



**GREEN
CLIMATE
FUND**

Meeting of the Board
27 February – 1 March 2018
Songdo, Incheon, Republic of Korea
Provisional agenda item 15

GCF/B.19/22/Add.14

6 February 2018

Consideration of funding proposals – Addendum XIV

Funding proposal package for FP072

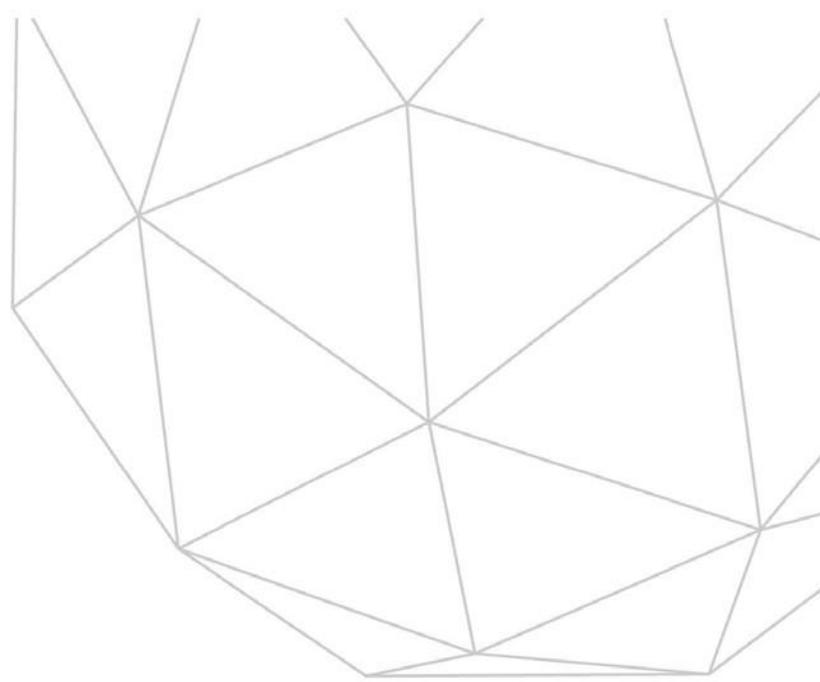
Summary

This addendum contains the following three parts:

- a) A funding proposal summary titled “Strengthening climate resilience of agricultural livelihoods in Agro-Ecological Regions I and II in Zambia”;
- b) No-objection letters issued by the national designated authority(ies) or focal point(s); and
- c) Environmental and social report(s) disclosure;



GREEN
CLIMATE
FUND



Funding Proposal

Version 1.1

The Green Climate Fund (GCF) is seeking high-quality funding proposals.

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

Project/Programme Title: **Strengthening climate resilience of agricultural livelihoods in Agro-Ecological Regions I and II in Zambia**

Country/Region: Zambia

Accredited Entity: United Nations Development Programme (UNDP)

Date of Submission: 5 February 2018

Contents

Section A	PROJECT SUMMARY
Section B	FINANCING / COST INFORMATION
Section C	DETAILED PROJECT DESCRIPTION
Section D	RATIONALE FOR GCF INVOLVEMENT
Section E	EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA
Section F	APPRAISAL SUMMARY
Section G	RISK ASSESSMENT AND MANAGEMENT
Section H	RESULTS MONITORING AND REPORTING
Section I	ANNEXES

Note to accredited entities on the use of the funding proposal template

- Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document.
- The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.

Please submit the completed form to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

“[FP]-[Agency Short Name]-[Date]-[Serial Number]”

A. PROJECT SUMMARY		
A.1. Brief Project / Programme Information		
A.1.1. Project / programme title	Strengthening climate resilience of agricultural livelihoods in Agro-Ecological Regions I and II in Zambia	
A.1.2. Project or programme	Project	
A.1.3. Country(ies) / region	Zambia	
A.1.4. National designated authority(ies)	Mr. Chola J. Chabala Permanent Secretary – Ministry of Planning and National Development	
A.1.5. Accredited entity	United Nations Development Programme	
A.1.5.a. Access modality	<input type="checkbox"/> Direct <input checked="" type="checkbox"/> International	
A.1.6. Executing entity / beneficiary	Executing Entity: Ministry of Agriculture Beneficiary: Rural smallholder farmers in the Agro-Ecological Regions I and II	
A.1.7. Project size category (Total investment, million USD)	<input type="checkbox"/> Micro (≤ 10) <input type="checkbox"/> Small ($10 < x \leq 50$) <input checked="" type="checkbox"/> Medium ($50 < x \leq 250$) <input type="checkbox"/> Large (> 250)	
A.1.8. Mitigation / adaptation focus	<input type="checkbox"/> Mitigation <input checked="" type="checkbox"/> Adaptation <input type="checkbox"/> Cross-cutting	
A.1.9. Date of submission	1 July 2016, 5 February 2018	
A.1.10. Project contact details	Contact person, position	Benjamin Larroquette, Regional Technical Adviser
	Organization	UNDP
	Email address	benjamin.larroquette@undp.org
	Telephone number	+251 (0) 912503308
	Mailing address	UNDP Regional Service Centre for Africa, Main Bole Road, DRC Street, P.O. Box 60130, Addis Ababa, Ethiopia

A.1.11. Results areas <i>(mark all that apply)</i>	
Reduced emissions from:	
<input type="checkbox"/>	Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)
<input type="checkbox"/>	Low emission transport (E.g. high-speed rail, rapid bus system, etc.)
<input type="checkbox"/>	Buildings, cities and industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)
<input type="checkbox"/>	Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)
Increased resilience of:	
<input checked="" type="checkbox"/>	Most vulnerable people and communities (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.)
<input checked="" type="checkbox"/>	Health and well-being, and food and water security (E.g. climate-resilient crops, efficient irrigation systems, etc.)

- Infrastructure and built environment
(E.g. sea walls, resilient road networks, etc.)
- Ecosystem and ecosystem services
(E.g. ecosystem conservation and management, ecotourism, etc.)

A.2. Project / Programme Executive Summary (max 300 words)

Please provide a brief description of the proposed project/programme, including the objectives and primary measurable benefits (see [investment criteria in section E](#)). The detailed description can be elaborated in [section C](#).

1. The proposed project supports the Government of Zambia to strengthen the resilience to climate change risks of vulnerable smallholder farmers in the country's Agro-Ecological Regions I and II. These regions are facing increasing risks as a result of climate change, primarily variability of rainfall and increased frequency of droughts, which have direct impacts on the agricultural production in the region. They are also the regions of Zambia which have the highest concentration of poverty incidence and where rain-fed agriculture is predominant. Therefore, the poorest smallholder farmers in these regions are facing devastating impacts on their livelihoods which will further erode development gains. Women are disproportionately affected by these impacts, given their role in ensuring household food production and food/nutritional security, despite their unequal access to land, information and inputs (e.g. improved seeds, fertilizer, tools).
2. This project aims to increase the resilience **of smallholder farmers in Agro-Ecological Regions I and II in Zambia in view of climate change and variability**. The project will achieve this aim by taking a value chain approach, addressing risks posed across key stages of the value chain – planning, inputs, production and post-production. The very high co-finance ensures that this project will shift public financing on agriculture towards climate resilient agriculture through strong partnership with GCF and UNDP. GCF funds will only finance the activities that have a clear climate change additionality like climate information and early warning systems, access to water for smallholder farmers and linkages with rural agricultural markets. The project will make targeted interventions to capitalize on opportunities to strengthen and promote viable climate-resilient value chains relating to smallholder agriculture in the target regions, specifically targeting value chains that are gender sensitive and provide viable economic opportunities for women. This includes three interrelated outputs: 1) strengthening capacity of farmers to plan for climate risk; 2) strengthening resilient agricultural production and diversification practices (for both food security and income generation); and 3) strengthening farmers' access to markets and commercialization of introduced resilient agricultural commodities. The third output on markets and commercialization is important as it will help to drive the production of resilient agriculture commodities and help to ensure the sustainability of the first two outputs. Capacity-building will be given deliberate emphasis across the various levels, starting from the national to the community level. This will target all the major project outputs and institutions, including extension, Zambia Meteorological Department (ZMD) and farmer field schools. The project interventions will have a strong focus on women, given their unique capacities and vulnerabilities.
3. Within the two Agro-Ecological Regions, smallholder farmers in the five provinces (namely, Eastern, Lusaka, Muchinga, Southern and Western) will be directly targeted by the project, specifically including the following 16 districts: Mambwe, Nyimba, Chongwe, Luangwa, Chirundu, Rufunsa, Chama, Mafinga, Kazungula, Siavonga, Gwembe, Namwala, Shangombo, Senanga, Sesheke and Mulobezi. The direct beneficiaries will represent approximately 946,153 people. These districts were selected given their specific vulnerability to climate change risks, primarily increasing droughts, variability of rainfall and occasional floods, coupled with high incidence of poverty. Target beneficiaries currently have little resilience to cope with climate impacts or sustain livelihoods in the face of climate.
4. The project aligns with the Government of the Republic of Zambia's (GRZ) key development goals, defined in Zambia's Seventh National Development Plan (7NDP) and Vision 2030 Strategy, which identify the agriculture sector as critical for achieving the objective of becoming a prosperous middle-income country by the year 2030. The project is also anchored in the country's National Adaptation Programme of Action on Climate Change (NAPA, 2007), National Climate Change Response Strategy (2010), National Strategy for Reducing Emissions from Deforestation and Forest Degradation (REDD, 2015) and contributes to the implementation of the Nationally Determined Contributions (NDC, 2015), which prioritizes "promotion of conservation/smart agriculture activities leading to adaptation benefits and enhancing climate resilience, especially in rural areas," as well as conservation of water, water technologies for irrigation, and strengthening

climate information services. It promotes a paradigm shift by taking a comprehensive approach to addressing the entire value chain, and providing the initial trigger for poor and vulnerable farmers to shift on to a resilient trajectory for agricultural livelihoods. This will also result in sustainable development benefits, as these vulnerable farmers and their families will see increases in income and enhanced food security – leading to health and environmental co-benefits.

5. GCF grant resources will support urgent adaptation actions that will benefit largely the poorest and most vulnerable regions of the country in Agro-Ecological Regions I and II.

6. The project was designed through extensive stakeholder consultations, including with civil society, at the national level and in the targeted regions of the country, and the National Designated Authority (NDA) has issued a no-objection letter.

A.3. Project/Programme Milestone	
Expected approval from accredited entity's Board (if applicable)	24 November 2017
Expected financial close (if applicable)	TBD [date of agreement on the FAA between UNDP and GCF]
Estimated implementation start and end date	Start: 01/10/2018 End: 30/09/2025
Project/programme lifespan	7 years 0 months

<p>Component 1: <i>Enhance the lives and livelihoods of smallholder farmers in Agro-Ecological Regions I and II in Zambia adversely affected by increasing climate change risks</i></p>	<p>Output 1: Smallholder farmers are able to plan for and manage water resources to support resilient agricultural production</p>	<p>1.1 Strengthen generation and interpretation of climate information and data collection to ensure timely and detailed weather, climate, crop and hydrological forecasts are available to support smallholder farmers in planning and management of water resources used in resilient agricultural practices</p>	3.174	0.369	-	3.543	33.094
		<p>1.2 Strengthen dissemination and use of tailored weather/climate-based agricultural advisories to ensure smallholder farmers receive the information they need for planning and decision-making</p>	1.589	5.100	-	6.689	62.483
	<p>Output 2: Resilient agricultural livelihoods in the face of changing rainfall, increasing drought and occasional floods</p>	<p>2.1 Promote irrigation schemes, water storage and capture as well as other resilient water management strategies to increase access to water for agricultural production in the target districts within Agro-Ecological Regions I and II</p>	10.046	12.200	0.102	22.348	208.749
		<p>2.2 Increased access to agricultural inputs (e.g. seeds, soil kits, tools) for resilient crops</p>	2.100	40.000	0.102	42.202	394.201
		<p>2.3 Introduction of new resilient agricultural production practices to strengthen production and diversify crops amidst climate variability and change</p>	1.500	21.000	0.102	22.602	211.121
		<p>2.4 Introduce alternative livelihoods to</p>	3.368	11.900	0.699	15.967	149.146

		strengthen resilience in target communities					
		2.5 Establish farmer field schools and learning centres of excellence to further document and scale up successful practices	2.517	0.100	-	2.617	24.447
	Output 3: Increasing farmers' access to markets and commercialization of resilient agricultural products	3.1 Strengthen processing of resilient products	1.814	3.000	0.200	5.014	46.835
		3.2 Strengthen storage, aggregation and transportation of resilient products to enhance commercialization and linkages to market and SMEs	2.000	3.000	0.100	5.100	47.638
		3.3 Increase access to finance and insurance products for smallholder farmers by engaging with potential financing sources including public, private, bilateral and multilateral sources	1.400	3.100	-	4.500	42.034
		3.4 Identify available markets and promote climate-resilient products	1.000	3.100	-	4.100	38.297
	Project Management		1.492	1.000	0.095	2.586	24.157
Total Project Financing			32.000	103.869	1.400	137.269	1,282.202

* UN exchange rate for the month of May 2017 is used (1USD=9.3408ZMW)

The expenditures by types of activities are presented in Annex V.

B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing
(a) Total project financing	(a) = (b) + (c)	137.269	million USD (\$)		

(b) GCF financing to recipient	(i) Senior Loans		32.000	<u>million USD</u> (\$)	() years	() % () % IRR	
	(ii) Subordinated Loans						
	(iii) Equity						
(iv) Guarantees							
(v) Reimbursable Grants							
(vi) Grants *							
* Please provide economic and financial justification in section F.1 for the concessionality that GCF is expected to provide, particularly in the case of grants. Please specify difference in tenor and price between GCF financing and that of accredited entities. Please note that the level of concessionality should correspond to the level of the project/programme's expected performance against the investment criteria indicated in section E .							
Total requested (i+ii+iii+iv+v+vi)		32.000	<u>million USD</u> (\$)				
(c) Co-financing to recipient	Financial Instrument	Amount	Currency	Name of Institution	Tenor	Pricing	Seniority
	<u>Grant</u>	103.500	<u>million USD</u> (\$)	Ministry of Agriculture	() years	() %	<u>Options</u>
	<u>Grant</u>	0.369	<u>million USD</u> (\$)	WARMA		() %	<u>Options</u>
	<u>Grant</u>	1.400	<u>million USD</u> (\$)	UNDP		() % IRR	<u>Options</u>
Lead financing institution: N/A							
* Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution.							
(d) Financial terms between GCF and AE (if applicable)	N/A						
	Financial instrument	Amount	Currency	Tenor	Pricing		
	Grants	<u>Options</u>	() years	() %		
Please provide a justification for the difference in the financial instrument and/or terms between what is provided by the AE to the recipient and what is requested from the GCF to the AE.							
n/a							
B.3. Financial Markets Overview (if applicable)							
13.	N/A						

Please fill out applicable subsections and provide additional information if necessary, as these requirements may vary depending on the nature of the project/programme.

C.1. Strategic Context

Economic context

14. Zambia remains a poor country despite recent good economic growth. Poverty rates, particularly in rural areas, are relatively high and the Government has identified poverty reduction as one of the main priorities (7NDP, 2017-2022). In fact, the poverty rate in rural areas is almost triple the level observed in urban areas. In 2010 rural poverty was estimated at 77.9 percent compared to urban poverty levels of 27.5 percent. In the 16 target districts, smallholder farmers live on less than USD 2 per day. Though more than 80 percent of the targeted farming households live in their own houses, these are mud-thatched whose average value does not go beyond USD 50. Based on the World Bank's 2015 Mapping Subnational Poverty in Zambia (2015), it is evident that the poverty incidence is highly concentrated in Agro-Ecological Regions I and II where rain-fed agriculture is predominant.

15. The high incidence of poverty is coupled with high food insecurity throughout the country. In 2013, 48.3 percent of the Zambian population was undernourished or food deprived (United Nations Statistics Division, 2014). Between May 2011 and April 2012, 42 percent of rural households experienced food shortages, with the average time of food access shortage of 3.2 months. Stunting rates in rural areas are frequently 52 percent (GRZ, 2013). Diets are very limited, leading to challenges of nutrition. About 50 percent of calorific intake was derived from maize and 14 percent from cassava (Ministry of Agriculture and Livestock, 2011). This heavy reliance on maize as a staple food causes deficiencies in micronutrients. Zambian calorie consumption of vegetables, nuts and pulses is around 2 percent (GRZ, 2013).

Climate risk in Agro-Ecological Regions I and II

16. There are three major Agro-Ecological Regions in Zambia. Region I, in the southern portion of the Southern and Western provinces, is one of Zambia's hottest, driest and poorest regions. It is categorized as a low rainfall area, where soils are sandy, characterized by poor fertility. Maize, sorghum, groundnuts, sunflower and cowpeas are cultivated, and some fishing activities are undertaken. This region is particularly vulnerable to climate change, and is categorized as a drought-prone area.

17. Region II has three subregions (IIa1 and IIa2, and IIb) and is a medium-rainfall belt running East-West through the centre of the country. It is an area with relatively good soils and receives more rainfall than Region I. It has the most favourable agro-ecological conditions in terms of rainfall, soil quality and absence of the tsetse fly. There is also ample irrigation potential. This allows for a diverse mix of crop and livestock enterprises. Region IIb, while often considered a part of Region II, is differentiated from the other parts of the region. It can be characterized as a low-rainfall area in the western part of the country that corresponds mostly to Central/Northern parts of the Western province. This area has lower rainfall and sandier soils, poorer road and market infrastructure, and high risk of droughts. Sorghum and millet are mainly grown as staple crops along with cassava, with some maize also being grown. This drought-prone area is also suited to extensive livestock production, cashew nuts and timber.

18. It is evident that severe weather/climate events have led to significant drops in GDP growth, especially in the relatively dry Regions I, IIa1 and IIb. The strength of the 2015-16 El Niño and severe drought, comparable in strength to the 1982-83 and 1997-98 El Niño events, led to a significant reduction in GDP growth, especially in the economically important agricultural sector, and it reduced its contribution to GDP. As a consequence, a surge in poverty rates, particularly among smallholder farmers who depend almost exclusively on rain-fed agriculture and have little or no coping mechanism in Regions I, IIa1 and IIb was expected (World Meteorological Organization, El Niño/La Niña Update, 12 May 2016).

Context of agriculture sector

19. Zambia is a landlocked country with a tropical climate favourable for agriculture and produces a variety of crops

including fruits and vegetables. As a result, agriculture is the backbone of Zambia's economy, with approximately 70 percent of the population engaged in agricultural livelihoods (Sitko & Tembo, 2013; World Bank, 2013). Overall, the agriculture sector accounts for approximately 9.6 percent of national GDP as of 2013 (World Bank). Increasing risks of climate change, particularly related to droughts, highly variable rainfall and occasional floods make these livelihoods extremely vulnerable to climate change. Over the course of the last 30 years, the impacts of floods and droughts have been estimated to cost the country USD 13.8 billion. If no measures were to be taken, climate change is expected to reduce GDP growth by USD 4.3-5.4 billion in the next decade, equivalent to a loss of 0.9 percent to 1.5 percent in GDP growth.¹

20. Smallholder subsistence farmers, defined as farmers with farms of less than five hectares in size², represent 96 percent of the country's ~1.1 million farmers and cultivate 76 percent of the total cropped area. Most female farmers come under this category.³ Currently, approximately 48 million hectares of land in Zambia is suitable for agricultural use. This area is suitable particularly for growing staple crops under rain-fed conditions, but is likely to decline by ~80 percent by 2100. This would directly affect small-scale farmers in Zambia, most of whom rely on rain-fed systems.

Climate impacts on the agriculture sector

21. Both Regions I and II are highly exposed to climatic hazards due to more frequent drought and flood events and to lack of adaptive capacities (NAPA, 2007). Projections show that rainfall is expected to be more erratic, less frequent but more intense, with more precipitation coming from extreme events, and that this would be concurrent with a general drying trend overall. The decline in precipitation and shortening of growing seasons would reduce agricultural productivity, while extreme precipitation events could, through flooding and run-off, destroy crops.

22. In particular, climate variability is forecast to reduce yields of major crops (including maize, sorghum and soybean) (Adhikari et al., 2015) and to reduce total GDP for the agricultural sector by USD 2.2-3.1 billion in midterm projections (10–20 years), representing more than 50 percent of the expected GDP losses from climate change (Zambia INDC, 2015). Rain-fed agriculture, on which small-scale farmers depend, has in the past shown high sensitivity to climate variability in terms of both droughts and floods (Climate Investment Funds, 2011).

23. Given the diversity of crops grown in the country as well as the climate in the agro-ecological regions, it is also important to understand potential impacts of climate change at a regional level. For example, Agro-Ecological Region I in the south of Zambia has the least rainfall in the country and is considered to be the most vulnerable to climate change (Climate Investment Funds, 2011). Certain crops are likely to do better under climate change scenarios: for example, cassava is considered to be drought tolerant and resistant to high temperatures (Jarvis et al., 2012). Currently, it is grown predominantly in Agro-Ecological Region III as well as parts of Region II.

24. On the other hand, maize, grown by nearly 83 percent of Zambian households (World Bank, 2013), is considered to be vulnerable to climate change impacts. Maize in particular dominates in Agro-Ecological Regions I and IIa (Hagglade and Nyembe, 2008). Yet as Adhikari et al. (2015) notes, "Despite large variations in projected impact on maize yield, there is a general consensus that climate change will adversely affect maize yield in East Africa [includes Zambia in this study]. Multiple studies indicated that East Africa could lose as much as 40% of its maize production by the end of the 21st century" (pp.116-17).

Policy context – priorities of the Government of Zambia

25. GRZ recognizes this complex economic and environment landscape, and has put in place several policies and strategies to address it. The 7NDP (2017-2021) recognizes the impacts of climate change and it has been mainstreamed in all strategies in order to reach the Government's Vision 2030 of becoming a "prosperous middle-income country by 2030." The 7NDP's key investment areas include agriculture, livestock and fisheries which are susceptible to climate

¹ Ministry of Tourism, Environment and Natural Resources (2011)

² AgWater Solutions (2009), Zambia Situation Analysis. Available at: http://awm-solutions.iwmi.org/Data/Sites/3/Documents/PDF/Country_Docs/Zambia/Situation%20Analysis%20Brief%20Zambia.pdf

³ Ibid.

change. Thus, climate change adaptation is a critical consideration in this sector, as well as a cross-cutting priority area, emerging under several of the other investment areas including water and sanitation, energy, and education and skills development.

26. The National Climate Change Response Strategy (2010) and the National Climate Change Policy further outline an approach for achieving the vision of “a prosperous climate change resilient economy.” They provide a strategy for a coordinated response to climate change issues, particularly contributing to the United Nations Framework Convention on Climate Change (UNFCCC) objectives and commitments. This includes a strong foundation of the NAPA (2007) which classifies agriculture as one of the most vulnerable sectors to climate change. There are also additional processes under way to develop the National Adaptation Plan, as well as a recently developed Nationally Appropriate Mitigation Action (NAMA) which focuses on conservation agriculture. In addition, Government has developed a national strategy on REDD, and one of the strategies is to promote conservation farming and climate-smart agriculture. Further, the Government of Zambia submitted an NDC in 2015 which outlines key priorities for promoting climate change mitigation and adaptation in the country. This includes “promotion of conservation/smart agriculture activities leading to adaptation benefits and enhancing climate resilience, especially in rural areas.” Furthermore, several other priority areas are highlighted, including increased conservation of water, enhancing water technologies for irrigation, and strengthening climate information services for early warning.

27. Water Resources Management Act No. 21 of 2011 embraces the tenets of climate change particularly the need to conserve water (see section 2.2.1.1 in the Feasibility Study for details).

28. The policy and the strategies on climate change stipulate that there shall be equity between genders and empowerment of women in the implementation of climate change-related activities. For instance, the Water Resources Management Act No. 21 stipulates that “there shall be equity between both genders in accessing water resources and, in particular, women shall be empowered and fully participate in issues and decisions relating to the sustainable development of water resources and, specifically, in the use of water.” The Act explicitly promotes women to take up leadership positions in the management of water user associations until the minimum of 40 percent women representation is achieved.

29. The planning and development of Zambia’s agriculture sector has been revitalized through the revised National Agricultural Policy (NAP, 2012-2030). The NAP outlines three primary goals of the agriculture sector: (i) To increase the annual growth rate of the real GDP; (ii) To increase the value and growth rate of crop exports; and (iii) To contribute to reduction of poverty and food insecurity in rural and urban areas. To support the operationalization of the NAP, GRZ developed the National Agriculture Investment Plan (NAIP, 2013), as part of the Comprehensive Africa Agriculture Development Programme. The NAIP is a strategic framework to prioritize investments in the agriculture sector and identifies the promotion of small-scale irrigation as a priority area for investment. The framework puts forward four interrelated programmes and Key Support Services for investment by GRZ over a five-year implementation period. These include: (1) Sustainable Natural Resources Management – USD 280.80 million; (2) Agricultural Production and Productivity Improvement – (i) Livestock – USD 354.25 million; (ii) Crops – USD 852.68 million; and (iii) Aquaculture development – USD 51.57 million; (3) Market Access and Services Development – USD 257.21 million; and (4) Food and Nutrition Security and Disaster Risk Management – USD 659.86 million.

C.2. Project / Programme Objective against Baseline

Baseline scenario: Agricultural livelihoods in Agro-Ecological Regions I and II

30. Given their reliance on rain-fed systems, smallholder farmers depend on general consistency and predictability of rainfall throughout the growing season. Depending on these patterns, farmers make decisions about when to plant, sow, harvest or undertake other processes throughout the life cycle of their crop. Some farmers rely on indigenous practices to predict weather patterns, such as the behaviour of birds, which is often coupled with the weather forecasts that are provided by ZMD. ZMD produces both daily and 10-day forecasts, as well as a seasonal rainfall forecast which is issued at the beginning of the agricultural season (September/October). These are disseminated via radio, TV, print

and online/email to district-level stakeholders and farmers.

