



Nurture Project Inception Phase

Summary of Studies



Table of Contents

I. Foreword	1
II. Acronyms	2
III. Acknowledgments	3
IV. Executive Summary.....	4
V. Baseline Assessment	9
VI. Climate Resilient Agriculture Assessment.....	12
VII. Climate Risk and Proofing Studies.....	19
VIII. Feasibility Assessment for the Establishment of an Incubation and Acceleration Programme for Startups in the Climate Resilient Agriculture Space.....	21
IX. Water Governance Study	26
X. Gender and Social Inclusion Assessment.....	29
XI. From Analysis to Project Design.....	33

List of Tables

- Table 1: Number of interviews by type of stakeholders per province9
- Table 2: Assessed pre-identification production systems.....13
- Table 3: Existing climate resilient agriculture practices.....15

I. Foreword by: Markus Bürli, SDC



In 2021, the Swiss Agency for Development and Cooperation (SDC) decided to increase its investment in Cambodia in the field of Climate Change and Natural Resources Management. Considering the increasing challenges for Cambodia's smallholder farmers, with changing rainfall patterns, floods and droughts, as well as increasing temperatures, we decided to join forces with HEKS and Caritas Switzerland to look into the issues in some of the worst affected provinces in the North West of Cambodia. During a one-year period, we mandated a series of studies filling the knowledge gaps to plan a concrete intervention that is now the Nurturing Climate Resilience in Cambodia (Nurture) project.

We believe that the findings of the studies presented in this report are not only relevant for SDC, HEKS and Caritas Switzerland, but they can also inform the Government of Cambodia, other development actors and maybe even private sector players that aim to improve the climate resilience of smallholder farmers in North West Cambodia. Sharing these detailed analyses publicly also creates opportunities for collaboration with you, as its reader, during the next eight years that Nurture plans to be active.

Markus Bürli

Director of Cooperation

Swiss Cooperation Office and Consular Agency, Cambodia

II. Acronyms

- **AC:** Agriculture cooperatives
- **CEDRIG light:** Climate, Environment and Disaster Risk Reduction Integration Guidance
- **CASIC:** Conservation Agriculture and Sustainable Intensification Consortium
- **EX-ACT:** Ex-Ante Carbon Balance Tool
- **FWUCs:** Farmer Water User Committees
- **FWUG/Cs:** Farmer Water User Groups and Committees
- **GHG:** Greenhouse gas
- **GDP:** Gross domestic product
- **IM:** Integrity Management
- **MFI:** Microfinance Institutions
- **MAFF:** Ministry of Agriculture, Forests and Fisheries
- **MoWRAM:** Ministry of Water Resource Management and Meteorology
- **NGO:** Non-Governmental Organisation
- **PDAFF:** Provincial Departments Responsible for Agriculture
- **PDoWRAM:** Provincial Departments Responsible for Water
- **PPPs:** Public-private partnerships
- **ROI:** Return on Investment
- **SDC:** Swiss Agency for Development Cooperation
- **HEKS/EPER:** Swiss Church Aid
- **VC:** Value Chain

III. Acknowledgments

The studies have been financed by Swiss Development Cooperation (SDC), HEKS/EPER and CARITAS Switzerland, and were carried out by the following authors contracted by the Nurture project in 2022.

- **CEDRIG Light:** Robledo C. (2022)
- **AdaptFast:** Robledo C., Heov K. (2022)
- **Climate data analysis and expected impact of planned project activities on the greenhouse gas balance:** Gardi, O. (2023)
- **Climate Resilient Agriculture Assessment:** Sevea (2022)
- **Baseline Assessment:** Sevea (2022)
- **Water Governance Study:** Phnom Penh Consulting Research Institute (2022)
- **Feasibility assessment for the establishment of an Incubation and Acceleration Programme for startups in the Climate Resilient Agriculture Space:** Impact Hub Phnom Penh (2022)
- **Gender and Social Inclusion Assessment:** Tous S. (2022)

The document has been edited by Francesco Melara – Regional Specialist for Market Systems and Climate Resilience, Judith Macchi – Thematic Advisor Climate Change, Environment and Resilience, Julien Brewster – Regional Director Mekong, Winfried Suess – Team Leader Nurture, Eileen Schilliger – Junior Project Officer at CARITAS Switzerland, and Marissa Carruthers.

The project team would like to thank all stakeholders and parties involved directly and indirectly in the realisation of the studies. This includes national and provincial level ministries, farmers, farmers' associations and companies, among other stakeholders.

IV. Executive Summary

Background

Caritas Switzerland and HEKS/EPER (Swiss Church Aid), with financial support from the SDC, are implementing the project 'Nurturing Climate Resilience in Cambodia in Cambodia—Nurture'. The goal is to make vulnerable smallholder farming households and their communities more climate resilient and increase their income through climate proofing agro-ecosystems.

The year-long design phase involved assessments on the impacts of climate change, the best adaptation options for smallholder farmers and the water governance context in the target provinces. This synthesis summarises the key findings and recommendations.

Studies Conducted During the Inception Phase

Baseline assessment: this provides a quantitative analysis of the socio-economic situation in the target provinces and the current application of climate resilient practices.

Climate resilient agriculture assessment: this analyses the market systems of the most climate resilient value chains (VC) in the target provinces. This includes understanding the farming practices of farmers, how they are affected by climate events, and an evaluation of existing products and services, especially digital tools for climate resilience.

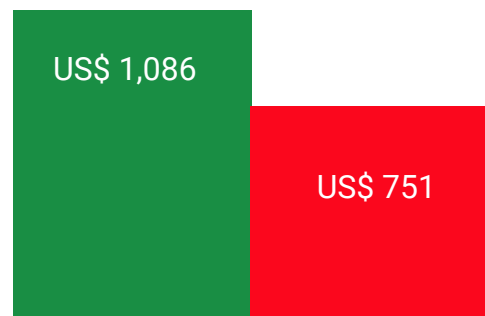
Climate risk and proofing studies: various tools were used to assess the project's exposure to risk from climate change, environmental degradation and natural hazards. These include the Climate, Environment and Disaster Risk Reduction Integration Guidance (CEDRIG light) approach and AdaptFast approach.

Water governance study: this reviews existing governance structures, mechanisms and norms that shape the project's context and opportunities. The assessment proposes ways to engage stakeholders in addressing the main challenges and improving local water governance systems.

