supply chain problems.

Project title	Nachhaltige Mechanisierung von Wertschöpfungsketten durch innovative, gendersensible Geschäftsmodelle
Programme	Fonds zur Förderung von Innovationen in der Agrar- und Ernährungswirtschaft (i4Ag)
Commisioning party	Bundesministeriums für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ)
Region	Kenia, Ruanda
Partners	sequa gGmbH, Maschinenring Foundation gGmbH, Volkswagen, LEMKEN
Duration	08/2023 - 12/2026

Innovative linkages in the electrification of agriculture, business models and climate resilient agricultural practices

The innovations combine the introduction of e-tractors and other electric agricultural machinery as a technical innovation with the scaling up of the machinery ring (MR) business model successfully tested in Kenya, as well as climate-resilient farming techniques and an e-tractor tested in Rwanda. Implementation will take place at regional level. A South-South exchange is planned, in which MR managers and trainers trained in Kenya will be deployed in Rwanda, and e-tractors will be used for the first time in Kenya. Another innovation is the establishment of a multifunctional empowerment hub (e-hub) in Rwanda to support SMEs and their employees in agricultural value chains. The e-Hub will include electric vehicle workshops, training rooms and premises for SMEs, with a decentralised photovoltaic power supply.

The integration of the partners' innovations addresses the challenges of transforming the agriculture and food sector in many African countries, and is expected to provide impetus for scaling up in other countries through impact studies and the organisation of round tables with national and international organisations.

The goal

Farmers have put innovative, sustainable solutions in the fields of mechanisation and energy to good use.

Key indicators

9,000 Farmers *improve their income opportunities*

100 kWp *of renewable energy is available in the empowerment hub*

1,300 ha *are cultivated using innovative climate-resilient farming techniques*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):

Approach and project partners

The project focuses on imparting technical and entrepreneurial knowledge in the fields of agroecology, management, marketing and investment in machinery. The development of gender-sensitive business models and training programmes takes into account the different needs of women, men and young people alike. The establishment of SMEs in the e-Hub for the post-harvest and processing phase aims to develop gender-sensitive business models and create job opportunities, especially for women.

The project is being implemented by a consortium partnership consisting of Volkswagen, sequa gGmbH in cooperation with Maschinenring Foundation gGmbH, LEMKEN GmbH & Co. Kg and GIZ.



Key activities

- Introduction of e-tractors and innovative agricultural implements linked to the MR business model, including capacity building
- Establishment of an e-hub with photovoltaic system and premises for SMEs and training courses
- Capacity building in the area of sustainable management of agricultural practices and businesses
- Carrying out impact studies on socio-economic aspects, e-mobility in agriculture and CO2 savings through renewable energies

Sustainability and scaling

Machinery Rings' knowledge transfer on business management issues and climate-resilient farming techniques promotes sustainable soil fertility and income generation for generations to come. Positive changes in farming techniques are recognisable after just one growing season. The local MRs strive for financial independence through membership fees and intermediary fees, based on experience from existing MRs in Kenya. The Federal Association of Machinery Rings integrates local MRs into its global structure and ensures long-term support.

The knowledge centre integrated in the e-Hub builds sustainable skills in mechanisation and decentralised energy supply for the local economy (societal and organisational level). The sustainability of the approach is ensured through cooperation with the private sector, which facilitates long-term investments in the introduced innovations (e-tractor and e-hub).



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Text Project factsheet

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In cooperation with:
Corporación Clayuca · Saving Grains · Agridrive · AATF Prosperity through Technology

Reducing post-harvest losses and utilising agricultural residues

Implemented by the *Fund for the Promotion of Innovation in Agriculture (i4Ag)*
As Part of the Special Initiative *Transformation of Agricultural Food Systems*

The Challenge

High post-harvest losses and their impact on food security in West and East Africa

High post-harvest losses (PHL), including food wastage at the production level and during initial processing stages, have become a pressing concern, as they significantly affect the food security of many people in West and East Africa. The health-threatening contamination of grains by aflatoxins is of particular concern. These losses can jeopardise the food security of low-income populations and, depending upon the product and region, can reach up to 40 % of the harvest in Ghana, Kenya and Nigeria, where the project is being implemented. The underutilisation of agricultural residue, particularly cassava peels, has also been observed. This waste is a missed opportunity for animal feed and extra income. At the same time, the majority of post-harvest activities, which often involves strenuous physical exertion and considerable time investment, are carried out by women and young people (e.g. cassava peeling). Further, PHL account for approximately 4.4 gigatons of greenhouse gas emission annually worldwide. These include on-farm agricultural emissions and energy used to produce, transport and store food that is ultimately lost.

