SMARTFARM - A data and digital technology driven and farm management solution for climate resilience.

Part I: Project Information

GEF ID
10965

Project Type
MSP

Type of Trust Fund
LDCF

CBIT/NGI
CBIT **No**
NGI **No**

Project Title
SMARTFARM - A data and digital technology driven and farm management solution for climate resilience.

Countries
Regional, Ethiopia, Rwanda

Agency(ies)
IFAD

Other Executing Partner(s)
Cropin Technology Solutions B.V.

Executing Partner Type
Private Sector

GEF Focal Area
Climate Change

Taxonomy
Focal Areas, Climate Change, Climate Change Adaptation, Climate resilience, Livelihoods, Climate information, Least Developed Countries, Adaptation Tech Transfer, Community-based adaptation, Innovation, Influencing models, Demonstrate innovative approache, Strengthen institutional capacity and decision-making, Stakeholders, Private Sector, Financial intermediaries and market facilitators, Beneficiaries, Type of Engagement, Partnership, Information Dissemination, Local Communities, Civil Society, Community Based Organization, Communications, Awareness Raising, Gender Equality, Gender Mainstreaming, Women groups,

Sex-disaggregated indicators, Capacity, Knowledge and Research, Capacity Development, Knowledge Generation, Knowledge Exchange

Sector
AFOLU

Rio Markers
Climate Change Mitigation
Climate Change Mitigation 0

Climate Change Adaptation
Climate Change Adaptation 2

Duration
36 In Months

Agency Fee($)
77,856.00

Submission Date
5/26/2022

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount($)	Co-Fin Amount($)
CCA-1	LDCF	819,536.00	3,650,000.00
	Total Project Cost ($)	**819,536.00**	**3,650,000.00**

B. Indicative Project description summary

Project Objective

The main objective is to make real-time weather and climate data along with data-driven farm advisory available to smallholder farmers, hence increasing adoption of climate resilient agriculture practices and enhancing rural communities' resilience to climate change.

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
Component 1: Deployment, adoption and scale up of SMARTFARM for increasing climate adaptation and resilience of 200,000 SHFs including women with help of 2000 village/agri entrepreneurs following a gender responsive approach.	Investment	Climate adaptation and resilience of 200,000 smallholder farmers (including 50% women) in Rwanda and Ethiopia improved through integrating a scalable, sustainable, and replicable digital platform ? ?SMARTFARM? to provide climate and agri advisories to smallholders.	1.1 Baseline information on 200,000 SHFs with the help of 2000 village/agri entrepreneurs associated with IFAD Country programmes and support organizations on-boarded on SMARTFARM platform. 1.2 A digital climate adaptation platform is developed and deployed for last mile delivery of services encompassing (a) weather and climate services (WACS), (b) data driven agriculture services (DDAS) 1.3 200,000 farmers have access to climate smart production inputs and practices. The service offering extends for a period of one year to smallholder farmers.	LDCF	600,000.00	2,700,000.00

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
Component 2: Capacity building of lead farmers focusing on women and youth and rural organizations and institutions/producer organizations, and implementation partners for knowledge and asset transfer through 2,000 extension workers (agri-preneurs) associated with IFAD Country programmes and support organizations.	Technical Assistance	Capacities of smallholder farmers, agri-extension workers and farmers led organizations are improved through capacity building and transfer of assets and knowledge on SMARTFARM	2.1 Onboarding and training of 2,000 agri-extension workers/Lead farmers from IFAD country programmes with a target for 50% women participation to use and scale agri advisories to smallholder farmers is completed.	LDCF	100,000.00	400,000.00

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
Component 3: Creation of partnerships, knowledge and tools for promoting intra-engagement of off-takers, buyers and institutions for credit and market linkage, and scaling up and replicating the model with member countries	Technical Assistance	Engagements and partnerships with (i) off-takers, buyers and (ii) financial institutions, (iii) Govts, and (iv) private sector is improved through effective dissemination of knowledge, data and evidence for better (a) risks and benefits sharing; (b) market linkages; (c) climate resilient input access; (d) credit linkages; (e) index-based climate insurance cover age (safety nets); for smallholder farmers and scaling to other regions	3.1 Knowledge management system will be setup including the form of (i) knowledge management platform (microwebsit e, web-page or a mobile application) to store, organize and manage knowledge products (reports, case studies, guides, how-to-do notes, technical briefs, blogs, videos, webinars, etc.); This will be hosted by implementing partner during the grant duration and supported by IFAD funded programmes in Ethiopia and Rwanda/ (ii) the data and evidence from Component 1 and Compone nt 2 are documented to: (a) enable participation of off-takers and buyers and financial	LDCF	69,536.00	327,350.00

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount($)	Co-Fin Amount($)
				Sub Total ($)	**769,536.00**	**3,427,350.00**
Project Management Cost (PMC)						
				LDCF	50,000.00	222,650.00
				Sub Total($)	**50,000.00**	**222,650.00**
				Total Project Cost($)	**819,536.00**	**3,650,000.00**

Please provide justification

LDCF Sub-Total: The exact costs per country will be based on the number of farmers supported in each country and will be finalized during the development of the full proposal.

C. Indicative sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
GEF Agency	IFAD	Loans	Investment mobilized	2,000,000.00
GEF Agency	IFAD will support in the form of staff time, coordination and management of activities and support to capacity building, knowledge development and dissemination	In-kind	Recurrent expenditures	400,000.00
Private Sector	CropIn (Staff time)	In-kind	Recurrent expenditures	250,000.00
Private Sector	CropIn	Grant	Investment mobilized	1,000,000.00
			Total Project Cost($)	**3,650,000.00**

Describe how any "Investment Mobilized" was identified

IFAD: discussion with Countries teams and identification of synergies with existing and forthcoming projects of IFAD in the same countries, and estimation of % of IFAD projects that can be mobilized to support the implementation of the present project. The digital platform cost per farmer per year is around $12-15 for Weather and Climate Information Services (WACS) and Data-Driven Agriculture advisory Services (DDAS). It goes up to $20 per farmer per year engagement if including pest and disease early warning systems in some of the projects. Firstly, CropIn is contributing $5 per farmer per year engagement cost as co-financing for WACS and DDAS, which makes it a total of $1M for technology cost, which have been subsidized for 200,000 SHFs. This is again exclusive of the cost involved in the regular updating of the platform, which is shared with all the clients. Secondly, in terms of human resource, CropIn is committing Project Director?s and other personnel?s costs including that of technology, data science, solution experts to the tune of $250,000 as in-kind support for the project duration. Additional mobilized investment of 8-9 M USD is expected from the private sector during later stage of project implementation. Additional information will be provided at Full Proposal Stage.

D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)	Total($)
IFAD	LDCF	Regional	Climate Change	NA	819,536	77,856	897,392.00
			Total GEF Resources($)		**819,536.00**	**77,856.00**	**897,392.00**

E. Project Preparation Grant (PPG)

PPG Required **true**

PPG Amount ($)

50,000

PPG Agency Fee ($)

4,750

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)	Total($)
IFAD	LDCF	Regional	Climate Change	NA	50,000	4,750	**54,750.00**
			Total Project Costs($)		**50,000.00**	**4,750.00**	**54,750.00**

Meta Information - LDCF

LDCF true
SCCF-B (Window B) on technology transfer false
SCCF-A (Window-A) on climate Change adaptation false

Is this project LDCF SCCF challenge program?
true

This Project involves at least one small island developing State(SIDS). false

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This Project involves at least one fragile and conflict affected state. true

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This Project will provide direct adaptation benefits to the private sector. true

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This Project is explicitly related to the formulation and/or implementation of national adaptation plans (NAPs). true

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This Project has an urban focus. false

This Project covers the following sector(s)[the total should be 100%]:*

Agriculture	**60.00%**
Natural resources management	**0.00%**
Climate information Services	**30.00%**
Costal zone management	**0.00%**
Water resources Management	**10.00%**
Disaster risk Management	**0.00%**
Other infrastructure	**0.00%**
Health	**0.00%**
Other (Please specify:)	**0.00%**
Total	**100%**

This Project targets the following Climate change Exacerbated/introduced challenges:*
Sea level rise false
Change in mean temperature true
Increased Climatic Variability true
Natural hazards true
Land degradation true
Costal and/or Coral reef degradation false
GroundWater quality/quantity false

Core Indicators - LDCF

CORE INDICATOR 1	**Total**	**Male**	**Female**	**% for Women**
Total number of direct beneficiaries	200,000	100,000	100,000	50.00%

CORE INDICATOR 2

Area of land managed for climate resilience (ha)	0.00

CORE INDICATOR 3

Total no. of policies/plans that will mainstream climate resilience	0

CORE INDICATOR 4		**Male**	**Female**	**% for Women**
Total number of people trained	2,000	1,000	1,000	50.00%

Part II. Project Justification

1a. Project Description

Overall the project aims to :

I. Deliver services to 200,000 smallholder farmers (beneficiaries) and their organizations in two least developed countries (LDCs), namely Rwanda, Ethiopia, and a third country in South-Eastern Africa (to be confirmed). This includes:

(i) End-to-End digitalization and streamlining of farm management modules for smallholder farmers in the two least developed countries on the SMARTFARM platform. This includes deployment and customization of the data-driven technology platform called ?SMARTFARM? by CropIn and collecting baseline data and information on smallholder farmers and farms to offer agriculture digital services in the two least developed countries associated with IFAD Country programmes and support organizations.

(ii) Evidence-based decision-making support system for smallholder farmers in the form of Access to Weather and Climate Information Services (WACS) and Data-Driven Agriculture advisory Services (DDAS) curated on the SMARTFARM platform.

(iii) Big data analysis of agronomy and input issues based on three-pronged data approach ?3PDA?: in-situ (farm and farm-derived), earth observation (EO)/satellite/remote sensing, and hyper local weather and climate project data from private sector and, global and local institutional service providers.

(iv) Mobilization, capacity building of 2000 agri-extension agents or the lead farmers as ?agri-prenerus? associated with the IFAD Country programmes and support organizations. The agri-preneurs network (1: 100 farmer) are responsible for the last

mile delivery of agriculture digital services and technology adoption for smallholder farmers. Special emphasis will be given to women and youth to become agri-preneuers and lead the change at the farm level.

II. Developing a sustainable, replicable, and scalable digital climate adaptation model that serves as a complete farm management solution offering a full-scale module of digital agriculture services:

(i) Build a proof-of-concept model and a learning case for a complete farm management solution and full-scale module of agriculture digital services for 200,000 smallholder farmers in the two least developed countries through 2000 extension workers::

1. Weather and Climate Information Services (WACS)
2. Data-Driven Agriculture advisory Services (DDAS),
3. Agri-Digital Financial Services (Agri-DFS), and
4. Digital Agriculture Market Services (DAMS)

(ii) Mobilization of additional funds to the tune of $8-10 million to provide a complete farm management solution and full-scale module of agriculture digital services for 200,000 smallholder farmers in the two least developed countries to increase their agri-worthiness from active participation and co-financing from the private sector, institutional donors etc.

(iii) Strengthen institutional capacity and build synergies with identified lead farmers? organization, farmer producer company, rural institutions, local meteorological organizations and government institutions for long-term asset creation and sustainability of the programme.

1) The Global environmental and/or adaptation problems, root causes, and barriers that need to be addressed (systems description):

1. ***The increasing volatility of weather patterns caused by climate change is posing significant challenges for smallholder farmers around the world.*** Agriculture is an income source for an estimated two-thirds of adults living in poverty[1][1], who typically lack the resources to maximize

yields and respond effectively to production challenges, such as adverse weather conditions, crop pests and disease. The smallholder farmers face increasing volatile climate***:***

a) Developing countries are experiencing 20 percent more extreme heat now than in the late 1990s.

b) Areas exposed to serious drought and flooding are expected to increase by up to 44 percent by 2050.

c) Higher temperatures reduce the amount of water available for crops by drying out air and soils, put stress on livestock, reduce labor productivity and increase pests and diseases for both livestock and crops.

2. ***The food and agricultural production of smallholder farmers*** is highly exposed to a wide range of climate changes and unpredictable local weather variations due to rising temperatures, heatwaves, unpredictable rains and depleting water which are intensifying the already formidable production and climate related risks. ***This results in increased food insecurity and livelihoods at risks:***

a) The number of people affected by hunger has been rising since 2014. In 2019, nearly one in ten people in the world were exposed to severe levels of food insecurity, in part due to climate shocks. Researchers estimate that climate change will depress growth in global yields by five to 30 percent by 2050[2][2].

b) In some African countries, yields from rainfed agriculture may have declined by as much as 50 percent by 2020, with smallholder farmers hit hardest.

c) Climate change is likely to raise food prices by 20 percent12 for billions of low-income people[3][3].

3. ***Smallholder production is vulnerable due to fragmented and small-size of lands, poor incomes, and limited or no access to climate resilient inputs and climate smart agriculture practice***:

a) Globally, 500 million farms are two hectares or less[4][4].

b) Two-thirds of adults living in poverty generate at least some of their income through agriculture.

c) Smallholder agriculture is typically rainfed, including 90 percent in sub-Saharan Africa[5][5].

d) Access to agricultural insurance or other formal safety nets is limited. In Sub-Saharan Africa, it is estimated that less than three percent of smallholder farmers are insured. In Asia, 22 percent have insurance[6][6].

e) Inputs such as improved seed and fertilizer are not widely accessible, keeping adoption low. For example, the adoption rate of improved maize across Africa is approximately 28 percent[7][7].

4. The variable production, absence of credible evidence on harvest and quality of the agri-produce, fragmented smallholder agriculture markets systems, have resulted in ***increased risks for off-takers and buyers (*markets) to participate with SHFs.** In particular, yields have been variable due to erratic climate events (e.g. flooding, droughts) occurring and smallholder farmers not having sufficient resilience for coping with the consequences.

5. ***Crop pests, diseases and weeds are identified as the greatest risk which are linked to climate and weather***. Losses due to pests and diseases are estimated at: 10-20% (preharvest); 20-30% (postharvest); and up to 100% for perishable crops and export crops. Examples of key pests are coffee wilt disease, cassava brown streak virus, and fruit flies.

6. ***Lack of (a) information on digital climate, agricultural and financial services; (b) assets;*** and ***(c) capacity of smallholder farmers and institutions*** further accentuate the risks and challenges faced by smallholder farmers due to climate change. Publicly available data from weather stations is sparse in most developing countries for instance with 4 stations operational in Rwanda and 7 stations in Ethiopia[8][8]. These sparsely distributed weather stations do not sufficiently present information regarding local weather conditions. Moreover, the information is not easily accessible for smallholder farmers.

7. ***Financial services that would support these investments, such as agricultural credit, and formal safety nets like agricultural insurance, are also not available to most smallholders***[9][9]**.** It is estimated that areas exposed to extreme weather will increase by up to 44 per cent by 2050, with affected areas experiencing reduced soil fertility and increased pest and disease pressures. As a result, there is a risk that growth in global yields could decline by as much as 30 per cent by 2050, driving up food prices and exposing millions more to food insecurity and hunger.