Feasibility assessment for the establishment of an incubation and acceleration programme for startups: this explores the role that the entrepreneurial ecosystem can play in strengthening smallholder farmers' resilience to climate change, and the current constraints and opportunities.

Based on a survey with 358 farmers, on average, 78% are smallholder farmers. In female-headed households, this rises to 86%. A total of 89% of farmers produce rice, 37% cassava, 20% fruit and vegetables, maize or sesame, 9% cashew and 5% soybean. The net income of smallholder farmers amounts to US\$1,086 per year, whereas for female-headed households it is US\$751 per year, compared to a median income of US\$4,695 for non-smallholder farmers.

■ Net income of smallholder farmers
■ Net income of female-headed households



Climate resilient farming practices are still limited among farmers. For example, only 3.6% of surveyed farmers use climate resilient technologies, such as drip systems, net houses and solar water pumps. Renewable energy (solar) is utilised as an energy source for only 4.5% of farms. For irrigation purposes, 42.2% of respondents have access to a water source other than rainfall. A total of 16% of farmers have a bank account (13.6% for female-headed households), 46% declared that they use microfinance institution (MFI) loans and 7.5% have other access to financial support, such as NGOs and relatives. A total of 36% of the farmers are organised in a farmer group. Also, 36% of female-headed households belong to a women's group.

Impacts of climate change, climate variability & environmental degradation

Temperatures in Cambodia have risen by approximately 1.1°C since 1960, with the increase most pronounced during dry season (November to April). Looking ahead, all climate models show a trend of continued, consistent warming. The number of 'hot days' in the country has risen in the last century by as much as 46 days per year. Projections in rainfall are less certain. However, forecast trends show a likely increase in the frequency and intensity of heavy rainfall events, as well as the amount of rainfall. A decrease in rainfall can be observed in years with strong El Niño, when moderate to severe droughts have occurred.

These trends strongly correlate with the observations of farmers interviewed. Of them, 81% perceive that there are more frequent or intense occurrences of floods and droughts. A further 77% connect these climate hazards to a decrease in yields. Higher temperatures and a shift in seasons are other trends observed. Higher temperatures demand increased irrigation, while season shifts lead to increased insecurity on when and what to plant, and result in the worst-case scenario crop failure and a decrease in income. Increasing issues with pests and diseases due to higher temperatures and increase in heavy rainfall events were also noted by the majority of farmers. Higher temperatures may also affect flowering and pollination in both self-pollinated and cross-pollinated crops.

Regarding environmental impacts, deforestation was identified as an issue leading to ecosystem and biodiversity loss. Furthermore, soil degradation and excessive use of chemical fertilisers and pesticides result in soil and water pollution, having negative impacts on agricultural production in the long-term.

Barriers faced by smallholder farmers to adopt climate resilient development pathways

The different assessments identified a number of barriers that limit the abilities of smallholder farmers in the four provinces to take up climate resilient technologies and practices.

- **Availability of technical knowledge & support to climate proof agricultural production:** most farmers do not know how to adapt to changing weather patterns, and there is no thorough knowledge regarding climate resilient and environmentally-sustainable agricultural practices. Farmers mainly rely on each other for knowledge exchange and support. Moreover, there are few private sector service providers offering climate resilient technologies and services.
- **Access to water for irrigation:** access to water is a major production hindrance for smallholder farmers, particularly during dry season. They mainly produce under rain-fed conditions and if irrigation infrastructure exists, only a few are in a good working condition. While Farmer Water User Committees (FWUCs) have been established to oversee irrigation infrastructure, they often lack the capacity and skills to do so efficiently and sustainably.
- **Access to finance:** this is crucial for farmers to switch to more climate resilient technologies and practices. However, for smallholder farmers, access to credit is a challenge due to high interest rates, collateral requirements and weak financial literacy skills.
- **Lack of accurate and accessible meteorology and early warning information:** the lack of meteorology infrastructure, accurate and accessible weather predictions or early warning information makes it hard for farmers to prepare for adverse weather events. It also hinders the development of commercial index-based crop insurance schemes.
- **Access to information technology:** there is limited digital knowledge and capacity among smallholder farmers to use apps or online platforms to support adaptation to more climate resilient agricultural practices and technologies. The internet infrastructure in rural areas is also underdeveloped and the slow internet speed discourages farmers from using ICT technologies.

Recommendations

The assessments gave the following recommendations to be addressed:

- **Improve farmers access to products and services for climate resilience:** foster collaboration with the private sector to pilot and scale-up business models that can support farmers to

strengthen their climate resilience. From access to solar water pumps to soil testing kits, the private sector holds huge potential to assist with farmers' transition to greater climate resilience.

- **Strengthen knowledge and capacity to adopt climate resilient production practices and technologies:** establish and facilitate multi-stakeholder partnerships, leveraging the public and private sectors to propagate knowledge around climate resilient and agroecological practices.
- **Diversify production systems:** promote the diversification of production systems combined with additional income generating activities that are responsive to market demand and help improve soil and environmental health. Sub-sectors identified where opportunities exist for greater adoption of climate resilient agriculture practices include vegetables, rice, maize, cassava, poultry, longan, mango, cashew, soybean and sesame.
- **Strengthen access to markets:** facilitate access to markets by identifying niche opportunities (organic cashew, for example). Links also need to be established between existing buyers and producers through agriculture cooperatives (ACs) to better respond to market opportunities and obtain a more equitable price.
- **Strengthen governance around irrigation infrastructure:** employ a participatory methodology, such as the Integrity Management (IM) toolbox, to identify the key bottlenecks preventing irrigation schemes from functioning effectively. Promote public-private partnerships (PPPs) to address gaps with irrigation scheme maintenance, service delivery and infrastructure development.
- **Facilitate access to meteorological information and early warning:** ensure that weather forecasts disseminated through different platforms reach community level to assist farmers with adjusting their cropping calendars. Enable access to life-saving early warning information in alignment with pledges made at COP28 to improve disaster risk reduction and management.
- **Empower women and gender mainstreaming:** recognising that women play a crucial role across agricultural value chains and that they are particularly exposed to the effects of climate change, ensure project interventions are gender sensitive and geared towards women's economic empowerment.