Name of the Project	Reducing post-harvest losses and utilising agricultural residues
Name of the Global Fund	Fund for the Promotion of Innovation in Agriculture (i4Ag)
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Project Region	Ghana, Kenya, Nigeria
Implementing Partners	African Agricultural Technology Foundation (AATF), Clayuca Corporation, Saving Grains 301 GmbH, Agridrive Ltd.
Duration	08/2023 - 01/2027

The Innovation

Innovations reshaping post-harvest management and processing in agriculture

Recent innovations in technology and digital solutions, along with novel business models offer solutions to reduce PHL and add value to agricultural residues.

- **Smart grain storage in Ghana and Kenya**: Saving Grains is enhancing hermetic storage bags with sensor technology, creating a public aflatoxin contamination warning system.
- **Eco-friendly grain drying in Ghana**: Kwame Nkrumah University of Science and Technology (KNUST) developed an eco-friendly and cost-effective grain drying technology using local biomass to enable loss-free storage and to prevent aflatoxin contamination in stored food. The dryer will be validated economically and ecologically.
- **Optimising crop storage with DryCard™**: The DryCard™, developed by the University of California, is a device for measuring moisture content in grains providing a cost-effective solution for improving crop storage practices. The extension to rice will be examined
- **Improving cassava processing in Nigeria**: Clayuca Corporation will introduce a new cassava processing technology in Nigeria that requires no prior manual peeling, saving water and time while increasing processing capacity. The end products are high-quality cassava flour for human consumption and high fiber cassava flour for animal feed.

The Main Objective

Support smallholder farmers and SMEs to use innovative approaches in the post-harvest sector to increase income and revenues.





From left to right: Transportation of Cassava/ Wet and mouldy maize with high aflatoxin/ Village demonstration with demo bag of groundnuts

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- **Income generation through digitally supported business models**: An innovative app offering features for transactions, payments, and traceability enables village entrepreneurs to enter the grain trade. Small-scale farmers benefit from rising prices after the harvest through profit-sharing in this social business model. In the cassava value chain, an innovative operational model for mechanical cassava processing is being developed. It involves introducing improved cassava varieties with low hydrogen cyanide content, mechanising cultivation, harvesting and processing, and incorporating a digital solution as a prerequisite.

Methodological Approach and Innovation Partnership

The project is being implemented via two integrated development partnerships with the private sector. In the grain sector, the German company Saving Grains 301 GmbH will innovate in the grain value chain in Ghana and Kenya with app-based solutions and hermetic storage models. In the cassava sector, the Nigerian provider of agricultural services Agridrive Ltd. is the implementing partner. Collaborating with the nonprofit organisations African Agricultural Technology Foundation (AATF) and Clayuca Corporation, they aim to enhance the cassava value chain through the mechanisation of cultivation and processing in Nigeria.

Most Important Activities

- Training on post-harvest management and further processing
- Introduce an innovative cassava processing machine and develop operating models in Nigeria
- Further training on technical and entrepreneurial skills for prospective village entrepreneurs
- Conduct awareness-raising campaigns

Sustainability and Scaling Strategy

The training measures ensure that awareness of the added value of innovative methods and technologies is retained. By consistently addressing the cross-cutting theme of developing gender-sensitive business and operational models, the measures ensure that affordable access to innovative technologies for the target group is guaranteed beyond the project's completion. This is crucial for the continued application and increasing dissemination of these technologies due to their income-enhancing effects. Supplementary measures to create market access in the cassava value chain, or to improve it in the grain value chain, will also contribute to effectiveness after the project's conclusion.

Through collaboration with advisory services and the dissemination of learning experiences to relevant stakeholders, the acquired knowledge and derived gender-sensitive recommendations for action are locally embedded and promoted. The implementation of the measures in cooperation with private sector partners who are interested in the long-term development and establishment of technologies and the exploration of new markets further ensures the sustainability of the approach. The continuous involvement of these partners guarantees the ongoing development and widespread adoption of the technologies even after the project concludes.

15 % *reduction in post-harvest losses*

26,000 *smallholder farmers, of whom half are women, trained in improved post-harvest management and further processing*

23,000 *smallholder farmers, of whom half are women, increase their income*

2,440 *SMEs, of whom 1,220 are run by women, increased their revenues*

The project contributes to the achievement of these Sustainable Development Goals (SDGs):



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