31. Even if farmers are able to get accurate weather information, which is often difficult (as further outlined below), sometimes the lack of rainfall or the varied rainfall patterns have devastating impacts on their crops. For example, with maize (the most commonly grown crop in Zambia), water is required at key moments throughout the crop cycle. It should be provided during the *establishment* stage (first 15-25 days), and then again at the *flowering* stages 50-90 days later. If the water comes too early or too late, the crop will not survive. In some cases, smallholder farmers have access to irrigation infrastructure, such as boreholes with pumps, small dams with water canals for distribution, or ponds and reservoirs. This allows them to store and manage water resources so they can use them throughout the crop season. However, this infrastructure is not consistently available across the country, and often limited in poorer and more vulnerable areas. When they do exist, they are often poorly maintained and require upgrading.

32. The three major staple crops grown in Zambia by small-scale farmers are maize, groundnuts and cassava. Cassava is primarily grown in the northern parts of the country, Agro-Ecological Region III (RALS, 2015). Furthermore, mixed beans and sweet potato are grown by a large number of farmers in the same parts of the country. The cash crops grown by many smallholder farmers are sunflower, tobacco, cotton and horticulture. Nonetheless, most smallholder farmers do not generate sufficient income from these crops. In fact, according to a study done in 2005, poverty is endemic among small-scale farmers, with an incidence of 84 percent. Farmers in Zambia depend heavily on maize production for income. However, maize is the most volatile and climate-sensitive crop grown in Zambia. Furthermore, Zambian crop yields are on average about one-third of global average yields. Below is a table summarizing the completed baseline investment.

Project Name	Financier	Key Focus Area	Total Budget
Agricultural Production and Productivity Improvement Programme	World Bank	The main objective is the sustainable and broad-based improvement of smallholder agricultural productivity as a means to improved food security and increased rural incomes	USD 1.3 million
Agricultural Productivity and Market Enhancement Project (APMEP)	GAFSP through AfDB	To contribute to economic growth and poverty reduction by ensuring food, income and nutrition security, among beneficiaries in these districts	USD 31.12 million
Conservation Agriculture Scaling-Up (CASU)	European Union	To contribute to reduced hunger, improved food security, nutrition and income while promoting sustainable use of natural resources in Zambia	Euro 11 million
Pilot Programme for Climate Resilience (PPCR) Phase II	World Bank	To mainstream climate change into the most vulnerable sectors of the economy, in order to ensure sustainable economic development towards the attainment of the country's Vision 2030	USD 36 million
Irrigation Development and Support Project	World Bank	Focuses on increasing yields per hectare and the value of diverse products marketed by smallholder farmers	USD 115 million
Smallholder Agribusiness Promotion Programme (SAPP)	International Fund for Agricultural Development	The goal of SAPP is to "increase the income levels of poor rural households involved in production, value adding and trade of agricultural	USD 23.6 million

	(IFAD)	commodities”	
--	--------	--------------	--

Baseline investments

33. GRZ recognizes the high dependence of its population on rain-fed agriculture, and simultaneously the potential the sector can have to promote growth and reduce poverty. High investment in the agriculture sector has therefore been a priority. Between 2007 and 2015, the Government of Zambia’s spending on agricultural and rural development (including both allocated budget and supplementary spending) was between 8.7 percent and 12.8 percent. Government spending on agriculture exhibits a recurrent pattern. In most years, more than 60 percent of the expenditure on agriculture goes towards two programmes, the Farmer Input Support Programme (FISP) which has sought to provide farmers with high-quality input and the Food Reserve Agency (FRA) which has sought to provide output market for the farmers.

34. The development objective of the Second Phase of Strengthening Climate Resilience Project for Zambia is to strengthen Zambia’s institutional framework for climate resilience and improve the adaptive capacity of vulnerable communities in the Barotse sub-basin. The project has three components. The first component is strategic national program support. This component aims to strengthen the national institutional and financial framework for climate resilience for providing the basis for long-term transformational change in Zambia and helping support the secretariat’s umbrella role in overseeing and monitoring the national program and in particular the Strategic Pilot Program for Climate Resilience (SPCR). It includes the following two sub-components: (i) institutional support to national climate change program; and (ii) strengthened climate information. The second component is support to participatory adaptation. This component will strengthen the adaptive capacity of vulnerable rural communities in the Barotse sub-basin, through: facilitation and strengthening of community decision-making; technical support to Western Province and district councils; and incremental project management support to Western Province and district councils. The third component is pilot participatory adaptation. This component will fund actual participatory adaptation investments in the Barotse sub-basin. It includes following three sub-components: (1) community adaptation sub-grants; (2) adaptation contingency fund; and (3) rehabilitation and strengthened management of traditional canals⁴.

35. Given the relatively high levels of spending, the persistence of rural poverty is still a challenge. To address this challenge, several investments are being made by the Government and cooperating partners to strengthen the agricultural sector, particularly for rural smallholder farmers. Investments have been targeted towards improving distribution of agricultural inputs and extension services. More recently, support has been provided towards improving climate information and weather forecasting to support farmers’ ability to manage climate risk, access to irrigation, and strengthening of value chains.

Investments in the agricultural sector to support rural smallholder farmers

In addition to the four interrelated programmes and Key Support Services outlined in the strategic framework of the NAIP (outlined above), several ongoing programmes implemented by the Ministry of Agriculture (MoA) contribute to the NAIP such as: i) the Sustainable Natural Resources Management Programme - USD 8,723,858; ii) the Agricultural Production and Productivity Improvement Programme – USD 1,361,360; and iii) APMEP with support of a USD 31.12 million grant from the Global Agriculture and Food Security Programme (GAFSP) multi-donor trust fund, through the African Development Bank (AfDB). APMEP progress so far is as follows:

- Consultants have been hired who will conduct feasibility studies of irrigation schemes of 3,000 ha. In addition, the contractor doing the land preparation and levelling has been engaged. Source of power will vary from place to place but electricity from power utility companies will be used to power the schemes. Solar power will be an option if all other options fail and for emergencies. The 3,000-ha block is planned to operate commercially in terms of markets and organized management with a board of directors selected from the people within those areas.

⁴ PPCR website, <http://projects.worldbank.org/P127254/zambia-strengthening-climate-resilience-ppcr-phase-ii?lang=en&tab=overview>

- Procurement of consultants is being done for designing mini-scale, community-managed irrigation schemes to cover an area totalling 895 ha which will be linked to agro-dealers' and outgrowers' schemes. Each scheme to have 10 ha and each participant to have 0.5 hectares which is the minimum for profitable and sustainable business. This will be managed by farmers. Capacity development is planned to enable the farmers to manage.
- 120 extension officers have been trained in irrigation and water management pertaining to this project. These included district and provincial staff.
- Zambia Electricity Supply Corporation has been engaged to electrify the sites, and preliminary work has been done to ascertain the measurements of different aspects and related costs.

Lessons learned include the following:

- Project disbursement of funds has delayed delivery due to limited understanding of the project by the managers.
- Beneficiaries were not mobilized on time and this has affected implementation.
- Understanding of the project by district staff has been slow and this has affected implementation.
- Identification of irrigation sites has been a challenge for the districts, and there is a need to train the staff on parameters that are needed for irrigation sites.
- No site in Chongwe has been identified but it is planned that Rufunsa district sites will get water from the Lunsemfwa river while Gwembe will use water from Lake Kariba on a commercial scale. The mini-irrigation sites haven't been identified. There have been delays in procurement though the project implementation unit has dedicated officers who should have benefited from the pool of procurement officers within the MoA, except the linkage between the project implementation unit procurement and MoA procurement has been weak which has affected implementation. The programmes have also integrated agribusiness whose aim is to improve roadside markets, access roads, cassava milling plants and agro-processing facilities.

36. This project builds and aims to scale up from a previous Least Developed Countries Fund (LDCF)-funded initiative called the Climate Change Adaptation Project (CCAP). The CCAP supported smallholder farmers in the adoption of resilient technologies and practices.

37. The terminal evaluation indicated that "all evidence points in the direction of an embryonic trend of technology transfer from subsistence agriculture towards a farming system based on resilient productivity." This trend has created an early positive impact on the food security conditions among the project beneficiaries interviewed, especially among women farmers. In addition, there is conclusive evidence to support an early impact due to the demonstration effect. The data reveals that non-targeted segments of the rural communities have already begun adapting climate-proofed technologies promoted by the project to their specific conditions, on their own initiative.

38. The project targeted a 10 percent increase in farm income across the outputs associated with outcome two and it was shown that several farmers had reached and exceeded this target. The target income was ZMK 2,310 which was exceeded as observed based on the 'winning' crops such as rice (ZMK 12,300/ha) and cowpeas (average ZMK 4,610/ha) in Kazungula; sorghum (ZMK 3,384/ha) in Siavonga; and high-yielding maize (ZMK 3,530/ha) in Chongwe.

39. In sum, all evidence indicates that the farmers, especially female farmers, adopted the technology transfer in the form of skill development, facilitated by the fact that soil improvement, land levelling and other skills do not require either assets or liquidity. Past agricultural experience shows that this is the most effective method of poverty alleviation in rural areas. The farmers interviewed from the three pilot sites during the terminal evaluation, both male and female, have adopted three agronomic techniques: 1) crop diversification, 2) crop rotation and 3) conservation agriculture. The cropping patterns remain traditional, even though new proposed varieties (high-yielding & drought-resistant) have been partially adopted. The key drivers in this process are free extension advice and inputs, together with accessibility to markets where produce can be sold, as evinced by the data.

Gaps and barriers

40. One key barrier that was observed at the time of the final evaluation was uncertain commercialization of surplus

production from high-yielding crops. It was observed that when the commercialization conditions are unproblematic, as in the Chongwe site, the technology uptake and expected economic results are unfettered. Thus, the evidence reveals that the economic results of this early uptake of know-how related to resilient productivity is heavily influenced by the commercialization conditions in a given site and time context. To this extent, the level of farm income is also shaped. Similarly, the full extent of the economic potential of the proposed technologies is now underutilized. Thus, introducing improved marketing arrangements which should allow smallholding farmers to take advantage of the market opportunities available either for staple or non-staple crops is critical. This is the lynchpin to unleashing the full economic potential of resilient productivity so that communities can effectively cope with the long-term effects of climate variability and global warming.

41. Lessons

- The key drivers to adoption of resilient practices are the extension service, inputs and accessibility to markets.
- Provision of Early Warning System (EWS) information minimizes losses that are a result of extreme weather when the farmers use that information to manage such risks.
- Other lessons include the goat pass-on mechanism as a very good innovation that allows more goats to reach additional farmers who were not in the first wave of the distributed goats. The mechanism afforded a multiplier effect which saw the project reaching many more people in the community.
- Beekeeping supported sustainable forestry management which has helped the efforts to slow down and halt deforestation and forest degradation.

Lessons on water harvesting include:

- An inclusive dam management committee is key to good management of water infrastructure.
- Availability of water throughout the year motivates farmers to practise year-round food production for consumption and markets.

42. Other programmes which support smallholder farmers include conservation agriculture/conservation farming, CASU and Sustainable Intensification of Maize-Legume Systems for the Eastern province of Zambia (SIMLEZA).

The conservation farming is ongoing and has a Conservation Farming Unit of the Zambia National Farmers Union, which has been in operation since 1996 demonstrating and promoting conservation farming practices. The Food and Agriculture Organization of the United Nations (FAO), CASU project is another ongoing project supplementing efforts aimed at increasing crop production and productivity for small and medium-scale farmers in Zambia. It is jointly implemented with the MoA in 31 districts across nine provinces of Zambia. The project intends to benefit a total of 21,000 lead farmers and an additional 315,000 follower farmers of which at least 40 percent will be women. It promotes agricultural practices similar to those promoted under conservation farming, and also introduced the farmer field school model to support training of farmers on conservation agriculture and value chain experiences. In addition, CASU has achieved the following:

- Mechanization and animal draught power strategy developed and implemented through geo-referencing of selected farmers' fields for management and provision of mechanization via an e-voucher.
- Introduced community-level multiplication of legume seeds to enhance crop rotation which has seen a total of 33 cooperatives and 937 farmers being engaged.
- Developed a geodata base and 75 field staff trained in basic GIS.
- Project facilitated the review of existing tertiary education curricula on conservation agriculture content.
- Developed a robust farmer register which Government has now adopted as the backbone for rolling out the e-voucher system on FISP.

The following lessons have been learned:

- Conservation agriculture adoption and development requires competent promoters with a longer-term commitment that can keep pace with target groups, responding and building their confidence, with or without development 'incentives'.
- It is evident that widespread conservation agriculture adoption is a time-related process, like any other agriculture system including conventional tillage agriculture. The process of adoption and spread, as well as in establishing

and improving conservation agriculture system quality, soil health and farmer knowledge base and experience of his or her specific conservation agriculture system takes time for smallholder farmers who are familiar with and experienced in using traditional methods. Similarly, realization of different types of productivity, economic, environmental and social benefits come through over time as conservation agriculture management, social conditions and cropping systems improve.

- Farmers adopting conservation agriculture practices tend to establish a basin-making plot of about 0.25 ha for guaranteed food security, even when they may have other reduced or zero tillage systems on the farm such as micro-pits in manual systems, or direct no-till seeding with tine (or shallow ripper furrow) seeders in animal traction, or mechanized systems where in-situ water harvesting is not critical.
- Input and output markets and supply chain services are essential for the sustainable adoption and scaling up of conservation agriculture as is true with any farming technology.
- Affordable access to private-sector/farmer-led animal draught power or motorized hire services for no-till ripper seeding services and herbicide application services hold high potential for conservation agriculture adoption and widespread uptake. Alongside, there is a need to promote the development of soil mulch cover with residues and cover crops, and for diversifying cropping systems. These practices take longer to establish in drier areas than in moist areas but they would add resilience and sustainability to existing and new conservation agriculture systems and their adopters.
- There is a need to effectively redress communal land use systems, especially those that involve unsustainable crop-livestock relationships under customary tenure that lead to land degradation and loss of productivity.

This proposal would continue to scale up the successes by:

- Maximizing potential and opportunity provided by existence of small to medium-scale mechanization service providers in the farmers' communities.
- Linking farmers to conducive financing for animal draught power conservation agriculture equipment or inputs.
- Upscaling community-level multiplication of legume seeds in selected cooperatives.
- Continuously providing capacity-building to staff and farmers.

The SIMLEZA project promoted some of the climate-resilient agricultural practices in the Eastern province of Zambia. The main objective of the SIMLEZA project was to find constraints and entry points for sustainable intensification and innovation at the farm level. This project provides useful experience which the GCF proposal will build on. It was coordinated in partnership with CGIAR and CYMYT through USAID. Several drought-resistant varieties of crops such as maize were released for increased nutrition and drought tolerance. Aflatoxins were also being worked on through improved fertilizers for reduced contamination in peanut butter. Harvest Plus provided awareness on vitamin A which helped in the uptake of new varieties because of the resulting acceptance of the varieties in addressing farmers' challenges. The varieties are now on the market. Seed companies have also been linked to the farmers. It is projected that there will be a reduction in cases of vitamin A deficiency in children. FISP has also integrated yellow maize as well as FRA to procure this seed/crop. The farmers have also been linked to the millers, and orange maize meal production has increased. Through collaboration, farmers' problems were solved in an integrated manner. The current and past investments have been either complementary or the basis for upscaling as articulated above.

43. The Government has also invested in promoting sustainable intensification practices among smallholder farmers. Farmers receive advice on agricultural practices from various sources (e.g. fellow farmers, extension officers and cooperatives). However, this advice varies across provinces and districts, with very limited advice provided in the 16 target districts of this proposal. Of those districts engaged in previous initiatives (including CCAP), not all camps and farmers were targeted and therefore support remains poor. This support also depends on limited capacity of the MoA, including extension workers. This capacity is temporarily bolstered by projects such as those outlined above, but in the 16 target districts this is still weak and needs additional support to establish a solid foundation for farmers to build on. These capacities and needs form part of the criteria for the targeted 16 districts under this project.

Investments in climate information and weather advisories

44. The ZMD is the primary provider of meteorological services in Zambia and the principal institution for gathering weather and climate information and making forecasts. ZMD is responsible for storing weather and climate data and information, as well as communicating this data and information to local communities and various government ministries

and departments. ZMD's annual budget including O&M is ~USD 320,000 per annum. With this limited budget, ZMD often faces challenges in meeting its mandate, due to unreliable provision of data from the existing network, staff shortages, lack of relevant skills on the latest technologies, and limited access to weather and climate model-related computing equipment.

45. Some of these challenges are being addressed to some extent by the various baseline projects and related initiatives. Automatic Weather Stations (AWS) have been provided by several projects (e.g. the Japan International Cooperation Agency [JICA], PPCR, LDCF Climate Information and Early Warning System [CIEWS]), some of which are still ongoing (LDCF CIEWS). (For more specific information on the weather station network, see the Feasibility Study, section 3.1.1 and Figure 16). Specifically, several projects (e.g. LDCF CIEWS, PUMA - also known as the Meteorological Transition in Africa Project, African Monitoring of Environment for Sustainable Development and MESA- Monitoring for Environment & Security in Africa) are also investing in computer systems and training to improve forecasting, as well as some limited work on tailored forecasting for different sectors. A number of additional development partners and projects in Zambia (in particular GIZ) are investing in hydrological and meteorological infrastructure and training to support the ZMD and the Department of Water Affairs (DWA)/WARMA in addressing their current capacity gaps. More details of these projects can be found in the Feasibility Study, Chapter 3, section 3.1.3).

Investments in irrigation and access to water

46. The National Irrigation Plan (NIP, 2004) promotes better exploitation of water resources. However, currently there are no irrigation systems in Zambia which are supplied by large dedicated dams. The GRZ has supported a medium-sized irrigation system for wheat in the Mkushi area. Wheat is also grown in Lusaka, Mpongwe and Chisamba, and is irrigated with the use of centre pivot technology. In Mkushi and Mpongwe the irrigation is from surface water sources, but in the rest of Zambia, it is through the use of groundwater sources. The experience in wheat irrigation will be useful to the proposal in providing information on the management of groundwater systems. According to DWA, since 1950 about 1,750 small to medium-sized dams from 3 to 15 metres high have been built. However, many of them have been poorly maintained and need to be upgraded. DWA provides maintenance to three additional dams per year. All national irrigation activities, as well as those planned, are presented in the Feasibility Study under section 5.1.4.

47. During 2006-2010, the Government invested USD 8.95 million (in constant 2010 USD) on average per year on water-related infrastructure and programmes. Over 80 percent of the government expenditure priority was channelled into water supply and sanitation (57.4 percent) and river development (24.7 percent). During the same period, official development assistance gross disbursements amounted to USD 47.78 million on average per year, with priority on water supply and sanitation (68.7 percent). Over the period 2006-2010, the Government of Zambia's water-related investments accounted for an estimated 0.6 percent of total government expenditures.⁵

48. In addition, the MoA is currently implementing an Irrigation Development and Support Project. This aims to increase yields per hectare and the value of diverse products marketed by smallholder farmers benefiting from investments in irrigation in selected sites supported by the project. Notwithstanding the above investment and support, there is still a gap to support irrigation infrastructure for use by small-scale farmers, particularly in the face of climate change when water harvesting is critical to maintaining agricultural productivity.

Investments in value chains

49. GRZ investments in the agriculture sector have primarily focused on improving production. However, there is a realization that the whole value chain that would make the agricultural sector resilient needs support. The Government is now investing in value chains, which is being augmented by the support from cooperating partners though still inadequate.

Given the impact of climate change on the agriculture sector, there is a need to support value chain interventions that will ensure household food security, income generation as well as commercialization of small-scale farmers

⁵ UN-Water Country Brief: Zambia (2013). Available at: <http://www.unwater.org/publications/un-water-country-briefs-zambia-2/>

50. The MoA is implementing SAPP. The goal of SAPP is to “increase the income levels of poor rural households involved in production, value adding and trade of agricultural commodities.” At the project level, the programme is expected to support up to 24,000 small-scale agricultural households (80 percent of the core target group in the programme area). The purpose of SAPP is to “increase the volume and value of agribusiness of small-scale producers.” The GCF proposal will build upon this project with the view to expanding and increasing the efficiency of the value chains for selected commodities, to enable large numbers of poor farmers to improve their cash incomes.

51. In addition, the GAFSP project supported by the AfDB is making investments in post-production capacity. Three districts in Agro-Ecological Region I are included in the project (i.e. Chongwe, Gwembe and Sinazongwe). The project is investing in processing plants for maize and cassava, community-level processing equipment and market linkages, including roadside markets. The GCF proposal will complement the gains made so far.

52. Seeds and their Characteristics with Respect to Climate Change.

Seed	Early Maturing Variety	High Yield	Drought resistant	Resistance to pests	Moderate to High Productivity	High Nutritional Value	Moderate to High Profitability
Cassava			X		X		
Maize - Obatampa		X	X	X	X		X
Maize- EMV	X	X	X	X	X		X
Groundnuts		X	X	X	X	X	X
Beans		X	X	X	X	X	X
Cowpeas		X	X	X	X	X	X
Sunflower		X	X	X	X	X	X
Sorghum		X	X	X	X	X	X
Rice		X		X	X	X	X
Tomatoes	X	X			X	X	X
Rape	X	X			X	X	X
Cabbage	X	X			X	X	X
Onion	X	X			X	X	X
Pigeon Pea		X	X	X	X	X	X

53. See the table below on climatic resilience of selected proposed value chain commodities.

Resilience and market potential of selected value chains to be introduced in the project

Cassava: Cassava is a suitable input for a wide range of products for human consumption as well as animal feed. Zambia's National Cassava Development Strategy⁶ notes that cassava can be used in more than 200 processed products and market demand is already unsatisfied at current prices. However, cassava also experiences strong competition from maize. With the advent of the e-voucher electronic system being promoted by FISP, maize subsidies are being phased out. Consequently, FISP is now being used for production of other crops including cassava. The increase from 10 percent to 40 percent in the use of cassava by Zambia Breweries in the production of its Eagle Beer brand has created a considerable demand for cassava. Grow Africa has been contracted by Zambia Breweries as an aggregator relating to cassava purchases which started in 2016. The low input requirements for cassava and the 'on-the-spot payment' have resulted in a considerable number of farmers switching to cassava production from maize. Since cassava is a drought-tolerant crop, it needs to be promoted in Regions I and II which are susceptible to droughts to support the farming systems among the small-scale farmers.

Cowpeas: Cowpeas have a high market value. However, while the crop is produced in all ten provinces, pulse crops' share of total allocated area and market value is relatively small due to limited supply of improved seed and knowledge (see Appendix X in the Feasibility Study). In the face of climate change, there is a need to provide resilient varieties to small-scale farmers and knowledge on when to plant and harvest. In addition, there is a need to increase information on marketing and consumption to increase the resilience of the cowpeas value chain. The World Food Programme (WFP) is supporting various components of the cowpeas value chain which the GCF proposal will replicate and expand in the 16 districts that are prone to climate change. In addition, the seven-year Agricultural Productivity Programme for Southern Africa being implemented by the Government of Zambia (since 2013) with support from the World Bank is promoting value chains relating to cowpeas and four other legume crops (the others being beans, pigeon peas, groundnuts and soybeans). It is anticipated that this intervention, coupled with the e-voucher system (under FISP) that provides flexibility in purchase of any type of seed, will contribute to unlocking the barriers in the cowpeas value chain.

Soybean: There is a pervasive belief among farmers that soya markets are unreliable. Lubungu et al. (2013), however, found that there is a significant unmet demand for soya in Zambia, including in the areas being targeted by the project. Buyers go to all areas where soybean is produced. The bulking centres and marketing facilities being promoted under this project will be particularly valuable in aggregating soybean (and the other products) from farmers to one point for buyers. Currently, soybean in Zambia is used as an industrial crop, in oil, soya chunks and soya meal. With the growing livestock market, the demand for soybean is increasing as it is the major ingredient in stockfeed.

54. This project will support rice cultivation as diversification and adaptation strategy and will follow the below 4 indicators:

- 1) Rice will not be supported on irrigated land but only on flood prone rainfed areas
- 2) Rice will only be supported in areas where it has been grown traditionally (7 districts out 16)
- 3) Farmers will be free to choose rice or not
- 4) No more than 25% of the cropping area of a given farm will grow rice, equivalent to no more than 300 ha of rice field of the project area

⁶ All ACP Agricultural Commodities Programme (2010). Zambia Cassava Sector Development Strategy, 2010-2015.

Key barriers addressed by the project

55. In order to achieve the above solutions, there are a number of barriers that need to be addressed and are summarized below. Further details on gaps and barriers are presented in the Feasibility Study, Chapter 4.

Inadequate weather and water monitoring infrastructure, including district-level gaps, which limits data collection, analysis and provision of timely advisories for agriculture and water management

56. Historically, the Government of Zambia has been providing funding to the meteorological department to procure and install software and hardware for the generation of weather information needed by civil aviation. As a result, climate and water information systems (including synoptic and agrometeorological stations, water level monitoring, etc.) in Zambia have been operating using a limited number of weather and water-level observation stations, especially in the southern regions around Agro-Ecological Regions I and II. Recently, ZMD and WARMA have received support through various donor projects, but district-level gaps remain, e.g. currently 17 functional AWS exist across the 16 target districts. This is not sufficient to monitor weather and water availability at the block level, which would provide the specificity needed for agricultural and water advisories to be relevant to farmers, as well as enabling planning for water infrastructure and water resource management, and to provide the foundation for insurance schemes. Additionally, the scientific and technical capacity to effectively identify agricultural and water-related hazards and forecast their likely impacts on vulnerable communities and the agricultural value chain is weak. This is partly due to a lack of computational equipment and software (model code and associated routines), but mostly due to a lack of human capacity/skills to program and run software and processes required to generate accurate forecasts and translate/tailor the forecast information for use in the agriculture and water sectors. This means that there is a shortage of skilled forecasters and meteorologists who can work on processing data received from the monitoring network, as well as the internationally and publicly available forecasts to be used for agriculture and water management.