V. Baseline Assessment

Methodology

Of the four targeted provinces, 20 communes out of 36 were selected within the 12 targeted districts. To maximise the representativity of the sample selected, different criteria were factored in:

- Poverty and dependence on farming by looking at the poverty rate and number of poor households registered in the target areas.
- Climate vulnerability by identifying the occurrence of floods and droughts and their levels of impact on the different production systems in previous years.

- Existing irrigation infrastructure to highlight potential water access constraints.
- Percentage of women involved in farming, both crop and livestock production.

A total of 392 interviews with different key stakeholders were conducted in 20 communes within the target area, of which 34 were semi-structured interviews and 358 structured interviews with individual farmers.

Table 1: Number of interviews by type of stakeholders per province

	Battambang	Banteay Meanchey	Oddar Meanchey	Preah Vihear	Total
Farmers	98	70	96	94	358
FWUC	1	1	1	1	4
AC	3	5	6	2	16
PDAFF	1	1	1	1	4
District	2	3	3	2	10
Total	106	79	105	102	392

Results of the baseline assessment

Socio-economic aspects:

- On average, 78% of farmers are smallholder farmers: 67% in Banteay Meanchey, 86% in Battambang, 66% in Oddar Meanchey and 91% in Preah Vihear. For the 18% of female-headed households, there is a higher percentage of smallholder farmers than male-headed households, respectively 86% and 76%.
- A total of 89% of farmers produce rice, 37% cassava, 20% other (fruits vegetables, maize and sesame), 9% cashew and 5% soybean.
- Net income of smallholder farmers: US\$1,086/year median net agriculture income (280 smallholder farmers).
- US\$751/year median net agriculture income female-headed households (57).
- Non-smallholder farmers have a median income of US\$4,695/year.
- Climate resilient practices: the use of organic fertiliser, improved drainage and intercropping/mix cropping are the most used practices. Regarding sustainable technologies, levels of adoption remain low, with only 3.6% of the farmers using climate resilient technologies such as drip systems, net houses and solar water pumps. Renewable energy (solar) is utilised as an energy source for only 4.5% of farms.

Irrigations systems: for irrigation purposes, 42.2% of the respondents have access to a water source other than rainfall. Smallholder farmers and larger farmers are similar in this regard, with about 42% mentioning access to an irrigation source. With respect to pumping, 29.9% of respondents, and 30.7% of smallholder farmers and 26.9% of larger farms have a pump. Farmers mentioned that they pump to irrigate but also to pump out water in case of flooding.

Access to Finance: regarding access to financial services, 16% of farmers use a bank account (13.6% for female-headed households) and 53.9% have access to other financial services. Additionally, 46% said they use MFI loans and 7.5% use other financial support from NGOs or relatives, for example.

Machinery: a total of 91% use at least one type of machinery. Of these, 79% of farmers use a power tiller, 71% a tractor hiring service, 49% a harvester hiring service, 8% a rice threshing machine, 5% rice cutting and 23% use other types of machinery, such as knapsack sprayers, rice mills, cutting machines (cassava, grass) and drones.

Hazard events (flood and drought, pest and disease): respectively, 81% and 60% of the farmers perceive that there are more frequent or intense occurrences of floods and droughts. A total of 77% connect these climate hazards to a decrease in yield. A majority of farmers declare having pest and diseases issues.

Organisation: according to the survey, 36% of the farmers are in a farmer group. Overall, 25% of all farms are members of an AC. Among female-headed households, 36% belong to a women's group. Benefits mentioned of participating in such groups were access to training, services, finance and tools.

Women and vulnerable groups: women's work involves more of a variety of complex and diverse tasks, such as growing agricultural crops, harvesting, processing, caring for livestock, working in agricultural or other rural businesses for wages, and involvement in trade and marketing.

ACs: most ACs have received capacity-building assistance from the government and local NGOs. ACs provide access to loan services within ACs, for working capital with low or 0% interest rates. They also provide technical support to deliver training to farmers, and the relationships between members have helped ACs build better social capital, obtain more accurate information and better negotiate market prices.

FWUCs: FWUCs receive capacity-building assistance from the government and donor programmes. Based on FWUCs committee report, farmers are willing to adopt or add on new agricultural activities, such as growing vegetables during the dry season, especially during the break from rice production. However, concerns have been raised about water availability during the dry season.

Disaster Risk Reduction

Interviews with PDAFF and district staff in target areas found:

Committees for disaster management: are in place at provincial, district, commune and village levels to support, evaluate and solve issues related to natural disasters. A masterplan is established to mitigate the effects of disasters. The committee provides training on disaster prevention, risk assessment, disaster preparedness and emergency response.

Climate risk mitigation: there is a MAFF guideline on the impacts of climate change and how to mitigate the effects of storms, floods and droughts.

Training: PDAFF staff are trained on climate risk mitigation by GIZ, CSD, ASPIRE and other NGOs/projects. PDAFF staff transfer that knowledge to farmers from the respective programmes. Course content: how to find new water sources during droughts, how to protect fields from wind, how to select seeds based on the soil type and how to select seeds adapted to climate change.

Annual budget/Investment plan: important for districts to set priorities. In agriculture irrigation system rehabilitation and seeds adapted to climate change are prioritised. In addition, this presents the opportunity to analyse the investment and action plans of each target commune, and understand which activities are a priority and if resources are sufficient.

VI. Climate Resilient Agriculture Assessment

The climate resilient agriculture assessment covered Battambang, Banteay Meanchey, Oddar Meanchey and Preah Vihear. The assessment had the following objectives:

1. Map and assess the most potential climate resilient value chains in the targeted provinces and the systemic constraints across their market systems.
2. Characterise the farming practices and profile of farmers in selected value chains, as well as the main impacts from climate events
3. Identify products and services, in particular digital tools, that exists to disseminate climate resilient knowledge and information, and their effectiveness and efficiency.