8. THE CONTEXT IN ETHIOPIA:

a) Ethiopia, a landlocked country in North East Africa, is largely arid and divided into three major climate zones, including (i) the alpine vegetated cool zones (Dega) with areas over 2,600 meters above sea level, where temperatures range from near freezing to 16?C; (ii) the temperate Woina Dega zones, where much of the country?s population is concentrated, in areas between 1,500 and 2,500 meters above sea level where temperatures range between 16?C and 30?C; and (iii) the hot Qola zone, which encompasses both tropical and arid regions and has temperatures ranging from 27?C to 50?C (WB, 2021)[10][10].

b) Ethiopia is a country enduring several environmental and socio-economic pressures. Most recently the World Food Program (WFP) published a report stating that the Horn of Africa is experiencing the most severe drought since 1981, impacting a total of 13 million people in the region (Ethiopia, Kenya, and Somalia)[11][11].

c) Agriculture is the backbone of the Ethiopian economy and contributes ~50 percent to the national GDP and more than 80 percent to the country?s exports. Furthermore, it is one of the main sectors of employment, with ~80% of the country?s population depending on the sector for their livelihoods. Notably, smallholder farmers produce 95% of the total quantity of main crops in Ethiopia (i.a. cereals, pulses, oilseeds, vegetables, root crops, fruits, and cash crops), on less than two ha of land each.

d) The vast majority of Ethiopian smallholder farmers are highly sensitive to climate change and variability as they rely on rainfall for agriculture production. Increasingly erratic precipitation patterns (in combination with droughts and increasing temperatures) have already been observed to result in reduced quantity and quality of agriculture produce with severe risks for food security and rural livelihoods. It is projected that variability of rainfall, in the absence of appropriate adaptation action, may cause an average reduction in crop yields for teff, wheat, and maize of 2.4%, 6.2%, and 10.8%, respectively, by 2050 at the national level (Zerssa et al., 2020).

e) Mean annual temperature is 22.6 (?C) and mean annual precipitation is 815.8 mm, for the latest climatology (1991-2020)). The average temperature in Ethiopia has increased by 1?C (2020 relative to 1960), with increases being most notable in the period June to September. The increase in mean temperature, in combination with the observed increase in the number of hot days, correlates with increased evapotranspiration, with implications for agriculture production and livelihoods. An overall decline has been observed in total annual precipitation, with increasingly erratic (intensity and frequency) precipitation events. Rainfall occurs during the summer months (April to September) with average climatic conditions presented in Figure 1.

f) Extreme weather events occurring in Ethiopia are mainly droughts and flooding, with several events occurring in the past 40 years as presented in Figure 2. These events impact annually from

10,000 up to 1 million people, as indicated in Figure 2. Especially drought events have a major impact on the population which is largely dependent on the agricultural sector for their income and food production.

g) It is expected that temperatures will continue to increase in East Africa in general and Ethiopia especially, with mean monthly temperature changes expected to increase by 1.8?C by the 2050s and by 3.7?C by the end of the century, under RCP8.5 (Table 1). Under RCP8.5, the total annual precipitation anomaly is projected to average +3.1 to +9.7 mm, depending on the time-scale (ibid.). Given the projected changes in weather patterns ? and ultimately climate ? informed and targeted adaptation action in the agriculture sector to adjust to changes in growing and harvesting cycles is becoming an absolute necessity.

h) It can be stated that Ethiopia is highly exposed to changes in climatic variables such as temperature and precipitation, both mean and extreme, and therefore requires urgent adaptation action to increase climate change resilience of agricultural production and livelihoods to observed and anticipated changes. The Notre Dame Global Adaptation Initiative?s ND-GAIN index ranks Ethiopia as highly vulnerable (rank 155 out of 182) to climate change and variability, which further highlights the need for urgent adaptation action.

i) It is predicted that in the future extreme weather events may occur more frequently with temperatures rising overall in Ethiopia. (Table 1)

Monthly Climatology of Min-Temperature, Mean-Temperature, Max-Temperature & Precipitation 1991-2020 Ethiopia

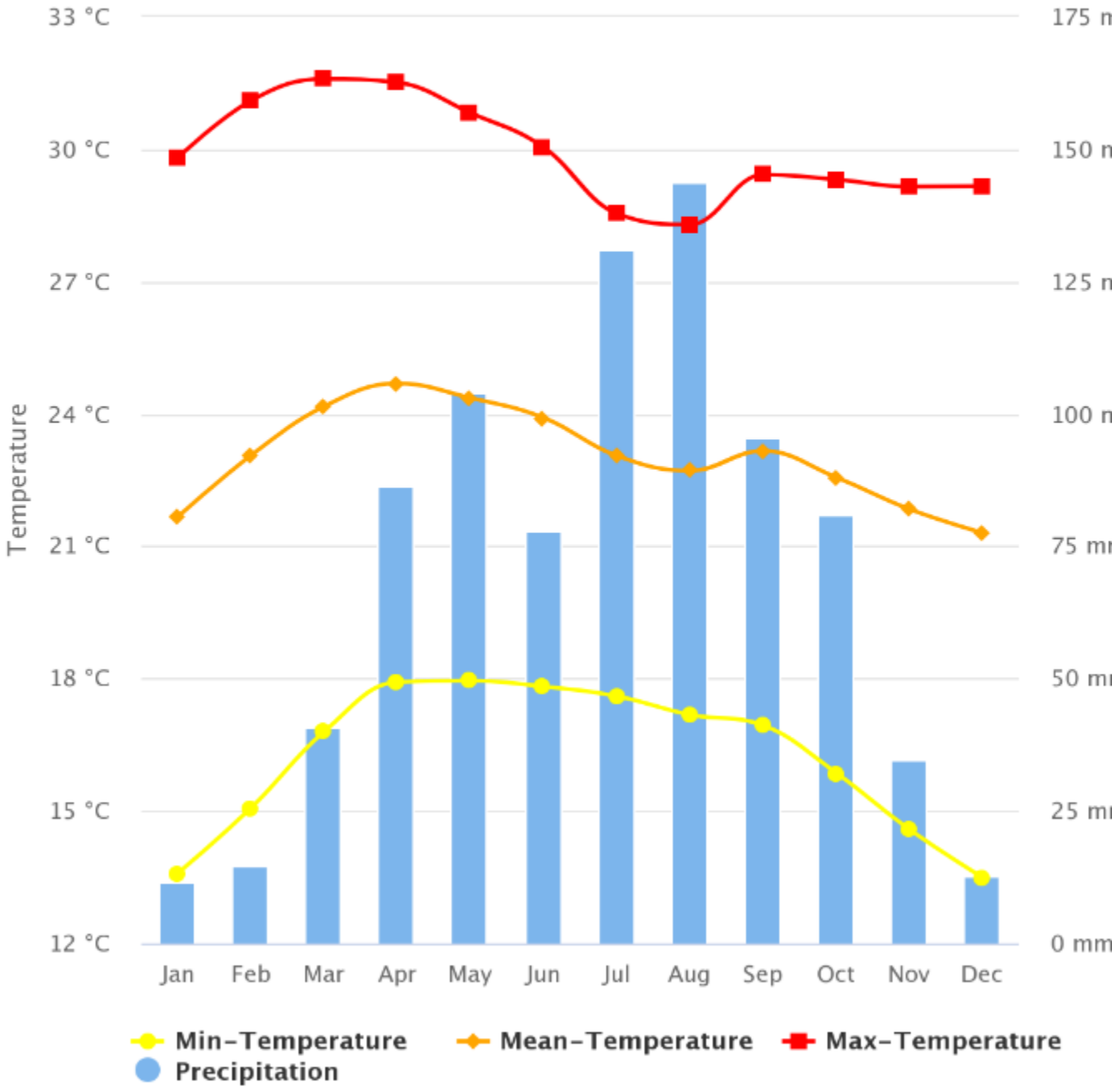

Figure 1: Climatic conditions of Ethiopia for 1991-2020 (Source: https://climateknowledgeportal.worldbank.org/)

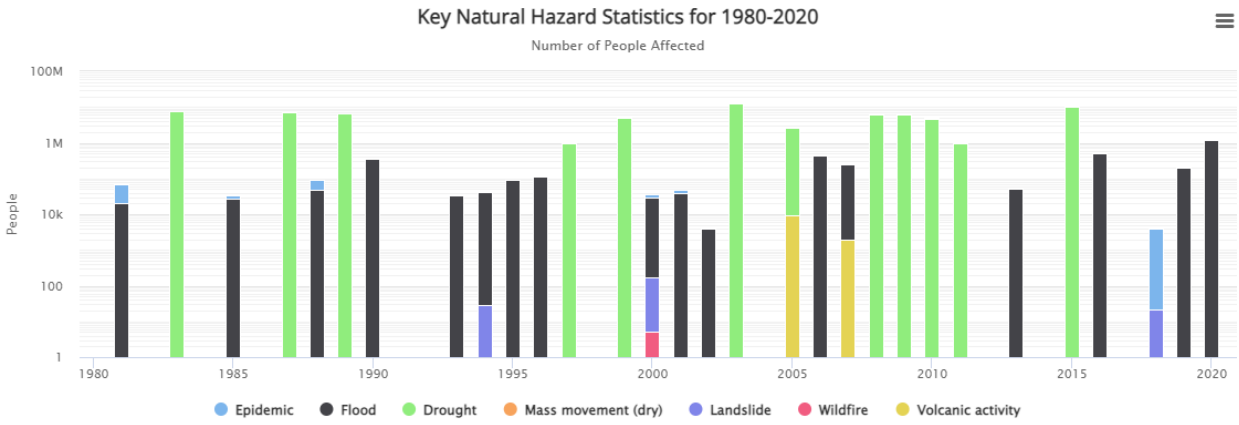

Figure 2: Natural hazard statistics of Ethiopia for 1980-2020 (Source: https://climateknowledgeportal.worldbank.org/)

Table 1: CMIP5 Ensemble Projection for Ethiopia (Source: Climate Risk Profile: Ethiopia (2021): The World Bank Group)[12][12]

CMIP5 Ensemble Projection	2020–2039	2040–2059	2060–2079	2080–2099
Annual Temperature Anomaly (°C)	**+0.6 to +1.5** (+1.0°C)	**+1.2 to +2.6** (+1.8°C)	**+2.1 to +4.0** (+2.8°C)	**+2.8 to +5.5** (+3.7°C)
Annual Precipitation Anomaly (mm)	**–14.4 to +21.2** (+2.2 mm)	**–16.8 to +27.4** (+3.1 mm)	**–18/8 to +37.6** (+6.0 mm)	**–17.5 to +50.0** (+9.7 mm)

Note: The table shows CMIP5 ensemble projection under RCP8.5. Bold value is the range (10th–90th Percentile) and values in parentheses show the median (or 50th Percentile).

9. **THE CONTEXT IN RWANDA:**

a) Rwanda is a small landlocked country and categorized into four climate zones: 1. The eastern plains (annual rainfall of 700 - 1,100 mm; mean annual temperature 20?C - 22?C); 2. The central plateau (annual rainfall of 1,100 - 1,300 mm, mean annual temperature 18?C - 20?C); 3. The highlands (annual rainfall of 1,300 - 1,600 mm; annual mean temperatures 10?C - 18?C), and 4. The regions

around Lake Kivu (annual rainfall of 1,200 - 1,500 mm; annual mean temperatures 18? - 22?). Overall, all four regions have traditionally experienced a long rainy season (March to May) and a short rainy season (September to November), as indicated in Figure 3. These seasons have alternated with the long dry season (June to August), and short dry season (December to February). The mean annual temperature for Rwanda is 19.1?, with average monthly temperatures ranging between 19.5?C (September) and 18.5? (July). Total annual precipitation is 1,170 mm. Rainfall is experienced throughout the year in Rwanda, with most significant rainfall occurring from September to May[13][13].

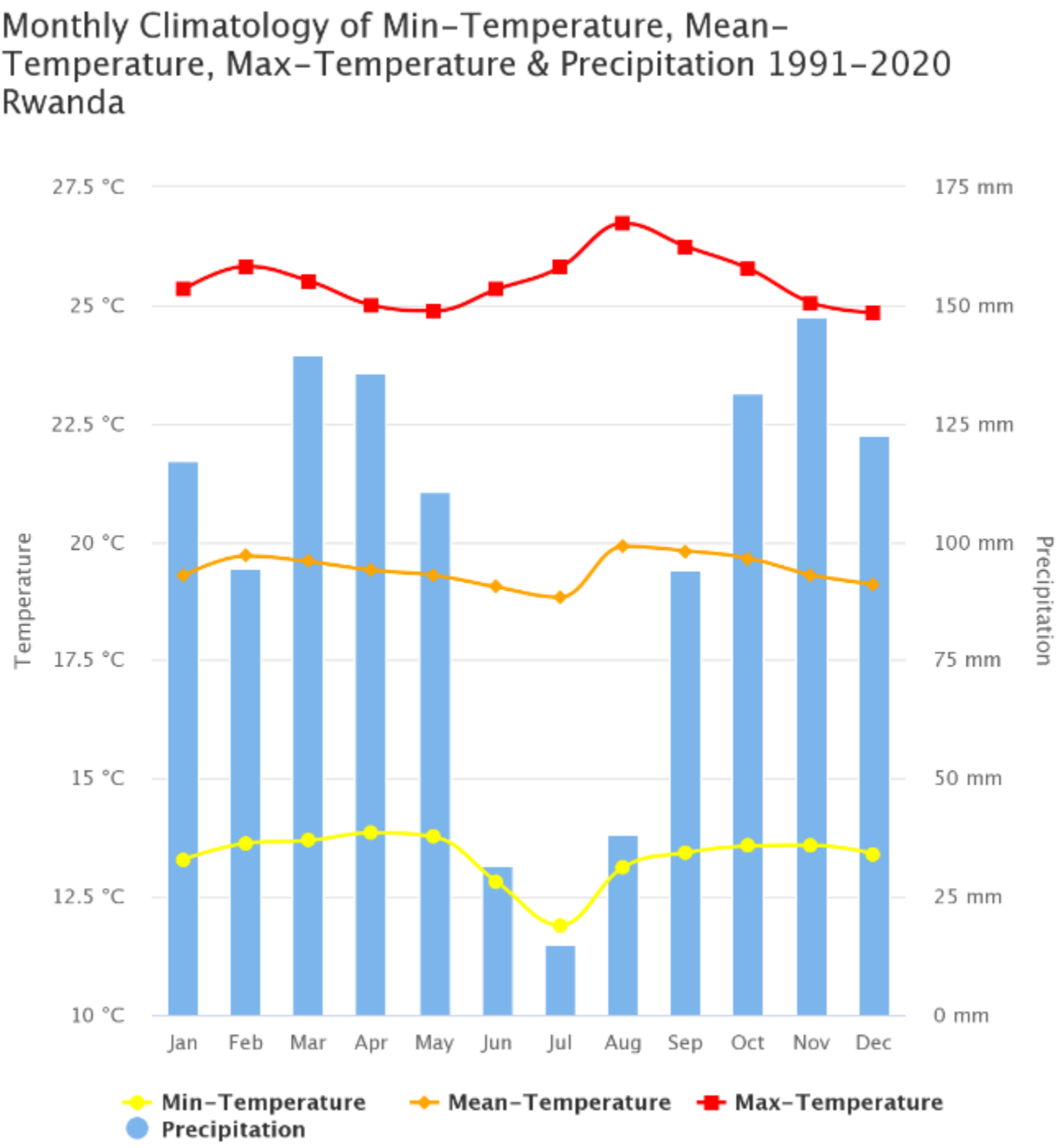

Figure 3: Climatic conditions of Rwanda for 1991-2020 (Source: https://climateknowledgeportal.worldbank.org/)

b) Rwanda?s agriculture sector is employing 70% of the total population and is contributing 31% to the GDP. Notably, 75% of Rwanda?s agricultural production comes from smallholder farmers, who play a key role in maintaining and preserving national and local food security and livelihoods. The average plot of land per smallholder farmer is ~0.5 ha, with agriculture being mostly rainfed. Main food and cash crops include coffee, pyrethrum, tea, beans, cassava banana, Irish potatoes, rice, wheat, and sugarcane[14][14].