Weak institutional coordination leading to limited packaging, translating and disseminating of weather and climate information, and early warnings for agriculture and water management

57. Whilst the Disaster Management and Mitigation Unit (DMMU) has a coordination mandate and sends out warnings, there is generally poor coordination between the ZMD, WARMA and MoA to produce water and agriculture-related information which can be used to plan for anticipated risks. Poor inter-sectoral coordination at a departmental and ministerial level results in the available climate, agriculture and environmental data and information not being adequately combined and/or translated for it to be easily understood by decision makers in agricultural and water management sectors. Furthermore, this results in limited agreements on official processes for sharing climate/weather and related environmental/socio-economic information, production of advisories, and issuing of subsequent warnings. Furthermore, the results of surveys and lessons learned through the CCAP and CIEWS projects indicate that most people (including both farmers and those engaged in other businesses) do not receive early warning information on agricultural and water-related hazards before they happen, e.g. more than 70 percent of people who experienced drought did not get the warning before the drought actually occurred. On the other hand, more than 80 percent of respondents indicated that when they did receive information, the information was correct, which means that the accuracy is trusted and it has the potential to help planning activities. Additionally, based on survey results, the mechanisms for receiving advisories are not consistent, and the CCAP project demonstrated that indigenous knowledge is also used in many places where it can complement scientific information and be disseminated through alternative media such as SMS/mobile. Packaging of information has been highlighted as a need, to ensure that when advisories are issued they are relevant, and are in a language and format that recipients understand and can act upon.

Insufficient infrastructure in communities to adequately capture, store and manage water resources given changing rainfall patterns and impending droughts and floods

58. The challenge of limited water resources for irrigation of crops is not completely due to the limited amount of water available in Agro-Ecological Regions I and II. While these areas are prone to drought, the two regions do get approximately 600 mm to 800 mm and 800 mm to 1,000 mm of rain annually, respectively. This is sufficient to grow many crops. However, the timing and distribution of the rainfall is the challenge. Since the country is highly dependent on rain-

fed agriculture, if the rain does not come at the right time during the season, and is not for the appropriate duration, crops will be destroyed. Therefore, irrigation and effective water management is important for ensuring continued and planned water resources throughout the crop season. According to UN-Water, one of the main constraints to irrigated agriculture is inadequate irrigation infrastructure and water storage. Field visits to the targeted 16 districts and to more than 64 sites (in five provinces) undertaken in March 2017 showed very limited infrastructure related to irrigation. For instance, there was a total of five weirs out of all the districts and sites visited, four of which were in Southern province and one in Eastern province; three canals (two in Eastern and one in Lusaka province) and 15 solar water bores most of which were in Lusaka (8) and Eastern/Muchinga (6) while Southern province had only one (see Appendix XII in the Feasibility Study for details). In the advent of climate change, more water infrastructure will be needed to maintain and increase agriculture productivity.

Limited access to high-quality agricultural inputs, including seeds, particularly for resilient crops

59. The GRZ provides subsidized inputs to farmers through FISP, with a focus on improved varieties of maize, as well as limited amounts of rice, groundnuts, sorghum and cotton. However, inputs for resilient crops have been limited and not consistent across all provinces. Other sources of agricultural inputs exist, such as commercial purchases. However, the high cost of these inputs is often prohibitive for the poorer, smallholder farmers targeted by this project. Some farmers grow their own seeds, or share with other farmers, particularly for open pollinated crops, such as cowpeas, beans, groundnuts and pigeon peas. These initiatives were started under previous projects (i.e. CCAP). However, the quality of seed for these crops has been poor. Although a new e-voucher system was recently introduced in 2016, allowing farmers to select their preferred inputs and agro-dealer, new better-performing seeds and crops are generally not readily available on the market. Since many of these crops are those more resilient to climate change (e.g. cowpeas), this limits the incentive for smallholder farmers to adopt new crops as a strategy to adapt to climate change.

Limited knowledge and technical advice on conservation agriculture and resilient agricultural practices

60. While conservation agriculture and other resilient practices have proven successful in small-scale pilots and demonstrations (e.g. UNDP's LDCF-funded CCAP project, FAO's CASU project), there is still limited adoption of these practices on a large scale, particularly in the 16 target districts (including the eight involved in the CCAP project). One of the reasons is inadequate extension services to enhance adoption of climate-resilient agricultural practices. Limited access to financial services by farmers is another contributing factor to the low adoption. Models for *input credit and insurance* have shown potential to avert the challenges to access appropriate seed varieties and farming implements. This scenario does vary across provinces, and those involved in previous initiatives have proven the value of strengthening information exchange platforms such as farmer field schools. In the case of this proposal, the farmer field school model will be used for disseminating climate and crop advisory information. These farmer field schools will be implemented within the context of cooperatives. Where such cooperatives do not exist, farmer field schools will facilitate their formation. On the other hand, where cooperatives do exist, they will be strengthened through the facilitation of farmer field schools. (*Detailed description of the farmer field school is contained under section 3.3.8 of the Feasibility Study.*)

Limited access to equipment and facilities for storage and processing

61. As further examined in the Feasibility Study (see section 4.2.1.1), the added value of storing and processing crops is significant for farmers with regard to income generation. An assessment of the commonly grown crop, maize, and profitable crops such as groundnuts and cassava showed an apparent increase in income generated after processing and storing these crops. Nonetheless, many farmers do not have access to the means, resources or facilities to effectively process and store these crops. The March 2017 gap-filling data collection exercise showed that the five provinces visited had a total of 18 storage facilities, half (nine) of which were in Lusaka, six in Eastern and three in Southern provinces (see Appendix XII in the Feasibility Study). Some pilot interventions were introduced under the CCAP and Purchase for Progress (P4P) initiatives for processing and storing crops responsively, which proved valuable. These approaches can now be scaled up to reach more farmers, and help them to generate further income, particularly of climate-resilient crop varieties.

Limited access to finance and markets for smallholder farmers and SME entrepreneurs

62. Several steps are required for climate-resilient crops to access markets, including post-production processing (such as drying and milling), storage, collection, transportation and marketing. However, for four crops studied, post-production value chains had high transaction costs and were largely informal. Key barriers to commercialization included lack of access to finance for Small and Medium-sized Enterprises (SME) entrepreneurs to establish facilities for processing (e.g. for cassava) and storage; access to market information, including pricing, for farmers, particularly women; long transportation distances to markets and industrial centres (e.g. for further cassava processing) and lack of collection points to increase transportation economies of scale; and lack of branding and marketing to increase demand by consumers for alternative crops and distinguish among varieties as well as quality.

The preferred solution for smallholder farmers

63. For effective and sustainable adaptation of the agriculture sector for smallholder farmers, it is necessary to trigger a paradigm shift in the way they undertake agriculture. This means addressing the entire value chain, from planning for climate risk, to ensuring resilience of water and other agricultural inputs, to resilient methods for production, to, ultimately, linking farmers and their climate-smart agriculture products to markets. This comprehensive approach ensures that climate risks across the value chain are addressed, while also putting in place the necessary technical, financial and institutional foundations to promote and accelerate resilient agricultural value chains that can be viable in the face of climate change.

64. A number of gaps have been identified in the baseline analysis. The need for improved and more accurate weather forecasts and agromet advisories for subsistence farmers is one of the main gaps that the baseline projects have left unattended. This climate and weather information is required for farmers to plan their cropping activities such as seeding, applying treatment, harvesting, etc. Another important gap is reliable access to irrigation water and stronger resilient agricultural practices such as crop diversification, smart agriculture and using improved short-cycle seeds. From the various consultations, assessments and lessons learned from other baseline projects, another important gap is strengthening the links between subsistence farmers and local agricultural produce markets. The increase in production from better weather information, improved cropping practices to better access to water leads to an increase in production at farm level, and the surplus needs to be sold. Thus, it is important to support farmers to better access markets.

65. This project will address these gaps in an integrated manner, by building on previous successful initiatives and scaling them up to be more impactful. The baseline describes actions on various gaps, but they have not yet been approached together, ensuring all the drivers are dealt with in one integrated approach. The CCAP project was very successful in improving the lives of subsistence farmers, and this project will scale up the good practices and lessons learned during that project, while complementing it with additional interventions that were identified to be lacking. The provision of all three aspects of resilient farming (climate information, access to water, and better practices and links to markets) in one comprehensive approach is a strong paradigm shift and will have lasting transformational effects on the agricultural sector in Zambia.

Project objective and approach

66. This proposed project aims to address the above barriers and improve on the baseline scenario to reach the objective of strengthening the resilience of smallholder farmers in Agro-Ecological Regions I and II to climate change. The project draws lessons from, complements and builds on recently completed and ongoing climate change adaptation projects that have proven successful. Specifically, this includes the LDCF-funded CCAP entitled: “Adaptation to the effects of drought and climate change in Agro-Ecological Regions I and II in Zambia” which closed in 2015. The objective of this project was to develop the adaptive capacity of subsistence farmers and rural communities to withstand climate change in Zambia. To do this, the project took a two-pronged approach: i) mainstream adaptation into agricultural planning at national, district and community levels to make the case for increased investment in adaptation in the agricultural sector; and ii) test and evaluate the adaptation value of interventions that protect and improve agricultural incomes from the effects of climate change. The project successfully reached its objectives, in both integrating climate risks into critical decision-making processes at local, subnational and national levels, as well as proving new agricultural practices through

demonstrations in the targeted districts. This project provides the foundation on which this GCF project is built. The successful practices proven in eight districts will now be scaled up across a total of 16 districts with GCF financing.

67. One of the new, innovative elements introduced in the GCF project will be to further strengthen mechanisms for learning and knowledge sharing on new agricultural practices, climate-informed decision-making and water management at the local level. This will specifically build on a successful farmer field school model, proven under FAO's CASU programme. The model will provide local, context-specific learning through farmer exchange and hands-on practice at the camp level. In addition, the project will introduce district-level learning centres of excellence which will further scale up and disseminate good practices on climate-resilient agriculture. The innovation to be introduced within the context of the farmer field school concept, and the practice to effectively respond to enhancing the resilience of the farmers is the use of an integrated learning platform at the farmer field schools and centres of excellence. The lessons will take into account the practices being demonstrated and their linkage to the enabling environment aspects such as the link to *area-specific climate information* (water and temperature management implications), the existing opportunities in national and local *policy and institutional mechanisms*, and the *value chain opportunities* (i.e. best bets for enhanced farmer participation in the value chain for income generation and food security).

68. The GCF project is also taking a more innovative and comprehensive approach to ensuring resilience than the previous CCAP project by addressing other barriers further along the agricultural value chain. This will lead to more effective and sustainable transformation of the sector. Specifically, this means focusing on a new, innovative output which aims to enhance commercialization of new resilient commodities and link farmers to markets. This was specifically recognized as a gap in previous interventions in Zambia. Farmers were hesitant to introduce new practices without confidence that there was a viable market for the resilient products. With more experience to build on, the GCF project will extend results achieved through two projects implemented by the WFP – Resilience 4 (R4) and P4P – which help to enhance access to finance and insurance products for farmers, strengthen storage and transformation systems, and link farmers to viable and sustained markets for resilient crops.

69. The GCF-financed project brings a paradigm shift through an integrated approach to strengthening resilience of smallholder farmers to climate change. This GCF investment will catalyse the 90M in co-financing provided by the GRZ and importantly contribute to shifting this regular Government investing (FISP) towards a more resilient path, by building a strong partnership with the Govt, and demonstrating the impacts of climate resilient agricultural practices. It will strengthen all key aspects of the value chain from climate-informed decision-making, to access to water and agricultural inputs, to strengthening production methods and alternative livelihoods, to enhancing post-production processes. Drawing on successful models introduced in Zambia and elsewhere, the project will put in place the necessary foundations for a sustainable approach to shifting farmers on to a resilient pathway for agricultural production and enhanced food security.

C.3. Project Description

70. The project will take an innovative approach by strengthening the resilience of the agro-based value chain for smallholder farmers in the targeted region against climate change risks in partnership with the GRZ and their FISP programme, such that climate-informed decision-making, critical inputs, production techniques and post-production strategies (including linkages to markets) are in place to ensure resilient livelihoods that help contribute to bringing both female and male farmers and their families out of poverty.

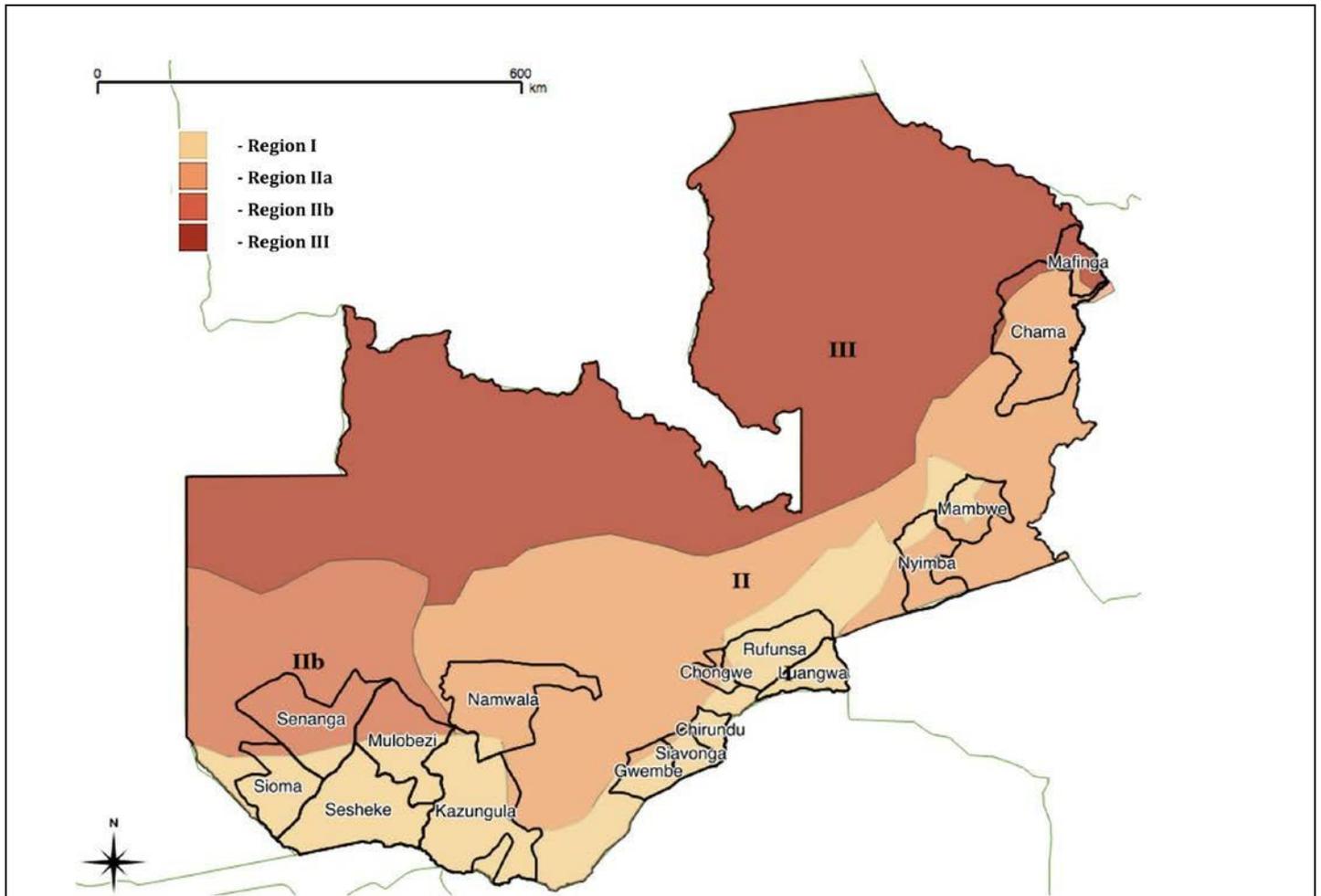
71. The key objective of the project is **strengthening and diversifying climate-resilient agriculture and agro-based value chains that are economically viable for smallholder farmers**. This will include strengthening the capacity of farmers to implement climate change risk-informed agricultural practices which will not only increase and generate new incomes but also enhance food security and ensure livelihood options are resilient. A strong emphasis will be placed on women, by focusing on specific value chains that are gender-sensitive and viable opportunities for involvement of women, as well as empowering women through capacity-building and engagement in all project activities. The project comprises three interlinked outputs (as per the GCF logical framework) that will build on best practices in baseline and other relevant projects. GCF resources will be used to remove key barriers to climate-resilient agriculture practices, at scale, in Zambia. These include: (i) increasing the ability of smallholder farmers (especially female farmers) to plan for and manage climate

risk; (ii) introducing new agricultural practices and alternative livelihoods for both women and men that take into account these risks and remain resilient in the face of climate-related impacts; and (iii) increasing female and male farmers' access to resilient markets and commercialization for these products that are resulting from these new, resilient livelihoods. This will include investment in marketing infrastructure/bulking centres that will be partly implemented under the auspices of WFP. The project will target climate-resilient varieties of legumes, cereals, root/tuber crops, alternative livelihoods as the basis for securing and maintaining food and incomes in an event of crop failure, and improving agro-based livelihoods. The project will also improve irrigation, water collection, and management technologies and practices that can further help stabilize and improve the production of crops during periods of inadequate rainfall (whose current production levels are less than 40 percent of their potential during periods of inadequate rainfall), and the higher temperatures/evaporative demand expected under climate change.

72. The above will guarantee a stable and increased supply of climate-resilient crop products. Additionally, the provision of weather and climate-related risk information (agrometeorological and water management/irrigation-related advisories) through farmer field schools will help both dryland and farmers practising irrigation to manage their available water resources and plan ahead to use appropriate varieties and farm inputs (fertilizer, mulch, etc.). The targeted diversification into horticultural/vegetable crops such as tomato, onion, cabbage and rape, to further strengthen resiliency, will furthermore benefit from investments in irrigation, water harvesting and climate risk information. Through using market infrastructure that will be constructed to facilitate bulking and aggregation of climate-resilient products, marketing opportunities will be further enhanced. Through aggregation of increased and stable quantities of the climate-resilient products in the bulking and market centres, value chain components such as processing, storage and transportation (among others) will be enhanced. The overall effect will be increased household incomes of smallholder farmers in Regions I and II in the face of projected climatic changes, as demonstrated by the reasonable gross margin values of the targeted crops (see section 5.1.3 and Appendix XIV of the Feasibility Study).

73. Specifically, activities under these three outputs will build on and scale up results that have already been achieved by the Government of Zambia through several demonstration activities over the last five years. In particular, the design is informed by the results of the recently completed CCAP project, as well as the CASU, R4 and P4P programmes. Lessons learned from these projects include the use of early warning information to inform smallholder farmer crop production. GCF resources will be used to scale up best practices and lessons learned and extend to additional districts within the two Agro-Ecological Regions (see sections 3.5.1 and 5.1 in the Feasibility Study for more details).

74. The expected key fund-level impact is *increased resilience and enhanced livelihoods as a safety net for the most vulnerable people, communities and regions in the Agro-Ecological Regions I and II of Zambia*. The primary direct beneficiaries include over 157,000 farming households and their families (946,153 direct beneficiaries in total), across five provinces (namely, Eastern, Lusaka, Muchinga, Southern and Western), specifically including the following 16 districts: Mambwe, Nyimba, Chongwe, Luangwa, Chirundu, Rufunsa, Chama, Mafinga, Kazungula, Siavonga, Gwembe, Namwala, Shangombo, Senanga, Sesheke and Mulobezi. This will include all women-headed households (about 22.5 percent of all households) and male-headed households under extreme poverty, both of whom are particularly vulnerable to these climate change impacts. The following map presents the target districts.



75. The selection of project locations has considered the following criteria: rainfall/climate and water scarcity, income poverty, multidimensional poverty and disaster impact on communities. The number of flood and drought-affected people obtained from the DMMU was used to analyse the impact of rainfall variability on these communities. In the case of droughts, stakeholder discussions showed that generally Agro-Ecological Regions I and II are affected by extreme weather.

76. The specific farmers to be targeted/supported in the selected districts have been identified by local government officials. With a strong understanding of their constituency, they have applied specific criteria to selecting a number of farmers from each of the camps. These criteria include:

- Women-headed households
- Young unemployed women in target villages
- Households with disability or HIV/AIDS-afflicted or affected persons
- Drought or flood affected in the last five years
- Families with children/women displaying low nutrition (underweight/anaemic)
- Families that have lost productive and non-productive assets due to adverse weather and diseases in the past five years
- Families with orphans
- Persons who are not benefiting from similar interventions from similar programmes in the targeted areas (to avoid double targeting)

77. GCF resources will provide support in order to transform the livelihoods of both female and male farmers by catalysing a shift away from climate-sensitive practices and towards a more resilient path. This has not previously been

done at the scale that is proposed in this initiative, since significant investment has not been made in a holistic and comprehensive way to simultaneously strengthen resilience of several critical elements across the entire value chain. An alternative to this project is to not take a value chain approach, instead focusing only on elements of the value chain in isolation – e.g. agricultural productivity, water access, or links to markets, as has been done in past projects. However, taking a value chain approach, which includes a focus on decision-making, production and post-production market linkages, is a more sustainable approach, one demanded by farmers in the project area, and is the heart of the innovation of this GCF-funded initiative. Marketing interventions are designed after the P4P model.

78. GCF resources will be used for interventions through three interconnected outputs:

Output 1: Smallholder farmers are able to plan for and manage climate risk to support resilient agricultural production

79. One of the most critical challenges facing smallholder farmers in Agro-Ecological Regions I and II with regard to climate variability and change is the unpredictability of rainfall patterns, as well as the onset of climate events such as droughts and floods. Farmers are unable to make decisions, effectively manage their crop cycle, and if necessary introduce more resilient practices, without useful knowledge and information on what to expect. Given that water availability is a challenge in these regions, knowing when to expect rain, how much and for how long, can make the difference between a successful growing season and a non-productive crop. In order to effectively introduce more resilient agricultural practices, as well as new alternative livelihoods, it is essential to have information on climate and weather (e.g. start/end of the rains, dry spells and drought during critical periods for crop filling/silking, and heavy rainfall/waterlogging during crop development). This entails strengthening climate observational infrastructure, including AWS and rain gauges, to generate this information. Just as important are the corresponding water and agricultural advisories, which utilize this and other environmental information to provide advice and knowledge which farmers can interpret, understand and act on.

80. At the same time, similar information tailored to the water sector (e.g. longer-term average rainfall, evaporation and hydrological flows/balances, water quality changes) is critical to inform water management planning. This includes information to support the identification of water infrastructure needs throughout the country for irrigation and monitoring at both the small-scale farmer level and the broader community and district level. The information generated would focus on both surface and groundwater monitoring, including both flow and quality, as they relate to the changing climatic conditions. This water monitoring information would align with and complement the climate and weather information being generated through the AWS and rain gauges. Integrated together, this information will be better placed to address the specific needs of farmers in the agriculture sector, e.g. irrigation, seasonal planning, water permitting (when to plant, when to harvest, etc.) and introducing new crops (based on weather and water projections). Linkages to insurance schemes (supported under Output 3) are also dependent on sound and reliable climate and water information.

81. As outlined in the Feasibility Study, section 4.1.1, the inadequate existing climate/weather information and water-monitoring infrastructure, along with limited technical and institutional capacity to collect, analyse and generate integrated data and information, has made it difficult to provide relevant information for farmers at the local level. At the same time, dissemination channels have been weak, such that farmers do not always have access to the information that is available. Further, the capacity of farmers themselves to interpret this information and turn it into concrete and informed decisions has also been difficult.

82. This output aims to address these key challenges and barriers with a focus on two interrelated activities. The first activity addresses the need to strengthen the generation and interpretation of the data itself, with an emphasis on integrated information that is relevant for farmers. This includes the necessary standard operating procedures to ensure integration and coordination across institutions. The second activity focuses on dissemination of this information to farmers, including both establishing and strengthening viable dissemination channels, and also training farmers to interpret and use the information alongside their existing local and indigenous knowledge.

Activity 1.1: Strengthen generation and interpretation of climate information and data collection to ensure timely and detailed weather, climate, crop and hydrological forecasts are available to support smallholder farmers in

planning and management of water resources used in resilient agricultural practices (Gov't co-finance: USD 369,000)

83. This activity focuses on enhancing the data collection and information generation of weather, agricultural and water advisories such that they are relevant to smallholder farmers. This includes strengthening the observation networks – through the introduction of additional AWS and hydromet stations. The capacity of ZMD to generate, analyse and develop advisories for their information will be strengthened. In addition, the ability of the sectoral departments (namely Department of Agriculture and WARMA) to undertake monitoring and modelling of current and changing conditions related to crops and water management, and develop tailored advisories will be strengthened. These activities will also support enhancing institutional coordination among the participating government departments to ensure advisories are comprehensive and consider information from across sectors, which is essential when supporting resilient agricultural approaches.