Table 2: Assessed pre-identification production systems

RICE	• Main agricultural product cultivated for subsistence, with high potential in the four provinces. • High interest from the government: mechanisation, access to inputs, diversification, irrigation etc. • Organising farmers into cooperatives facilitates access to market and creation of FWUC to efficiently manage water resources.
CASSAVA	• Second largest crop produced and vital cash crop, high resilience to drought, with high potential in the four provinces, especially in upland areas. • Marketing is conducted by traders; farmers do not have influence on selling price. • Cassava requires considerable post-harvest effort but presents an opportunity to move up the value chain.
MAIZE	• High potential, especially in Battambang and Banteay Meanchey. • Most of the maize produced is for the feed industry (90%) and is sold directly to collectors, then circulated to Vietnam (80%) or local factories (20%). • Price fluctuation depends on neighbouring countries and the country only processes half of its capacity.
MANGO	• High potential, especially in Battambang and Oddar Meanchey. • Contractors are involved in the management of production, as well as collection and trading. • Low margin product, high price fluctuations and few companies processing and exporting (eg Misota Food Cambodia in Battambang).
VEGETABLES	• High potential in the four provinces, especially in Battambang and Banteay Meanchey. • High margin products but production is limited and a large quantity of fresh vegetables is imported from Vietnam. • Lack of access to information and market, limited technical knowledge to increase productivity.
SOYBEAN	• Minor crop, although the area planted has risen steadily, with high potential in Battambang and Preah Vihear. • Sold to collectors and small traders, who sell to large traders and onto Vietnamese or Thai traders. • Low price compared to other crops, but demand from other countries presents growth opportunity.
SESAME	• Drought tolerant crop, low fertiliser requirement. • Export in Vietnam, Japan, Thailand and China. • Profit changes drastically from year-to-year, depending on the weather.
CASHEW	• High potential in Preah Vihear and Oddar Meanchey. • Mainly cultivated in small plantations (2-5 ha), with about 95% of production informally exported, mostly to Vietnam. • Sector is poorly organised, but has growing demand in export markets.
LONGAN	• High potential in Banteay Meanchey and Battambang, with talks to start formal export to China. • Thailand is the main export market, but trade takes place through informal channels. • Contractors/collectors are involved in production management, collection, grading and trading.
POULTRY	• High potential in the four target provinces. • Mostly traditional and backyard systems, production is oriented toward local consumption. • Relative price stability, with seasonal spikes during celebrations

Impacts of climate change on productivity



The effect of increasing periods of drought and flood have already been observed on annual crops for several years. A complicating factor is the effect of La Nina and its counterpart El Niño, creating temporal climate effects. The effects of climate change and impacts vary across the different agricultural value chains, resulting in important loss of yields. For example, upland crops, such as maize and soybean, could be seriously impacted by prolonged droughts, flooding or rising temperatures. In addition, higher temperatures and increasing rainfall could also change, not only the spectrum of pests and diseases, but also the intensity. Higher temperatures may also affect flowering (for instance, maize has an upper limit of 30C) and pollination in both self-pollinated and cross-pollinated crops.

Table 3: Existing climate resilient agriculture practices

RICE	• Smallholder farmers mainly grow wet season rice as a monoculture, with dependence on rain-fed agriculture. • Use traditional varieties, but improved varieties represent the largest part of traded rice production. • Production predominantly manual, with little to no machinery used.
CASSAVA	• Cassava causes severe soil erosion; it is mainly cultivated as a monoculture. • Drought resilient and can survive in extreme conditions and requires low production costs. • Climate resilient practices observed: mostly cover crop, crop rotation and zero/minimum tillage.
MAIZE	• Cultivated in monoculture, with potential for two harvests a year if irrigation is available. • Maize production in upland areas is mainly done in a rain-fed system, not under irrigation. • Intensive use of pesticides, herbicides and fertiliser leads to water pollution and soil contamination.
MANGO	• Two harvests per year with the variety Keo Romeat. • Usually not irrigated and excessive use of chemical products. • Quite resistant to drought, but additional irrigation prevents crop damage and increases yields.
VEGETABLES	• Vegetables can be harvested year-round, but have a high sensitivity to pests and diseases. • Dependence on water; water saving solutions already used in some areas (e.g. drip irrigation). • High potential for diversification and adoption of agro-ecological practices.
SOYBEAN	• Rain-fed crop. • One harvest per year, possibility of two with irrigation. • Good for crop rotation, thanks to nitrogen fixation.
SESAME	• Cultivated from March to June, high capacity to resist droughts. • Farmers practice crop rotation, rotating cassava with sesame or maize. • Sesame is grown without irrigation and requires a low amount of fertiliser.
CASHEW	• Cashew trees come to full production capacity in five to seven years. • Use of high yielding varieties and usually not irrigated. • Crop usually associated with cassava during the first three years of cultivation.
LONGAN	• Sensitive to environmental conditions, irregular yields from year-to-year. • Irrigation systems are needed and potassium chlorate to induce flowering for off-season production. • Seeding trees take up to six years to bear fruit.

The situation analysis enabled the identification of key market barriers that limit adoption of climate resilient practices among smallholder farmers:

- Availability of technical knowledge is limited. Farmers have very little knowledge about possible mitigation strategies, which could be improved through the implementation of adapted extension services.
- Extension services are still perceived as inadequate. Agricultural extension services are limited, farmers often rely on each other and other actors in the VC network for decision-making information.
- Even if irrigation infrastructures exist, most farmers produce under rain-fed systems and said access to water remains a key issue, especially during the dry season.
- Access to finance remains a key challenge. High interest rates, hard collateral and weak financial education are key constraints that limit farmers access credit.
- Access to market is limited and VCs are poorly organised, with a network of informal market stakeholders, low negotiation power from farmers and the absence of mechanisms to face potential market failures.
- Remarkable progress has been made in climate change policy. But difficulties remain due to limited understanding of the impacts of climate change at institutional levels, limited information and resource availability, lack of coordination between public and private entities, and insufficient financial support.

Public and private sector involvement

The involvement of stakeholders from the private and public sectors to provide services that contribute to the adoption of climate resilient practices has been assessed.

Private sector: there are very few products or service providers offering climate resilient solutions. Their scale of operations is limited and the main focus is on rice. Equipment and service costs are higher than conventional practices and the level of awareness is relatively low, which requires time to demonstrate the effectiveness and generate interest among farmers.

Public sector: existing systems to support the uptake of climate resilient practices are mainly provided through inadequate extension service systems. Ongoing initiatives dedicated to support the transition toward sustainable agriculture are often project-based and supported by development partners. For example, the Conservation Agriculture and Sustainable Intensification Consortium(CASIC), a national mechanism under MAFF, promoting conservation agriculture practices through knowledge management, coordination, promotion and research. The MetKasekor model is currently being piloted, focusing on sustainable agriculture involving public institutions, private sector, agricultural cooperatives and farmers.