c) Extreme events occurring in Rwanda are typically drought events, extreme flooding, and landslides.

d) Figure 4 shows the extreme events occurring the past 40 years which have become more frequent the past decade and impacting over 10,000 people annually. Those impacted by these events are often the rural poor.

e) Future projections (RCP8.5) indicate that the annual mean temperature is continuing to increase by +1.9?C (2040-2059) and +3.9?C (2080-2099). The projected annual precipitation anomaly various strongly, with the average indicating increased mean precipitation across Rwanda under RCP 8.5 (Table 2). Therefore, it can be stated that key climatic variables relevant for agriculture and dependent livelihoods are and will continue to become more erratic, with implications for rural livelihoods and food security, in absence of targeted adaptation measures.

f) The Notre Dame Global Aadptation Initiative?s ND-GAIN index ranks Rwanda[15][15] 124 (out of 182), with country 182 being the most vulnerable to climate change and the least ready to face its consequences. The index indicates that Rwanda is highly exposed and sensitive to long-term climate change as well as extreme events.

g) An 2021 IFAD published study[16][16] estimates that ? in the absence of appropriate adaptation measures ? bean production could be reduced by up to 30.000 tons/ year with total replacement costs incurred by Rwandan households of up to USD 15.9 million per year (by 2050). These reductions in bean production are influenced by changing rainfall patterns relative to the traditional agriculture calendar but could be addressed and partially offset by adjusting the timing of field preparations and sowing of seeds. Currently smallholder farmers do not have sufficient adaptive capacity to adjust to climate change and increasingly erratic variability and hence remain sensitive to the climatic variables.

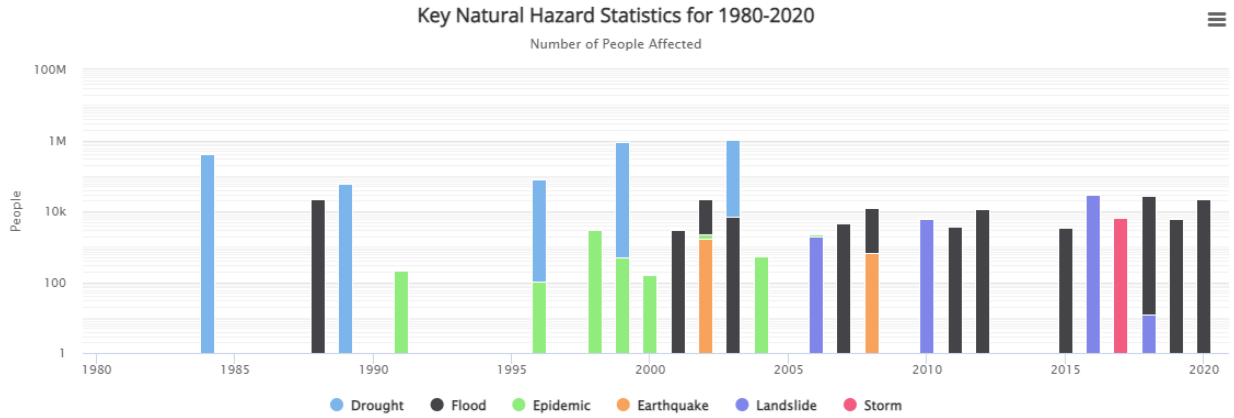

Figure 4 Natural hazard statistics of Rwanda for 1980-2020 (Source: https://climateknowledgeportal.worldbank.org/)

Table 2: CMIP5 Ensemble Projection for Rwanda (Source: Climate Risk Profile: Rwanda (2021): The World Bank Group)[17][17]

CMIP5 Ensemble Projection	2020–2039	2040–2059	2060–2079	2080–2099
Annual Mean Temperature Anomaly (°C)	**+0.7 to +1.5** (+1.1°C)	**+1.4 to +2.6** (+1.9°C)	**+2.3 to +4.0** (+2.9°C)	**+3.1 to +5.3** (+3.9°C)
Annual Precipitation Anomaly (mm)	**–18.4 to +29.3** (3.3 mm)	**–23.3 to +39.3** (5.1 mm)	**–26.4 to +63.6** (9.5 mm)	**–24.5 to +91.5** (18.2 mm)

Note: The table shows CMIP5 ensemble projection under RCP8.5. Bold value is the range (10th–90th Percentile) and values in parentheses show the median (or 50th Percentile).

2) Baseline scenario and any associated baseline projects

11. ***Business-as-usual (BAU).*** The BAU baseline assumes that future development trends will follow those of the past. The proposed project will explore synergies with new and on-going IFAD-supported projects as well as those supported by other agencies such as with ATA Africa and AGRA.

12. ***Kayonza Irrigation and Integrated Watershed Management Project ? Phase 1 and 2 (KIWP)***

a) The main goal of the KIWP project in Rwanda is the reduction of poverty and increased food security for rural households. Smallholder farmers will become more resilient against extreme climatic

events such as severe droughts. Phase 1 (KIWP1) is an ongoing project starting in 2019 and completing in 2022. Phase 2 (KIWP2) was approved in 2021 and is expected to be completed in 2027. The first phase focuses on addressing urgent issues regarding drought and conducting feasibility studies for irrigation schemes in support of the planned activities in the second phase.

b) The overall outcomes of the project are: (i) improved access to land, forests, water and water bodies for production purposes; (ii) increased acreage of farmland under water related infrastructure; (iii) increased acreage of farmland under climate resilient management and practices; (iv) increased capacity of smallholder farmers and local government to sustainably manage natural resources and climate related risks; (v) enhanced use by farmers, including youth, of technologies, equipment and infrastructure adapted to smallholder agriculture and (vi) increased farmers? economic benefits from market participation and increased sales

c) The SMART FARM project could align with outcomes (iii-vi) focus on introducing climate smart agricultural practices through farmer field schools (FFS). Major crop types are paddy, maize, potatoes, soya and horticultural crops. The SMARTFARM will align with the ~550 FFS that are planned under the KIWP project.

d) There is scope to introduce localized climate information services to farmers for climate resilience through the FFS and build capacity of local institutions and service providers to use digital technologies to further scale this.

13. ***Participatory Small-scale Irrigation Development Programme II (PASIDP II)***

The PASIDP is the second phase of an earlier project implemented in Ethiopia from 2008-15. The phase 2 project is operational from 2016 and due for completion in 2024. Small-scale irrigation projects are initiated in four regions: Amhara, Oromia, Tigray, and the Southern Nations, Nationalities and People?s Region. The goal of this project is to further enhance the productivity of farmers through the small-scale irrigation projects and climate smart agricultural practices; ultimately improving the food security and livelihoods of the farmers. PASIDP II is based on the assumption that poor farmers who are provided with access to a secure irrigation production base as well as access to markets and services, will be able to produce and market greater volumes of produce in a profitable scenario. The watersheds contiguous with the irrigation schemes, which exhibit varying levels of degradation, will also receive investment to stabilize and improve their productive capacity and enhance the resilience of systems. This will improve the prosperity, food security and nutrition of farmers, thereby improving their resilience against external shocks, including those induced by adverse weather and climate change. In order to achieve these goals, the interventions enable increased profitable production and productivity of the targeted farmers in food insecure Woredas. The SMART FARM project in alignment with the activities proposed under the project will support technology adoption for improved climate adaptation for smallholder farmers through local climate information services, integrated marketing, and financial services which also support the overall development objectives of the project.

3) Proposed alternative scenario with a brief description of expected outcomes and components of the project

14. ***Weather and climate services, data-driven agriculture and agri-digital financial services have the greatest potential to positively impact smallholder climate resilience.*** Digital technologies enable a range of services that can mitigate the challenges smallholder farmers face, and help agricultural value chains function better, especially in the last mile. In the present project, digital agricultural solutions are grouped into three broad categories of access. The digital agriculture services allow smallholder farmers to directly mitigate the impacts of long-term climate change, short-term climate shocks and extreme weather events:

Weather and climate services (WACS)	**Data-driven agriculture services (DDAS)**	**Agri digital financial services (AGRI-DFS)**	**Digital agri- market services (DAMS)**
Weather nowcasts	Farm management & agriculture intelligence	Agricultural credit	Traceability
Weather forecasts	Climate smart agri advisory	Agricultural insurance	Digital procurement
Climate prediction & projection	Precision agriculture		E-commerce platform
Early warnings	Early warnings		

Weather and climate services (WACS) are advisory services that provide valuable and actionable information to smallholder farmers on the hyper local changing weather conditions. The three sub-use cases of weather nowcasting, weather forecasts and climate prediction represent services that extend further into the future, and therefore require different data sources and modeling approaches. CropIn deploys SMARTFARM application to offer hyper local weather forecasts. CropIn will set up weather based rule engines in the Climate Sense module which gets activated if the weather conditions match for the plot. This will trigger a SMS to the farmers. CropIn has global partnerships with the likes of IBM that have weather stations for every 500 m x 500 m grid which is nearly for every 60 acres we get weather data specific to that location. Besides, synergies with local meteorological organizations will be explored in the programme.

Data-driven agriculture services (DDAS) use localized and timely data to create information and advisory services for agricultural value chain actors collected through SMARTFARM platform. Agricultural intelligence services monitor and predict agricultural activities to support decision making for a variety of organizations. Climate-smart agri advisory builds on traditional agricultural advisory services by incorporating local and timely data to tailor advisory messages to farmers? current farm

conditions. Precision agriculture uses hyperlocal data sources, such as sensors and UAV imagery, to optimize on-farm activities, and may involve elements of mechanization, such as solar irrigation.

Agri digital financial services (Agri DFS) include agricultural credit and agricultural insurance that can help smallholder farmers become more resilient to climate change. Agricultural credit includes digitally enabled credit products that smallholders can use to access agricultural assets, inputs and services. Index insurance refers to insurance that relies on the modeling and monitoring of observable phenomena (such as rainfall) to determine insurance costs and pay-outs. CropIn deploys SMARTRISKS and PLOTRISKS to score farmers and farms out of 100 to gauge the risks associated with the particular farmer.

Digital Agri-Market services (DAMS) include complete farm to fork traceability and horizon on harvest and yield for off-takers and buyers to participate in business relationships with smallholder farmers institutions through traceability, digital procurement, and e-commerce platform. CropIn deploys ROOTTRACE and MARKETPLACE applications under this component.

15. ***Digital agriculture plays an important role in climate resilience, from long-term adaptation to short-term responses***

a) **Adaptation** to climate change can take place when farmers are aware of the longer-term shifts in climate affecting them and have the resources to adopt practices that will maximize their productivity in this new context. Climate prediction and climate-smart agri-advisory provide the information farmers need to understand climate change and the implications for local agriculture. In the medium term, seasonal weather forecasts allow farmers to select appropriate climate adapted crops and varieties, and plan their agricultural activities.

b) Throughout the cropping season, weather forecasts, nowcasts and early warnings provide advance warning of adverse events, allowing farmers to **respond** to changing meteorological conditions where possible.

c) In the case of adverse weather events, such as droughts or heavy rainfall, insurance provides a safety net for farmers to recover some of their production costs or lost income. Similarly, agricultural credit can be a catalyst for **recovery**, allowing farmers to invest in agricultural inputs for the next season after suffering losses in the past.

d) Agriculture contributes to climate change by producing greenhouse gas (GHG) emissions, primarily through livestock production and deforestation. Agri-intelligence services can monitor land use changes, alert relevant authorities to deforestation activities and allow agribusinesses to identify risk in their supply chains. Together, these services can reduce the net carbon emissions of agriculture and contribute to climate change **mitigation**. Meanwhile, agricultural credit can enable smallholder

farmers to shift to more sustainable farming practices through increased access to inputs and assets, and therefore reduce the need to expand their cultivated land.

16. ***SMARTFARM will leverage digital technologies*** such as Artificial Intelligence, Machine Learning, Remote Sensing & mobile telecommunication to offer data driven agriculture digital services (WACS, DDAS, Agri-DFS, & DAMS) on innovative and collaborative digital platforms, i.e., cloud web-based & mobile application, based on three-pronged data approach ?3PDA? : in-situ (farm, farmer, derived farm data), earth observation/Satellite (EO) and weather data ***to strengthen smallholder farming systems & institutional climate adaptation and resilience*** by increasing farm productivity through data-driven farm management, crop life cycle, irrigated water management, better access to inputs and agronomical knowledge, and improved access to markets and finance.

17. ***A four-step process for designing digital site-specific/farm-site-specific (local context) and region specific (regional and national level) digital services for smallholder farmers? climate change adaptation*** and become resilient and proactive to mitigate both long-term climate and local weather shifts and short term shocks, weather-related disasters, and pests and diseases etc. The four-step process is as follows:

(a) Data collection and acquisition: acquiring baseline farm-site historical, current and forecast data through digital tools and technologies through a three-pronged data approach (3PDA), i.e., in-situ, remote sensing/earth observation (EO)/satellite, and weather and climate data. This also includes building synergies between the local meteorological organizations that are providing these services.

(b) Data analysis and issue information maps: detection, identification and characterization of site-specific issues through data analysis, i.e., agronomy issues (crop-planning, crop-physiology, health and nutrient, crop stress, water stress, harvest, weeds, pest and disease etc.), input issues, credit issues, and market.

(c) Production of digital services: The issue analysis and information maps are converted into a design process for site-specific digital services, namely, WACS, DDAS, Agri-DFS, DAMS.

(d) Delivery of services*:* this includes strategy on farm & farmers level adoption of digital services, delivery mode, Implementation, feedback, iteration and re-design, and final delivery. For the design of region-specific solution, the site-specific solution is extrapolated into region specific solution based on regional level data, where Govts, policy makers, and donor decisions informed by macro-agricultural intelligence that draw on big data and machine learning to identify vulnerable areas and model the counter moves and outcomes of interventions.

18. ***SMARTFARM, will combine:***

a) End-to-end digitalization and streamlining of farm processes and modules for smallholder farmers. This includes collecting baseline data and information on smallholder farmers and farms.

b) Big data analysis of agronomy, inputs, finances and market issues based on three-pronged data approach ?3PDA?: in-situ, earth observation (EO)/satellite/remote sensing and weather and climate data sources.

c) focused human efforts of agri-extension workers.

d) digital services (weather and climate information services (WACS) and data-driven agriculture services (DDAS)) for smallholder farmers.

to increase climate change adaptation and resilience of 200,000 smallholder farmers with help of 2000 extension officers (associated with IFAD Country programmes and support organizations) across agri-value chains in two Least Developed Countries (LDCs) in Africa ? Rwanda and Ethiopia and over a period of two and half years.