84. Real-time, observed data will be used as inputs for statistical forecasting models and act to ground truth global and satellite observations/models. Currently, the real-time meteorological observation network in the proposed project area is inadequate – for downscaling and generating the forecast for specific areas. Forecasts are generalized, due to insufficient meteorological data available in real time. ZMD will work on area-specific forecasts (focused by district) utilizing meteorological data within each district. The additional observations will enhance area-specific weather analysis (to locate current small-scale meteorological features responsible for area-specific weather occurrences). With the increase in the area-focused observations, specific, timely and accurate data will be captured and analysed, and area-specific forecasts will be produced for small-scale farmers. These same data will be provided to WARMA daily and in real time to develop water resource models and advisories.

85. The value addition of additional weather observations is that they will provide much denser data points that are required for better interpretation of weather forecast models, (European Centre for Medium-Range Weather Forecasts - ECMWF and Global Framework for Climate Services- GFS), and help improve the interpretation of weather forecasts at higher resolution. Long-term collection of these data will be used for understanding the climate, developing statistical downscaling (modelling system) of weather forecasts and potentially designing weather index insurance products (see sections 5.1.2, 3.3.10 and Appendix III of the Feasibility Study for details). Additional weather observations, in combination with satellite-derived products, will ensure the timeliness and accuracy of now-casting (very short-range and short-range forecasting) at higher resolutions. The economic value of these investments will be through both avoided damages due to better warning of impending hazards, as well as the value addition of meteorological services and products for agriculture and water management. Meteorological forecasts are critical for farmers' decision-making before and during agricultural activities in any rain season. Some of the decisions would include type of seed to plant, the time of sowing/planting, the time of spraying and weeding, and thereby reduce farming risks, increase optimization and hence increase production.

- The meteorological products will be translated in local languages to enhance uptake and usability. ZMD has been translating forecasts in Tonga for Southern province and Lozi for Western province, and they are used by MoA and farmers.
- There will be increased interaction between ZMD, MoA and other users at different levels (national, district and field level) using the participatory integrated climate service in agriculture to enhance decision support.
- ZMD will share data collected from all weather stations in Agro-Ecological Regions I and II on a daily basis (data sent each day) with MoA and WARMA. IT systems will be installed so this happens automatically and data is ingested into databases at MoA and WARMA. A memorandum of understanding/agreement or letter of agreement (LoA) to this effect will be signed by ZMD, WARMA and MoA before the purchasing of any AWS and hydrological observation stations.
- ZMD will work together with MoA and WARMA to produce tailor-made products based on requirements specified by MoA and WARMA which they can use as part of their planning and advisory processes in response to local community needs.

86. Specifically, this includes the following sub-activities:

- Strengthen climate information and data collection, including enhancing the observation network. This includes the introduction of 20 AWS in the target districts (managed by ZMD) as well as strengthening the groundwater monitoring systems (introducing 16 water quality and groundwater data loggers and computer hardware, 16

boreholes for monitoring groundwater, and a regional water quality laboratory), enhancing the surface water monitoring systems (15 surface water monitoring stations, 10 gauging weirs and instrumentation for 15 gauging stations), and strengthening software and hardware for catchment water modelling (managed by WARMA). The 10 surface water monitoring stations, 5 gauging weirs, 16 groundwater monitoring boreholes and a regional water quality laboratory requested under this proposal will add to the water management and monitoring capabilities of WARMA, complementing other investments in water observational infrastructure being undertaken under the Zambia Water Resources Development Project (ZWRDP), GIZ and kfW.

- Strengthen capacity of staff in ZMD, MoA and WARMA on O&M of climate and water monitoring equipment and infrastructure. The WARMA equipment lifespan is projected at seven years. From the project's O&M schedule (Table 45, Feasibility Study), WARMA will gradually take over full O&M financing after year four of the project period, the costs of which will be incorporated in the O&M budget for WARMA. Similarly, ZMD will provide co-financing for observing the network to enhance services through government funding which is USD 320,000 per annum as indicated in the Feasibility Study, section 3.1. According to the yellow book from 2011, the budget allocation has maintained an increase of 8 percent each year. At least 3 percent of this amount per annum is channelled to O&M.
- Strengthen capacity of MoA to use crop models for monitoring current conditions, with weather and seasonal forecasts to plan irrigation scheduling, fertilizer application and other agricultural management practices at critical periods within the crop growth cycle.
- Strengthen capacity of ZMD on generation, analysis and modelling of climate information, particularly on the use of Modelling System for Agricultural Impacts of Climate Change (MOSAICC – to integrate climate modelling, crop simulations and hydrological forecasts) for shorter-term planning. *This builds on experience with long-term forecasting using MOSAICC. CASU also provides useful experience as noted in the Feasibility Study, section 5.2.2.*
- Engage with and strengthen university programmes targeting climatologists, to enhance Zambian capacity overall for climate and weather information generation and analysis.
- Strengthen capacity of Ministry of Water Development, Sanitation and Environmental Protection through WARMA to develop water user associations related to surface and groundwater management. *This includes providing information on groundwater and surface water levels based on rainfall, water run-off, water quality, temperature, extraction rates, water balance modelling, etc.*
- Support ZMD and Department of Agriculture to develop tailored crop weather advisories drawing on weather and seasonal forecasts, crop modelling, fertilizer application and irrigation scheduling for target districts. This will be tailored both for smallholder farmers as well as SMEs and partners engaged in the post-production activities (e.g. drying, processing, distribution, storage).
- Development of a standard operating procedure for coordination among agencies generating, interpreting and disseminating the climate information – namely ZMD, Department of Agriculture, WARMA, DMMU and others through an established and mandated inter-agency coordinating platform. While some work to strengthen the observation network is being undertaken through ZWRDP, GIZ, kfW and TNC initiatives, this proposal will complement this ongoing work by introducing much-needed infrastructure.

87. Improved data collection will be coupled with improved data analysis using water resources modelling tools that take into account climatic changes, projected impacts and trends, in order to accurately generate relevant information for the different stakeholders in the project area to adapt to climate impacts, as well as establishing ways of monitoring and predicting water availability for management in Agro-Ecological Regions I and II. The support under the GCF project will contribute to a more sustainable system for WARMA to provide water-related information, including management of the infrastructure. From an improved water allocation system drawn from water balances in the catchments, WARMA will be able to enhance its revenue collection from the water fees and charges drawn from water permits. It is envisaged that this revenue will ensure sustainability in the management of the water monitoring infrastructure. WARMA will ensure that this is undertaken equitably and in a transparent manner which will be further enhanced through an advanced water resources analysis derived from an effective water resources modelling regime. Guidance on investment costs based on available water in a particular catchment will all be achieved as economic benefits from water resources modelling (see 4.1.1.2 of the Feasibility Study for details).

88. Improving the integration of meteorological information into decision support in relation to climate change issues,

particularly in selecting and implementing adaptation measures using tools developed by WARMA and MoA, is critical. ZMD is part of the National Early Warning platform that provides weather and climatic information, and informs other sectors on the likelihood of floods and droughts. From this information, the other sectors derive their contingency plans (DMMU), crop yields (MoA), vulnerability assessments, entomology outbreaks, and waterborne diseases (Ministry of Health). In addition, hydropower generation is planned from that, as well as water rights issues and planning of construction works. At provincial level, ZMD is part of the Provincial Development Coordinating Committee (PDCC) responsible for provincial planning. At district level, ZMD is part of the District Development Coordinating Committee (DDCC). There exists an understanding on the need to collaborate between WARMA and ZMD. This collaboration, including the real-time sharing of daily data by ZMD from the existing and installed AWS network, needs to be strengthened so that WARMA automatically receives updates each day. WARMA currently shares the raw data it collects from its rainfall stations with ZMD. ZMD has established a web-based data-sharing portal⁷ to address this need from stakeholders, but the automatic transfer of data to WARMA will need to be developed. Another website⁸, based on the work of the European Network for Advance Computing Technology and Science (through Columbia University), provides information related to weather and climate, as well as medium to long-term forecasts for rainfall and temperature. All these will be part of project activities elaborated in ZMD and WARMA's annual work plan and budget.

Activity 1.2: Strengthen dissemination and use of client-tailored weather/climate-based agricultural advisories to ensure smallholder farmers receive the information they need for planning and decision-making (Gov't cofinance: USD 5,100,000)

89. Building on the increased capacity of ZMD, MoA and WARMA to monitor changing and projected trends related to weather, agriculture and water, and to develop the specific information products relevant for farmers, this activity will ensure that tailored advisories are disseminated and used to inform smallholder farmers' decision-making. The GRZ extension services and their FISP programme will channel this information to the last mile. This includes developing products and using dissemination techniques that are relevant and target women. DMMU will also enhance preparedness at the grass-roots level by ensuring community-led early warning becomes an integral part of Community-Based Disaster Risk Management. Existing communication channels for sharing this information will be strengthened, such as radio, television and print media. Water resource modelling will accrue economic benefits to both WARMA and the primary stakeholders. The latter will benefit through accessibility to information which will facilitate economic decision-making that will promote profitability. At the same time, innovative systems will be strengthened and scaled up, including the use of an SMS-based system, which is already under development through the LDCF CIEWS project. Further, extensive training of trainers and technical support will be provided to all target farmers to better interpret new information and integrate it with indigenous practices to strengthen their adaptive practices. This will, in essence, support the transformation of the weather, agricultural and water advisories into concrete farming decisions to strengthen resilience. Finally, this information will also be integrated into local policies and planning to ensure sustained support to farmers in the face of changing climate conditions. This will include the following sub-activities:

- Disseminate enhanced agricultural advisories through existing communication channels including community radio, television, field extension services, print media and effective engagement with the media services.
- Facilitate public-private partnerships between ZMD and mobile companies to establish SMS dissemination systems to farmers. *This would include workshops and meetings, expert consultants on legal matters and public-private partnerships, etc. It could also help to introduce or build on SMS delivery systems for broader socially relevant information for farmers (e.g. health, education) that would also incorporate climate-related products.*
- Facilitate other partnerships between ZMD and other private-sector actors in civil aviation, insurance, tourism, etc., who would provide an additional income stream for ZMD to operate and maintain their systems.
- Training of trainers (extension workers and lead farmers from Government and non-governmental organizations [NGOs]) on how to interpret climate information/advisories and identify options for use of information through decision-making. *This approach would use historical climate observations with farmers to develop options to respond to climate variability and change, including options available through Output 2. It would further guide farmers on the use of weather and seasonal forecasts, disseminated through different media, to adapt to anticipated (forecast) weather/climate.*
- Dissemination of training to target smallholder farmers. *This training would be linked to the farmer field schools*

⁷ <http://41.72.104.142:8080/secure/common/main.vm>

⁸ <http://41.72.104.142/maproom/index.html>

and learning centres of excellence (Output 2.5), where integrated learning would take place around climate risk, agricultural production, alternative livelihoods and value chain development.

- Support farmer-to-farmer exchanges on how information is being received and applied for selecting resilient practices, and also applying value chain development (e.g. impact of drought on processing and storage). *Same as above, linked to activity 2.5.*
- Training of PDCC, DDCC and ward-level policy makers on how to use relevant climate information to inform policies and planning through existing meeting forums and structures.

Output 2: Resilient agricultural livelihoods are promoted in the face of changing rainfall, increasing drought and occasional floods

90. With better planning for and management of climate risk, farmers will be supported to be in an improved position to adapt to climate change by managing water more sustainably, introducing new agricultural practices, adopting new varieties of crops and pursuing alternative livelihoods. However, this will require a shift in current business practices, relying heavily on training and capacity-building, as well as information generated under the first output. Farmers will also need to integrate sustainable water management techniques, within the context of water catchment planning and water user associations, and ensure resilient agricultural inputs are available and sustained. For example, farmers are currently dependent on seeds provided by Government or purchased from agribusinesses which are not always the most resilient variety, and those that tend to be are either inefficiently distributed or unaffordable. Consequently, strengthening local capacities to produce and distribute their own seeds, particularly those that are less common in the market and more resilient to drought conditions (like cowpeas, other legumes and cassava) becomes critical.

91. All the practices scaled up under this project, including establishment of seed producer groups and alternative livelihoods, have been piloted and tested under previous projects, namely the CCAP project and work undertaken by other UN agencies (e.g. FAO's CASU project). These successful practices will be scaled up and replicated in the target areas of this proposed project. Further, to ensure sustainability of the new approaches, a comprehensive knowledge and learning mechanism will be put in place. This will be built on the successful model of farmer field schools, which provide local, context-specific centres where farmers can share experiences with other farmers and continue to receive technical support from extension workers and other experts. Learning centres of excellence will also be established at the district level to promote scaling up and enhance replication to other camps throughout the district. Specifically, this output includes the following activity areas:

Activity 2.1: Promote irrigation schemes, water storage and other resilient water management strategies to increase access to water for agricultural production in the target districts within Agro-Ecological Regions I and II (Gov't co-finance: USD 12,200,000)

92. A significant barrier to resilient agricultural production identified by smallholder farmers in the target regions is the limited access to water. Providing access to water will complement and enhance the effects of the Government FISP programme which aims at providing quality seeds and information on agricultural practices to smallholder farmers. The amount of water is not the primary issue, as these regions get on average 800 mm of rain annually (less than 800 mm in Region I and 800-1,000 mm in Region II). However, the distribution and changing patterns of rainfall caused by climate change have negative impacts on agricultural production. Therefore, this activity provides innovative water management technologies, including both infrastructure and management strategies, so that farmers are able to capture water when it rains (and even during occasional floods), and use it when drought conditions occur. This will take into account the specific roles and responsibilities of both men and women in water procurement and use, while also empowering women through training on water management approaches. All infrastructure under this activity will be sustained after the project through an O&M strategy which includes the DWA and the communities themselves (see O&M plan in the Feasibility Study, section 5.3, and letters of commitment in Appendix IV).

93. Additionally, these water-related infrastructures, along with the climate and hydrological information generated under Output 1 on water monitoring above, will contribute to the strengthening of the management of water catchment areas, including the establishment and implementation of water catchment plans which are already under development

within the framework of the Water Resources Management Act No. 21 (2011) (WRM) – led by WARMA. The WRM established a decentralized structure of water resources management, including the development of multi-stakeholder water user associations, and at a higher level of governance, catchment and sub-catchment councils. These bodies are responsible for governance of water resources in their specified boundaries and many of the functions are performed by water users themselves. The structure of these water user associations is outlined in Article 24 of WRM (more details on water user associations are found in the Feasibility Study, section 2.2.1). A core part of this activity will be to further establish and strengthen these multi-stakeholder water user associations and build their capacity to manage water resources in an integrated way that takes into account climate change impacts and resilient approaches.

94. Based on the information gathered through site visits and further analysis, this activity will include the following sub-activities (see Appendix XII in the Feasibility Study for details):

- Introduce new water management and storage infrastructure in each target district, building on existing infrastructure and addressing remaining needs for increased resilience. Preliminary designs and costings have been done for selected locations, and detailed designs will be further confirmed and refined during the first stages of implementation, based on in-depth participatory assessments in each camp (see Appendices XI, XII, XIII & XV in the Feasibility Study). *The following numbers are drawn from district/camp-level consultations held during the proposal development process:*
 - Introduction of 170 farmer ponds to simultaneously maintain and manage changing water resources and support alternative resilient livelihoods
 - Introduction of 25 community-based multipurpose weirs
 - Introduction of 158 solar boreholes
 - Construction of 32 irrigation canals and water distribution systems
 - Construction of 54 market facilities (bulking centres/storage facilities)
- Strengthen O&M of new small-scale irrigation infrastructure, particularly through strengthening water user associations.
- Strengthen management of catchment areas by local associations, institutions and lead farmers, building on the existing management structures supported by WARMA. *This will include strengthening the capacity of more than 15,000 farming households; water user groups and formal water user associations; enhancing the development plans for each catchment; and strengthening the capacity of the various stakeholders in how to operationalize these plans.*

Activity 2.2: Increased access to agricultural inputs (e.g. seeds, soil kits, tools) for resilient crops (Gov't co finance USD 40,000,000)

95. In order to ensure farmers can successfully introduce new resilient practices, this activity facilitates their access to the necessary agricultural inputs. This includes resilient seed varieties not easily accessible on the market or through existing agricultural input programmes. This is where the partnership with the FISP will be crucial, to partner with the GRZ to improve their flagship programme to a more resilient support. This will be introduced through a pass-on mechanism, where farmers who have been given farming inputs commit themselves to pay back 10 percent of the seed to the village seed bank. This is then passed on to other farmers through the bank. This mechanism is supported through the establishment of a management group which ensures that the mechanism functions efficiently and farmers are held accountable. These mechanisms – successfully piloted under the CCAP, ensure the inputs reach a greater number of farmers over time. At the same time, in order to ensure sustainability beyond the life of the project and address one of the key barriers identified in the Feasibility Study, section 4.1.4 (i.e. access to high-quality seeds for resilient crops), this activity will also introduce seed multiplication to small-scale farmers (both male and female) and to cooperatives. This was a successful practice demonstrated under the LDCF-funded CCAP project, particularly in Kazungula district, where many women and men became trained in successful seed multiplication. Seed multiplication not only provided farmers with their own seeds, but also generated a new income stream by selling these high-quality seeds (particularly those with limited availability on the market or from the Government) to other farmers in the community. The seed crops that will be targeted are climate-resilient legumes (beans, groundnuts, cowpeas, pigeon peas, soybeans), cereals (short-maturing and drought-tolerant maize varieties, sorghum) and root and tuber crops (short-maturing and high-yielding cassava). Appendix X of the Feasibility Study presents the climate-resilient characteristics of these crop varieties.

96. Sub-activities will include:

- Provide farmers with access to initial inputs of drought and pest-tolerant seeds, soil kits and tools to successfully introduce new resilient agricultural practices, including conservation agriculture. *This will be done through a pass-on mechanism that will also establish management groups for the sharing and dissemination of seeds, including establishing seed banks.*
- Strengthen or establish cooperatives in each of the 16 districts to manage production and distribution of improved seed varieties. *This will be done jointly with farmers and existing as well as new cooperatives through training on seed production methods to facilitate production of seed for sale in the community.*
- Share information with farmers on the value of improved seed varieties suitable for their local areas, drawing on existing evidence from previous demonstrations and analyses. *This will be done through direct training of extension workers and farmers in each of the 16 districts, and farmer-to-farmer exchanges within and between districts.*
- Integrate newly introduced seed multiplication and distribution practices into local and district-level planning, including raising awareness and training of local policy makers on benefits of the practices. *This will be done through site visits, dialogues with smallholder farmers and distribution/presentation of analyses done under monitoring and evaluation (M&E) processes.*

Activity 2.3: Introduction of new resilient agricultural production practices to strengthen production and diversify crops in the context of climate variability and change (Gov't co-finance: USD 21,000,000)

97. The new resilient crops and associated agricultural practices introduced under this activity draw directly on successfully demonstrated pilots from previous projects, and integrate components of agroforestry to increase areas under forest cover in the project areas. Specifically, this refers to the LDCF-funded CCAP initiative implemented by the MoA (with UNDP support), and the CASU initiative (with FAO support). This activity will scale up these practices to reach more farmers in the target districts. The crops targeted for this activity will include those that support resilient food security in the face of climate change impacts (such as cowpeas, soybeans, pulses and horticultural crops), as well as resilient crops with high demand on the market (such as cassava). Section 5.1.4 and Appendix X of the Feasibility Study provide details.

98. There will be an emphasis on the prioritization of crops that are traditionally cultivated by women, such as cowpeas, or crops that provide viable economic opportunities for women. The project will also draw on indigenous strategies to ensure sustainability within the targeted local communities. Finally, local policy makers will also be targeted for information sharing to ensure these new practices are integrated into local and district-level planning. Specifically, sub-activities will include:

- Strengthen farmer/user groups on crop diversification, targeting members considered as champions at each camp to facilitate and oversee the adoption of drought-tolerant and alternative crops by the wider communities (e.g. cassava, cowpeas, soybeans, pulses and horticulture).
- Apply different conservation agriculture and other climate-resilient techniques in each of the target communities, drawing on the assessments done under the CCAP on pilot techniques. These practices will include:
 - Intercropping
 - Crop rotation
 - Organic manure application
 - Composting
 - Leguminous cover cropping
 - Minimum tillage
 - Agroforestry
- Strengthen capacity of farmers/user groups to maintain selected sustainable agricultural practices in each community.
- Integrate newly introduced sustainable agricultural practices and diversified crops into local and district-level planning, including raising awareness and training of local policy makers in benefits of the practices. This will be done through site visits, dialogues with smallholder farmers, dissemination of key lessons and findings from M&E processes.

Activity 2.4: Introduce alternative livelihoods to strengthen resilience in target communities (co-finance: USD 11,900,000 Gov't & 1,100,000 AE)

99. Beyond crop diversification and new agricultural practices, this project will also promote other alternative livelihoods that are less reliant on climate-sensitive natural resources to use as a safety net. Specifically, this activity will promote beekeeping, goat rearing and fish farming, which have all proven under the CCAP to be successful for current environmental and changing climatic conditions, while also providing economically viable livelihoods that have successfully engaged and empowered women. This is particularly true for the drought-prone areas targeted by this project, where goat rearing and beekeeping provide sustainable livelihood opportunities. Again, here the partnership with the GRZ and the FISP programme will be central to introducing the more resilient livelihoods, and transforming the way the programme provides livelihood support. A proven model of the pass-on system has been established for the goat rearing, where a farmer is advanced two goats. Once the goats have given birth, the farmer passes on one goat to another farmer whose name is part of the waiting list of farmers. The process is repeated for the successive farmers, leading to spreading of goats to more households for improved welfare and resilience. A similar mechanism is being considered for beekeeping, to ensure that the inputs provided to farmers are reaching a greater number of beneficiaries and are having a greater impact. Fish farming has also proven to be a successful alternative livelihood which benefits not just the farmer but a cooperative as well, where such an entity participates in the production. Breeding ponds will also be introduced to provide fingerlings to other farmers, similar to the seed multiplication approach proposed for implementation under activity 2.2. This activity will also be closely linked to activity 2.1, where new water storage and management infrastructure and technologies will be used not only for irrigation but also for hosting fish farms – thus increasing their impact. Specifically, sub-activities under this area will include:

- Provide inputs to farmers to introduce and strengthen resilient alternative livelihoods (e.g. beehives and beekeeping equipment, goats, fish). *This will be done through a pass-on mechanism embedded in the agreement, so that the inputs reach a greater number of farmers.* Section 3.5.1.7 of the Feasibility Study provides details.
- Strengthen or establish cooperatives in each of the 16 districts to manage fish breeding ponds in order to produce and distribute fingerlings to the rest of the community.
- Strengthen capacity of farmer beneficiaries across all 16 target districts to adopt and maintain new alternative livelihoods.
- Integrate newly introduced resilient alternative livelihood practices into local and district-level planning, including raising awareness and training of local policy makers on the benefits of the practices given the changing climatic conditions. This will be done through site visits, dialogues with smallholder farmers or distribution/presentation of analyses done under M&E processes.

Activity 2.5: Establish farmer field schools and learning centres of excellence to further document and scale up successful practices (Gov't co-finance: USD 100,000)

100. Finally, to ensure sustainability and enhanced replication of the resilient practices introduced by this project, this activity will focus on strengthening knowledge and learning mechanisms across the target districts. This will specifically build on the successful model of farmer field schools, introduced under the CASU initiative in Zambia (supported by FAO), as well as good practices from other countries. These field schools will be based at the camp level, so that the knowledge shared and exchanges facilitated between farmers (both women and men) will be locally focused and meet the specific needs of farmers in these contexts. The information on weather and climate change generated by ZMD is shared with the agriculture district offices that is in turn passed on to the farmer field schools for dissemination to farmers, and used in decision-making on the choice of crops and varieties to grow in a particular season. Further, the farmer field schools will also facilitate the establishment of cooperatives where they do not exist and organizational capacity-building, where it does not exist. Farmer field schools will capacitate farmers with information related to the whole value chain, from production, food preparation, marketing and consumption.

101. The farmer field schools will be a one-stop centre that will provide information for small-scale agriculture resilience including information on diversification of crops, livelihoods, safety net and insurance. In addition, learning centres of excellence will be introduced at the district level to further scale up best practices and replicate them in other camps across the districts. The innovation under this project will also be for these schools and centres to not only include learning

on resilient agricultural practices, as has been done in previous projects, but also learning generated from other activities and outputs of this project – i.e. adaptive water management techniques, climate-informed decision-making, crop processing and marketing techniques (in short, comprehensive climate-resilient value chains). This integrated approach will strengthen the schools and centres to act as catalysts for scaling up climate change adaptation. Further, the new centres will be operated and maintained after the close of the project through the support of the MoA (see O&M plan discussed in the Feasibility Study, sections 5.3 and 5.6). The sub-activities will include:

- Establish or strengthen existing farmer field schools in each of the target camps across the 16 districts
- Training of trainers (extension staff) to facilitate experiential learning by communities on adaptive practices
- Establish or rehabilitate learning centres of excellence in each of the 16 target districts

Output 3: Increased farmers' access to markets and commercialization of resilient agricultural products

102. Experience from the previous pilot projects indicated that farmers are often reluctant to adopt resilient agricultural practices without knowing whether there is a strong market for these products. At the same time, new practices introduced, cooperatives established and alternative livelihoods adopted under the CCAP project have the potential to grow further and scale up into more robust commercial enterprises with better linkages to markets, access to finance and business capacity – which would further expand their adaptation impact. For effective and sustainable adaptation of the agriculture sector for smallholder farmers, it is necessary to trigger a paradigm shift in the way they undertake agriculture. This means addressing the entire value chain, from planning for climate risk, to ensuring resilience of water and other agricultural inputs, to resilient methods for production, to, ultimately, linking farmers and their climate-smart agriculture products to markets. This comprehensive approach ensures that climate risks across the value chain are addressed, while also putting in place the necessary technical, financial and institutional foundations to promote and accelerate resilient agricultural value chains that can be viable in the face of climate change.