Existing digital tools for climate resilience

Digital solutions and tools were assessed by characterising the service providers, profiles of farmers, operation and processes, service accessibility etc. Information services, data-driven agriculture services and financial services were considered. The remaining constraints inhibiting the wider digitalisation in the sector and limiting adoption of these tools were identified.

- Limited knowledge and capacity were key factors limiting the use of digital tools by service providers, who face challenges to update online platforms with quality information, promote apps or digital tools, or have to cover costs to run the digital services, and from farmers who are often not aware of the potential benefits of digital services and do not have the capacity to use smartphones.
- Various initiatives have been implemented in recent years, but these efforts were mostly small-scale, project-based and unconnected. There is no unified platform developed for digital agriculture technologies that can be used jointly by the government, farmers, private sector actors and development partners.
- Another key challenge was the underdeveloped internet infrastructure in rural areas. Even if phone and internet coverage has reached a wide segment, internet is mainly used for entertainment. The slow internet speed is a challenge discouraging farmers from using e-commerce and digital payment services.
- The lack of meteorology infrastructure and accurate and accessible data across the entire country was also identified as a key constraint, especially to predict outcomes and develop legitimate commercial index-based crop insurance schemes.

VII. Climate Risk and Proofing Studies

Objectives of the assessment and methodology

Several tools were applied to assess the planned project's exposure to risk from climate change, environmental degradation and natural hazards, as well as whether its interventions could further exacerbate GHG emissions, environmental degradation or risks of natural hazards.

Starting with a CEDRIG light study, the overall extent of climate risk was discussed in an expert group. Based on these recommendations, a large stakeholder workshop used the AdaptFast approach to identify suitable adaption options for the provinces and assess its strengths, weaknesses, opportunities and threats, including budget and monitoring implications. To sustain the adaptation options and assess the impact, a climate corridor analysis was conducted to add the climatic perspective to the selected crops and value chains. Further assessment of potential GHG emissions showed that depending on the uptake of the individual irrigation and agricultural practices, the project's induced emissions or reductions need close monitoring to identify how mitigation effects may be achieved, if at all.

The Rapid Risk and Impact Screening based on the CEDRIG light served as an initial filter to assess whether the Nurture project was potentially at-risk due to climate change, environmental degradation or natural hazards. The objective of this study was to test the interplay of already successfully piloted approaches contributing towards greater resilience to climate change and obtaining proof of concept for their replication under the project and its context.

The main activities screened were: institutional capacity building around irrigation and agricultural value chains, supporting and improving irrigation infrastructure operation and maintenance, crop diversification (alternatives to rice monocropping), improve water governance through IM Toolbox for irrigation and replicating successfully piloted cropping calendars.

Key findings

A risk and impact perspective revealed the different hazards, their exposure in the context of the project and possible consequences, and indicate the likelihood, extent and risk level of each hazard.

Deforestation: extremely harmful risk of climate change, with multiple negative impacts (loss of agricultural productivity, pest, diseases due to loss of biodiversity). An increase of agricultural land will benefit food production and livelihoods but negatively impact forest-dependant people.

Degradation of land, soil and ecosystems: loss of productivity and increase of pests due to negative changes in key conditions for agricultural production are very likely, extremely harmful and high risk.

Soil pollution: can be harmful in some areas but not for all due to excessive use of pesticides/fertilisers in rice paddies. This is a likely hazard with a high risk.

Water pollution: can be harmful in some areas but not for all, with very likely impacts that have a high risk on rivers/ ground water due to excessive use of pesticides/ fertilisers in rice paddies.

Pests and epidemics: a very likely, high risk of reducing agricultural productivity, with extremely harmful consequences.

Droughts: high risk of reduced agricultural productivity, including crop failure and a negative impact on livestock that poses an extremely harmful threat.

Floods: high and extremely harmful risk of multiple and combined consequences, including destroyed fields, human and animal lives, agricultural assets, crop failure and property damage.

General trends: medium yet harmful risk of seasonal changes in temperature, increased demand for irrigation (water) for some crops, such as vegetables and upland crops.

Shift in seasons: extremely harmful and high risk of multiple intertwined consequences, including crop failure, decreased yields and increased poverty.

Based on the above listed hazards, a detailed risk assessment was requested. This was additionally required as the impact perspective highlighted potentially negative, as well as positive, impacts due to the diversity of interventions and the ambiguity of environmental and economic effects of improved or simply extended irrigation.

As a consequence of the CEDRIG light study, a three-day workshop on planning Adaptation Measures took place, applying the AdaptFast® Methodology. A total of 69 participants across all stakeholder groups and sectors identified main hazards, impacts and preferential adaptation options for the individual project provinces, and laid the basis for the work planning and negotiations with potential implementation partners.

As an additional safeguard to consider long-term climate risks and effects, a detailed climate data analysis scrutinised the climate corridors of the identified main crops and farming systems for their suitability in the light of expected warming and higher frequency of extreme weather events. The analysis highlighted the importance of sustainable water management to cope with droughts and floods that would otherwise destroy rural smallholder systems completely.

Applying the Ex-Ante Carbon Balance Tool (EX-ACT) for the envisaged interventions and activities has confirmed the assumption that the acceptance of agroecological practices, agroforestry approaches and carbon-sensitive rice production could significantly reduce the current and expected GHG emissions, yet economic and social framework conditions may also lead to constant or even increasing emissions if the incentives for extended conventional farming override the long-term benefits of sustainable climate resilient agriculture. The studies highlighted the relevance of climate considerations in the selection of interventions and partners based on a substantial improvement of water governance and management.

VIII. Feasibility Assessment for the Establishment of an Incubation and Acceleration Programme for Startups in the Climate Resilient Agriculture Space

The Entrepreneurial Ecosystem

The private sector holds the potential to build smallholder farmers' climate resilience by enabling access to climate resilient services and products. In the last decade, Cambodia's entrepreneurial ecosystem has experienced a rapid increase of socially-oriented startups and companies, incubator and training programmes, as well as other business-support services. Despite rapid private sector growth, startups and companies still face a range of challenges that prevent them from further expanding products and services – including climate resilient solutions for agriculture – to more rural and remote areas. This assessment explores the role that entrepreneurship and the entrepreneurial ecosystem can play in strengthening smallholder farmers' resilience to climate change, and the current constraints and opportunities. It examines existing access to knowledge, technical assistance and networks, as well as coaching and mentoring for startups/companies in the climate resilient agriculture space.