19. ***The SMARTFARM project will have three components:***

Component 1 ? Deployment, adoption and scale up of SMARTFARM to provide weather and climate services (WACS) and data driven agriculture services (DDAS) for increasing climate change adaptation and resilience of 200,000 SHFs with help of 2000 village/agri entrepreneurs for a scalable, sustainable, replicable decision-making support system that will serve as farm and farm management solution for smallholder farmers. This is a one time service offering to smallholder farmers that extends to a period of 12 months in the programme. It would take approximately 30 months to complete 200,000 smallholder farmers associated with the IFAD country programme and supported organizations.

Component 2 - Capacity building of identified/selected farmers? and rural organizations and institutions/producer organizations and implementation partners for knowledge and asset transfer through 2000 extension service officers (who are targeted to become agri entrepreneurs through incentive scheme); Strengthening of smallholder farmers, agri-extension workers and farmers led

organizations workers through capacity building and transfer of assets and knowledge on SMARTFARM, a data driven climate change adaptation model

Component 3 ? Creation of knowledge management system to promote inter-engagements and partnerships with (1) off-takers, buyers and (2) financial institutions, (3) Govts, and (4) private sector through effective dissemination of knowledge, data and evidence for better (a) risks and benefits sharing; (b) market linkages; (c) climate resilient input access; (d) credit linkages; (e) index-based climate insurance coverage (safety nets); for smallholder farmers and scaling to other regions. The knowledge management products intend to plan for advanced phase of the programme to offer full scale module of digital agriculture services ? WACS, DDAS, AgriDFS, and DAMS.

20. The SMARTFARM project will link with on-going IFAD supported projects in the two least developed countries Rwanda and Ethiopia along with exploring synergies with ongoing programmes with ATA Ethiopia and African-wide collaboration with AGRA. The project will also partner with other private and development sector institutions, financial institutions (banks and insurance companies) etc. The project will build synergies with the IFAD programmes among others in the two LDCs ? Rwanda and Ethiopia avoiding duplications and enhancing the overall impact in Africa. The project will mainstream gender and youth (~50% women and ~30% youth targeted) ensuring that digital climate and weather advisories are inclusive. The ICT4D experiences of IFAD and CropIn will be used for deciding the entry points in ongoing projects. To strengthen these synergies at the operational level, the project will support harmonized planning process and operational coordination with IFAD funded programmes. The operational protocols with specific collaboration modalities for each project will be developed at the start-up.

21. Under Component 1, with the initial GEF financing:

I.1. Deployment, adoption, and scaling up of SMARTFARM - a data and digital technology driven climate adaptation model encompassing (a) weather and climate service (WACS), (b) digital agriculture advisory services (DDAS) to 200,000 smallholder farmers through digital technologies and focussed human efforts of agriculture extension workers associated with IFAD Country programmes and support organizations.

I.2. Improving the incomes, productivity, agri-worthiness and climate resilience of 200,000 smallholder farmers in two least developed countries (Ethiopia, Rwanda).

A. Initial GEF Financing

? With the GEF financing, the programme will implement modules of WACS and DDAS to strengthen climate resilience of 200,000 smallholder farmers in the two least developed countries associated with IFAD Country programmes and support organizations. The services are a onetime engagement that extends for a period of 12 months in the programme. It would take approximately 24 months to onboard 200,000 smallholder farmers associated with the IFAD country programme and supported organizations and services will be offered in batches.

? The cost for the primary digital services, i.e., WACS and DDAS, is approximately $4/farmer/year engagement after subsidizing technology and deployment costs. The primary module is explained in the section below where services are explained in detailed. This costing excludes the deployment of PLOTRISKS and Disease Early Warning systems (DEWS) which are necessary for preparing agri-worthiness of farmers for Agri-DFS and DAMS. IFAD in-kind contribution does not directly incentivize the agriculture digital services for smallholder farmers but is primarily intended for mobilization, capacity building, and knowledge management.

? The local networks of 2000 extension workers are to be jointly mobilized from the existing IFAD Country programmes and project sites to implement WACS and DDAS. The extension agents will work directly with smallholder farmers (1:1000) ratio to deliver the intended services and will be upskilled to use the technology platform.

B. The additional funding for complete farm management solution and full-scale module of agriculture digital services:

? It is envisioned that the programme intends to offer a complete farm management solution and full-scale module of agriculture digital services - AgriDFS and DAMS to 200,000 smallholder farmers. Through targeted funds, the programme seeks to directly incentivize the smallholder farmer beneficiaries to avail a full scale module of digital service offerings to improve incomes, productivity, and tackle climate change and variations effectively.

? For the full-scale module delivery of digital agriculture services, i.e., WACS, DDAS, AgriDFS, & DAMS, to increase the agri-worthiness of the 200,000 smallholder farmers, those that are associated with IFAD Country programmes and support organizations in the present programme, and their capacities to participate with financial institutions lending and market off-takers, it is estimated that the cost of availing digital agriculture services per farmer would be around $35/farmer/year engagement. The rough tabulation is given below:

WACS & DDAS : $4/farmer/year engagement after subsidizing technology and deployment costs.

Full DDAS (including PLOTRISKS and DEWS) : $15/farmer/year engagement.

AgriDFS, & DAMS: $ 15/farmer/year engagement.

? This is a range of costs which also depends on factors like digital assets, knowledge and capacities on ground, geography, inflation factors, building synergies with local institutions and IFAD country programmes, along with challenges for financial institutions and market off-takers.

? The additional fund-raising would have incentives for 2000 agri-extension workers to the tune of $3-5/farmer/year engagement to implement a complete suite of agricultural digital services. One extension worker serves 1000 smallholder farmers and makes yearly $3000-5000/year to support last mile delivery of a full module of digital services and services by financial institutions and market off-takers.

? CropIn is in discussions both internally and externally with leading international development organizations, foundations, and charities, financial institutions for co-financing, scale-up, and sustainability of the programme to reach the figure of $35/farmer/year engagement. This is possible only after formal approval for PIF Stage 1.

? This costing is expected to reduce as and when baseline strength like knowledge, assets and networks are built in the programme.

C. The sustainability of the agriculture digital services for smallholder programme beyond the GEF financing and additional fund raising:

22. The model envisages a triangular model of sustainability for digital technology that will sustain from participation by buyers, FIs, farmers/farmers institutions, who will pay for the services for enablement of transaction with each other. Firstly, with the help of SMARTFARM, it is important to build market linkages for targeted farmers and identify the needs for building farm assets, which are going to meet the needs of the market. Secondly, define financing and other services (insurance, package of practices, etc.) according to the needs of this triangular partnership (i.e., buyers, FIs, farmers/farmers institutions). And, thirdly, define the cost for enablement of this ecosystem through digital technologies. Once buyers and FIs find the value in enablement through technology, they would sustain these digital technologies for smallholder farmers.

23. SMARTFARM will end-to-end digitalize farm management for 200,000 smallholder farmers (associated with IFAD Country programmes and support organizations) - registering baseline farmer & farm to offer climate and advisory services (WACS & DDAS), capturing historical trends, advising crop selection, monitoring farms remotely through satellite and weather forecasts, curate technical know-how and advisories on planning and management, inputs and credits, sowing and harvest window, irrigation plans, crop stress, fertigation and pesticide spray, and ensuring efficient usage of available resources.

24. The component 1 includes a decision making support system in form of advisories based on in-situ and climate projection data of regional and hyper local weather from sources such the IBM weather data, World Bank Climate Change Knowledge Portal and other institutional publicly available repositories like the World Meteorological Organization. Hyper local weather data will provide data that is specific for the locational conditions using satellite data and is an improvement compared to weather station data, which is sparsely distributed in the country. CropIn will set up weather based rule engines in the Climate Sense module which gets activated if the weather conditions match for the plot. This will trigger a SMS to the farmers. **CropIn has global partnerships with the likes of IBM that have weather stations for every 500 m x 500 m grid which is nearly for every 60 acres we get weather data specific to that location. Besides this, synergies with local meteorological organizations will be explored in the programme.**

25. The field extension team, will, facilitate seamless capture of ground-truthing data & dissemination of relevant agronomic advisories. **The extension officers will be responsible for disseminating information to the smallholder farmers in their network with 1 extension officer catering to about 100 SHF**. The mobile application would be deployed to capture ground data on Insured farmers, take crop images, and capture insurance details. The web applications would have a dashboard with satellite image-based monitoring and evaluation. Mobile application is used for data capturing and advisory dissemination. Also provides pre-emptive & prescriptive climate-smart, hyper-local, crop specific advisory services to the registered farmers through mobile application & SMS. This helps farmers avoid losses due to unforeseen/extreme weather conditions, and pests & diseases. It is expected to gather baseline information on presence of digital assets such as mobile phones with the field extension team of the IFAD country teams programmes and support organizations.

26. The SMARTFARM platform has satellite monitoring capabilities. AI-based platform along with remote sensing detects vulnerable regions & plots based on weather forecasts, historic performance, and satellite image analysis. The platform provides satellite image-based analysis of the registered plot. Metrics on crop acreage, crop health & growth stage, and yield forecasts are provided on the web application. CropIn uses a combination of vegetative health metrics, weather data and soil moisture assessment to assess the relative health of the crop and represent any anomalies arising for the plots. The platform also provides analysis at a regional (pin-code/block/district) level on acreage under insured crops, Weather Anomalies, monitoring health and estimated yield. The regional level analysis would help identify the plots affected due to extreme events like floods or droughts and address the needs of those farmers on priority.

27. Satellite remote sensing technology offers an effective means for monitoring agricultural crops at large scale on a repetitive basis to analyze sowing area estimations , crop patterns , Stage and Yield estimations. CropIn utilizes both optical and Radar satellite imagery making year-round analysis possible. The models work by combining satellite data with ground training data and are trained using neural network algorithms to produce plot-level crop maps. Historic crop detection analysis is carried out based on the fusion of data from different satellite sensors ensuring a cohesive, calibrated and cloud-free data stream.

28. Upon achieving a significant scale in farm digitization, each farm will generate its own scorecard periodically, to assess performance and prescribe the next steps based on a crop health score and learnings from other connected farms in the network to partner with third parties like banks, insurance providers, input and output companies, advisory companies, and potential buyers in order to access the benefits of their programme and services, and grow into more cost-efficient farm businesses.

29. ***Under Component 2, with the initial GEF Financing and IFAD in-kind support:***

II.1. Identification and selection of farmers?, rural organizations and institutions/producer organizations in the linked IFAD Country programmes and support organizations for capacity building and transfer of knowledge and assets for last mile delivery of WACS and DDAS to 200,000 SHFs.

II.2. Increasing access to assets necessary for digital technology adoption by smallholder farmers and agri-extension officers.

II.3. Training and capacity: Building of 2000 agri-extension officers as agri-preneurs in Ethiopia and Rwanda on digital technologies and data, and deploying data driven weather, climate and agriculture services for 200,000 SHFs.

30. Capacity building is structured around the training of 2000 agri-extension officers who are mobilized under lead farmer institutions and groups in the linked IFAD Country programmes and support organizations to deliver last mile agriculture digital services to 200,000 smallholder farmers. The farmer-led institutions (legal/semi-legal, or informal) will form grassroots Project management Units who work under the main Project Management Unit that implement the digital agriculture services and are responsible for both upstream and downstream activities. The agri-extension officers can be lead farmers, who are key figures in their community and have the ability (and authority) to promote the innovative technologies in their community. Extension officers will also be selected for the capacity building programme in the IFAD country programmes and support organizations that have basic digital assets like mobile phones. Special focus will be given to women and youth to develop them as agri-preneurs.

31. A total of 2000 agri-extension officers/ Lead farmers are expected to be able to cover the extension services of SMARTFARM to 200,000 SHF?s. It is pertinent to mention here that the global average of field scouting managers to small holder farmers is 1:500 and in this project, it is going to be 100 farmers to 1 agri-entrepreneur. The capacity building programme will be structured around understanding the digital platform and tools and enabling the extension officers to: 1) assist in acquiring the data to register new fields and 2) provide last mile delivery of implementation and monitoring support to the SHF?s based on the advisory information (DDAS) from the SMARTFARM platform.

32. Farmer Field schools will be a relevant training method for the capacity building programme to give the officers a practical experience of the tool.

33. Farmers are farm level micro-entrepreneurs and changing farm practices has a very direct effect on their livelihood, especially smallholder farmers. Farmers are often perceived to be conservative, as new practices or technologies do not find widespread adoption. We see two major constraints for adoption by farmers worldwide:

A) Farmers want to see practical implementation somewhere else first before implementing it at their own farm. They want to see first if the challenges that need to be faced when implementing the practice or technology can be overcome in their own context.

B) Farmers want to know if the practice or technology that is to be implemented is profitable in the end. Profitability ensures the economic sustainability of their own farm, and therefore the profitability of a new technology needs to be assessed and communicated.

These constraints can be addressed by using field schools as a capacity building method. Further improvement of adoption of practices will be achieved through using existing institutional structures such as farmer cooperatives, and communities.

34. The digitalization of farmers? institutions and/or producer organizations, and extension workers' activity will enhance their linkages with other service providers to increase their capacity for the last-mile delivery of agricultural advisories, farm planning and management, inputs and services resulting in strengthening productivity and resilience.

35. ***Under Component 3, with the initial GEF Financing and IFAD in-kind support:***

Knowledge management system in the form of -

(1) knowledge management platform (micro-website, web-page or a mobile application) to store, organize and manage knowledge products (reports, case studies, guides, how-to-do notes, technical briefs, blogs, videos, webinars, etc);

(2) the data and evidence from Component 1 and Component 2 to (a) enable participation of off-takers and buyers and financial institutions (credit and insurance) for AgriDFS & DAMS, and (b) enable scaling and replication of model to other local, regional and national context regions with Govt and private sector participation through operational guidance.

36. The project would create systematic and integrated knowledge management and tools to build partnerships and promote intra-engagement of value chain actors to inform self-learning design, replication and sustainability, and participation of member governments and the private sector for credit and market linkage in the value chains.

37. The objective under Component 3 is to to build a case for sustainable, replicable, and scalable digital climate adaptation model that serves as a complete farm management solution offering a full-scale module of digital agriculture services.

(A) An average sampling of selected plots at pin code level on the PLOTRISKS & Disease Early Warning Systems (DEWS) to detect crop health and stress due to factors associated with climate change and forecast yield. Advanced data driven agronomy advisory services will be delivered from the SMARTFARM that accelerates CSA efforts to further influence regenerative practices that lead to better yields and improved soil health and biodiversity, decreased deforestation and increased productivity by improving resource use, supporting early decision making and maintaining 24/7 monitoring systems. SMARTFARM, thereby, builds SHFs resilience to climate change and enables farm related businesses to respond more organically to environmental challenges and adjust systems accordingly.