As a result, within the GCF project, this situation will be addressed by taking a more innovative value chain approach in a way that promotes the scaling and replication of project interventions. This will be done by introducing supply storage and warehousing, allowing crops to be sold when prices are reasonable given varying climatic conditions, reducing post-production losses caused by climate change as well as access to market tools in the face of change (pricing and demand information), and learning to optimize farmer selling behaviour during each point in the growing season. This approach focuses on the vertical market chain – not just primary market actors but also the enabling environment, including policy and regulation as well as infrastructure and capacity of intermediaries such as off-takers. By targeting project interventions that reduce climate risk and at the same time enhance market opportunities, this approach works to align the economic interests of beneficiaries with long-term climate resilience. Involving market intermediaries will allow the project to reach more people, through both replication and scaling, than it could by only targeting individual smallholders. Previous projects have highlighted that this approach has great potential for successful resilience building in the project area.”

Economic conditions are indeed diverse but not widely different. The direct beneficiaries of this initiative are all smallholder subsistence farmers who operate in fairly similar economic conditions and are very dependent on their crops for nutrition and livelihood. This project will achieve long lasting and effective commercialization by strengthening all aspects of the value chain, from managing climate risks with better access to climate information and early warnings, by improving the access to water for irrigation during dry spells of the rainy season (and also resilient agricultural practices), and most importantly by improving the access to markets by farmers for their produce. This is absolutely key, and lessons from the previous CCAP project support this. Improving resilient agriculture output is possible with direct support to farmers, however selling the surplus is an integral part of the success as farmers need to know that their increased production can be sold to adopt the new practices. Various actions will be taken, such as improving processing of agricultural produce, creating resilient storage spaces that limit crop losses and allow to sell when the prices on the market are right, increasing access to micro finance, and creating market linkages. Behavior change can be fast, provided it is evident to the people whose behavior has to change that the changes are beneficial to them. We have evidence from the CCAP project that in four years farmers have gone from farming a single climate sensitive crop (maize), to diversifying and using climate resilient crops (like sunflower, cowpea, rice...etc.). So behavior change is not a real risk or concern here, provided these changes have perceptible benefits to the beneficiaries.

This output focuses on providing both female and male farmers with the capacity and linkages to viable markets for resilient products. By investing in this output, the GCF will catalyze and transform the way the FISP supports the access to markets and the value chain in general. This output focuses primarily on processing, storage and transportation, as

well as identifying viable markets (such as schools) for rural products. There is a specific emphasis on women, to ensure they gain better access to resources (e.g. finance and insurance), and also have the financial and business skills to scale up alternative livelihoods. Each activity in this output will maximise the use of technology to make the value chain more resilient to climate change. For example, solar dryers will be preferred to diesel ones, storage will be raised to be more resilient to floods...etc. As discussed above, several projects are already under way to pilot innovative and successful models for setting up these networks.

This GCF project will therefore, strengthen these networks, and scale them to reach the target districts. This includes the following activities:

Activity 3.1: Strengthen processing of resilient products (co-finance: USD 3,000,000 Gov't & 200,000 AE)

103. To further increase the economic potential of resilient products while simultaneously making them further strengthen the resilience of their producer, this activity will focus on introducing and maintaining new processing centres and providing training to farmers on processing techniques. This is a critical output of the new adaptive practices for a few reasons. First, it will ensure the new crops are economically viable to provide the necessary incentive for farmers to invest in their production. Second, it will make the crops last longer, thus providing a better safety net for climate-induced shocks. Finally, it will increase the value of the crops, providing increased income to the farmer and thus increasing their resilience. Several of these processing centres were piloted under the CCAP initiative, and proved to add extensive value to the crops farmers were producing, which further incentivized investing in the new resilient crop. For example, processing cassava into flour greatly increased revenue per unit, compared to selling it raw. This led farmers to commit to producing this drought-resistant crop. Additionally, processing crops often gives them a longer shelf life and more flexibility in terms of targeting different markets. This provides producers with the option to keep them for times of drought or periods of unpredictable rainfall. The processed crops will then act as a safety net for climate-induced shocks or events. The project will develop a sustainable model for payment of maintenance costs based on user fees, as outlined in the O&M plan discussed in the Feasibility Study, section 5.3, such that the processing centres will continue to operate after the close of the project. The following sub-activities will be included under this area:

- Establish multipurpose processing centres with processing equipment across each of the 16 target districts. *These centres will include equipment and energy sources (e.g. solar) and will be multipurpose, depending on the realities of the season and needs of the community. This will be closely tied to the farmer field schools, located in each of the target camps, where the centres will be co-located.*
- Provide training to farmers on processing techniques.
- Provide training to farmers on the use and maintenance of processing equipment.

Activity 3.2: Strengthen storage, aggregation and transportation of resilient products to enhance commercialization and linkages to markets and SMEs (co-finance: USD 3,000,000 Gov't & 100,000 AE)

104. Another way to strengthen the resilience of crops produced by smallholder farmers is to store the crops and aggregate them in order to make them available at different times of the year, and also get a higher price on the market. This activity will drive farmers to search for more viable and resilient markets, through storage and aggregation. The activity will build on the P4P approach, implemented previously by WFP, which focuses on linking smallholder farmers to sustainable commercial markets (further evidence for experiences of this approach is provided in the Feasibility Study, section 3.4.2). Under this approach, farmers' capacity to produce quality commodities for commercial markets and the ability to negotiate better prices are enhanced. Farmers are exposed to effective post-harvest handling practices and technologies (hermetic solutions) to ensure that the quality of the commodity is maintained during storage. This is particularly important to avoid post-harvest losses caused by climate change. It also ensures that farmers have a safety net to protect their products and overall incomes in times of climate-related shocks. They can also take advantage of the high prices during periods of low supply on the commodity exchange, thus increasing income which leads to increased resilience. As changing rainfall patterns and seasonal shifts become more prevalent, the time when a crop will be most valuable on the market will shift with the changing conditions. Employing an adaptable system for storage and transportation will allow farmers to be more resilient to whatever impending conditions occur, and it will provide this safety net for unpredictable conditions. This will be delivered in the form of technical assistance and setting up of marketing

infrastructure. These storage infrastructures will be owned by the community and managed by the community-led committees. More complex models of warehouse receipt systems, also presented in the Feasibility Study (section 3.4.2), have also proven to provide farmers with opportunities to use stored crops as collateral towards accessing additional financing. This is also critical for adaptation, as additional financing can help to provide the initial investment in new adaptive practices, which are not always accessible to the most vulnerable farmers. Commodity aggregation is fundamental in this approach if farmers are to supply commercial buyers whose demand is usually in bulk.

105. Further, transport infrastructure is underdeveloped in the rural areas which increases the transportation costs, and is often vulnerable to climate change impacts – such as floods or heavy rains. With the provision of toyo cycles (tractor-cycle with 0.5-ton cargo capacity), farmers' access to rural aggregation centres for both output and input markets is enhanced, particularly during times of shocks. For farmers to effectively participate in the commercial market, access to market information is vital and the virtual farmers' market will aim at addressing this challenge. Further, this activity will provide more information to farmers on available markets for resilient crops, quality assurance, negotiation skills and entrepreneurship, which can help strengthen and scale up their businesses. The lessons from the farmer field schools across the target districts will provide a localized depository of useful market information for each of the crops grown within that locality, thereby resulting in improved market performance. This process will be anchored by MoA's information services. These will also be incorporated into the training and technical support provided under Output 1, and disseminated using the farmer field school and learning centre models.

106. The specific sub-activities will include:

- Scale up ongoing 'Dial-A-Load' project which provides transporters with a supply-and-demand information platform including on climate-resilient products for more effective use of trucking capacity in rural areas which is crucial to improving the performance of key aspects of the value chains.
- Support smallholder farmers with toyo cycles for transport on a loan basis.
- Support the development of a private-sector-led distribution network for household-level hermetic storage solutions.
- Promote the use of hermetic storage solutions among smallholders to reduce post-harvest losses due to climate change impacts (e.g. airtight bags, metal and plastic silos).
- Development of marketing strategy for dissemination of post-harvest handling technology for integration into ongoing government programmes.
- Support the establishment of private-sector-managed, rural buy/aggregation points with storage and processing facilities where smallholders and buyers can trade and access a variety of agricultural services for climate-related conditions, including support to the Zambian Commodity Exchange (ZAMACE).
- Promote and support capacity of smallholder farmers' organizations on the use of ZAMACE and the warehouse receipt system to increase resilience.
- Training to farmers on quality assurance, group marketing and negotiation skills related to climate-resilient products.
- Develop a 'virtual farmers' market' (supply-and-demand information and payment platform that focuses on climate-resilient products) that enables equitable and competitive trade between smallholders and traders.

Activity 3.3: Increase access to finance and insurance products for smallholder farmers by strengthening financial education and facilitating engagement with potential financing sources including public, private, bilateral and multilateral sources (Gov't co-finance: USD 3,100,000)

107. This activity focuses on increasing the capacity and knowledge of farmers to access relevant and additional financial services (credit and insurance) needed to protect their livelihood gains from climate-related impacts. This is particularly important given the increasing frequency of floods, droughts, changing rainfall conditions and other unpredictable events that will threaten the crops of vulnerable farmers. Most of these farmers do not have the knowledge or resources to access the types of products that provide the safety net needed to cope with changing climate conditions. Access to finance is also critical for adaptation, as it provides farmers with the additional capital needed to invest in adaptive changes that will only show returns after the growing season.

108. The operation model applied under the resilience project of R4 has necessitated the credit company to offer the

lowest rate of credit product on the market to farmers. The model uses a group guarantee type of first-level collateral where the group members pledge to secure the loan on each other's behalf in case of default. The substitute collateral is pledged to the group and not the credit company to strengthen issues of social network. The activities will build on the successfully piloted experiences under the R4 programme (implemented by WFP), establishing the foundations for increased access to and a stronger market for weather-index-based insurance and credit schemes. This will involve financial education to farmers, facilitating the engagement between farmers and potential private-sector partners already providing insurance schemes, and undertaking the necessary groundwork (establishing indexes, setting up networks and systems) for future insurance schemes. Specifically, sub-activities under this area will include:

- Facilitating partnership creation between farmers (workshops, meetings, training) and financial institutions on the provision of credit and access to insurance schemes for smallholder farmers.
- Scaling up provision of agricultural credit training and awareness raising on financial education programmes for farmers.
- Providing technical support to strengthen insurance product development of more area-specific weather-index-based agricultural insurance products.

Activity 3.4: Identify available markets and promote climate-resilient products (Gov't co-finance: USD 3,100,000)

109. As proposed under the Feasibility Study, sections 3.4.2 and 3.5.1.11, strengthening market linkages for climate-resilient products from the demand side is also essential to successfully incentivize, strengthen and promote resilient products. The strategies proposed under this study focus on awareness and media campaigns to increase understanding of resilient crops, such as soybeans, cassava, cowpeas and other legumes, about their nutritional value and alternative uses. This activity will also support the development of partnerships with potential consumer groups who can provide a sustained demand for the farmers' crops, building on the P4P programme which established linkages with schools and hospitals for various crops. The specific sub-activities will include:

- Connect rural producers to rural procurement from smallholder farmers of indigenous foods required for the national home-grown school feeding programme.
- Scale up the provision of nutrition education and establishment of school gardens to sensitize schoolchildren.
- Awareness raising of existing wholesale markets for resilient agricultural produce, linking smallholder farmers to local markets.

C.4. Background Information on Project / Programme Sponsor (Executing Entity)

110. The MoA of Zambia is the Executing Entity for the proposed project. This project will be implemented primarily by the Department of Agriculture under the MoA, which is responsible for the pivotal role of providing agricultural extension services that are critical to promoting adoption of improved farming technology for farmers to achieve high productivity levels, as well as maintaining and improving the agriculture resource base. This is a critical department in the Ministry which coordinates all the agricultural activities related to production, productivity, irrigation, farm structures and extension, among others. Specifically, the department is mandated to: 1) package and disseminate technical and other information to the farmer community; 2) provide technical services in irrigation, farm power, mechanization and land husbandry; and 3) provide technical information and extension services in crop production, horticultural production, nutrition, crop protection and soil fertility to the farming community.

111. Financial status and project support: For 2016, the MoA received an annual allocation of ZMK 2,382,266,379 (USD 238,226,637.90) from the Government for management and coordination of agricultural activities. Over the past few years, MoA has received and managed projects with grant funding including from World Bank, IFAD, Government of Japan (through JICA), AfDB, Finnish International Development Aid, UNDP and FAO of the United Nations. The Ministry's recurrent expenditure allocation for the upcoming year of 2017 is estimated at ZMK 5,865,083,860 (USD 586,508,386). Further, the capital expenditure denoting investment in agricultural projects implemented throughout the country for the year 2016 and 2017 is projected to be ZMK 110,056,577 (USD 11,005,657.70) for 2016, and ZMK 1,171,386,400 (USD 117,138,640) for 2017.

112. The MoA provides project management support and in-kind contribution to project implementation through its technical and administrative staff and systems. It will provide operations and management support to the project through

its staff as well as the dedicated Project Management Unit set up for the project. MoA will also function as the 'Executive' in the Project Board. A micro-capacity assessment for the implementing partner (IP) was undertaken by UNDP for another project with satisfactory results. A detailed capacity assessment will be undertaken for the IP for the proposed project prior to project implementation.

113. Engagement with a series of responsible parties to implement the following activities will be formalized through LoAs prior to commencement of project activities:

- MoA and WARMA for Output 1
- DWA for activity 2.1

114. In the same vein, UN agencies will implement the following activities which will be formalized through UN agency to UN agency Contribution Agreements prior to commencement of project activities as follows:

- FAO for activity 2.5
- WFP for activities 3.2, 3.3 and 3.4

115. Additional memorandums of understanding (MoUs) will be entered into to ensure that responsible parties (RPs) work and collaborate together, e.g. data sharing from AWS operated by ZMD (see C.3. above). Therefore, it is envisaged that the following MoUs will also be entered into and clearly describe each institution's responsibility:

- ZMD and WARMA – sharing data (on a daily basis) collected through AWS and hydrological observational infrastructure. Working together on climate-related products for the water sector
- ZMD and MoA – sharing data (on a daily basis) collected through the AWS network. Working together on climate-related products for dryland agriculture
- WARMA and MoA – sharing water resource information related to agriculture and working together on irrigation scheduling products for irrigated agriculture

116. An RP is defined as an entity that has been selected to act on behalf of the Executing Entity on the basis of a written agreement or contract to purchase goods or provide services using the project budget. In addition, the RP may manage the use of these goods and services to carry out project activities and produce outputs. All RPs are directly accountable to the Executing Entity in accordance with the terms of their agreement or contract with the Executing Entity. The Executing Entity uses RPs in order to take advantage of their specialized skills, to mitigate risk and to relieve administrative burdens.

C.5. Market Overview (if applicable)

117. The primary focus of Output 3 is to support the post-production phase for climate-resilient products, which includes strengthening linkages between smallholder farmers and markets. As part of the proposal development process, a detailed value chain analysis was undertaken to identify the specific market opportunities for ecologically produced and climate-resilient new crops, and define specific entry points for ensuring viability and sustainability in this market. This includes a strong emphasis on gender, identifying the role women can play in entrepreneurship and strengthening businesses.

118. The project will introduce new, more-climate-resilient crops such as cowpea, sunflower, sorghum and rice. These crops are more able to sustain climate shocks such as droughts and floods as opposed to maize.

C.6. Regulation, Taxation and Insurance (if applicable)

119. Government signature to the programme document gives the general permission for the implementation to start. This is, however, backed by the Standard Basic Assistance Agreement (SBAA) that was signed when the UN established the offices in Zambia. This implies that execution permits may be needed for staff who are non-Zambians and this is arranged by the UN office with the Ministry of Foreign Affairs.

120. For a project that will have an effect on the environment, an environmental impact assessment will need to be undertaken, and other developments of smaller magnitude will need to have an environmental impact statement from the Zambia Environmental Management Authority (ZEMA) before the development can start. ZEMA provides clearances for all developments which have an effect on the environment. Construction will need the drawings to be submitted to the

planning authority. This is in keeping with urban and regional planning considerations.

121. The Government of Zambia has signed an SBAA with UNDP consistent with Article III of the SBAA, the responsibility for the safety and security of the Executing Entity and its personnel and property, and of UNDP's property in the Executing Entity's custody, rests with the Executing Entity.

122. The current regulations do not have any negative effect on the operationalization of the project or other investments that the UN intends to undertake in support of the GRZ.

123. The UN in Zambia does not pay taxes. Where this may not be practical at the point of purchase, tax refunds are made to the UN for all the goods and services that are bought or contracted through contracts by the UN. The exchange rate is largely determined by the market forces. UNDP's currency hedging policy is based on the use of natural hedges (matching cash flows [i.e. revenues and expenses] in non-USD currencies) to the extent possible. When a commitment is incurred in currencies other than USD, it shall be recorded in the project accounts in the USD equivalent at the prevailing United Nations operational rate of exchange. At the time of payment, where currency fluctuation has resulted in a change in the USD equivalent from the original amount obligated, the difference is to be charged or credited to the same project account against which the obligation was recorded. All valid obligations at 31 December will be revalued to reflect the United Nations operational rate of exchange in effect on that date. Country Office bank account balances are managed not to exceed approximately one month's disbursement requirements to minimize risk.

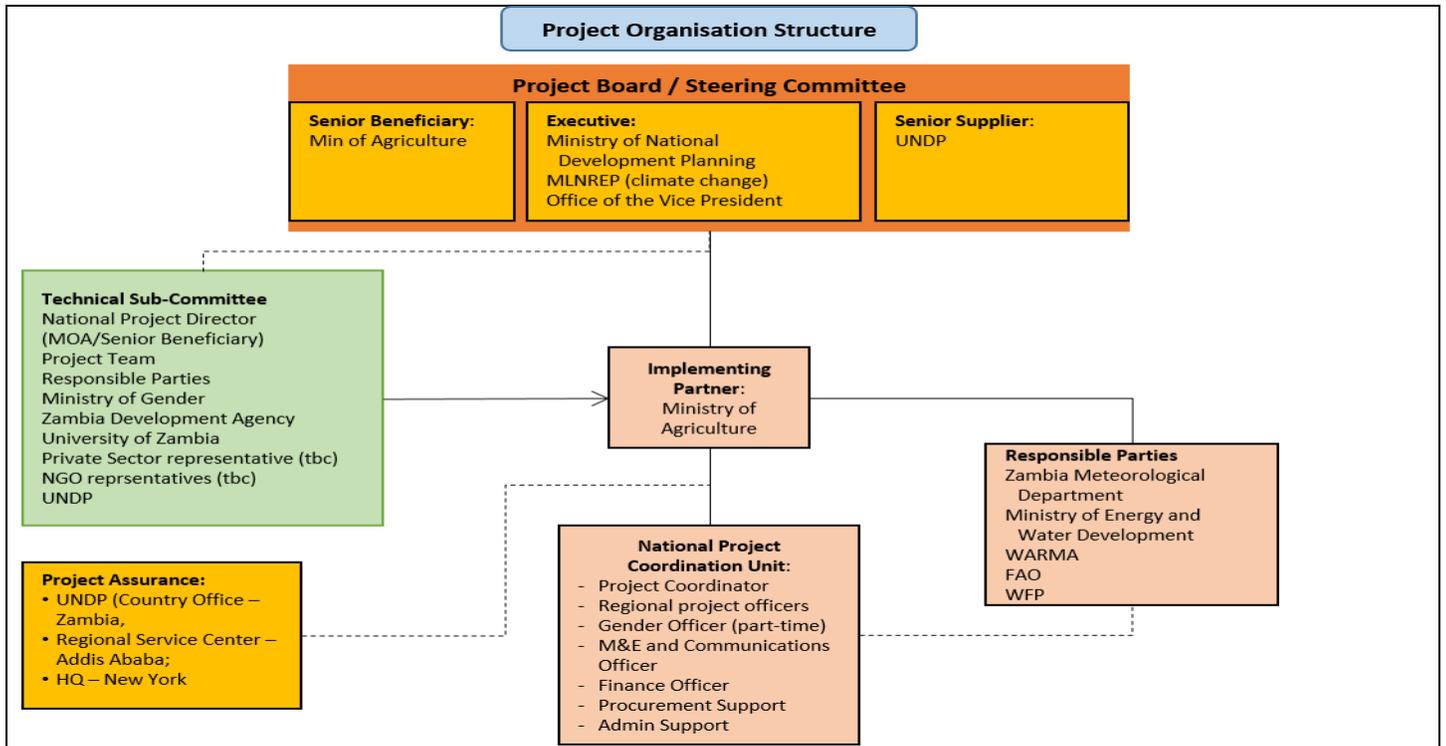
C.7. Institutional / Implementation Arrangements

124. The project will be implemented based on: UNDP's National Implementation Modality (NIM); the SBAA between UNDP and the Government of Zambia; the Country Programme Document; and policies and procedures outlined in the UNDP Programme and Operations Policies and Procedures (POPP) (see: <https://popp.undp.org/SitePages/POPPSubject.aspx?SBJID=245&Menu=BusinessUnit>)

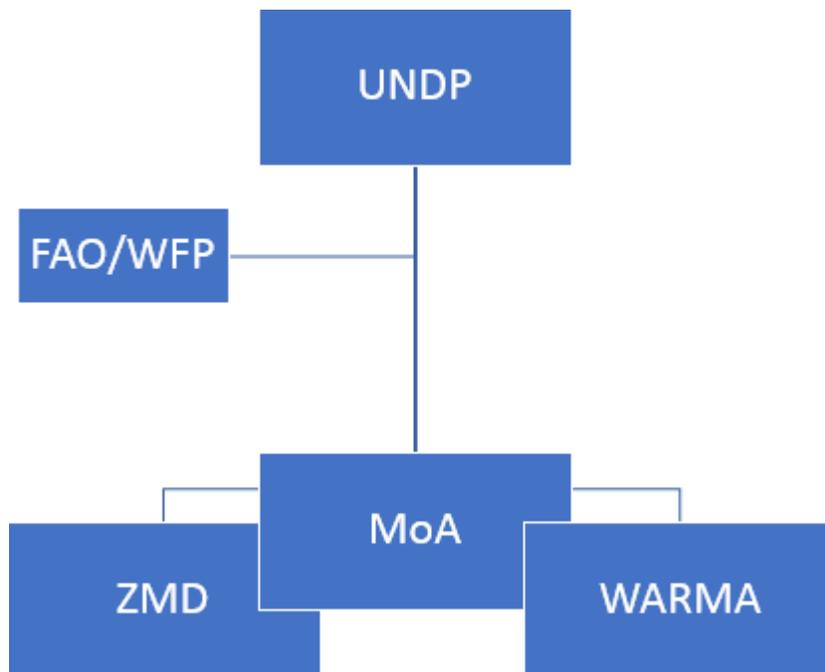
125. The **Executing Entity** for this project is the MoA. The MoA is accountable to UNDP for managing the project, including M&E of project interventions, achievement of project outcomes, and effective and efficient use of project resources. The following parties have entered into agreements with the MoA to assist in successfully delivering project outcomes and are directly accountable to the MoA as outlined in the terms of their agreement: Ministry of Transport and Communications, ZMD, WARMA, FAO and WFP. These entities have been requested to lead on implementation of specific activities under the project as RPs, on behalf of the MoA. This includes both national entities (WARMA, ZMD) and UN agencies (WFP, FAO). UNDP has the overall oversight of both the IPs and RPs to ensure compliance with its policies and procedures, and ultimate accountability to the GCF for delivery of the project. The project falls under Pillar 3 of the Sustainable Development Partnership Framework related to economic development and environmental sustainability, especially on climate change and environment, led by UNDP. Upon clearance, UNDP may use the UN agency to UN agency agreement or other applicable legal agreements as per UNDP POPP to engage UN agencies as RPs.

126. The UN agencies, including WFP and FAO, have been requested by Government to facilitate the upscaling of specific programmes (e.g. R4/P4P and CASU respectively) in the 16 districts that are most vulnerable to the impacts of climate change. The integration of these approaches and their upscaling is in line with the implementation of the NDCs and the National Climate Change Policy. Further upscaling of R4 will deepen the involvement of the private sector and NGOs in the climate resilience and low emission development agenda of the National Climate Change Policy.

127. The management arrangements for this project are summarized in the figure below:



128. Flow of funds



129. The Project Board/Steering Committee is comprised of the following organizations: **MoA (Senior Beneficiary), UNDP (Senior Supplier), Representatives of the Ministry of National Development Planning, Ministry of Lands and Natural Resources and the Office of the Vice President.** As Senior Beneficiary, MoA is also part of the board/committee. Furthermore, as the Senior Supplier, UNDP provides quality assurance for the project, ensures adherence to the NIM Guidelines and ensures compliance with GCF and UNDP policies and procedures. The Project Board/Steering Committee is responsible for making, by consensus, management decisions when guidance is required by the Project Coordination Unit (PCU), namely the Project Coordinator. Project Board/Steering Committee decisions will be made in accordance with standards that shall ensure management for development results, best value for money, fairness, integrity, transparency and effective international competition. The Project Board/Steering Committee will meet twice a year. A Technical subcommittee comprising the National Project Director (MoA/Senior Beneficiary), all RPs, the PCU and important partners: Ministry of Gender, the Zambia Development Agency, University of Zambia, private-sector representative (tbc), and NGO representative (tbc) will be delegated to provide more regular and periodic (monthly) technical guidance and implementation support to the PCU. This Technical subcommittee will draw its mandate from the Project Board/Steering Committee and report directly to the Executing Entity. UNDP will participate in Technical subcommittee meetings in its oversight capacity as and when needed.