Methodology

The study looked at macro data from desk research and in-depth interviews. Interviews were held with selected entrepreneurs working in the climate resilient agriculture space, along with select support organisations, such as impact and traditional investors (e.g. banks), research institutes, INGOs and development agencies. Ecosystem Mapping was also conducted, with a visual map of the key players and their roles in the ecosystem. Together this informed the recommendations and proposed design of the appropriate incubator/accelerator-type of initiatives.

Startup Stages: to help frame patterns emerging from the diverse entrepreneurs/ businesses in this study, the startup maturity framework is used to contextualise insights and explore commonalities and nuances across stages.

Prototyping: this stage includes startups that have built an initial prototype of their product/service and are currently testing it with potential clients. However, they have not yet generated any sales.

Early Operational: this stage includes startups that have generated some sales and gained market traction with their product/service but are not yet profitable.

Operational: this stage includes startups that have generated stable or increasing profits over a longer period of time.

Mature: this stage includes startups that are looking to expand their current operational base/market reach or want to establish one or more new branches locally or internationally.

Key Findings

A broad overview of common business challenges among startups is provided below:

Common business challenges among startups: consistent with what is generally understood in the ecosystem, themes on common challenges emerged from the interviews with entrepreneurs.



Specific constraints for startup expansion to Battambang, Oddar Meanchey, Preah Vihear and Banteay Meanchey

Finding a trusted local partner: the presence of a trusted local partner is a key consideration for most entrepreneurs as trust mitigates the perception of risk.

Market size and domestic potential return on investment (ROI): there is a perception that these four areas do not have a significant market size for a proportionate ROI, with the exception of Battambang.

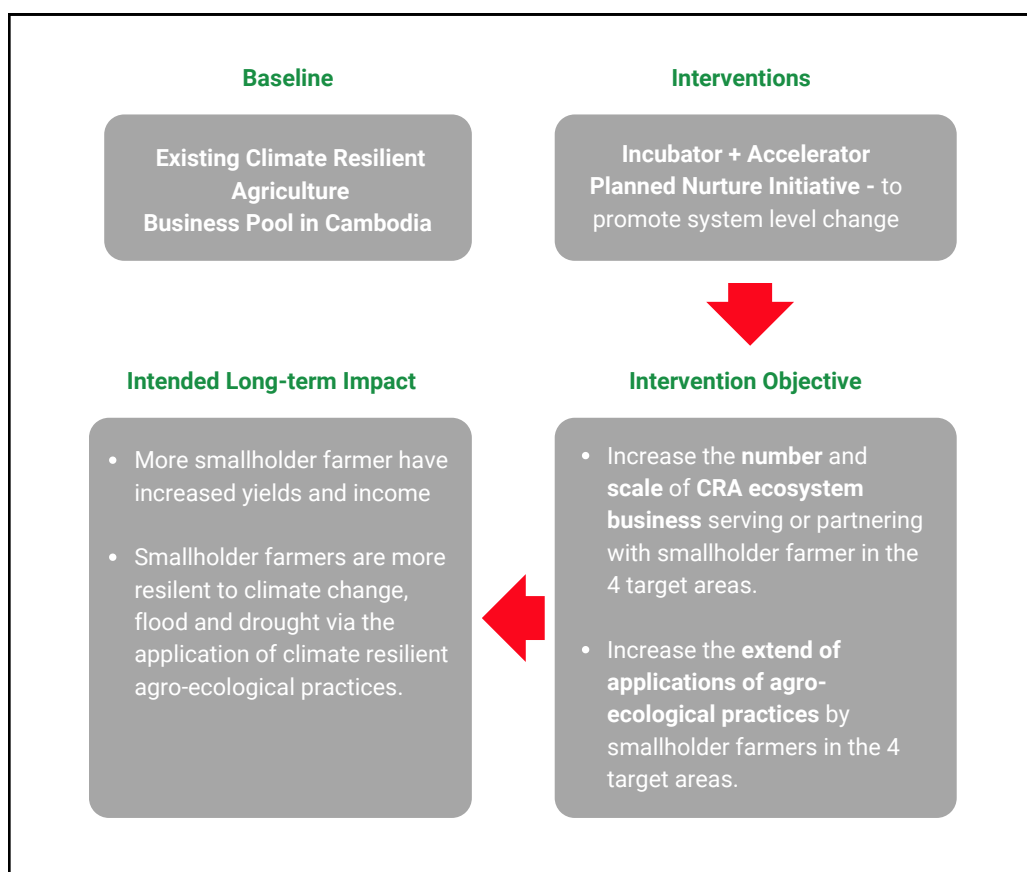
Limited capacity of product supply: plenty of the interviewed businesses can only produce their products to supply in a few Cambodian provinces due to VCs or logistical hurdles of moving materials/products.

Recommendations

To maximise the return on impact based on identified demand and growth stages, climate resilient agriculture companies that are in early operational and operational stages would be the ripest to support, and the most likely to show tangible progress in a short period of time.

Incubator: support entrepreneurs in developing and strengthening a Minimum Viable Product (MVP) of a business that supports or integrates climate-resilient agriculture practices.

Accelerator: speed up the scaling of existing operational businesses to get them to a mature stage where they achieve a stable and sustainable threshold of performance and impact while integrating CRA practices.



IX. Water Governance Study



Objectives of the assessment

The overall goal was to look at water governance aspects in irrigation and agriculture. The assessment had the following objectives:

1. Assess all relevant **stakeholders** at sub-national and national level, including civil society, government and private sector, focusing on their roles and responsibilities, capacities, interests, influence and power dynamics (with a special focus on the roles of women and vulnerable groups).
2. Explore **governance** practices, processes, institutional and regulatory frameworks.
3. **Propose strategies** to involve stakeholders to better address identified bottlenecks and challenges, and present a framework with indicators and feasible targets for the project.

Methodology

The study applied three approaches in the four target provinces. A literature review was conducted to elaborate on the current situation and to source general information about the governance aspects in irrigation and agriculture. Moreover, focus group discussions and key informant interviews were conducted with stakeholders from NGOs, Nurture project staff, government representatives, local authorities, farmers and members of FWUCs.

At the beginning of the research, various governance indicators were drafted for the project. These were then modified at the end based on the findings of the study.