(B) Build a proof-of-concept model and a business case for a complete farm management solution and full-scale module of agriculture digital services for 200,000 smallholder farmers in the two least developed countries through 2000 extension workers:

1. Weather and Climate Information Services (WACS)

2. Data-Driven Agriculture advisory Services (DDAS),

3. Agri-Digital Financial Services (Agri-DFS), and

4. Digital Agriculture Market Services (DAMS)

(B) Mobilization of additional funds to the tune of $8 million to provide a complete farm management solution and full-scale module of agriculture digital services for 200,000 smallholder farmers in the two

least developed countries to increase their agri-worthiness from active participation and co-financing from the private sector, institutional donors etc.

(C) Strengthen institutional capacity and build synergies with identified lead farmers? organization, farmer producer company, rural institutions, local meteorological organizations and government institutions for long-term asset creation and sustainability of the programme.

4) Alignment with GEF focal area and/or Impact Program strategies

38. The project is fully aligned with the CCA Objective 1 ?Reduce the vulnerability of people, livelihoods, physical assets and natural systems to the adverse effects of climate change through transfer of technologies and innovative practices for adaptation?. Through climate smart agricultural practices, it is expected that smallholder farmers will be more resilient to natural hazards such as droughts and flooding, which are expected to occur more frequently in the future.

5) Incremental/additional cost reasoning and expected contributions from baseline, the GEFTF, LDCF, SCCF, and co-financing

39. The project aligns with the GEF focal areas regarding food security and climate adaptation. The innovative information sharing platform of SMARTFARM is expected to be cost-effective and financially attractive for 200,000 smallholder farmers and for increased investments from value chain actors to offer additional funding for deploying technology services for financial inclusion and market services. The initial set-up of the platform requires financial contributions to:

? Deploy and customize the platform for 200,000 small holder farmers associated with IFAD Country programmes and support organizations;

? Design additional features according to stakeholders needs and expectations;

? Onboard 2,000 agri-entrepreneurs and lead farmers as extension workers associated with IFAD Country programmes and support organizations

? Build capacity amongst the 2,000 extension workers to enable them to apply the SMARTFARM information and technology;

? Build knowledge and strategy for the advance phase of the programme where it is expected that the SMARTFARM and associated digital platforms such as PLOTRISKS, SMARTRISKS and the coinciding institutional structure is fully operational and sustainable requiring minimal fees of farmers to gain significant benefits from the platform.

40. **On the initial GEF Financing:**

a) With the GEF financing, the programme will implement modules of WACS and DDAS to strengthen climate resilience of 200,000 smallholder farmers for a period of year in the two least developed countries associated with IFAD Country programmes and support organizations. The total project duration is expected to be 30 months covering 200,000 smallholder farmers.

b) The cost for primary module digital services, i.e., WACS and DDAS, is approximately $4/farmer/year engagement. The primary module is explained in the section below where services are explained in detailed. This costing excludes the delpying PLOTRISKS and Disease Early Warning systems (DEWS) which are necessary for preparing agri-worthiness of farmers for Agri-DFS and DAMS. IFAD in-kind contribution does not directly incentivize the agriculture digital services for smallholder farmers but is given for capacity building and knowledge management.

c) The local networks of 2000 extension workers are to be jointly mobilized from the existing IFAD Country programmes and project sites to implement WACS and DDAS.

41. **On the additional funding/co-financing for complete farm management solution and full-scale module of agriculture digital services:**

a) It is envisioned that the programme intends to offer a complete farm management solution and full-scale module of agriculture digital services - AgriDFS and DAMS. Through targeted funds, the programme seeks to directly incentivize the smallholder farmer beneficiaries to avail a full scale module of digital service offerings to improve incomes, productivity, and tackle climate change and variations effectively.

b) For the full-scale module delivery of digital agriculture services, i.e., WACS, DDAS, AgriDFS, & DAMS, to increase the agri-worthiness of the 200,000 smallholder farmers (associated with IFAD Country programmes and support organizations) and their capacities to participate with financial institutions lending and market off-takers, it is estimated that the cost of availing digital agriculture services per farmer would be around $35/farmer/year engagement. The rough tabulation is given below:

WACS & DDAS : $ 4/farmer/year engagement after subsidizing technology and deployment costs.

Full DDAS (including PLOTRISKS and DEWS) : $ 15/farmer/year engagement.

AgriDFS, & DAMS: $ 15/farmer/year engagement.

c) This is a range of costs which also depends on factors like digital assets, knowledge and capacities on ground, geography, synergies with local institutions and IFAD country programmes, challenges for financial institutions and market off-takers.

d) The additional fund-raising would have incentives for 2000 agri-extension workers to the tune of $3-5/farmer/year engagement to implement a complete suite of agricultural digital services. One extension worker serves 100 smallholder farmers and makes yearly $300-500/year to support last mile delivery of a full module of digital services and services by financial institutions and market off-takers.

e) CropIn is in discussions both internally and externally with leading international development organizations, foundations, and charities, financial institutions for co-financing, scale-up, and sustainability of the programme to reach the figure of $35/farmer/year engagement.

f) This is possible only after formal approval for PIF Stage 1.

On the sustainability of the agriculture digital services for smallholder programme beyond the GEF financing and additional fund raising: The model envisages a triangular model of sustainability for digital technology that will sustain from participation by buyers, FIs, farmers/farmers institutions, who will pay for the services for enablement of transaction with each other. Firstly, with the help of SMARTFARM, it is important to build market linkages for targeted farmers and identify the needs for building farm assets, which are going to meet the needs of the market. Secondly, define financing and other services (insurance, package of practice etc.) according to the needs of this triangular partnership (i.e., buyers, FIs, farmers/farmers institutions). And, thirdly, define the cost for enablement of this ecosystem through digital technologies. Once buyers and FIs find the value in enablement through technology, they would sustain these digital technologies for smallholder farmers.

6) Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

42. Climate adaptation is an important aspect for coping with future climate projections and extremes. With the innovative SMARTFARM technology, smallholder farmers are equipped with valuable tools and information to adopt climate smart agricultural practices. Globally, smallholder farmers play an essential part in the agricultural sector, providing food for their livelihoods, local community, regionally and nationally. Improving the production and resilience of smallholder agriculture will have a global impact on food security.

Food security will be improved and the impact from natural hazards (pests, weather extremes) reduced due to innovative technology and information provision from SMARTFARM.

7) Innovation, sustainability, and potential for scaling up

Innovation:

43. The project is innovative in deploying the SMARTFARM, ***a one-point field intervention system*** for recording the farm location and area coordinates where all advisories are triggered via satellite-based crop assessments and local weather parameters. CropIn?s models predict the crop, the stress and the potential infestation mal alerts that are ready to be deployed for the crops listed across the selected 3 LDC?s at scale for multimillion farmers at one go. ***The cost per farmer is as low as $35/farmer/year engagement for a range of digital services ? WACS, DDAS, Agri-DFS, DAMS*** - from farm level intervention to increase productivity to increase in access to finance and incomes**.**

44. In addition, the project deploys SMARTFARM as a collaborative platform that combines cutting edge technology (Big Data, AI, machine learning, smartphones/tablets, etc.), innovative business model (agriculture platform as a service), and focused human efforts (training, agriculture insights, products, and services) for providing digital services (WACS, DDAS, Argi-DFS, DMAS) to build climate adaptation and resilience of farmers and risk mitigation for all actors in value chains and.

45. Another novel feature of the project is the incorporation of climate projection data at the regional and hyper local weather from sources such the IBM weather data, World Bank Climate Change Knowledge Portal and other institutional repositories like the World Meteorological Organization into the digital model.

46. The project is also innovative in that it will support the development SMARTFARM model led by the lead farmers? and rural institution/producer organisation is easily replicable at policy and institutional levels and for private sector engagement as the platform is sustainable data-driven, scalable, intelligent, self-learning, real-time collaborative digital agri-food system, which serves as a farm as well as farmer management solution, predictive analytics and monitoring tool, and decision support system for all actors in the value chain.

47. The project is innovative in its alignment with other IFAD-funded programmes and other new designs will provide a model of integrated and innovative investments towards digitization of agriculture for greater benefits for smallholder farmers especially the youth and women.

48. The project activities will also aim at sustainable adoption of digital technologies by the IFAD programmes from piloting solutions and business models to evaluate their effectiveness before scaling-up. The SMARTFARM programme will give priority to piloting innovative solutions on farm productivity and create sustainable market and financial linkages for the smallholder producers. Once these digital innovations have been proven effective in specific project areas, it can be replicated in other areas.

49. The project will promote the necessary innovations related to farm level adoption of climate resilience productivity enhancing technologies, combined with improved availability of inputs and services and stronger farmer organizations for producing consistent volume and for sustainable engagement with profitable markets; ICT-based M&E and KM innovations and business based case studies for KM.

50. Learning and knowledge management will be important in drawing lessons from the project to assist the Government with refining its policy and for scaling up the successful elements in their national policies and programmes.

51. Finally, the project is innovative as it will yield positive climate-related, environmental and social impact by (i) reducing the vulnerability of smallholder farmer and institutions to disruptions and losses from climate impacts, (ii) creating new opportunities for climate resilient and adaptive development and employment, and (iii) demonstrating that investments in resilience and adaptation can deliver social, environmental, and financial returns thereby catalyzing a broader market for resilience products and services.

Sustainability and Potential for scaling:

52. ***The SMARTFARM Project intends to build a sustainable, replicable, and scalable digital climate adaptation model, that serves as a farm and farm management solution and evidence based decision-making support system for smallholder farmers towards climate change*** and includes the following: -

i. Access to weather and climate information services (WACS), data-driven agriculture services (DDAS), and agri-digital financial services (Agri-DAFS) and digital agri-market services (DAMS) will support farmers to raise their productivity and resilience to climate thereby improving incomes and enabling better access to inputs and other services

ii. The project will enable financing and linkages with private sector off takers, market players and financial services providers through their active participation enabled by trust and confidence building based on data and evidence.

iii. Through strengthening institutional capacity of identified lead farmers? organization/producer company and/or rural institutions, and governments for income & livelihood generation, agri-worthiness, increase in productivity, food & nutrition security and long-term asset creation and sustainability.

iv. Lessons from implementation from IFAD and CropIn extensive experience of implementing projects in Asia and Africa will be integrated during planning and startup of the project.

53. CropIn climate smart programs have been implemented with partners like the World Bank project which demonstrated a 32% increase in yield and 18% reduction in losses, the IFC, and the Government of Mozambique since the last several years.

54. Visibility of the agri-value chains will lead to risk and cost sharing and long-term mitigation. The strengthening of agri-value chains through data and evidence will lead to increased investments from agro-processing companies, input suppliers, financial institutions, telecom companies, and development agencies working with large networks of SHFs that will sustain the cost once the donor institutions exit. Particularly:

? The programme intends to support 200,000 smallholder farmers by increasing their potential economic capacity through maximising farm productivity and quality with a suite of weather and crop and farm advisory services. The full value will be realised gradually once farmers start adopting these data driven practices and decision making over a period of time.

? As the farm data would build up and benefits start getting released, there would be an uptake from the farmers to invest more and reap higher benefits through better seeds , crop management practices , chemicals etc. The program therefore intends to support such needs by bringing a financial institution as well as an offtaker of the selected commodity in the value chain on the shared digital platform so that the collective risk can be reduced for the stakeholders. Technology will play a key enabler in terms of data interoperability, building economic and financial profiles based on historical, present and future agriculture performance.

? It is important, as a first step in the programme, to build farmers and farm profiles by collecting, verifying and sanitising the data on CropIn's SMARTFARM platform to not only improve advisory services but later build a credible risk sharing models and credit scores for a small group of farmers that is useful for buyers, off-takers, insurance providers, FIs to interact and transact with the farmer/Farmer groups. The programme intends to experiment and build minimum viable products and services and bundle them together beyond the initial stated objective of providing climate and advisory services.

? The interaction can be further enabled through remote sensing based crop assessments, credit scores, and a strong offtaker insight platform to connect buyers to potential farmers/farmer groups.

? Community representatives from Farmer clusters / Collectives would be empowered to leverage digital platforms to digitize farm records and work as an institution to later benefit from collective trade. This would not only help maximize value and generate local employment but also reduce risk and build strong institutional capacity for stakeholders to further engage.

? In the later phase, the risk sharing and credit score models would reduce the cost of operations which goes in a brick and mortar/traditional model of transaction with farmers or the aggregated farmers. It would eliminate the need for collaterals and criterias which FIs need to issue credit to farmers through accurate risk assessment and due diligence. Further, the presence of buyers in the triangular value chains would provide extra incentive and pull for FIs to lend to the farmers for varying needs besides farm-based loans.

? The model can be scaled and replicated to 200,000 SHFs, and other regions through IFAD and other agencies supported programmes in Africa and India.

55. Enhancing cooperation and partnerships will promote intra-engagement and partnerships for financial and market linkage among off-takers, agro-processing companies, input suppliers, financial institutions, telecom companies, and development agencies, thereby, bringing acceptance and acceptance at the policy level for the digital climate adaptation food system. CropIn has already touched base with leading FIs, buyers, donors and academic institutions to participate in experimenting with building minimum viable products and services for the programme. These include the likes of Rabobank, Ecobank, Wageningen University & Research, GSMA, GIZ, USAID, IDH etc.

56. The creation of systemised knowledge, capacities and tools among the implementation partners, member countries and using South-South Triangular Cooperation between regions will scale up digitalization effort and replicate digital climate model in other regions.

57. At the present stage, with the initial GEF Funding, the programme has approx $ 4/farmer/year engagement to implement primary modules of WACS and DDAS to strengthen climate resilience. It is stipulated that the programme intends to reach the advanced phase which involves AgriDFS and DAMS. For the full-scale module delivery of digital agriculture services, i.e., WACS, DDAS, AgriDFS, & DAMS, to increase the agri-worthiness of the smallholder farmers and their capacities to participate with financial institutions lending and market off-takers, it is estimated that the cost of availing digital agriculture services per farmer would be around $35/farmer/year engagement. This range of costs also depends on factors like digital assets, knowledge and capacities on ground, geography, challenges for financial institutions and market off-takers.

58. CropIn is in discussions both internally and externally with leading international development organizations, foundations, and charities, financial institutions for co-financing, scale up, and sustainability of the programme to reach the figure of $35/farmer/year engagement. But this is possible only after formal approval for PIF Stage 1. Through targeted funds, the programme seeks to directly incentivize the smallholder farmer beneficiaries to avail more digital service offerings to improve incomes, productivity, and tackle climate change and variations effectively.

59. It is expected that the project would generate ~$8million investments from the private sector and institutional donors etc. It is envisaged in the programme that through risks and cost sharing, and trust and confidence building based on data and evidence for the benefit of smallholder farmers would lead to increased participation and co-financing from the private sector, institutional donors etc. who then incentivize the smallholder farmers for a complete farm management solution and full-scale module of agriculture digital services.

60. It is envisaged in the programme that through risks and cost sharing, and trust and confidence building based on data and evidence for the benefit of smallholder farmers would lead to increased participation and co-financing from the private sector, institutional donors etc. who then incentivize the smallholder farmers for a complete farm management solution and full-scale module of agriculture digital services.