130. The **MoA** is the main Executing Entity, and a **Dedicated** National PCU will be established within this Ministry, in the Department of Agriculture. The MoA will also be responsible for establishing a coordination group within the Ministry, to ensure alignment and continued synergies between the project and other relevant initiatives implemented by the MoA. The PCU will be led by a Project Coordinator, who will oversee the running of the project on a day-to-day basis on behalf of the MoA, within the constraints laid down by the Project Board/Steering Committee. The Project Coordinator will cease to function when the final project terminal evaluation report, and other documentation required by the GCF and UNDP, have been completed and submitted to UNDP. The Project Coordinator is responsible for day-to-day management and decision-making related to the project. His/her prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality, and within the specified constraints of time and cost.

131. **Project Assurance:** UNDP provides a three – tier oversight and quality assurance role involving UNDP staff in Country Offices and at regional and headquarters levels. The quality assurance role supports the Project Board by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed. Project Assurance must be independent of the Project Management function; the Project Board cannot delegate any of its quality assurance responsibilities to the Project Manager. The project assurance role is covered by the accredited entity fee provided by the GCF. As an Accredited Entity to the GCF, UNDP is required to deliver GCF-specific oversight and quality assurance services including: (i) Day-to-day oversight supervision, (ii) Oversight of project completion, (iii) Oversight of project reporting.

In addition, the Government of Zambia may request UNDP to provide direct project services for this project. The UNDP and Government of Zambia acknowledge and agree that those services are not mandatory, and will be provided only upon Government request and specified in the Letter of Agreement. If requested, the direct project services would follow UNDP policies on the recovery of direct project costs relating to GCF funded projects.

132. In addition to the Project Coordinator, the PCU will consist of the following team members:

- A part-time Gender Officer, providing technical guidance on gender-related issues to ensure effective mainstreaming of gender-responsive and gender-transformative activities under the project
- Two Regional Officers, who will be based at the provincial level and provide support on delivery and M&E in a group of districts
- A national Communications and M&E Officer, responsible for development and delivery of a programme communication strategy – both for external communication on project results and achievements, as well as internal communication on knowledge flow and learning. S/he will also be responsible for ensuring all M&E procedures and actions are undertaken, as well as central coordination and analysis of all M&E information
- Finance Officer, responsible for all financial matters to facilitate project delivery
- Procurement Officer, responsible for all procurement processes to facilitate project delivery
- Administration Support Officer, responsible for all admin matters for effective project delivery

133. The project will be delivered on the ground via the MoA's existing structures at the district, block and camp level. At the district level, the District Agricultural Coordination Office and the Senior Agricultural Officer will be the main focal point, and shall be responsible for coordination of all technical issues at the district level (e.g. met. officer, forestry officer, water officer, livestock officer, etc.) who will contribute to the delivery of the project impact. The District Agricultural Coordination Office will also coordinate directly with the DDCC, made up of representatives from all key sectors at district level. The District Agricultural Coordination Office will be supported by a research assistant in each of the district offices. There will also be two United Nations Volunteers (UNVs) based at the district level to support the districts directly. These officers, who will be budgeted for the lifetime of the project, will help to strengthen capacity at the district level to deliver, monitor and report on activities.

134. The Block Extension Officer will report to the Senior Agricultural Officer, and provide backstopping support to the Camp Extension Officer. The camp officer will coordinate and implement activities at the camp and regional level, and provide direct support to farmers. He/she will report to the Senior Agricultural Officer through the Block Extension Officer.

C.8. Timetable of Project/Programme Implementation

135. Timetable of Project Implementation: Sequencing of programme activities allows for the dependence of some activities on others, e.g. Output 3 will commence after Output 2, given that production of climate-resilient crops/livelihoods needs to precede post-production activities, including processing, storage and marketing. Additionally, the phasing of activities within each output is timed so that dependencies do not impede implementation, e.g. dependency of modelling on data collections, etc. Whilst this timing is important, it is also recognized that training and capacity-building needs will start early in the project, and may not be as dependent on sequencing as the operational components of activities. It is also important to note that within each output, there will be a phasing of activities to facilitate lesson learning. For instance, the establishment of irrigation infrastructure such as borehole drilling will not all be done at once in order to allow for effective lesson learning to improve implementation performance.

For Timetable of Project/Programme Implementation, please refer to Annex X of the Funding Proposal.

D.1. Value Added for GCF Involvement

136. The contribution of the GCF is critical for this project given the country's current economic situation. While some government funds have been used to provide support to farmers through extension services, as well as generate and deliver climate information and support water management, the current public expenditure is limited and only provides support for the status quo. These baseline investments are insufficient to shift the paradigm of smallholder farmers to more resilient and diversified livelihoods. As of 2014, the Government of Zambia had a total public debt of 35.1 percent of GDP, which had increased steadily every year since 2011.⁹ Therefore, the Government is unable to increase investment in this area.

137. The GCF involvement is critical to triggering a true and sustainable shift in livelihood practices in the two targeted Agro-Ecological Regions. While other projects have addressed different pieces of the value chain in isolation, with GCF support the project will have the reach and scale to address multiple components of the chain – from inputs to production to post-production, in an integrated way. This approach ensures that the market systems are in place to sustain the adaptation approaches adopted by farmers beyond the project timeline. The GCF funding will provide the catalyst to move smallholder farmers away from and out of their current cycle of poverty and food deficits – exacerbated by climate change impacts – to a pathway that is resilient and has market opportunities. Therefore, the initial contribution, which cannot be supported through other sources, will leverage further investment, incentivize government agencies to invest in a different and progressive work attitude, and mobilize communities to invest in their livelihoods and develop market linkages.

138. The additional activities supported by this project need to be urgently implemented with additional finance in order to ensure that vulnerability of the poor populations is addressed before the conditions get worse. These smallholder farmers, who are barely able to sustain subsistence-level livelihoods, and face increasing impacts of climate change, have insufficient resources to invest in training, information and water services, inputs for resilient agricultural livelihoods and practices, or post-production support.

139. In the case of activity 2.2, Financial Internal Rates of Return (FIRR) are negative even with GCF funding; however, given the public goods nature of this activity (distribution of improved seeds, soil kits, etc.) and its long-term socio-economic and environmental benefits, the GCF funding request for this activity is justified.

D.2. Exit Strategy

140. **Community participation and ownership:** The project was designed in close collaboration and in consultation with a range of stakeholders. A series of consultations (detailed in Annex XIII [a]), at both the national and district level, provided opportunity for all major stakeholders to inform the specific scope, objectives and activities of the project. This included inputs from government representatives, both at the national level and provincial/district level; NGO/INGO partners engaged in relevant activities in Zambia; private-sector partners, academic and research institutions; women-focused community-based organizations, farmer organizations and farmers themselves. As such, the proposed activities closely align with the recognized needs and solutions proposed by the stakeholders themselves. This will ensure that projects are enthusiastically supported by all relevant stakeholders, and are viable in the local context such that they can be continued and replicated after the project is completed.

⁹ Staff Report for the 2015 Article IV Consultation – Debt Sustainability Analysis,” International Monetary Fund, available at: <https://www.imf.org/external/pubs/ft/dsa/pdf/2015/dsacr15152.pdf>

141. **Capacity-building and participatory approaches based on local solutions:** The project activities bring together traditional knowledge and climate-resilient technologies and best practices. The strategy underlying all outputs will be based on participatory approaches, where farmers will engage directly in the design and application of new technologies and knowledge. This will provide the opportunity to integrate the new knowledge with traditional knowledge and practices, thus ensuring they make sense for the given context and are easy to continue after the project support comes to an end. Similarly, training and capacity-building underlie all outputs of the project, ensuring that farmers are not simply provided with inputs or new technologies, but are trained in how to use, implement and maintain the new technologies and practices on their own. There will also be a focus on strengthening and establishing farmer cooperatives and associations, which will also provide the institutional and financial structures to strengthen farmers' ability to independently access finance and link them to markets.

142. **Using value chain approach to catalyse private investment:** One of the key findings of an LDCF-funded CCAP project was that in order to translate the increased know-how on climate-resilient practices into sustainable economic results, there was a need for commercialization. Therefore, this project focuses on promoting climate resilience through addressing barriers to investment along the entire value chain. The value chain approach will tackle institutional constraints, information and knowledge gaps, access to finance, technology and infrastructure, in an integrated, systematic way. This approach will contribute to the sustainability of project results by catalysing private investment and providing opportunities for the most vulnerable to break out of the cycle of poverty. For example, project activities are focused specifically on setting up the systems to provide post-production opportunities for farmers, including: identifying and establishing linkages with markets for climate-resilient agricultural products, establishing and strengthening marketing groups to support aggregation of resilient produce, and linking farmers to SMEs who can provide support on aggregation, transportation and storage. The project will also support the establishment of multipurpose processing centres for farmers, and increased access to finance and market information so that farmers can access up-to-date information on demand and pricing. Capacity will also be provided on business practices. With these systems and capacities in place, farmers will have their own incentives to continue activities after the close of the project. The project will also help catalyse private-sector investment, particularly in the areas of agricultural inputs, markets for climate-smart, ecologically produced crops, and services related to dissemination of climate-related information and water management techniques.

143. **Co-investment by government institutions:** The project leverages domestic financing from government institutions that support baseline and O&M funding towards the project objectives. These investments (itemized in section B.1. of the proposal) demonstrate the commitment and ownership of the project by the Government, as well as the ability for the Government to continue the activities and sustain O&M after the project ends. The total budgetary commitment by Government under the NAIP over the five-year period (2014 to 2018) is USD 2,730 million, with an average of USD 546 million a year. This includes financing of climate-resilient activities in the 16 targeted districts.

144. **Plan for ex-post Operations and Maintenance:** An O&M plan (project and post-project O&M) including the budgeting for the human and financial resources required for O&M for the project investments is presented in the Feasibility Study, section 5.3. The plan reflects local ownership and commitment for the long-term sustainability of the project activities and outcomes. The costs of developing a long-term strategy for O&M is provided for in the first two years, and the strategy will be reassessed towards project completion (final two years). GCF resources will finance and leverage financing to support the human and technical resources required for O&M initially, with a decreasing contribution towards the end of the project lifetime, after which domestic financing (from the budgets of designated authorities as reflected in the commitment letters from the MoA, WARMA and local communities) will continue to support O&M. For O&M of the hydro-agro-met network, the project supports maintenance of the equipment for a limited period after the warranty periods, and training of government officials and local

communities along with domestic financing is expected for post-project O&M.

145. **Learning and knowledge management:** In order to ensure smallholder farmers effectively shift away from climate-sensitive livelihoods on to a new resilient pathway, as introduced under this project, a shift in mindset is required among farmers. This is supported through the extensive technical support provided by the project across all three outputs. By the end of the project, the target beneficiaries will have the necessary foundation of knowledge to continue the activities introduced. However, to further substantiate this knowledge and provide continued technical support, as well as to further replicate these activities in other districts and provinces across Zambia, the project has introduced a strong learning and knowledge management mechanism. This will be founded in the farmer field schools and learning centres of excellence established at the camp and district level (respectively) and staffed by the government staff and lead farmers. The O&M of these schools and centres will be adopted by the MoA during the project, so that they can successfully continue them after the project is over. These centres will provide an opportunity for farmers to be continuously trained by technical experts, share experiences between farmers, and generate materials and tools which can be used elsewhere. This model has been piloted and demonstrated under previous projects (e.g. CASU), and shown great added value in supporting farmers to strengthen their own knowledge and share it with others. In addition, this project further elaborates on this model by bringing in knowledge from other components of the value chain, such as climate information, water management, processing methods and marketing/business information, to provide a one-stop shop for farmers to continue to strengthen their capacity in a comprehensive way. With these new centres in place, they will not only continue the practices after the project is over, but further expand and replicate their knowledge to increase impact.

E.1. Impact Potential

Potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas

E.1.1. Mitigation / adaptation impact potential

146. Overall, the project will contribute to the fund-level impact of increased resilience and enhanced livelihoods of the most vulnerable people affected by climate-related disasters and variability. The climate-impact potential of the project is based on its integrated and comprehensive approach to address critical elements of resilient agricultural value chains in areas of Agro-Ecological Regions I and II, which are particularly vulnerable to climate change impacts. The interventions will directly benefit 946,153 people (157,692 households).

147. The improved capacity to plan for and manage climate risk (Output 1) will provide enhanced information on climate and weather, as well as water monitoring. To complement this enhanced information, capacity of institutions to generate and analyse more integrated advisories and guidance across institutions will also be enhanced. Capacity of end users (primarily farmers, water management groups, SMEs and insurance companies) will also be strengthened. This will ensure that smallholder farmers, subnational decision makers and national policy makers are all able to plan for the variability in rainfall, increasing drought conditions and occasional floods, including strengthening water management approaches and plans, building on experience from the LDCF-funded CIEWS project, as well as the PPCR and other initiatives aimed at strengthening climate information. This project will further strengthen the linkages between generation of climate information and decision-making of smallholder farmers. Farmers, in particular, will gain the technical capacity, tools and resources to interpret and use climate information to better inform their decision-making for resilient agriculture. With an increased ability to plan for climate risk, farmers will be better placed to ensure resilience of their crops throughout the season. Further, linkages with other institutions, such as water user associations, catchment councils, other SMEs and insurance companies, will also be strengthened. This will help ensure that water management, infrastructure and catchment planning incorporates reliable climate and water monitoring information, SMEs are able to make market-based decisions which take into account impacts by climatic changes, and insurance products are founded on strong climate data.

148. The new climate-resilient agricultural practices and alternative livelihoods introduced under Output 2 will also have a direct impact on all beneficiaries. The project will enhance the capacity and means to establish water management systems that retain water available during wet months for use during the dry months for agricultural production. Experience from previous projects implemented by UNDP in other countries, where water availability was reduced due to climate change, and rain variability was increasingly unpredictable, shows that having access to more seasonal weather and climate information can help farmers make more resilient decisions about how to manage these water resources. It has also been shown that the right access to water (through small-scale infrastructure) coupled with robust water governance structures (that involve women in leadership and decision-making roles) allows farmers to better plan for and use water resources for both domestic and irrigation purposes.

149. Through increased water access, coupled with reliable agricultural inputs and the introduction of new resilient agricultural practices and alternative livelihoods, these smallholder farmers and their families will improve income generation and food security in the face of climate change and variability. The project will ensure that approximately 946,153 people from the target areas adopt diversified, climate-resilient livelihood options (including fisheries, agriculture, tourism, etc.). These practices have been proven to have an impact on smallholder farmers' lives and livelihoods under the previously implemented LDCF-funded CCAP project. The successful practices will be replicated and scaled up to reach a broader range of farmers, coupled with the post-production support, which will further incentivize and scale up these value chains.

150. This post-production support provided under Output 3, which strengthens access to storage, transportation and processing services, access to finance, linkages to markets, and business skills will also further ensure that climate-resilient products have a viable market to ensure sustainable livelihoods. This will ensure that the livelihoods are enhanced and more resilient to climate change. Further, with an increased and sustainable income, beneficiaries

will themselves be more resilient to climate change impacts.

151. In addition to the direct impact of the project activities on beneficiaries, each output area will also contribute to strengthened institutional capacity at different levels. This will lead to greater sustainability and future scale-up. Specifically, under the first output, the capacity of both ZMD and WARMA will be enhanced to capture, analyse and disseminate weather and climate-related information, including water and agricultural advisories. This will also be true at the provincial and district level, to help strengthen downscaled information. The coordination between ZMD, WARMA and MoA will also be strengthened to ensure water user associations are comprehensive and incorporate climate-related inputs. A stronger institutional foundation for the generation and analysis of this climate-related information will have enormous impacts not just on the target beneficiaries, but also the country as a whole.

152. Similarly, the second output will not only strengthen capacity of the farmers themselves, but also the technical and institutional foundations which support them. Local agricultural extension staff will have increased capacity to better advise farmers, and the tools and resources through the farmer field schools will facilitate the provision of comprehensive guidance on climate information, resilient practices, alternative livelihoods and post-production methods.

153. Finally, the third output will also strengthen institutional networks and partnerships to ensure that the post-production processes and systems are not addressed in isolation. Bringing together the necessary actors, involved in storage and transportation, finance and insurance, and marketing, will help to scale up the resilience of farmers' livelihoods, as well as the rest of the Zambian economy at large, in the face of climate change.

E.1.2. Key impact potential indicator

Provide specific numerical values for the indicators below.

	<i>Expected tonnes of carbon dioxide equivalent (t CO₂ eq) to be reduced or avoided (Mitigation only)</i>	<i>Annual</i>	
		<i>Lifetime</i>	
<i>GCF core indicators</i>	<ul style="list-style-type: none"> <i>Expected total number of direct and indirect beneficiaries, disaggregated by gender (reduced vulnerability or increased resilience);</i> <i>Number of beneficiaries relative to total population, disaggregated by gender (adaptation only)</i> 	<i>Total</i>	946,153 direct beneficiaries, (Male 465,129 and female 481,024 and Approx 3,000,000 indirect beneficiaries
		<i>Percentage (%)</i>	Direct beneficiaries 6.1% of the total population, and indirect beneficiaries 18% of the total population
<i>Other relevant indicators</i>	<p>Expected strengthening of adaptive capacity and reduced exposure to climate risks: Indicator: Extent to which vulnerable smallholder farmers and their households used improved strategies and activities to respond to climate variability and climate change</p>		

154. The total number of direct beneficiaries (in targeted camps within the 16 targeted districts) has been calculated based on an understanding of which populations will benefit from the specific activities supported under

each of the proposed outputs. For Output 1, the target will include farmers in the selected camps who will benefit from better weather and agricultural advisories, as well as trainings on how to interpret this information. This is in addition to the national and subnational government officials trained on how to generate and analyse this information. Similarly, Output 2 will support the same farmer population to access water, receive agricultural inputs, and engage in training and technical support on resilient agricultural and alternative livelihoods. In addition, the farmer field schools will engage all farmers at the camp level. Finally, Output 3 will also support selected farmers from this same farmer population to undertake processing of their resilient crops, access finance and insurance products, and link to markets.

155. Based on this rationale, the direct beneficiaries of this project will include the entire farmer population for the camps targeted under the project. The total number of households in each of the camps is based on figures provided by district-level officials. Given that some districts are new as of 2015, some of these numbers are projections done at the local level. Based on these numbers, calculating the number of farmers is based on the figure that 89.4 percent of households in rural areas are engaged in agricultural production (2015 LCMS). This estimates that approximately 207,517 households are engaged in agriculture within the target areas. According to the 2015 LCMS, the average household size in Zambia is 5.1 (5.0 in urban areas and 5.2 in rural areas). Therefore, given that direct beneficiaries will include farmers and their families, the estimated number of direct beneficiaries is approximately 946,153.

156. Based on the activities supported by this project, certain activities will benefit farmers and their families not directly supported through trainings and inputs. Specifically, the learning centres of excellence will be set up at the district level, and therefore provide opportunities for exchange, replication and scaling up to the entire district populations. In addition, the climate information systems being generated at the district level, including both the advisories as well as the dissemination/communication channels, will also be available to those farmers and their families outside of the targeted camps. In fact, the strengthened observation systems within the 16 districts will help to strengthen the weather information for the country as a whole, and help improve weather advisories across the entire nation. In addition, the support to the water user associations will address management of water catchments that go beyond the borders of the target districts. However, to be conservative, we can say that at a minimum, the information generated as a result of the higher density of observation stations across the target districts will strengthen the information generated for the provinces in which they are located, given their similar geographic, climatological and environmental characteristics. Therefore, the indirect beneficiaries would include the entire population in the targeted provinces located in Agro-Ecological Regions I and II. The estimate is therefore 5,329,570. Nonetheless, it should be noted that the benefits of this project will go beyond these provinces, and even these Agro-Ecological Regions. Given the stronger climate information system, as well as the introduction of new markets for climate-resilient crops, the benefits will reach the entire population of Zambia.

E.2. Paradigm Shift Potential

Degree to which the proposed activity can catalyse impact beyond a one-off project/programme investment

E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)

157. The paradigm shift lies in the project's comprehensive approach to strengthening climate-resilient agri-based value chains among the poorest and most vulnerable smallholder farmers. The specific climate-resilient agricultural practices that are being scaled up under this project will not be introduced in isolation. This will be coupled with addressing the critical needs at both the input and the post-production level. At the input level, the focus will be on strengthening the ability of smallholder farmers to plan for and access necessary water resources, which has been recognized as the critical barrier to improving agricultural livelihoods in the face of climate change and variability. At the same time, support will also be provided to strengthen market opportunities for climate-resilient products (such as new types of drought-resilient crops or products developed with alternative livelihoods – like honey through beekeeping). This was identified as a key lesson learned from the previous LDCF-supported project (CCAP), whereby limited post-production support led to a more limited uptake of resilient approaches by farmers. This will be addressed in this scaled-up GCF-supported proposal linking farmers to markets that are interested in new resilient crops,

strengthening business skills in the face of uncertainty, identifying opportunities for access to financing that will help invest in adaptive approaches, and improving processing, storage and transportation capacity of resilient products to create a safety net during climate-related shocks. This will ensure that not only are new practices introduced, but they have viable commercial opportunities to incentivize adaptation and sustain them in the face of climate impacts beyond the project lifetime.

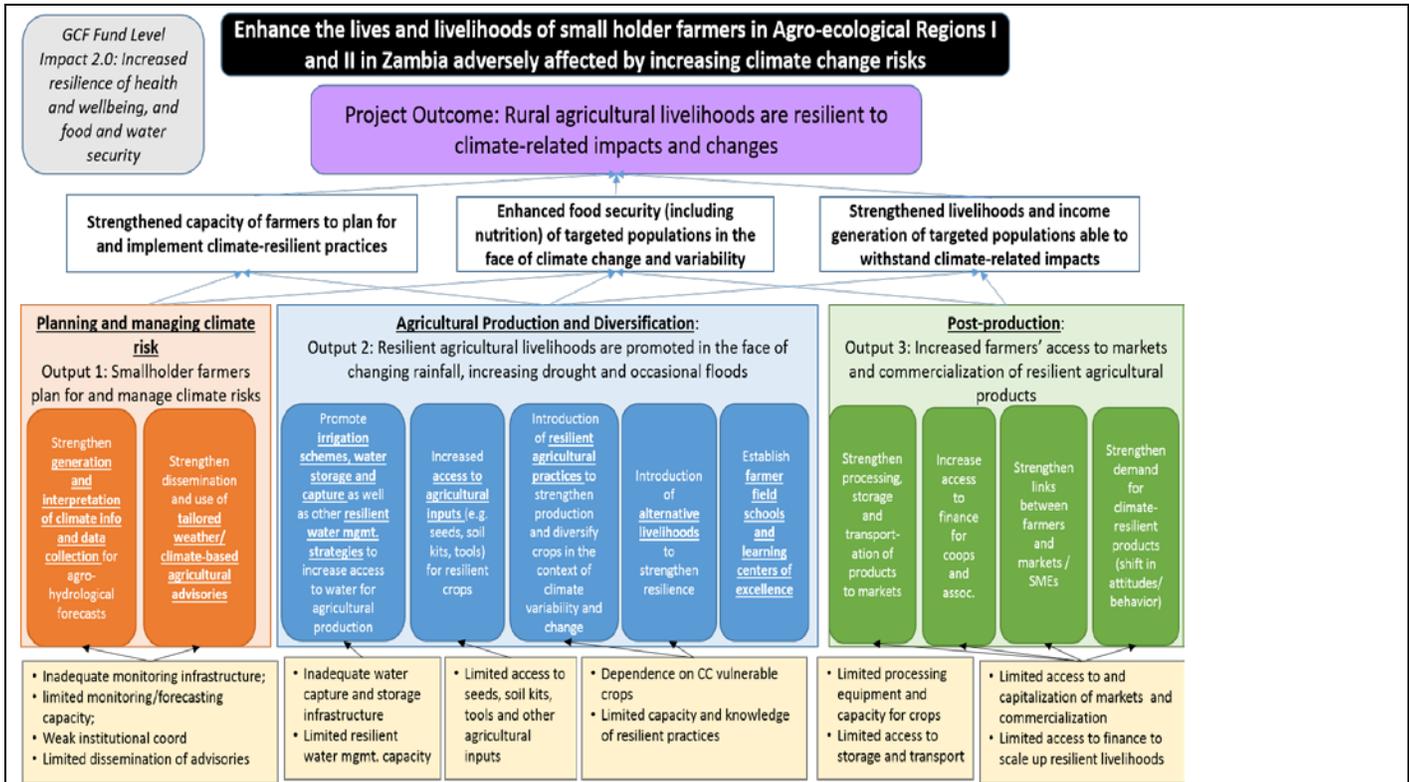
158. Whilst the benefits of crop diversification and other resilient practices were apparent under the CCAP initiative, the project's terminal evaluation noted that both female and male farmers were apprehensive about adopting agronomic technologies because of uncertainty in the ability to market and sell surplus production from high-yielding crops. Where these conditions were not problematic, as in the case of Chongwe site, the uptake of technologies/crops and expected economic results were good. Thus, the project revealed that the economic results of early uptake of know-how related to resilient productivity is heavily influenced by the market conditions at a given site and time.

159. As a result, within the GCF project, this situation will be addressed by taking a more innovative value chain approach in a way that promotes the scaling and replication of project interventions. This will be done by introducing supply storage and warehousing, allowing crops to be sold when prices are reasonable given varying climatic conditions, reducing post-production losses caused by climate change as well as access to market tools in the face of change (pricing and demand information), and learning to optimize farmer selling behaviour during each point in the growing season. This approach focuses on the vertical market chain – not just primary market actors but also the enabling environment, including policy and regulation as well as infrastructure and capacity of intermediaries such as off-takers. By targeting project interventions that reduce climate risk and at the same time enhance market opportunities, this approach works to align the economic interests of beneficiaries with long-term climate resilience. Involving market intermediaries will allow the project to reach more people, through both replication and scaling, than it could by only targeting individual smallholders. Previous projects have highlighted that this approach has great potential for successful resilience building in the project area.