Key findings

Governance analyses of water and irrigation

- **Legal frameworks:** to ensure effective and sustainable uses of water resources in Cambodia, the government has set up various legal frameworks, laws and policies. However, challenges still remain with implementation, such as providing further financial and technical support.
- **Operation and management process of FWUCs:** FWUCs were created under the coordination of PDOWRAM. Therefore, it is recommended that PDOWRAM develops a work plan for the operation and management of the irrigation system with FWUCs and provide them with training.
- **Capacities of FWUCs:** it is a challenge for farmers to clearly understand their roles and responsibilities and to follow through all their obligations under the FWUCs. Further, FWUCs do not have their own budget and therefore rely on members to contribute money for irrigation system maintenance.
- **Collection of irrigation service fees:** every year, members give some small amounts of money to FWUCs for the operation and maintenance of the system. Thus, fees collected can sustain FWUCs throughout the year. This only applies to functioning FWUCs.
- **Budget and funds for FWUCs:** after establishment, FWUCs have to look for both technical and financial support on their own.
- **Cooperation and collaboration of FWUCs:** FWUCs work closely with local government authorities, especially at commune and district levels. Moreover, they are connected with other provinces through Telegram channels they created.

Relevant stakeholders

- **National level:** MOWRAM, MAFF, donors, funding agencies (e.g. World Bank, ADB), NCDD, MOI.
- **Provincial level:** provincial governors, PDOWRAM, PDOAFF.
- **District level:** district governors, district office of agriculture, national resources and environment, civil society organisations and other associations.
- **Commune level:** local commune councillors, commune chiefs, village chiefs, civil society organisations, NGOs, AC members, private sectors and farmers.

Bottlenecks and challenges

The governance of water and irrigation systems still face a lot of challenges, which are outlined below. Greater support from government, donors and development partners are key to respond to these challenges.

Limited capacities of FWUCs: FWUC members are often unaware of their roles and responsibilities. The inefficient collection of irrigation service fees, limited human resources, lack of participation in decision-making, water use conflicts, and poor maintenance of irrigation systems are challenges to be addressed.

- **Gender issues:** at the local community level, participation of women in many activities is lacking. Furthermore, at district, provincial and national levels, the numbers of female representatives in leadership roles and positions remain low.
- **Limited data:** up to now, there are gaps in data on the total number of irrigation schemes, established FWUCs, functioning FWUCs, and non-functioning FWUCs throughout the country.
- **Coordination issues:** the district office of agriculture does not yet have staff responsible for water and irrigation systems. Support is typically provided directly by PDOWRAM. There are opportunities to engage district level officials.
- **Limited private sector participation:** the participation of the private sector in water and irrigation management is still relatively limited.
- **Problems with farmers:** farmers face varying challenges, e.g. those with land next to the irrigation system do not always share the water with others.

Recommendations

The government and development partners need to provide more support to FWUCs to enable them to fulfil their roles and responsibilities. The following recommendations and strategies are suggested for the Nurture project to address the challenges:

- capacity building to FWUCs,
- crop diversification to maximise returns and profits,
- gender mainstreaming and empowerment,
- support for the sustainability of FWUCs,
- further data collection and analyses on FWUCs.

X. Gender and Social Inclusion Assessment

Cambodia's vulnerability to climate change, especially due to its reliance on rain-fed agriculture, could impact its GDP and poverty reduction efforts. Women, poor groups and female-headed households are particularly affected due to smaller landholdings, fewer income sources and less social capital. Considering the importance women play in shaping food systems and their exposure to the impacts of climate change, Nurture undertook a gender and social inclusion assessment. The assessment was conducted during the inception phase in the project's target provinces.

Objectives

- Analyse how men and women have different roles, needs and power relations.
- Identify gender inequalities and discrimination in the intervention context.
- Assess the impact of the intervention on gender equality and women's rights.
- Provide recommendations for gender-responsive objectives, activities and indicators.

Key findings

- Food crop and vegetable growing is assigned to women for food security and nutrition. However, these roles limit women's mobility and restrict them to less profitable farming or business activities.
- Despite these constraints, women are involved in decision-making processes within families, although men often have the final say on major matters.
- Advanced technologies have reduced women's roles in crop production but increased their domestic responsibilities. This shift is more pronounced as men migrate for alternative income sources.
- Women are particularly vulnerable to climate change due to unstable income sources, limited access to protection and information, and weak social safety nets.
- Women's roles in managing household resources position them well to contribute to environmentally adaptive livelihood strategies. However, their contributions are limited by lack of information, more limited access to planning processes and care obligations.
- Many female farmers are shifting towards commercial agriculture and agroenterprise to supplement household income.
- Participation in farmer cooperatives can help improve farming techniques, marketing strategies and access to credit. However, issues such as poor leadership can hinder the effectiveness of these cooperatives.
- Microfinance loans can be beneficial for investing in agricultural inputs if farmers have a clear understanding of loan repayment requirements. However, there are concerns about the ability of poor female-headed households and vulnerable groups to repay these loans.

Recommendations

The Nurture project aims to support gender equality and women's empowerment through its interventions. To do so, it needs to adopt a gender-responsive and transformative approach that considers the different needs, roles and opportunities of men and women. The studies conducted identified four main areas:

Promoting gender awareness and mainstreaming in the Nurture project

- Develop a gender strategy that guides the project's design, implementation and evaluation.
- Set women quotas for project events and activities.
- Define gender indicators and targets for the project outcomes and outputs.
- Provide gender training, mentoring and technical support to the project team, partners, stakeholders and farmer groups.
- Allocate a gender budget to address specific gender priorities in the project.
- Appoint gender focal points from the project and local partners to coordinate and monitor gender mainstreaming efforts

Addressing gender challenges in agriculture

- Support women's leadership and representation in community groups and farmers' associations.
- Improve market information platforms and policy information for men and women smallholders.
- Enhance knowledge and skills on business development, financial literacy and gender awareness for community enterprise groups and associations.
- Conduct separate stakeholder or farmer consultations for women and men to address their specific concerns and needs.
- Promote the best practices and success stories of women smallholders, producers and traders in climate resilient agriculture through media and digital media platforms.

Addressing gender challenges in water governance:

- Fairly distribute resources and benefits among men and women smallholders and FWUC representatives.
- Involve women farmers in the design, consultation and planning process of related water interventions, and allow them to express their concerns and needs.
- Support community groups in fostering equal participation, voice and leadership in the farmer water user associations.
- Review FWUC regulations to enable women to apply for leadership positions in the committee.
- Reserve a percentage of seats with voting power for women in water user committees.
- Select a gender-sensitive chairperson for relevant meetings and election meetings.