61. This is enabled through data-driven approach and digital technology adoption model at the farm level on the climate adaptation, risk mitigation and strengthening of agri-value chains that promotes agro-processing companies, input suppliers, financial institutions, telecom companies, and development agencies, govts etc. in order offer their core services to the last mile farmer through the digital platforms and agri-preneurs networks.

62. It is further envisaged that the programme would generate knowledge and learnings for a case of a data-driven climate adaptation model that is **sustainable, replicable, and scalable** for other regions and farmers.

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[10] https://climateknowledgeportal.worldbank.org/sites/default/files/2021-05/15463A-WB_Ethiopia%20Country%20Profile-WEB.pdf

[11] https://www.wfp.org/news/13-million-people-facing-severe-hunger-drought-grips-horn-africa

[12] https://climateknowledgeportal.worldbank.org/sites/default/files/2021-05/15463A-WB_Ethiopia%20Country%20Profile-WEB.pdf

[13] https://climateknowledgeportal.worldbank.org

[14] https://rdb.rw/investment-opportunities/agriculture/

[15] https://gain-new.crc.nd.edu/country/rwanda

[16] https://www.ifad.org/documents/38714170/42164624/climate_analysis_rwanda.pdf/02c48795-df0d-bba9-9d6b-d7a247c64ca6?t=1606831140000

[17] https://climateknowledgeportal.worldbank.org/sites/default/files/2021-09/15970-WB_Rwanda%20Country%20Profile-WEB.pdf

1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

In Annex A an elaborate map of selected locations is provided with Figure 6 providing an excerpt for selected countries i.e. Ethiopia and Rwanda.

(i) In Rwanda the project location will align with the Kayonza Irrigation Project (KIIWP) at approximately -1.94, 30.51 coordinates.

(ii) In Ethiopia the project location will align with PASADIP project and selected two regions (Oromia and SNNP) for the activities of this new project.

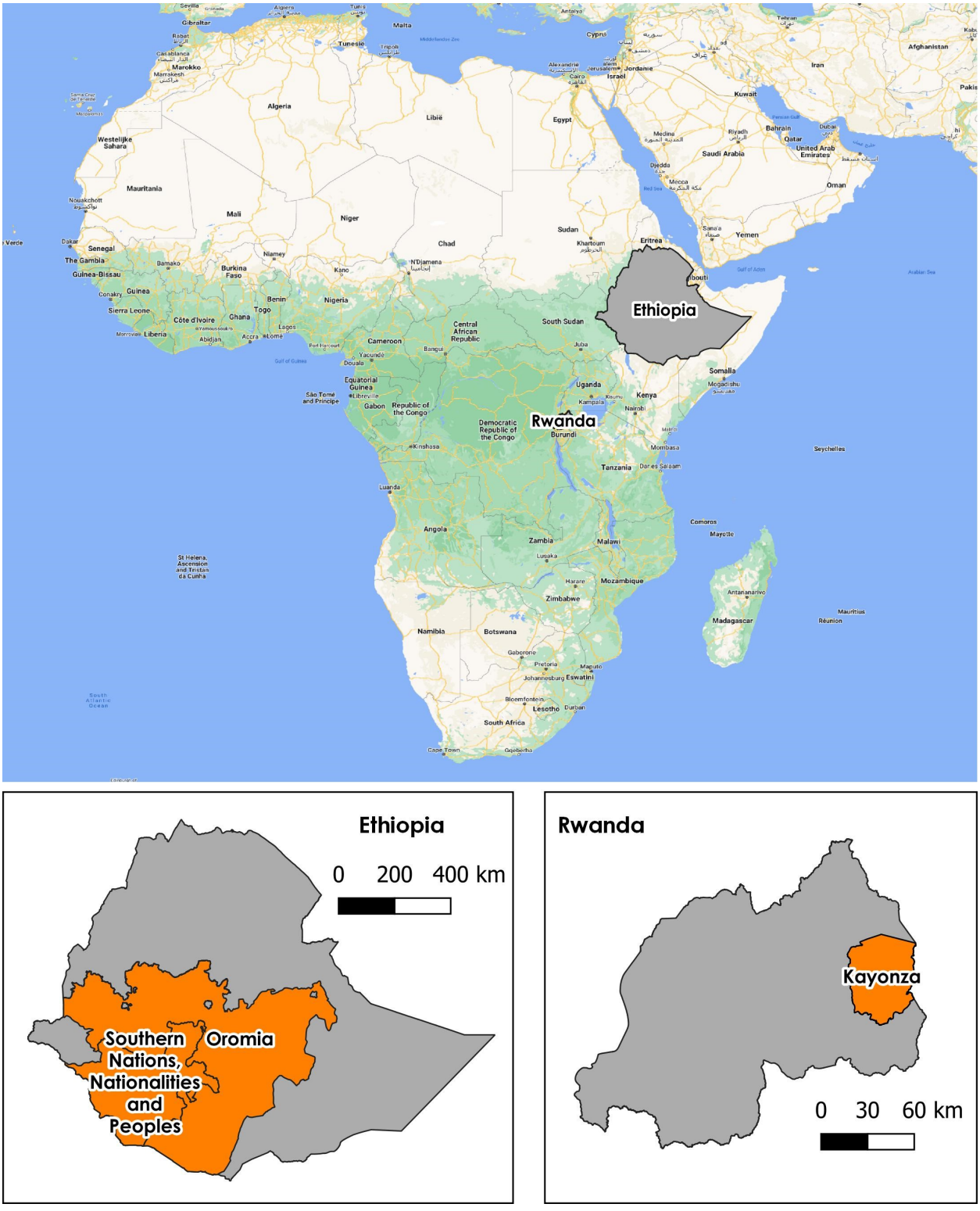

Figure 6 Project map and location of project activities (in orange) in Ethiopia and Rwanda

2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above, please explain why:

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement

1. In the project identification phase several stakeholders have been consulted to support the design of the project. These stakeholders have been consulted through individual meetings and/or general surveys. The following stakeholders have been consulted:

a) IFAD ICT4D team

b) IFAD Country offices in Rwanda and Ethiopia

c) Respective nominees of Ministry of agriculture of Govt. of Rwanda and , Ethiopia

d) Farmers

e) Banking institutions

f) Insurance sector

g) Fintech providers

h) Input suppliers

i) Market off-takers

j) Technical consultancy firm ? FutureWater

During stage 2 of the project, stakeholder consultations with other ministries including irrigation/water resources, public sector agencies working on agriculture extension, and climate changes aspects will also be consulted. In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.

2. Results from the stakeholder consultation stated a few key points to be considering in the development and implementation of this project:

a) A needs assessment should be performed, which will determine the type of services and information (from SMARTFARM) considered most relevant

b) Stakeholders should be consulted to support specifying agricultural communities for collaboration and 'pioneer' farmers

c) It is of importance that services are tailored to the local context especially concerning issues of environment, culture, and institutional structure (cooperatives).

d) Further stakeholder consultations can determine existing (institutional) systems and programs to build up on.

e) SMARTFARM technology needs to be tailored to be accessible for users considering the knowledge level and technical capabilities of smallholder farmers.

f) Inclusivity aspects: determine minority groups and strategies for including them in the project

g) Any legal and institutional issues can be identified in advance.

h) Further stakeholder consultations can contribute to the risk assessment and also provide essential inputs for determining upscaling and sustainability (long-term impact) strategies.

3. Gender Equality and Women's Empowerment

Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

1. A Gender Mainstreaming Plan (GMP) based on a needs assessment of beneficiaries? profiles, specific technology needs will be prepared and approved during the first three months of implementation of the project. This programme is committed to ensuring that all activities of the project integrate gender considerations. This project will seek to mainstream gender considerations into the preparation activities of the Project, including into the stakeholder engagement process.

2. During the implementation of the project, attention will be given to ensuring equitable opportunities for women smallholder farmers and extension workers to participate in the development of SMARTFARM and in all stakeholder engagement activities, including when engaging with: (i) potential financial sector institutions investees, (ii) potential off-takers and buyers, (iii) potential public and private sector investors etc. Lessons taken from on-going projects in Rwanda and Ethiopia will be used to ensure issues regarding gender equality are effectively addressed in this Project. A common aspect of smallholder agriculture observed in these regions is that landowners, commercial farmers, and decision-makers are mostly male. However, it is common that field workers are mostly female, estimated at 52% for Rwanda[1] and 57.4% for Ethiopia[2]. For improving agricultural practices, women play an essential role in the activities of planting, weeding, fertilizing, and harvesting. Female workers have limited technical knowledge and access to information, which can support them in their field activities[3]. Field activities are often labor intensive due to the traditional, and often unmechanized, agriculture practices used in smallholder agriculture. SMARTFARM as an

information and advisory platform will therefore empower female field workers to leverage data and access to information that reduces the labor requirement by tailoring the activities to specific locations (i.e. fields) to empowering them make decisions on farm that improve their productivity and overall resilience.

3. In Ethiopia, the project will leverage on the landscape assessment being undertaken through a Bill and Melinda Gates Foundation supported project focusing on Gender Transformative Mechanism (GTM) for climate adaptation. The analysis will support the development of the gender mainstreaming plan of the project. The project will also leverage of the knowledge and expertise of the IFAD gender team who will support the design of the project in both countries and integration of Gender Action Learning System Methodology to ensure equal participation of men and women during design and implementation. The existing IFAD supported projects in the two countries also mainstream gender (as part of IFAD corporate commitments) which will complement the efforts of the SMARTFARM project.

4. During implementation, the project will ensure participation of women in both technology transfer as well as capacity building (as lead farmers) activities. Wherever required, SMARTFARM will engage with women groups, extension workers to promote participation of women to the project as well as ensure adequate monitoring of their participation in the project.

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[1] NISR (2010). National Agricultural Survey 2008. Kigali: National Institute of Statistics of Rwanda, Government of Rwanda, Rwanda.

[2] https://tradingeconomics.com/ethiopia/employees-agriculture-female-percent-of-female-employment-wb-data.html

[3] FAO (2017). Rwanda Newsletter Volume 3 - Issue#4 4th quarter 2017. Rwanda

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes

closing gender gaps in access to and control over natural resources; Yes

improving women's participation and decision-making; and/or Yes

generating socio-economic benefits or services for women. Yes

Will the project?s results framework or logical framework include gender-sensitive indicators?

Yes

4. Private sector engagement

Will there be private sector engagement in the project?

Yes

Please briefly explain the rationale behind your answer.

1. ***The project intends to build a sustainable, replicable, and scalable digital climate adaptation model, that serves as farm and farm management solution and evidence based decision-making support system for smallholder farmers towards climate change*** and includes the following: -

i. Access to weather and climate information services (WACS), data-driven agriculture services (DDAS), and agri-digital financial services (Agri-DAFS) and digital agri-market services (DAMS).

ii. Active participation of private-sector (financial institutions and off-takers buyers) by risks and cost sharing, and trust and confidence building based on data and evidence for the benefit of smallholder farmers.

iii. Srengthening institutional capacity of identified lead farmers? organization/producer company and/or rural institutions, and governments for income & livelihood generation, agri-worthiness, increase in productivity, food & nutrition security and long-term asset creation and sustainability.

2. Simultaneously, the digital intervention intends to provide reciprocal benefits to the financial institutions and market off-takers to participate in the agri-value chain by providing last mile delivery of their services to smallholder farmers.

3.To achieve the above stated objective, the project will engage with private sector for partnerships and fundraising to tune of $8-10 million ($35/farmer/year engagement) for full scale module services (WACS, DDAS, Agri-DFS, DAMS) by sharing data and evidence with following private sector:

(a) **Banking institutions ?** to offer innovative credit lines to small holder farmers.

(b) **Insurance institutions ?** to offer safety nets in the form of climate-index insurance products for covering climate related risks faced by smallholder farmers.

(c) **Buyers and off-takers ?** to offer better prices and stable markets for farmers by completing farm to fork traceability and horizon on harvest and yield for off-takers and buyers to participate in business relationships with smallholder farmers institutions.

(d) **Agritechs, fintech, and international development institutions ?** to support better digital services to smallholder farmers and providing cash, in-kind, programme development support to the project and scaling to other regions.

5. Risks to Achieving Project Objectives

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

Key area	Anticipated risk	Mitigation methods	Risk level

Implementation Risks: The projects fail to achieve the results. Advisories are not converted into action plans. There is a lack of interest and trust in the stakeholders about digital technologies as they fail to see value. There is a lack of motivation and incentive to keep pace with upgradation in the fast-changing technology landscape. There might be individual hindrance due to privacy issues. Farmers? willingness to adopt new climate smart agricultural practices	Farmers may lack trust or credit to adopt new practices. The implications of failure are too great for many that depend on farming as their livelihood. Inability of travel to the field for activities due to covid-19 restrictions	- Identify pioneer farmers that are interested in adopting a new technology or set-up demo plots which will cause low risk for farmers. - Capacity building and training on a blend of world of practice approaches. - CropIn would provide its platforms in the proof-of-concept stage as an in-kind contribution. - Consult and involve the main target/user groups in the development of the implementation plan - use agile project management with frequent client inputs for the development of any new services/products - support the PMUs in clearly defined and allocated roles and responsibilities for project management - advocate for establishing specific task groups or working groups in the PMUs to closely monitor project implementation process, and establish governance and review processes - establish procedures to ensure the responsible use of data across the whole project implementation - Embedding of digital technology capacity building in all project design and operations - Better understanding of local needs and effective and management bottlenecks -	High

Covid-19 pandemic Covid-19 pandemic revival in the countries of implementation that limits operational capacities to develop the project COVID-19 induced shocks to agriculture incomes and resilience	Covid-19 pandemic has been effectively managed in Rwanda and Ethiopia. This coincided with regulations and strict enforcement to reduce spreading of the virus. During a revival of the pandemic the regulations may influence the implementation of the project. Consequentially, the anticipated risks are: - Inability of travel to the field for activities due to covid-19 restrictions - Limitations in group gatherings for training events and meetings. In an already difficult environment, the resilience of smallholder farmers is impacted due to COVID-19 induced shock to farm incomes	- While, the impact of COVID-19 has been low in the two countries, the project will ensure engagement of local agencies and partners to enable adequate implementation and monitoring. COVID protocols will be respected during project implementation and support provided to communities through messaging on the pandemic and during stakeholder engagement. - Some activities which can be done virtually will be accordingly completed. By providing e-advisory services and ensuring that farmers still have access to information to support production. SMARTFARM will support the recovery from the pandemic through the data driven agricultural services and improved input access. Smallholder farmers will be able to make more efficient use of their resources, particularly agricultural inputs that will contribute to green recovery. In addition the productivity of the smallholders is expected to increase as a result of the capacity building and improvement of farming practices, which will also contribute to increased production at local level for food security and recovery from the pandemic. - SMARTFARM will increase climate and weather information services available to farmers. **Technical and institutional capacity (lead farmers, local institutions) will be augmented** so farmers have an understanding of how climate change will impact at a practical level their farm fields and what adaptive measures are available to improve their resilience. - . The climate and weather data information services help the farmers and local players to adjust agriculture practices to the actual or expected effects of climate change and transition to green agriculture practices. **Changes in farming operation and adjustments according to climate risks** is expected to enhance productivity, and market potential thereby improving incomes and recovery from shocks. - Sustainability of the project includes access to markets, insurance and financial services thereby mitigating risks and improving resilience to shocks both inherent and those from covid-19 related	Medium