160. Considerable progress has been made in terms of the Water Resources Master Plan. The Zambian Government through the Ministry of Water Development, Sanitation and Environmental Protection is implementing the ZWRDP with support from the World Bank. The overarching objective of the project is to support the implementation of the Current Status on the ZWRDP Master Plan. Currently, Zambia is still referring to the 1995 Master Plan supported by JICA. However, Terms of Reference (ToRs) for the consultant have already been done. The World Bank is now reviewing the ToRs and subsequent actions will soon follow as per schedule. However, in generating information needed for a water management master plan, the following have been done: (i) The six water catchment areas have already been delineated and approved by the Office of the Surveyor General of Zambia; (ii) The World Bank-funded Aurecon Consultancy looking at an optimized hydro-meteorological network for the country is under way; (iii) A draft water pricing strategy and tariff mechanism for raw water is nearing completion; (iv) Development of regulations (Draft SI for surface water now out, groundwater regulations ongoing); and (v) National aquifer mapping and characterization campaign at Department of Water Resources Development (DWRD) formerly Department of Water Affairs (DWA) is under way.

Potential for scaling up and replication

161. The theory of change articulated below illustrates how each of the three outputs of the proposed project contribute to the long-term objective and how the resulting project impacts can be sustained, replicated and scaled up to contribute to climate-resilient development in Zambia. Through integration of the Exit Strategy elements into the project design and implementation, conditions are created that lead to sustained impacts and potential for scale-up.



162. Output 1 of the project strengthens the relevance of climate information for smallholder farmers through enhancing data for, dissemination of, and use of weather, agricultural and water advisories. Through this activity, a strengthened observation and monitoring network, coupled with increased capacities of departments responsible for generating these advisories, will not only strengthen information to the target districts, but also enhance information to other parts of the country. The weather and agricultural advisories produced by the Government for the target districts of this project will be replicated in other districts as well, once the model and process has been established. This has the potential to be replicated threefold to reach the remaining districts. In addition, the density of the new network based on the number of new AWS introduced under the project, could be replicated across the country to further strengthen the system for national coverage. With a solid model in place for introducing new infrastructure that has reliable and sustainable O&M (building on the lessons learned from previous projects), it will be more viable to scale up infrastructure to other parts of the country. In terms of water monitoring structures, the same logic applies. The stations and monitoring network established will help strengthen the information generated for the target districts, but also inform and strengthen accuracy of monitoring in other parts of the country based on analysis. The network established could also be replicated to reach the rest of the country, and provide further data to develop water and agricultural advisories for farmers.

163. The approach to strengthen climate information for use by farmers goes beyond the reach of previous projects, which focused primarily on the infrastructure, analysis and modelling capacities, with some focus on dissemination. This project will also emphasize the necessary institutional coordination capacities needed to ensure a strong foundation for coordination between ministries and relevant stakeholder organizations (particularly ZMD, MoA and WARMA), and accountability to farmers for enhanced information. This includes direct engagement of WARMA, responsible for the water modelling and monitoring, who will implement specific activities under this output. Given WARMA's mandate, this will also directly link to strengthening water catchment planning structures and processes, where the climate information and water/agricultural advisories can be directly applied. This will lead to seamless scaling up to water catchment areas beyond the project target districts, given that the target areas fall under multiple

catchment areas (dictated by environmental and not administrative boundaries).

164. Under Output 2, the resilient water management and agricultural practices introduced, as well as new alternative livelihood opportunities, will strengthen the resilience of the beneficiaries directly targeted. Specifically, with regard to water infrastructure, lessons learned from the CCAP initiative indicated that stronger basic and site-specific information was needed prior to introducing the new infrastructure (e.g. water budgets, soil survey, land tenure). While initial feasibility information was collected as part of the project design phase, these site-specific assessments done at the camp level (of which there are over 150 targeted by the project) will be done in the first year of implementation. These studies will also provide information, as well as an approach and experience, that the GRZ can use to help scale up the introduction of these small-scale infrastructures in other camps and districts not targeted by the project.

165. In addition, the introduction of agricultural inputs and inputs for alternative livelihoods will include a 'pass-on mechanism', which ensures immediate scale-up of the intervention to additional farmers. Some farmers will be provided with initial inputs, and agree on a pay-back to other farmers after their first season. To ensure the system runs smoothly, farmers sign an agreement in order to receive the initial inputs, and a management group is set up to hold farmers accountable to the agreement. This model has been established and successfully demonstrated under the CCAP for diversification of crops and goat rearing. For example, 10 percent of the resilient seeds provided to farmers will be contributed to a village seed bank after the first season, which will be given to other farmers. For the goat rearing, two goats will be given to recipient farmers, and after the first year, the farmer will give one goat to another farmer on the waiting list. This same type of mechanism is also being designed for beekeeping and fish farming. These mechanisms will ensure immediate scale-up to reach all farmers in the districts and ensure sustainability beyond the project lifetime. More information on the system and experience under the CCAP is provided in the Feasibility Study (see Appendix V).

166. Further, the farmer field schools and learning centres will provide an opportunity to replicate the water management, resilient agricultural practices and alternative livelihoods with other farmers in the same districts and provinces, as well as document the experiences for scale-up in other parts of the country. These schools will, for the first time, incorporate a comprehensive scope of information, not only the practices themselves, but also how to integrate climate information into planning and new post-production approaches – processing, storage, transportation and marketing. Specifically, the model of the farmer field schools, and the curriculum used to strengthen resilience of farmers, could be scaled up to every district (replicating approximately threefold).

167. Finally, the post-production processes strengthened under Output 3 will also have the potential to be replicated in other areas of Zambia. This is on account of the networks established with private-sector entities, the storage and transport systems, and the sustained demand of specific resilient products which will also inform supply of resilient products in other parts of the country. Further, the groundwork necessary to strengthen the access to insurance and credit for smallholder farmers (e.g. financial education, technical analysis to underpin future schemes, access to reliable climate information) will be further tested and proven, which would be the foundation necessary to scale up insurance schemes in the future. With more than 157,000 direct beneficiary farming households, there is potential to replicate this in all farming households in Zambia estimated at 1.2 million.

168. Across all three outputs, a focus on capacity-building, not only of the farmers but also of the Government and extension workers supporting farmers beyond the target areas, will provide the opportunity for scale-up and replication. Participatory approaches, training of trainers, and farmer-to-farmer exchanges will also ensure that the direct project beneficiaries are not the only ones to benefit from the project activities. Previous projects have shown that when targeted farmers have been successful in implementing these practices, and see concrete results, other farmers in surrounding areas which have not been targeted by the project begin to explore options for adopting such practices themselves (e.g. Medium-Term Review Report, Agricultural Sector Investment Programme, 1998, MoA). As such, the project expects that with a greater scale-up of these practices through GCF investment, potential for even further replication and scale-up, both for non-targeted farmers in the target provinces, as well as non-targeted provinces

throughout the country will be realized. Further, the emphasis on strengthening local and provincial policies and plans (activity 2.3) will also ensure that the right enabling environment is in place to support farmers to continue and replicate their successful work. Finally, targeted support on post-production processes, such as linkages to markets and access to finance, will ensure that the incentives are in place and opportunities identified for smallholder farmers to further scale up their livelihoods. Strengthening these markets will also provide the incentives for other farmers outside of the target areas to shift to resilient agricultural crops.

E.2.2. Potential for knowledge and learning

169. The core foundation of most activities supported by this project is the creation and strengthening of knowledge as well as collective learning processes. The project will improve the generation, sharing and application of relevant climate and weather-related information, which will be translated into concrete and valuable *knowledge* through tailored advisories and products that meet the specific needs of smallholder farmers. In addition, participatory approaches to training community engagement around interpretation of climate information, and the integration of this information with indigenous knowledge to inform planning, will be incorporated. This allows for farmers to enhance their understanding of climate risks, and learn how to translate them into concrete decision-making for agricultural planning.

170. Further, with regard to knowledge and learning on water management techniques, climate-resilient agricultural practices, seed multiplication and alternative livelihoods, the project will focus on capacity-building and strengthening the knowledge of farmers to undertake these new practices. Specifically, using the mechanism of the farmer field schools and learning centres of excellence at both the camp level and district level will provide an opportunity for increased knowledge sharing and learning, as well as continued technical support to farmers. This would also include dissemination of knowledge products (guidance manuals, tools, methods). Training of trainers (extension workers and lead farmers) and farmer-to-farmer exchanges will be undertaken using these centres, and will incorporate knowledge from across the value chain – from how to interpret climate and weather information/knowledge, to sustainable water management techniques, and application of resilient agricultural practices to post-production strategies. Strengthening knowledge on post-production processes and business skills will also be a core element across activities under Output 3, particularly around strengthening farmers' understanding of markets (e.g. market intelligence systems), quality assurance, entrepreneurship, negotiation skills (to get the best prices in the market), and business/financial literacy, in order to ensure sustainable scale-up of resilient practices.

171. At the same time, documentation and evidence-based analysis of the successful practices and their potential for scale-up will also be generated by the project's M&E component, in order to further document the knowledge generated on these resilient practices.

E.2.3. Contribution to the creation of an enabling environment

172. The project will invest in technical capacity and knowledge of government agencies and community organizations on climate-resilient agricultural practices, water management approaches and application of climate information to ensure continued engagement of the public sector and key community-based partners in strengthening resilient agricultural practices. The MoA has a National Adaptation Plan in place and is receiving backstopping for National Adaptation Planning support from the Ministry of National Development Planning, which is coordinating a GCF-supported facility for national adaptation planning. The Ministry of National Development Planning is facilitating other sector ministries in national adaptation planning. Activity 2.3 also focuses on strengthening the policy and planning processes at the provincial and district level such that the new resilient agricultural practices are sustained and supported by the public sector beyond the project time frame. At the same time, identifying and strengthening linkages between smallholder farmers and market opportunities, including farmers' own capacity to access and benefit from markets, will establish the enabling environment to further engage with private-sector partners.

173. The paradigm shift of the project hinges on taking an integrated approach to gender, climate risk reduction, and market development (through a value chain approach). This innovation builds on lessons from previous projects which underscore the point that a holistic approach will improve sustainability, scalability and replicability of project interventions by catalysing private investment, while at the same time reducing the vulnerability of the poorest. Further, the project will contribute to innovation, market development and transformation by focusing on strategies that reduce climate risk while enhancing market opportunities, particularly for women. Value chains for inclusion in the project were selected based on their climate resilience, market potential and opportunities for economic empowerment of women.

E.2.4. Contribution to regulatory framework and policies

174. The project aligns to a number of government policies and strategies as outlined in Zambia's Revised Sixth National Development Plan, Vision 2030 Strategy, the NAP and NAIP. Providing the substantive demonstration and successful scale-up of specific resilient agricultural and water management approaches under the project will contribute directly to these national development priorities and strategies of Zambia. Furthermore, the knowledge and technical products such as technical guidelines/manuals, standard operating procedures around climate information, water catchment management plans, and capacity-building activities such as training of technical agencies and local-level organizations on climate-resilient technologies and practices will make a significant contribution to the implementation of the National Adaptation Plan, National Climate Change Response Strategy and the newly adopted National Climate Change Policy.

E.3. Sustainable Development Potential

Wider benefits and priorities

E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

Economic benefits

175. The project will deliver economic benefits at both the micro and macro levels. The project will enhance the agricultural production and productivity of approximately 157,000 farmers (946,153 direct beneficiaries) in the target areas through climate-resilient crops, improved marketing systems, and improved crop, water resource and irrigation management advisories. This will result in increased incomes that will in turn enhance resilience to climate change variability and extreme events. There will also be some indirect employment opportunities created as the local economy is stimulated by the activities of the project, such as establishment of community ponds and introducing processing centres.

176. There will be macro-level indirect economic benefits derived from the contribution to food security. Self-sufficiency through diversified agricultural production beyond the staple maize crop will contribute towards a reduction in potential imports. Reducing the vulnerability of the farming households will also reduce the likelihood of the households needing social protection/safety net payouts, thereby helping to reduce pressure on the national treasury.

Social benefits

177. Most of the target communities are households in poverty who are dependent on subsistence farming for livelihoods. Increasing production and access to markets will increase income levels that will be utilized by poor families for essential social needs, such as education and health. Further, increased nutrition from diversified and more nutrient-rich foods (e.g. sorghum/rice or legumes instead of maize) will also contribute to improved health outcomes of these poor communities. Increased nutrition as well as increased access to water will also ease the pressure on households, particularly on women, who are responsible for fetching water, feeding the household and caring for the sick.

Environmental benefits

178. The agricultural practices supported by the project, including conservation agriculture, will not only strengthen resilience to the changing climate but also contribute to strengthening the environment in the target areas. Specifically, benefits could include:

- Soil conservation and reduction of erosion and sedimentation
- Improved tree cover in home gardens
- Restoration of ecosystem integrity, goods and services
- Preservation of biodiversity in home gardens, forests and crop fields
- Improved management of natural resources as a result of enhanced knowledge/access to information
- Increased productivity per unit area of land (increasing yield so that less land is required for the same output)
- Increased productivity per unit of labour

179. The project includes improved collection, analysis and utilization of climatic and hydrological data by Government, committees and farmers. This will lead to better modelling and decision-making regarding the use of resources, particularly water, which can have significant environmental and social benefits.

180. The project will improve communication between stakeholders which assists in mainstreaming environmental sustainability by strengthening mechanisms for dissemination of information, raising environmental issues and developing/implementing wide-scale solutions. Environmental sustainability will be improved through development and use of standard operating procedures and mechanisms for coordination and cooperation among stakeholders.

Gender-sensitive development impact

181. Climate change has differential impacts on men and women due to their differing gender roles, social and cultural norms, and as a result, power relations. Women in the context of this proposal are more vulnerable than their male counterparts. The project aims to deliberately target women, in both male-headed households and female-headed households, to increase their resilience. The project has taken an affirmative action, and at least 40 percent of the beneficiaries and 30 percent in farmer groups/cooperatives/water user association decision-making bodies will be women respectively. Further technologies and crops that will be promoted will not only enhance productivity but also reduce the drudgery to address gender and disability inequalities. For irrigation, the equipment will be powered by solar energy, from lifting of water into the tanks to distribution through drip irrigation, which will significantly reduce the labour for the women who draw water through labour-intensive methods. The project consists of interventions that yield differential and enhanced benefits for the different needs of women and men as outlined within the annexed Gender Assessment, including the Gender Assessment Action Plan (see under Annex XIII [b]). The women will be

trained in climate information collection, community-based early-warning systems and other best agriculture practices. Further, the women will be empowered by ensuring they are members of decision-making committees and providing them with working tools. They will also be linked to mechanization service providers and, where feasible, linked to higher services for animal draught power or other women empowerment programmes such as the mechanization programme under the Ministry of Gender.

182. While men are primarily responsible for staple cash crop production, women cultivate a wider range of crops and are also responsible for food security at the household level. As such, the interventions supported by this project will not only address men's needs related to cash crops, but will directly impact women's roles within the household and community by providing diversified crops and alternative livelihoods. The project will target women for activities under all three outputs, especially supporting seed production and diversified crops, training on alternative livelihoods such as goat rearing and beekeeping, strengthening entrepreneurial skills, and fostering strong market linkages for potential women entrepreneurs. These gender-specific targeted activities lead to changes within social and cultural norms, paving the way for transformational outcomes for the benefit of the entire community. In addition, these acquired skills contribute to the strengthening of women's leadership and decision-making opportunities, affect behavioural change and empower women. Women are also primarily responsible for collecting water, which will also be impacted through water management and storage technologies, such as community ponds and solar water pumps. It will reduce the burden on women if water is more readily available.

E.4. Needs of the Recipient

Vulnerability and financing needs of the beneficiary country and population

E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)

183. Zambia is a landlocked lower-middle-income country, largely dependent on agriculture. Approximately 85 percent of the labour force is engaged in the agricultural sector, most of which is dependent on rain-fed agriculture, particularly in the rural areas. Climate change projections outlined in the NAPA show an increase in temperature and a change in rainfall patterns, leading to prolonged droughts, localized flooding and a shortened growing season in Zambia. Many of these impacts are already being experienced in these regions. As a result, Agro-Ecological Regions I and II are already experiencing strong water deficits at critical periods of the cropping calendars, resulting in severe decreases in crop yields which will only get worse in future years. Extensive consultations with Government and other stakeholders have assessed the needs on the ground; please refer to the Stakeholder Engagement Plan (Annex XIIIId) describing the consultation process during the preparation of the proposal.

184. Specifically, the 16 districts targeted by this project are already acutely experiencing these impacts. In these districts, average annual rainfall is between 700 mm and 1,000 mm, reaching as high as 1,200 mm in Namwala and as low as 400 mm in the Southern and Lusaka provinces. Pests and diseases for both crops and livestock are prevalent. Droughts typically occur once in five years (more frequently in Chongwe, with droughts/prolonged dry spells every two-three years) and occasional floods in some areas. Food insecurity is also common, with survival mechanisms and coping strategies often employed to deal with the short-term challenges. *(More detailed analysis of the specific conditions in the 16 districts is presented in the Feasibility Study, see Table 3 in section 1.5.2.)*

185. Without the implementation of timely adaptation measures, these impacts will drastically reduce food security, particularly in the rural communities of these two regions. Many of these communities, particularly those in the districts targeted by this project, are already facing extreme poverty with incomes of less than USD 2 per day. This will only be exacerbated by these impending impacts.

186. The capacity of national and local institutions to address these impacts is also limited. As outlined in the key barriers this project aims to address, limited knowledge and capacity on climate change – both related to limited access and interpretation of climate information, as well as adaptation approaches – adds to the vulnerability of the country

and the farmers who are dependent on climate-impacted natural resources. Beyond information and knowledge access, government capacity to directly support farmers, through extension services and by providing the resilient inputs, is limited. The extension: farmer ratio is high (in thousands). This is exacerbated by poor rural roads and feeder roads, as well as limited transport which makes it difficult to reach farmers. This makes direct and continuous support to farmers impossible, and puts them at a disadvantage in responding to climate change.

E.4.2. Financial, economic, social and institutional needs

Financial constraints

187. Zambia is a Least Developed Country, where the Government is highly indebted, particularly due to an economic decline starting in the late 1990s. For this reason, the Government of Zambia seeks GCF resources to leverage funding for the incremental costs of adaptation investments related to addressing climate risks and exposure of vulnerable populations. The districts where the project interventions are situated are particularly vulnerable and poor, and therefore require external investment in order to set them on a resilient path. There is an urgent need to introduce resilient practices to trigger a shift in livelihoods so that climate change will not push these beneficiaries further into poverty.

188. Further, the current extension services provided to farmers are limited. The existing capacity of the MoA to provide the necessary support to catalyse farmers to take up climate-resilient livelihoods is not feasible given the Government’s current limited human and financial resources.

189. The adaptation interventions in this project target public goods – irrigation, water supply, climate information/advisories and agricultural practices. As the project targets the very poor, there is no scope for end users to pay for the services generated through the project. There is no short or medium-term prospect of private-sector investment in such public goods for the poor.

E.5. Country Ownership

Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme

E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

190. The project proposal is fully aligned with the Government’s national strategies and policies related to sustainable development, defined in Zambia’s Sixth Revised National Development Plan and Vision 2030 Strategy. These strategies and policies identify the agriculture sector as critical for achieving the objective of Zambia becoming a prosperous middle-income country by the year 2030, and promote diversification of crops away from maize (the primary staple crop in Zambia), increased irrigation, access to finance in rural areas, utilization of improved seed varieties and strengthened agricultural technologies.

191. The project is also supportive of the National Climate Change Response Strategy (2010) and the recently approved National Climate Change Policy (2016). The National Climate Change Response Strategy (2010) aims to ensure climate change is mainstreamed into most of the economically important and vulnerable sectors of the economy, which specifically recognizes agriculture as “the engine of income expansion in the economy,” and “offers the best opportunities for improved livelihoods” to about 60 percent of the total population and 70 percent of the poor who live in rural areas. The newly adopted National Climate Change Policy aims to support and facilitate a coordinated response to climate change in the country. This project has been designed to contribute directly to this policy, and fully aligns with its objectives.

192. In addition, the proposal aligns with Zambia’s commitments to fulfil agreements under the UNFCCC, including the NAPA, NAP, NAMA and NDC. The NDC outlines several priority areas for addressing climate change mitigation and adaptation, which includes sustainable agriculture. Its objectives are to enhance resilience to climate change, to promote activities providing adaptation benefits in the rural areas, and to generate electricity from agriculture waste.

Those activities will create the foundation for co-benefits such as poverty reduction in the rural areas of the country, additional employment opportunities, and increased soil and crop productivity. A NAMA was also recently developed which focused on climate-smart agriculture practices, which further align with the focus of this proposal. In addition, priority area three of the Zambia NDC has been identified as the conservation of water, and priority area eight has been identified as water technologies for irrigation and sustainable management for households, agriculture and industrial purposes. The NDC also prioritizes strengthening climate information services for EWS (area six).

193. Further, the project aligns with the country's NAPA (2007) and NAP (under development). The NAPA recognizes agriculture as one of the four sectors most vulnerable to climate change impacts. The NAPA also recognizes Agro-Ecological Regions I and II as extremely vulnerable, and promotes diversification of crops in order to ensure food security in these regions. The first two project outputs recommended by the NAPA focus on reducing vulnerability of those dependent on rain-fed agricultural practices to anticipated rainfall shortages due to climate change, and strengthening EWS to improve services relating to preparedness and adaptation to climate change.

194. Finally, the project specifically supports strengthening of provincial and district-level planning, such that it incorporates climate risks and resilient adaptation options (scaled up by the project). This work will further strengthen the framework to systematically drive investment, from both public and private sectors, to improve climate-responsive planning and development.

E.5.2. Capacity of accredited entities and executing entities to deliver

195. The proposal is aligned with UNDP's comparative advantage in the areas of capacity-building, providing technical and policy support, reducing barriers, and creating enabling conditions for adaptation planning and investments. Specifically, the proposed project will build upon UNDP's comparative advantage stemming from experience in working with governments and communities in Zambia and globally on: i) establishing and strengthening institutional, policy and legislative mechanisms; ii) building capacity and institutional strengthening; iii) undertaking risk assessments; iv) mainstreaming climate change adaptation, disaster risk reduction and EWS into development planning; and v) harnessing best practices and community-based approaches across different thematic areas for climate change adaptation and disaster risk reduction. This includes experience with initiatives focused on transferring knowledge and technology via South-South cooperation.

196. The UNDP Country Office in Zambia is well placed to oversee the implementation of the proposed project. This is because it has built close connections with the Government of Zambia through its support to the implementation of at least 14 projects on enhancing biodiversity, sustainable energy, sustainable land management and forestry in the country with financing from the Global Environment Facility and bilateral donors. UNDP has played a pivotal role among the UN agencies and other development partners in supporting the Government of Zambia, through supporting climate change policy dialogue and review, adaptation and mitigation, and soil and land management. Furthermore, the UN has worked through ZMD under the Ministry of Communication & Transport in supporting and developing capacity on EWS aspects into national development planning processes and sectoral agencies.

197. UNDP can provide a vital coordination role for catalysing enhanced capacity to adapt to climate change risks and impacts across sectors in Zambia. To ensure that the necessary capacities and institutional mechanisms are developed and strengthened at both the national and district levels, UNDP will maintain its upstream focus. Furthermore, UNDP will facilitate and ensure transformational impacts are realized at the community level. UNDP also has considerable experience in providing additional support to NIM to facilitate smooth project delivery. UNDP has been using an approach based on the principle of optimizing resources and capacities through multisectoral and multi-stakeholder-driven partnerships in Zambia. The Country Office in Zambia is supported by Regional Technical Advisers at the UNDP offices in Addis Ababa, Ethiopia, as well as by policy, adaptation, economics and climate modelling experts in New York and Bangkok. The project will be implemented by MoA using UNDP's NIM, which is designed to ensure domestic systems are used for accountability.

198. The MoA of Zambia is the Executing Entity for the proposed project and is mandated to coordinate and oversee food and nutrition security in the context of climate change and sustaining the resource base. This includes climate-smart agriculture practices and irrigation. The MoA has established and is implementing key policies for development and promotion of resilient agriculture to ensure food and nutrition security in the context of climate change. For 2016, the MoA received an annual allocation of ZMK 2,382,266,379 (USD 238,226,637.90) from the Government for management and coordination of agricultural activities. Over the past few years, MoA has received and managed projects with grant funding including from World Bank, IFAD, Government of Japan, AfDB, UNDP, WFP and FAO.

199. MoA has extensive past experience in executing large externally/foreign-funded projects including: Programme for Luapula Agricultural and Rural Development funded by the Finnish Government (Euro 20 million); Smallholder Agricultural Diversification Programme funded by UNDP (USD 12 million); World Bank-funded Agricultural Diversification Smallholder Programme (USD 23 million); and the Agricultural Sector Investment Programme, which had a funding facility involving several cooperating partners (USD 350 million.). MoA is also currently managing an ongoing portfolio of foreign and government-funded development projects. The MoA is implementing an ***Irrigation Development and Support Project (USD 115 million - World Bank)***, the ***Pilot Programme for Climate Change Resilience (USD 36 million - World Bank)***, a portfolio of projects support by IFAD (USD 105.9 million) and ***Livestock Development and Animal Health Project (USD 50 million - World Bank)***. The MoA is also implementing the ***CASU*** and ***Climate-smart Agriculture*** projects (***USD 17 million - FAO and European Union***). Whilst there are experienced project management staff within MoA, the PCU will be a dedicated team of staff exclusively for this GCF-funded project.