Gender considerations related to hazards and risks from climate change

- Provide practical guidance for community members to identify and reduce climate risks and hazards, including information on how to relocate to safe zones.
- Develop gender-sensitive learning materials that are easy to understand and use for children and illiterate people.

The recommendations were integrated in the Nurture project in the form of a Gender Action Plan and are cross-cutting issues of the project's implementation.

XI. From Analysis to Project Design

- The Nurture project was designed based on the studies conducted. The project identified three main intervention areas focusing on (i) local water governance; (ii) policy and planning on climate adaptation; (iii) climate resilient agriculture.

Intervention Area 1 – Local Water Governance:

- The Nurture project aims to improve the use and management of water and land for irrigation systems, with a focus on inclusiveness. The project will analyse the challenges and constraints of irrigation systems, the roles and responsibilities of different stakeholders, and the financing mechanisms for rehabilitation and operation and maintenance. The project will also promote crop diversification for greater climate resilience and explore the role and potential of private sector water management service providers.

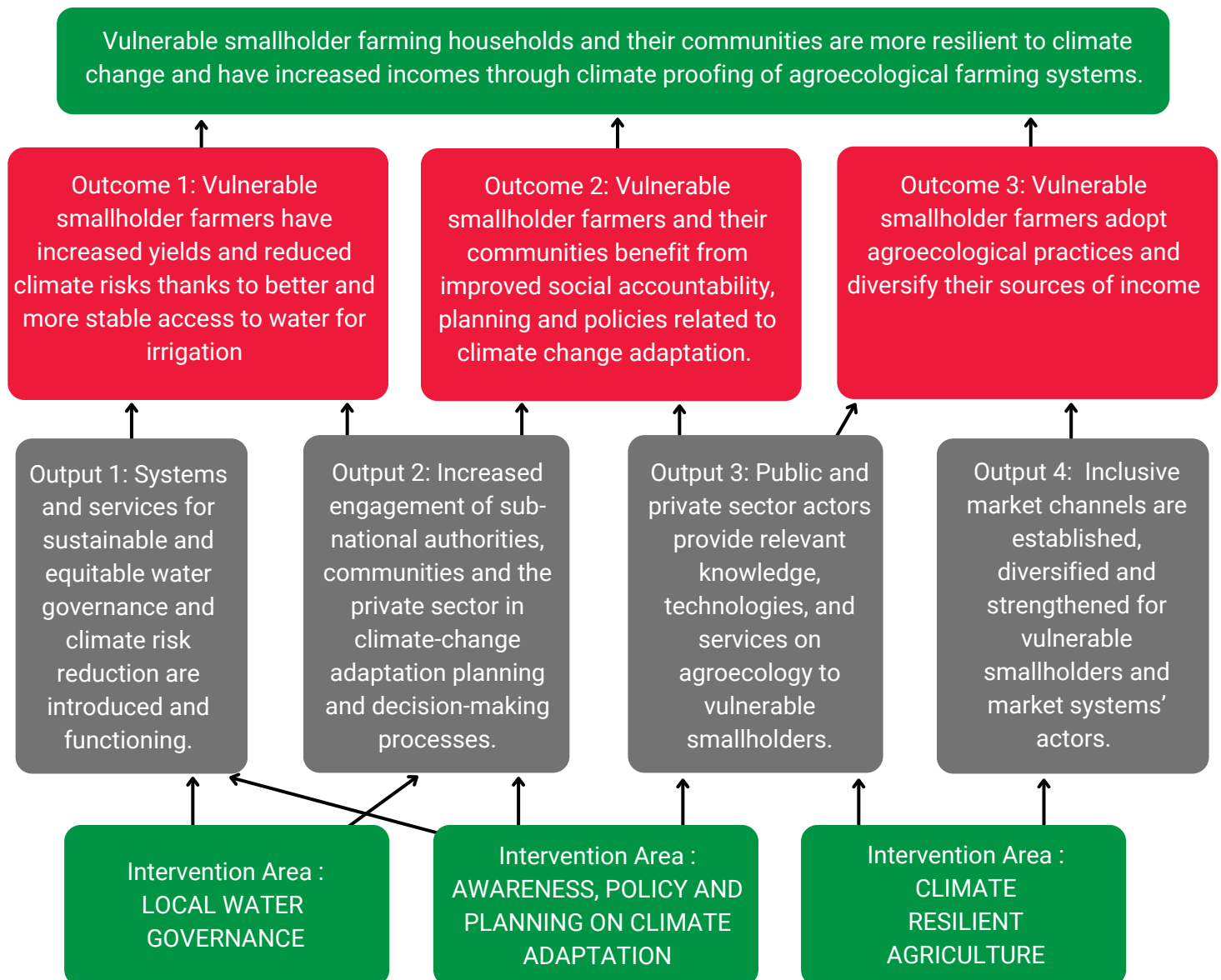
Intervention Area 2 – Policy and Planning on Climate Adaptation:

- This intervention aims to raise awareness and support planning for climate resilient actions among commune and district-level decision makers. The project integrates technical inputs from water governance and climate resilient agriculture with evidence-based knowledge on climate change, risk reduction, inclusion and conflict sensitivity. The project also engages with the public and policy makers through various platforms, networks, partnerships and communication channels. The roll-out of early warning systems for disaster risk reduction will be supported.

Intervention Area 3 – Climate Resilient Agriculture:

- This intervention aims to promote climate resilient and agroecological practices across different sub-sectors, as well as increase access to markets for smallholder farmers. The intervention leverages public and private sector actors to enable increased access to extension services, as well as climate resilient products and services. Startups in the climate resilient space will be supported to expand products and services to Nurture's target areas. The intervention promotes both diversification of income and farming systems, while ensuring increased access to markets.

Nurture's Intervention Logic and Theory of Change



The Nurture project welcomes cooperation with other organisations, companies and development partners who share the same goals. Contact details can be found below.

Mr. Winfried Suess

Team Leader - Nurture Project

Nurture Project Office Siem Reap

Concrete Drain Road, Svay Dang Kum,
171202 Siem Reap, Cambodia

Tel: +855 92974853 (Telegram)

Email: winfried.suess@heks-eper.org