Climate change & Environment risks	Future climate Projections for Rwanda and Ethiopia according to GERICS[1] report predict that for Rwanda temperatures are expected to rise with likelihood of heatwaves resulting in extreme drought, or other climatic extreme in the next century. However, precipitations are expected to increase in some locations and some areas are prone to cyclones, extreme flooding, events. The same predictions for Ethiopia with the exception of low precipitation for Ethiopia in the beginning of the century and gaining towards 2050.[2] These predictions indicate possible coincidence with an additional occurrence of extreme rainfall and extreme events with flooding events expected to impact rivers and surface water runoff during the summer rainy season leading to crop failures, large-scale damage, and interference of coordination. . Climate risk screening which includes the aspects of hazards, exposure, sensitivity, and adaptive capacity, indicated a climate risk of ?moderate	- The impact of these events on the overall project can be mitigated by selecting multiple locations/communities to work with so the risk is spread. - **Robust weather nowcasting, forecating and prediction models in SMARTFARM to be incorporated at all the stages of project design and project implementation to provide advisory on weather and climate projections to enable decision making on farm** - Capacity building of staff on weather information services, climate risks and adoption of climate information services and resilient agriculture practices by smallholder farmers. - Overall, the SMARTFARM programme aims at increasing the adaptive capacity and reducing the sensitivity to climate hazards for smallholder farmers, by providing relevant climate based advisory services on effective usage of agriculture inputs and agricultural resources	Medium

Security issues	Conflict and violence can limit project staff of travelling or working in certain areas.	- Anticipate these issues of conflict that are currently known and select alternative locations. Establish a security protocol for project staff (e.g. no travelling at dark).	Medium
Technology risks The advisories on digital technologies are not working and not delivering the expected results and are not cost-effective. Poor ICT infrastructure in rural areas. Lack of understanding and knowledge of ICT Lack of ICT security management Inaccurate or incomplete data	The project fails to implement technology at the grassroots.	- Define realistic targets by taking into consideration ICT infrastructure and technology readiness adoption. - Leverage digital technology partnerships to speed up investments in infrastructure. - CropIn would provide its platforms in the Proof-of-concept stage as an in-kind contribution. - Capacity building of staff on digital technologies. - Raise awareness of cybersecurity and data protection issues - Robust and accurate data collection through effective point of collection and with clear accountabilities	Medium

Partnerships Lack of support from government and key stakeholders. Lack of interest to invest in poor remote areas by private sector partners. Lack of understanding of local context by digital technology developers. Lack of adequate digital technology supporting strategy and policies in partner organizations. Key partners pulling out. Risks of harm to beneficiaries.		- Raise awareness on the importance and urgency of digital technology stressing that digital technology is not a choice, but a request for immediate action for achieving the SDGs. - Strong engagement with governments, international development institutions, private sector, IFIs and service providers. - Perform an inventory of applicable laws and technical standards in privacy protection and cyber security. - Actively engage with government and key stakeholders through capacity building and sharing digital technology success stories; - Have very strict and clear rules about the terms of partnerships and the use of data and protection of the users.	Medium

Financial Actual project needs significantly exceeds initial budget.		- Thorough building of clear scope of work and deliverables with defined budgets. - Conduct analysis with mitigating measures at the project design stage with concrete project implementation plan - Have robust project budget management and control procedures - Mobilize partnerships with governments, international development institutions, private sector, IFIs and private sector companies to leverage more resources.	Medium

[1] Rwanda - Mean Projections | Climate Change Knowledge Portal (worldbank.org)

[2] https://climateknowledgeportal.worldbank.org/sites/default/files/2021-05/15463A-WB_Ethiopia%20Country%20Profile-WEB.pdf

6. Coordination

Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.

Implementation procedures and project management, including implementing partners and implementation agreements

1. 1. **Lead Programme Executing Agency:** Under the SMARTFARM Project, the lead agency for Programme implementation shall be CropIn Technology Solutions B.V. (?CropIn B.V.?) located at The Hague, Netherlands. CropIn B.V. is a wholly owned subsidiary of CropIn Technology Solutions Pvt. Ltd. (?CropIn?) headquartered in Bangalore, India.

2. Programme Steering Committee (PSC). A multi-stakeholder Programme Steering Committee chaired by the representatives from the GEF, IFAD & CropIn will be established to provide Programme oversight, direction, and advice for the Project. The PSC will be mutually selected by the three agencies after consultations and effort will be made to keep the continuation from the design stage to implementation stage. The PSC will be made up of representatives of 3 representatives each

from GEF, IFAD and CropIn (implementing organization). Advice from other IFAD projects or externals (e.g. public institutions) can be provided through IFAD or CropIn or if relevant, be invited as a guest to the PSC meeting. The PSC would meet 12 times over a 3 year project duration (on a quarterly basis) to review work plans and budgets, financial and progress reports, receive draft annual reports and approve all major Programme decisions. The multi stakeholder composition of the PSC will ensure the Programme?s implementation complements rather than duplicates other GEF, IFAD & Govts interventions, provides check and balances and continuous review, and harmonizes the Programme?s contribution with the GEF, IFAD, & Govts strategic priorities and development objectives.

3. The Programme Management Unit (PMU): The PMU will have a Project Director (who is the Lead of Development Sector Programme at CropIn BV responsible for project design and implementation work). Other programme managers and experts (technology, solutions and on-field manager) will be mutually selected with IFAD recommendations to deliver on the three components of the project. The PMU shall be responsible for day-to-day management, consolidation of Annual Work Plan and Budgets (AWPBs), procurement plans, progress, and financial reports, and will coordinate the procurement of goods, works and services. The PMU will also consist of Senior Knowledge Management experts, senior designers, ICT experts, an accountant/MIS/procurement expert.

4. Planning: The main planning tools for the Programme will comprise the logical framework, monitoring and evaluation (M&E) framework including its indicators and targets, and the Results Based Annual Work Plan and Budget (RB-AWPB). The Logframe provides indicators and targets for Programme implementation from output over outcome, development objective to impact levels. The RB-AWPB will break physical targets up by year and attach financial resources to them. The RB-AWPB shall present financial and physical outputs and outcomes of the Programme for the given year, and report on the accumulative achievements. The execution of the RB- AWPB will be monitored along the M&E framework of the Programme and reported back in regular intervals from quarterly to semi-annuals reports. The cycle of planning, monitoring and reporting is essential for efficient management of the Programme and for achieving the results as agreed.

5. Financial planning: The project?s organizational structure will ensure an adequate internal control system and clear segregation of duties. The flow of funds will ensure that GEF financing is segregated from other donors? funds and accounted for and reported separately. The project will be audited annually.

6. Programme Implementation Manual (PIM). The Programme shall be implemented in accordance with the approved AWPB and the PIM built through collaborative approach with GEF & IFAD teams. The PIM shall be approved by the Task team, which will also consult public agencies, and will serve as the guidance manual for the 3 year project. The PIM shall include, among other things:

a) terms of reference, implementation responsibilities and appointment modalities of all Programme staff and consultants;

b) Programme operating manuals and procedures;

c) monitoring and evaluation systems and procedures;

d) PSC meetings and review action plans;

e) Result framework;

f) project/PMU progress report;

g) knowledge management framework;

h) a detailed description of implementation arrangements for each programme component;

i) detailed modalities of the sub- programmes;

j) financial management and reporting arrangements including accounting, approval of payments, financial reporting, internal controls, fixed asset management, as well as internal and external audit;

k) Communication and Visibility plan; and

l) the good governance and anti-corruption framework.

7. Implementation period and workplan: The implementation period will be for 3 years. CropIn will deploy the Gantt Chart which will be jointly developed with consultations of the GEF & IFAD Task Team after on-ground surveys and need assessment and will be incorporated in the PIM.

8. Supervision arrangements: The grant project is to be directly supervised by the GEF & IFAD team as per the given terms of reference. CropIn PMU Team will take feedback from GEF & IFAD on a regular basis at the PSC meeting and incorporate the feedback. Direct supervision would encompass four discrete processes: (i) grant administration; (ii) procurement review; (iii) audit review; and (iv) supervision and implementation support.

9. Key supervision processes include: (i) ensuring fiduciary compliance with the grant administration; (ii) assessing Programme performance; (iii) guidance towards the achievement of the Programme?s strategic objectives; and (iv) conducting supervisory missions.

10. Monitoring, evaluation and reporting: The CropIn?s approach to planning, monitoring and evaluation will be compatible with the IFAD policies and tools. Guided by the Programme?s logical

framework, the M&E function systematically records data and performance information of project implementation. The system will build on the experience of completed and existing programmes as well as provide information that informs management decision making. CropIn would dedicate funds from the project management cost towards M&E and reporting.

11. Communication and visibility plan

Visit our media and communication section - https://www.cropin.com/media/

? Overall communication objectives The Communication and Visibility strategy for the project aims at: Ensuring project ownership by all stakeholders.

? Promoting and advocating the project and its results among project beneficiaries, stakeholders, development partners and a wider audience, thereby increasing impact and visibility for the project itself, the IFAD as the donor agency and CropIn as the lead implementing agency.

? Disseminating information on project activities to react to, support and benefit from current and new developments and programmes and initiatives in Africa in a timely manner, and build synergies with other projects and initiatives whenever possible.

? Facilitating project coordination and monitoring among stakeholders; this includes communications related to the operational aspects of the project and to its day-to-day management, as well as forward planning, strategic guidance, and navigation.

? Knowledge developed from the project could be made available to other partners.

12. Responsibilities for project communication ? CropIn B.V., as the project lead implementing agency, manages the overall project communication and visibility strategy in synergy with the PSC. The role of GEF & IFAD will be highlighted in all project communications. Communications on specific project activities and events, as well as project reporting, are managed by CropIn B.V. according to its responsibilities for project implementation, the conditions defined in the Communication and Visibility Plan in the PIM.

13. Communication principles ?

? Tailor communications to audiences according to the specific objectives for each target group.

? Ensure communication contains consistent core messages: these are the key cross-cutting messages which should consistently be used to present and introduce the project to any audience.

? Ensure partner visibility along with organization-wide communication guidelines and requirements. All training and communication materials developed under the project should appropriately display the names and logos of GEF-IFAD and CropIn. Materials used for events should follow project guidelines to ensure full visibility for project partners. This includes event programmes,

invitation letters, brochures, banners, badges, nameplates, PowerPoint presentations, certificates, any other as relevant.

? Information given to the media, beneficiaries and wider audience, all related publicity material, official notices, reports and publications, shall acknowledge that the activity was carried out within the context of the project.

14. Communication Activities - Main activities that will take place during the period covered by the communication and visibility plan Project activities that will be covered by the communication and visibility plan include:

? Bi-annual PSC meetings,

? Project milestones e.g. project launch, public-private policy meetings, etc.

? Main capacity building activities and events such as training workshops,

15. Communication tools - Project flyer Project, PowerPoint presentation, Press releases/Media advisories, Project e-newsletter CropIn and GEF-IFAD website; project website Social media (Facebook group, Twitter account) Project video Press book etc. https://www.cropin.com/news/ CropIn Youtube Channel - https://www.youtube.com/channel/UCvlca6utL2wBUIvUlKlgObg

7. Consistency with National Priorities

Is the Project consistent with the National Strategies and plans or reports and assesments under relevant conventions?

Yes

If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc

National Bio Strategy Action Plan (NBSAP)

- CBD National Report

- Cartagena Protocol National Report

- Nagoya Protocol National Report

- UNFCCC National Communications (NC)

- UNFCCC Biennial Update Report (BUR)

- UNFCCC National Determined Contribution

- UNFCCC Technology Needs Assessment

- UNCCD Reporting

- ASGM National Action Plan (ASGM NAP)

- Minamata Initial Assessment (MIA)

- Stockholm National Implementation Plan (NIP)

- Stockholm National Implementation Plan Update

- National Adaptation Programme of Action Update

- Others

1. The project is well aligned with the Paris Agreement?s Global Goal on Adaptation including the following specific elements:

? Increase international focus on and efforts on adaptation.

? Recognition of need for metrics and assessment tools.

? Capacity-building and support for National Adaptation Plans; and

? Increased adaptation finance from developed countries for vulnerable developing countries.

Implementation of the Paris Agreement and country level will be incorporated in this programme and project activities.

2. The project helps to address the ***Paris Agreement?s Global Goal on Adaptation*** by (i) supporting the development of climate intelligence tools for climate risk assessment, (ii) developing metrics to assess the impacts of climate adaptation and resilience investments and measures, (iii) providing technical assistance for technology transfer of climate adaptation and resilience solutions and capacity building in developing countries.

3. This project is consistent with and promotes ***the goals of the UNFCCC and the UNCBD*** and particularly the pursuit of adaptation and resilience to climate change in developing countries. In addition, this project is consistent with and supports the ***Sustainable Development Goals*** (Goals 1, 2, 3, 5, 8, 9, 12, 13 and 17). It also supports the Copenhagen and Durban climate finance targets of mobilizing USD 100 billion per year by 2020 for mitigation and adaptation in developing countries.

4. The project is also aligned and contributes to the Ethiopian Ten-Year Development Plan (2021-2030); Agriculture Sector Ten-Year Plan (2021-2030); Climate Resilient Green Economy (CRGE) and the associated Climate Resilience Strategy and Climate Smart Agriculture (CSA) strategy, 2020. Similarly, for Rwanda the SMARTFARM project contributes to National Agriculture Policy (NAP) of Rwanda and Strategic Plan for Agriculture Transformation phase 4 (PSTA 4) which aims at ensuring better weather and climate information and early warning, and climate smart technologies to enhance resilience and increase production.

5. The project also supports ***GEF goals on adaptation and mitigation***.

6. This project is consistent with ***GEF?s objectives supporting private sector engagement*** for climate change adaptation, and specifically its desire to support *?enhanced climate risk assessment tools that can be used by private sector investors and insurance companies; supporting technologies and business models for adoption of climate/weather services and drought tolerant techniques and crops, for example, which can build capacity for smallholders to adopt Climate Smart Agriculture techniques and expanding insurance access for countries vulnerable to climate change, such as Small Island Developing States and least developed countries*.?

7. Each component of the project, including operationalization, resource mobilization and legal setup will lead to increased investment in climate resilience and adaptation.

8. The project is consistent with the national strategies of the countries where it will be implemented, and in particular with the NDC and NAPs

Ethiopia NAP, NDC key alignment aspects:

The National Adaptation Plan[1]

With its CRGE strategy and GTP II, Ethiopia aims to achieve middle-income status by 2025 while developing a green (low emissions) economy. GTP-II argues that reaching its goals require significant investments to boost agricultural productivity, strengthen the industrial base and foster export-oriented growth. However, Ethiopia - as a country and its people - has been the subject of costly natural disasters in its long history. Droughts, floods, human and livestock diseases, crop diseases and pests, hailstorms and wildfires (specific to some regions) are the major climate-related hazards in the country, affecting the livelihoods of significant numbers of people.

The NAP for Ethiopia aims to proactively and iteratively pursue further integration of climate change adaptation in development policies and strategies, including macroeconomic and sectoral policies and strategies at the national level, as well as Regional and Woreda plans and strategies. To achieve this,

five strategic priorities have been identified as below and the SMART FARM project can support priorities 1 and 2 pf the NAP.

- ? Mainstreaming climate change adaptation into development policies, plans and strategies
- ? Building long-term capacities of institutional structures involved in NAP-ETH
- ? Implementing effective and sustainable funding mechanisms
- ? Advancing adaptation research and development in the area of climate change adaptation
- ? Improving the knowledge management system for NAP-ETH

The Nationally Determined Contributions[2]

Ethiopia?s long-term goal is to ensure that adaptation to climate change is fully mainstreamed into development activities. This will reduce vulnerability and contribute to an economic growth path that is resilient to climate change and extreme weather events. Sectors included are Agriculture (livestock and soil), Forestry, Transport, Electric Power, Industry (including mining) and Buildings (including Waste and Green Cities). Inline with these Ethiopia aims to improve crop and livestock production practices for greater food security and higher farmer incomes while reducing emission. As a medium term, the long-term adaptation goal, is to increase resilience and reduce vulnerability of livelihoods and landscapes in three pillars; drought, floods and other cross-cutting interventions. Particularly the measures proposed for droughts include improve traditional methods, productivity etc.; for floods enhancing the adaptive capacity of ecosystems, communities and; for other cross cutting the plan is to use effective early warning systems and disaster risk management policies to improve resilience to extreme weather events. SMARTFARM project is aligned to these government policy priorities and will contribute to their implementation through its projects components

Rwanda NAP, NDC key alignment aspects:

The Nationally Determined Contributions[3] are built upon the NCCLCD and advocate for a climate resilient economy. The framework aims at achieving Category 2 energy security and low carbon energy supply that supports the development of green industry and services, sustainable land-use and water resource management, appropriate urban development as well as biodiversity and ecosystem services. Rwanda is increasingly experiencing the impacts of

climate change. Rainfall has become increasingly intense and the variability is predicted to increase by 5% to 10%. , the country seeks to contribute to the goal of limiting temperature rise to 2oC with efforts to reach 1.5oC agreed under the Paris Agreement. The country adopted the Green Growth and Climate Resilience Strategy (GGCRS) setting out the country?s actions and priorities on climate change relating to both mitigation and adaptation and to how these will be mainstreamed within economic planning. The GGCRS is also embedded in the recently developed National Strategy for transformation (NST) (2018 ? 2024) in alignment with Rwanda?s 7-year Government Program. Under adaptation, for agriculture Rwanda aims tio adopt:

Develop climate resilient crops and promote climate resilient livestock; Develop climate resilient post harvest and value addition facilities;and technologies; Strengthen crop management practices; Develop sustainable land use management practices; Expand irrigation and improve water management; and Expand crop and livestock insurance. These activities are well aligned to the SMARTFARM Project.

National Adaptation Plan[4] for Rwanda aims to adopt an integrated approach to adaptation to promote climate-resilient national, social and economic development with an emphasis on community- and ecosystem-based adaptation initiatives and building capacity of the government to advance the NAP process. The NAP for Action of NAPA for Rwanada had determined 6 priorty action areas for adapatation to climate change which include: Integrated water resources management; Set up information systems of hydro agrometeorologic early warning system and rapid intervention; Promotion of income generating activities; Promotion of income generating activities; Introduction of varieties resisting to environmental conditions; and Development of energy sources alternative to firewood

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[1] https://www4.unfccc.int/sites/NAPC/Documents/Parties/NAP-ETH%20FINAL%20VERSION%20%20Mar%202019.pdf

[2] https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Ethiopia%20First/INDC-Ethiopia-100615.pdf

[3] https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Rwanda%20First/Rwanda_Updated_NDC_May_2020.pdf

[4] https://unfccc.int/resource/docs/napa/rwa01e.pdf

8. Knowledge Management

Outline the knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

1. Introducing and implementing innovative technology also has risks and it is therefore required to have a robust Monitoring and Evaluation (M&E) strategy implemented throughout the project. At different key moments throughout the project, lessons learned will be shared and strategies will be adopted to cope with the issues involved.

2. The approach for evaluating and updating learning objectives and the development itself will use the 'agility cycle', as shown in Figure 7. This allows for regular adjustments to the design and project implementation depending on the knowledge gained during the previous cycle. This is an effective and flexible method to generate new knowledge and integrate it in the development of the innovation.

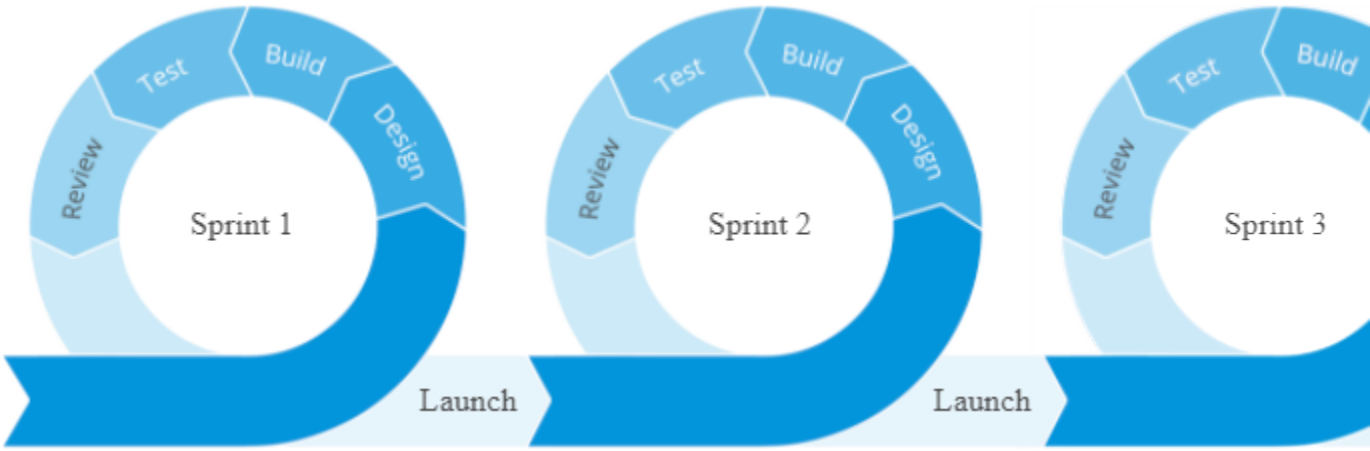

Figure 7 The agility cycle for knowledge management and development.

3. Projects Knowledge management strategy will be guided by the theory of change and has five main expected outcomes:

? Higher quality project and country programme results;

? Scaled up development results;

? Enhanced use of evidence-based and experiential knowledge;

? Greater visibility, credibility and influence; and

? A stronger learning culture.

4. Knowledge management is a key pillar of the project to ensure future design and implementation. The learning system will capture and document lessons and innovations through ongoing data collection, monthly/semi-annual reports and thematic studies will be an integral part of the project learning and knowledge management. A lot of emphasis will be put on capturing accurate data for making real actionable plans.

5. The knowledge management team (KMT) will comprise a Senior Knowledge Management expert, Data scientist/Technology Solution expert, and Senior designer & ICT host. The KMT will incorporate (i) Knowledge management action plan built around 3 action areas: knowledge generation, knowledge use and enabling environment and (ii) knowledge management result framework in the PIM.

6. The project will develop a knowledge management platform (web-page or a mobile application) to store, organize and manage knowledge products for their effective dissemination on the cases and evidence generated from component 1 and feedback from component 2.

7. The project would promote systematic and integrated management of data and results from two components to inform design and implementation of future interventions. Knowledge Products will build on the lessons from activities being undertaken under the grant.

8. The envisaged activities for this action area are:

? Promote the systematic and integrated management of project data and results to inform the new design and implementation of future interventions in country programmes;

? Increase the use of digital technology in M&E and impact assessment by: (i) increasing and improving the datasets currently used for these activities; (ii) expanding the tools to interrogate and disseminate that data (artificial intelligence and data science are fundamental in detecting trends and driving predictive analytics);

? Develop case studies, lessons learned, toolkits and templates related to the use of digital technology in project operations, and host them on repository along with external resources;

? Advancing knowledge and fill data gaps related to the use of ICT in agriculture and rural areas, including through the production of knowledge products;

? Organize knowledge-sharing events that foster peer-to-peer sharing of lessons learned from ICT4D projects;

? Promote a dedicated digital technology community of practice that includes GEF & IFAD headquarters, sub-regional hubs, centres of excellence for South-South and Triangular Cooperation and knowledge sharing, and external experts; and

? Build on the existing work of CropIn?s knowledge bank and IFAD?s Research and Impact Assessment Division to expand the use of ICT-based tools for M&E and impact assessment and develop a common toolset to capture baseline, midline, end-line and annual outcome data.

9. **Knowledge products:** Technical briefs, guides, how-to-do kits, videos, presentations, flyers, press releases, blogs, webinars, reports, case studies, etc..

10. **Knowledge development and dissemination**: The project will support the creation of replicable and scalable approaches to graduation and the development of innovative digital solutions. Disseminating reports and studies (in full or summarized) will enable information sharing and facilitate dialogue with stakeholders. The project will also have biannual and annual review meetings/workshops. Workshops will report on programme progress, lessons learned, challenges and solutions to implementation constraints.

11. The project will work closely with programme partners and the M&E function to capture lessons and impacts. The M&E knowledge management function will document and share knowledge through internal mechanisms (e.g. learning events, stakeholder workshop meetings, etc.) and externally (e.g. website, blogs, podcasts featuring programme stakeholders). In addition, the programme will publish a semi-annual programme update (online/print), along with good practices and human-interest stories. Knowledge activities will proactively pursue gender and youth issues and will report success stories related to the adoption of ICT solutions by member countries.

9. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF	CEO Endorsement/Approval	MTR	TE
Medium/Moderate			

Measures to address identified risks and impacts

Provide preliminary information on the types and levels of risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the

project (considering the GEF ESS Minimum Standards) and describe measures to address these risks during the project design.

1-The project could potentially lead to procurement, supply and/or result in the use of pesticides on crops, livestock, aquaculture or forestry (as the enhanced climate services are designed to strengthen climate resilient agriculture practices)

2- The likelihood of the risk is minor and the impact of this risk would be minor as well

Supporting Documents

Upload available ESS supporting documents.

Title	Submitted
IFAD-GEF-SMARTFARM-SECAP ESC Screening	

Part III: Approval/Endorsement By GEF Operational Focal Point(S) And GEF Agency(ies)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

Name	Position	Ministry	Date
Kasahun Wakoya???????	Acting Director General, Resource Mobilization and Project Administration	Federal Democratic Republic of Ethiopia Environmental Protection Authority	4/8/2022
Juliet Kabera	Director General - GEF Operational Focal Point	Rwanda Environment Management Authority (REMA)	5/11/2022

ANNEX A: Project Map and Geographic Coordinates

Please provide geo-referenced information and map where the project intervention takes place

An elaborate map of selected locations is provided with Figure 6 providing an excerpt for selected countries i.e. Ethiopia and Rwanda.

(i) In Rwanda the project location will align with the Kayonza Irrigation Project (KIIWP) at approximately -1.94, 30.51 coordinates.

(ii) In Ethiopia the project location will align with PASADIP project and selected two regions (Oromia and SNNP) for the activities of this new project.

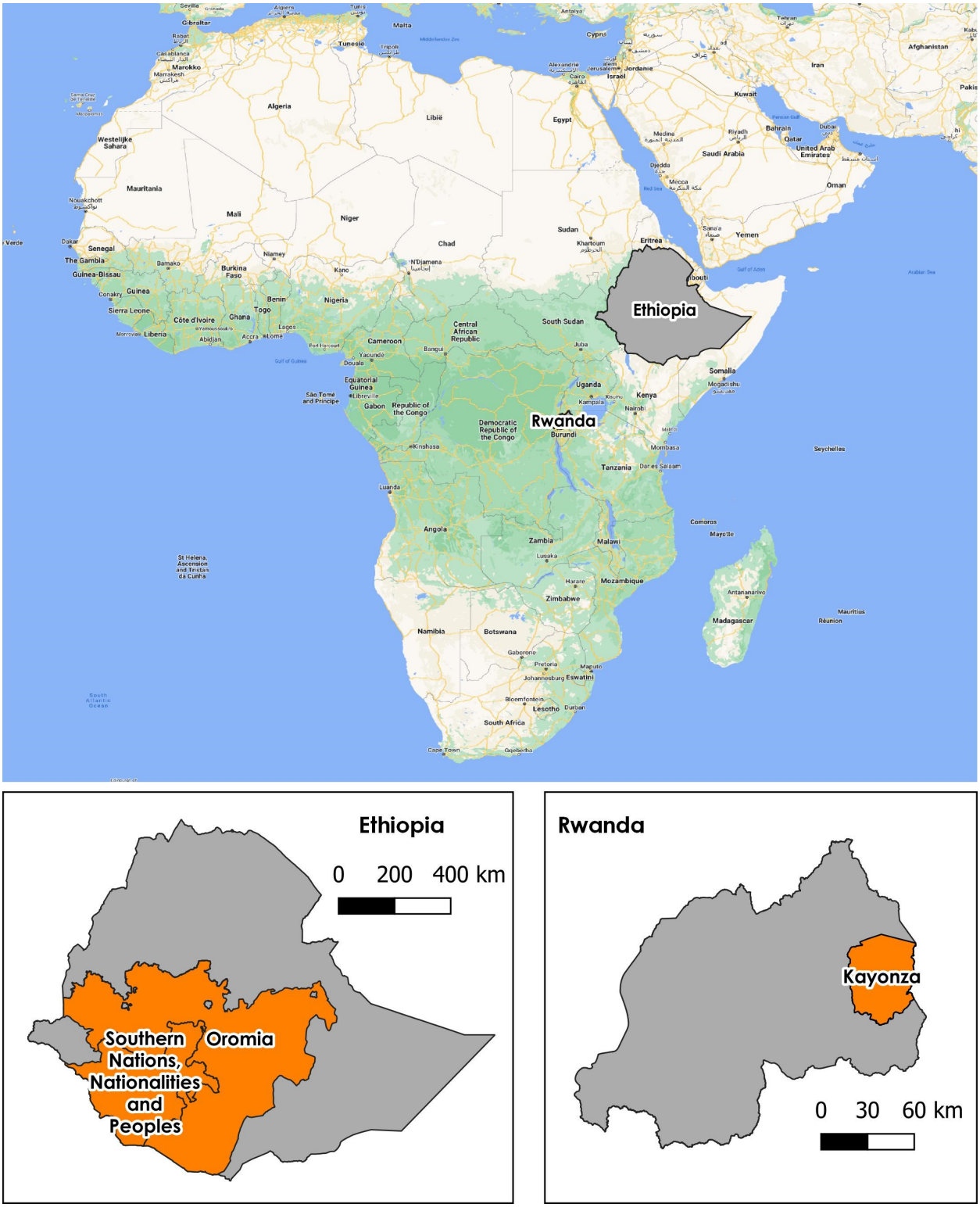

Figure 6 Project map and location of project activities (in orange) in Ethiopia and Rwanda