E.5.3. Engagement with NDAs, civil society organizations and other relevant stakeholders

200. Project development was initiated based on a request from the NDA to UNDP to develop a climate change adaptation proposal. The communication made reference to two requests from the MoA and the Office of the President to scale up two recent and ongoing LDCF-funded projects through the GCF, namely the “Adaptation to the effects of drought and climate change in Agro-Ecological Regions I and II in Zambia” (CCAP) (implemented by the MoA), and “Strengthening Climate Information and Early Warning Systems in Eastern and Southern Africa for Climate Resilient Development and Adaptation to Climate Change – CIEWS Zambia” (implemented by ZMD). The NDA requested UNDP to support the Government in developing one proposal which incorporated components of both of these projects to address the needs of smallholder farmers.

201. A series of consultations were then held between December 2015 and June 2016 to inform the development process (see stakeholder consultations below). This included regular meetings with the NDA to keep them updated on the proposal development process, and also to receive inputs and guidance. The concept note was endorsed at a Technical Committee, chaired by the NDA, on 30 March 2016.

202. The group discussed the concept, provided comments and endorsed the concept for submission to the GCF. Subsequent inputs and review informed the finalization of the proposal, and a no-objection letter was issued by the NDA on 1 July 2016 (post-UNDP appraisal meeting, and resulting from the NDA-chaired Technical Committee endorsement).

203. **Stakeholder consultations including civil society organizations:** The project proposal is founded on multi-stakeholder engagement for both the design and implementation phase. During the design phase, extensive consultations have been undertaken from the start, initiated by a meeting in December 2015 to discuss needs within the agriculture sector, attended by representatives from six government departments, and representatives from academia and international development agencies. This was followed by a series of bilateral consultations with a series of stakeholders, including the MoA, Ministry of Planning, ZMD, Interim Climate Change Secretariat, Disaster Mitigation and Management Unit of the Vice President’s Office, WARMA, Integrated Water Resources Management Centre, DWA, Zambia National Farmers’ Union, Ministry of Environment, Zambia Agriculture Research Institute, NWK (private-sector agribusiness), Barclays Bank, Standard Chartered Bank, UN agencies (FAO, WFP, IFAD), and the World Bank, as well as individual experts in Zambia. Field consultations were also undertaken in the districts of Kazungula, Sesheke

and Mulobezi to inform the feasibility report. Another national multi-stakeholder consultation was held in Livingstone on 14 March 2016. This consultation was attended by 53 participants representing farmers, members of civil society organizations, government agencies, private sector, financial institutions, international development organizations and the media (detailed participants' lists can be found in Annex XIII [a]). The consultation provided an opportunity for stakeholders and civil society organizations to further inform the project structure. It included in-depth group work where participants helped to define the specific barriers and needs across the project activity areas. These inputs were then incorporated into the project structure.

204. Additional bilateral consultations were undertaken to further substantiate the proposal and gather the necessary background information for inclusion in the supporting documentation. Two district-level consultations were held in Livingstone from 18-19 May, one covering the Southern-Western cluster of districts, and the other covering the Centre-Eastern cluster of districts. These consultations were attended by 80 and 70 participants (respectively) representing farmers, senior agricultural officers, block extension officers and camp extension officers. The objective of the meetings was to engage district-level stakeholders to further identify gaps in the draft project proposal, specifically related to sub-activities. They were also requested to fill in the gaps, by providing both baseline data and needs (including costs) for the proposed sub-activities.

205. A follow-up national consultation was held on 14 June to share the final proposal and identify remaining information gaps required for full proposal development. *Fifty-eight participants attended the meeting, including local and national-level government representatives, research institutions, UN agencies, civil society organizations and farmers from the target districts* (detailed participants' list can be found in Annex XIII [a]). A proposal endorsement meeting was held on 29 June, with representatives from Government, civil society, private sector, academia and UN agencies. A follow-up Technical Committee meeting was held on 30 June, chaired by the NDA, with representatives from Government, to finally approve and endorse the proposal. Following review of the proposal by the GCF Secretariat (see Annex XIII [b] for details of comments), a team of consultants and selected key MoA provincial and district officials primarily from the Technical Services Branch undertook a set of field visits and stakeholder engagements, aimed at assessing and designing the required water and irrigation infrastructure. This team was subdivided into four teams (each coordinated by a team leader) in order to speed up the data collection. Each team focused on one of the four targeted project areas covered by Regions I and IIa. These were: Eastern/Muchinga provinces; Lusaka province; Southern province and Western province.

206. Prior to the team's commencement of data collection, it converged in Siavonga district to: (i) have a detailed understanding of the project and the task at hand; (ii) refine the data collection instrument (checklist); (iii) develop templates for data collection; (iv) pretest the data collection instrument and templates; and (v) develop the approach and methodology for data collection. This process (including the actual data collection) was facilitated by UNDP (see Annex XIII [c] for details of those who participated in the data collection process). Annexes XIII (d) and XIII (e) are the data collection checklist and data collection templates respectively.

207. Furthermore, four groups of Irrigation Engineers undertook more detailed consultations of communities in the 16 project districts.¹⁰ At district level, each team would engage the Development Assistance Coordination Office for the purpose of collecting data for all project agricultural camps in the district that fall under Regions I and IIa. The team would then visit several communities per district (four-six) for ground truthing, verification and the engagement of community members regarding both old and proposed projects using the developed checklist and data collection templates. Areas of community engagement included: infrastructure type (whether old or proposed); estimated beneficiary households of the infrastructure by gender; description of topography on which the infrastructure sits or is expected to sit; soil type; current land use and ownership; and justification for choosing the site.

¹⁰ The project districts visited were: Mambwe, Chama, Nyimba, Mafinga (Eastern/Muchinga provinces); Gwembe, Kazungula, Namwala, Siavonga (Southern province); Mulobezi, Senanga, Sesheke, Sioma (Western province); and Chirundu, Chongwe, Rufunsa and Luangwa (Lusaka province).

208. Upon implementation of the project, participatory approaches will underpin all activities. The specific products of the various activities, such as the tailored climate advisories and intervention plans for water management, will be defined directly by the communities and end users themselves, drawing on expertise from other government and academic stakeholders. Strategies will be employed to ensure this, including training of trainers, continuous consultations, and regular review and monitoring of activities from a multi-stakeholder group. A specific stakeholder engagement plan will be further developed during the full proposal development process, drawing on the feasibility assessment and the key stakeholders involved in different outputs of the project. Part of the stakeholder plan is the process highlighted above, relating to stakeholder engagement at district and community level in the 16 targeted project districts for the purpose of gathering data.

E.6. Efficiency and Effectiveness

Economic and, if appropriate, financial soundness of the project/programme

E.6.1. Cost-effectiveness and efficiency

209. The effectiveness of proposed solutions has been tested in a number of projects at varying scales. This project builds on those lessons of cost-effectiveness and efficiency of delivery. The geographic, hydro-climatic and socio-economic suitability of the recommended activities were successfully tested in the field (UNDP LDCF-funded CIEWS and CCAP projects), and they offer effective and efficient solutions to address climate vulnerability in the two regions. To promote coordination and avoid duplication, other executing entities will undertake activities in line with their institutional mandates, as well as collaborating on joint products and activities (recognizing the need to work together across mandates). Further MoUs or LoAs on collaboration and data-sharing modalities will be finalized prior to implementation to ensure collaboration and data sharing (see section C.4.). Refer to Appendix IV: O&M plans and Commitment Letters. Also, refer to section 5.1 of the Feasibility Study. MoUs/LoAs will highlight the expected services from each Executing Entity to be provided to other partners. Collaboration with partners and meetings will be coordinated by the Project Management Unit. Coordination among the various funding agencies and implementers will be secured through the already existing platforms. For instance, the cooperating partners meet on a monthly basis to discuss sector development issues and coordination. The discussions and the donor matrix particularly play a critical role in fostering coordination and information sharing. Furthermore, there have been bilateral engagements with other cooperating partners aimed at exchanging information and enhancing collaboration.

210. The costs of implementing the project are co-financed by existing systems and staff of government agencies. The MoA is the lead Executing Entity, and has committed USD 14,869 million in co-financing to support strengthening the resilience of smallholder farmers. Other responsible parties will also contribute to the project through existing systems. Zambia Meteorological Department (ZMD) will coordinate the implementation of the AWS and forecasting system investment in the country. ZMD will provide in-kind funding for O&M of the additional observing network, as indicated in the Feasibility Study, section 5. From 2011, the budget allocation for ZMD has maintained an increase of 8 percent each year, of which at least 3 percent is channelled to O&M. ZMD will also collaborate closely and share weather/climate data with MoA and WARMA to ensure there are effective agricultural and water advisories that incorporate cross-sectoral information for farmers. WARMA will also implement a output focusing on water monitoring and analysis networks (including capacity to undertake water resource modelling). Through their collaboration with MoA and ZMD, this strengthened observation network and analysis capabilities will contribute to more effective water advisories to inform smallholder farmers and irrigation planning.

211. The project will build synergies with other projects in the same geographical location that are working on climate resilience and livelihood diversification to maximize effectiveness. For instance, the project will synergize with ongoing interventions supported by UNDP, FAO, WFP, the World Bank and others on irrigation, conservation agriculture, warehouse and storage analysis, and access to finance and insurance which increases the productivity in the farms. ZMD has a policy which defines its functions, while WARMA exists by an Act of Parliament. The primary mandate of ZMD is the generation and provision of weather and climate products. While WARMA's mandate is water

resources management, it is also a client and recipient of weather products generated by ZMD. While weather and climate information is provided by ZMD through various means (a website, group emails and by specific data requests), it will be necessary to set up specific data transfers and access to enable WARMA to fulfil its water resource modelling commitments and generate forecasts. An MoU between WARMA and ZMD will be entered into, and the allocated staff and IT resources will provide a framework and system for customized data exchange between the two organizations to enable calibration of water resource models as well as running projections/forecasts with such models.

212. Community participation in the implementation and operational stages will ensure cost-effectiveness of the investments. Previous experience shows that in some instances (e.g. in the case of diversified livelihood activities) labour is usually volunteered. The community-based weirs and processing centres will be managed by the community, thereby reducing the O&M costs for the Government in the long term. Similarly, the community contribution to the management of hydro-meteorological stations can make the maintenance cost-effective because this will reduce the inputs (travel, salaries and accommodation) from the project.

213. Alternative solutions were considered in the design of the proposed interventions. An alternative solution to the loss of productivity in the rural areas is to divert the agricultural population to other forms of production such as industries, which is not a foreseeable investment for these agro-ecological regions of the country. Therefore, government policies are aimed at improving the agricultural productivity in this region. Investment in irrigation in the country is limited with adequate room for expansion. The option that has not been considered is large-scale water supply schemes. In the case of alternative livelihood, a number of other alternative livelihoods were considered under the LDCF project, and options that maximize livelihood are going to be concentrated on in the training and support to the farmers. All training programs will be self evaluated and rated by participants and KAB methodologies will be used Overall, the proposed solutions were designed to be in line with best practices, community ownership and synergies across the three interrelated outputs, and build on ongoing efforts to ensure their efficiency and cost-effectiveness.

E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

N/A

E.6.3. Financial viability

214. Financial analysis of the proposed “Strengthening climate resilience of agricultural livelihoods in Agro-Ecological Regions I and II in Zambia” project was carried out in accordance with the Financial and Economic Analysis of Projects guidelines of UNDP.

215. Output 1 activities are mainly focused on building the necessary infrastructure and knowledge, and training farmers to use weather, rainfall and climate data such as rainfall and drought patterns in Zambia, and it is structured to be a farmer/institutional capacity-building output and hence, finance isn’t considered pertinent for this output, given the public goods nature of its outputs and the fact that it is difficult to attribute and estimate increased direct financial revenues to farmers due to activities under this output. Output 2 has five separate activities planned and financial analysis is conducted for activities 2.1 (small-scale irrigation schemes), 2.2 (increased access to agricultural inputs such as seeds and soil kits) and 2.4 (alternative livelihoods), since these activities involve significant capital investments. Activities 2.3 and 2.5 are more focused on training and capacity-building activities and hence, financial analysis isn’t considered pertinent for these activities. Output 3 has four separate activities planned, and financial analysis is conducted jointly for activities 3.1 (processing) and 3.2 (storage and market linkages), since these activities involve significant capital investments. Activities 3.3 and 3.4 are more focused on training and capacity-building activities and hence, financial analysis isn’t considered pertinent for these activities.

216. Financial analyses over a 15-year period result in positive Financial Net Present Values and FIRR that are higher than weighted average cost of capital for activities 2.1, 2.4, 3.1 and 3.2 and hence, investments to be made under these activities are estimated to be financially viable and sustainable for the long term. Investments to be made

under activity 2.2 are computed not to be financially viable, with negative FIRR value. However, given the public goods nature of this activity, wherein farmers obtain access to improved seeds and soil kits which have long-term socio-economic and productivity benefits, proposed investments to be made under this activity are still justified. Further details about this assessment are available in Annex XII (c).

E.6.4. Application of best practices

217. This proposed project builds specifically on best practices piloted under the LDCF-funded climate change adaptation project *Adaptation to the effects of drought and climate change in Agro-Ecological Regions I and II in Zambia* which closed in 2015. This project effectively piloted resilient agricultural production techniques in selected targeted areas within these two regions of Zambia, which face increasing droughts and unpredictable rainfall patterns. These practices will be further scaled up under this project for even greater adaptation impact. Based on the lessons learned from this LDCF project, the need for sustained access to water resources to irrigate these resilient crops was recognized as a critical barrier, thus leading to the introduction of the first output of this project, which focuses on planning for and managing unpredictable water resources. The use of climate information to substantiate weather and agricultural advisories with regard to water availability has been piloted under UNDP's Climate Information for Resilient Development in Africa, which is being implemented in 10 countries throughout Africa, including Zambia.¹¹ A more detailed analysis of lessons learned from the CCAP is examined in detail in section 3.5 of the Feasibility Study, and reflected in Chapter 5 on recommendations in terms of how these lessons have been taken into account in designing this project.

218. Additional projects implemented by other UN agencies also have proven models which will be scaled up under this project for further adaptation impact. FAO's CASU project has introduced conservation agriculture practices, and used a farmer field school model to strengthen capacity and share knowledge. This successful approach will be further scaled up in the participants' camps across the 16 districts under this project, with the addition of a learning centre of excellence at the district level for increased impact (see sections 5.1.4 and 5.4 in the Feasibility Study).

219. The WFP's R4 project has also introduced pilot financing and insurance products to farmers, which have aimed to strengthen their resilience and transfer climate risk. This model will be further built on, through strengthening capacity and partnerships, setting the foundation for scaling up to target the 1.26 million farmer beneficiaries across the 16 districts under this project. Further, WFP's P4P project also demonstrates valuable models for ensuring resilience of smallholder farmers through strengthened value chains and links to market. Supporting the storage and transportation systems, as well as linkages to viable markets and sustainable demand, will be further scaled up under this project for increased impact (see section 3.4.2 in the Feasibility Study).

220. This project also incorporates lessons learned and best practices from several successful international efforts, to enable transformative impact through the use of value chain approaches to enhance climate resilience. Key lessons and success factors include: i) integrating climate risk in value chain projects in Djibouti, Lesotho, Morocco, Nicaragua and Nigeria¹²; ii) scaling up smallholders' access to markets in Bangladesh, Tajikistan and Zambia¹³; iii) best practices in growing inclusive agri-food value chains benefiting African farmers and SMEs¹⁴; and iv) developing value chains for climate-resilient products in Tajikistan¹⁵.

¹¹ <http://www.adaptation-undp.org/projects/cirda>

¹² IFAD, 2015. How to do: Climate change risk assessments in value chain projects. Retrieved from: <https://www.ifad.org/documents/10180/30b467a1-d00d-49af-b36b-be2b075c85d2>

¹³ Oxfam, 2015. Gendered Enterprise & Markets. Retrieved from: http://api.ning.com/files/Fxq0VavCSuCKTTW11-J5XmtZunqDWvFZeG6bu1LngM-VhQ*o4CRQwDkJV67Y-lx2UEOcP4Mw8yTjPWikrF16Qtxo0Bt9ABSR/GEMAnnualReport20152016.pdf

¹⁴ UNDP Africa Regional Services Centre, 2013/2014. African Agribusiness Supplier Development Programme Toolkit. Retrieved from: www.undp.org/africa/privatesector

¹⁵ UNDP/WRI, 2015. Adapting from the ground up: Enabling Small Businesses in Developing Countries to Adapt to Climate Change. Case study on Tajikistan. Retrieved from: https://www.wri.org/sites/default/files/Adapting_From_The_Ground_Up.pdf

E.6.5. Key efficiency and effectiveness indicators

<p>GCF core indicators</p>	<p>Estimated cost per t CO₂ eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)</p>
	<p>(a) Total project financing US\$_____</p> <p>(b) Requested GCF amount US\$_____</p> <p>(c) Expected lifetime emission reductions overtime _____tCO₂eq</p> <p>(d) Estimated cost per tCO₂eq (d = a / c) US\$_____ / tCO₂eq</p> <p>(e) Estimated GCF cost per tCO₂eq removed (e = b / c) US\$_____ / tCO₂eq</p> <p><i>Describe the detailed methodology used for calculating the indicators (d) and (e) above.</i></p> <p><i>Please describe how the indicator values compare to the appropriate benchmarks established in a comparable context.</i></p>
	<p>Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (mitigation only)</p>
	<p><i>Describe the detailed methodology used for calculating the indicators above.</i></p> <p><i>Please describe how the indicator values compare to the appropriate benchmarks established in a comparable context.</i></p> <p>n/a</p>
<p>Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/programme)</p>	<p>n/a</p>

F.1. Economic and Financial Analysis

221. The economic feasibility of the project was determined using funds generated by small-scale farmers who are expected to benefit from the project. Financial and gross margin analyses were conducted to assess the financial impact of the project's interventions on the project's beneficiaries.

222. The total cost of the project amounts to about USD 137 million that includes the operating and maintenance (O&M) costs. This is the total cost of the project including Government of Zambia co-financing of 105 million for the first seven years of the project. The O&M cost is included in the government co-financing and described in the O&M plan of the project. The O&M plan for investments such as irrigation are going to be performed by the communities as highlighted in the Feasibility Study, section 5.3.

223. Economic cost-benefit analysis was carried out to assess the impact of the project on society's welfare. The analysis of the project was carried out in accordance with the Guidelines for the Economic Analysis of Projects of United Nations Development Programme (UNDP, 2015). The economic desirability of the investments was determined by computing the economic internal rate of return (EIRR) and economic net present value and comparing the EIRR with the assumed 10 percent discount rate (as recommended in UNDP, 2015). The discounted fund flows period varies by intervention between 10 years and 25 years. We assume that after the useful life of each intervention, the benefits become zero. The analysis is based on country discussions in each district and terminal evaluation results from previous LDCF projects in the region.¹⁶

224. Cropping patterns will differ by district and region, and farmer experience and speciality. It is expected that households will maximize the use of the irrigation investment by mainly growing high-value horticulture cash crops such as tomato, onion and cabbage. A wider range of options has been included in the models, including wheat, maize and seed maize, soybean, sugar bean, banana, tobacco and potato. Based on status quo farming practice in Zambia without irrigation and EWS, Glaesener (2010) estimates the gross margin per cultivated hectare to be USD 112. With irrigation investment, farmers will typically plant green maize in the dry period. Data from the MoA indicates the yield is 44,000 cobs/ha with a gross margin of about USD 2,700. The same statistics show a higher gross margin for cabbage production in that season. The lower irrigation value (green maize) is used to estimate the value of the project in the region.

225. We argue that estimates from this study provide a lower band on the return to agriculture in Zambia given the increasing number of droughts in the country in recent years that have reduced output and gross margin per cultivated hectare. This has led to a potential increase in the benefit of irrigation and EWS in the country.

226. The cost benefit analysis shows that with a 10 percent discount rate, the discounted net present value of the project with the pass on of seeds and goats is valued at about 3.15 million USD. The economic internal rate of return is 10.8%, which is higher than the 10% discount rate assumed. The proposed investment is economically feasible with the pass on program which has been successfully implemented under previous UNDP projects in the country.

227. Without considering the pass on program, the net present value of the project is lower (-7.89 million USD) with economic internal rate of return of 8%. A 20% reduction in the cost (say efficient administration of government cofinancing on FISP which is currently underway with the e-voucher program) leads to an IRR of 14.9% without the pass on program.

228. All proposed investments are economically feasible with the pass on program excluding fertilizer subsidy as government cofinancing, with positive NPVs and EIRRs exceeding the minimum threshold of 10%. Sensitivity

¹⁶ Adaptation to the Effects of Climate Variability and Change in Agro-Ecological Regions I and II in Zambia (CCAP)

analysis reveals the investment to be robust to significant increase in cost (20%) and/or decrease in benefits (20%) only with the pass on program and separating the co-financing benefit.

229. Financial analysis has been conducted for activities 2.1 (small-scale irrigation schemes), 2.2 (increased access to agricultural inputs such as seeds and soil kits), and 2.4 (alternative livelihoods), and jointly for activities 3.1 (processing) and 3.2 (storage and market linkages), since these activities involve significant capital investments and quantifiable direct revenues to the project's beneficiaries. The discounted fund flows period was assumed to be 15 years for all financial analyses. The analysis is based on country discussions in each district and terminal evaluation results from previous LDCF projects in the region. However, data from other similar projects in Zambia and from other African countries were used from sources such as FAO reports, while ensuring suitable adaptation and making assumptions for this data to fit current and project contexts.

230. The same gross margin values per hectare were used for both financial and economic analysis. Other key data points and assumptions used are – fish production estimates of 81 kg per pond for 100-cubic-metre ponds and 41 kg per pond for 50-cubic-metre ponds (for activity 2.1 analysis), increased revenue to farmers due to improved seeds is USD 143 per hectare (used for activity 2.2 analysis), average annual net incomes to farmers due to alternative livelihood activities such as beekeeping, fishing and goat rearing range between USD 200 and USD 214 (used for activity 2.4 analysis) and improved storage capacity and market linkages will result in a 15 percent increase in gross margins to farmers (used for activities 3.1 and 3.2 analysis).

231. Sensitivity analysis of financial returns computed above was performed primarily to assess the impact of lower than assumed revenues or higher than estimated costs. The financial returns are still positive if revenues decrease by 10 percent or costs increase by 10 percent for activities 2.1, 2.4, 3.1 and 3.2.

232. The GCF funds also bring additionality to investments under activities 2.1, 2.4, 3.1 and 3.2 since financial returns are lower than weighted average cost of capital, and hence, financially not viable, if MFI loans are deployed for these investments instead of GCF grants. In case of activity 2.2, FIRR are negative even with GCF funding, however, the public goods nature of this activity (distribution of improved seeds, soil kits, etc.) and its long-term socio-economic and environmental benefits are to be considered. Further details about this assessment are available in Annex XII (c).

F.2. Technical Evaluation

233. This project focuses on infrastructure facilities and services critical for strengthened resilience of smallholder farmers, including: climate and weather observation network to generate information relevant to smallholder farmers, water storage and capture technologies, irrigation facilities to sustainably manage water resources, and processing and storage facilities to ensure linkages to markets.

234. All of the infrastructure introduced under this project builds on extensive experiences and proven models under previous projects. They are specifically relevant and viable in the local context. This is further examined and substantiated in the Feasibility Study, section 3.5.

F.3. Environmental, Social Assessment, including Gender Considerations

235. This project has completed the UNDP social and environmental screening procedure (see SESP attached as Annex VI). This screening was undertaken to ensure this project complies with UNDP's Social and Environmental Standards. Women are key players in strengthening climate resilience of the agricultural livelihoods sector in Zambia as 80 percent of the workforce is composed of women, thereby making them important agents in addressing food security, livelihoods and water management. However, they own fewer assets, have less access to land, agricultural inputs, and financial services. The vulnerability of rural women in Zambia is dependent on several different factors (biophysical, socio-economic and political).

The Government of Zambia established the Gender Equity and Equality Commission, which oversees the mainstreaming of gender in all policies, legislation, programmes and budgets, inter alia. The Act serves to ensure that women living in rural and peri-urban areas benefit from development and in that respect, participate in the elaboration and implementation of development planning at all levels; be free to organize self-help groups and cooperatives in order to obtain access to economic opportunities through employment or self-employment; and have to access agricultural credit and loans, marketing facilities, appropriate technology, land allocation and agrarian resettlement schemes.

Through consultations with stakeholders at the national, district and camp level who are familiar with the agriculture sector and the role of women and men in the broader value chains, including government, private sector and civil society, this proposal has identified areas where integrated and gender-mainstreamed interventions can provide responsive and transformative results for the project. Section H.1 (logic framework) includes several gender performance indicators, and sex-disaggregated targets from the Gender Action Plan at the fund-level impacts or outputs level. For example, Activity 2.1 outlines the following as indicator: “Improvement of female smallholder farmers introduced to existing irrigation schemes or commence with new water management practices,” and Activity 2.3 outlines the following, “Introduce new agricultural practices for women drawing on indigenous knowledge strategies. (Gender Action Plan)

236. The overall social and environmental risk category for this project is: moderate. Specific project risks are listed in section G below, together with appropriate mitigation measures.

F.4. Financial Management and Procurement

237. The financial management and procurement of this project will be guided by UNDP financial rules and regulations available at: [here](#). Further guidance is outlined in the financial resources management section of the UNDP POPP available at: [here](#). UNDP has comprehensive procurement policies in place as outlined in the ‘Contracts and Procurement’ section of UNDP’s POPP. The policies outline formal procurement standards and guidelines across each phase of the procurement process, and they apply to all procurements in UNDP. See: <https://popp.undp.org/SitePages/POPPSubject.aspx?SBJID=211&Menu=BusinessUnit>

238. The project will be implemented based on the NIM Guidelines available at: [here](#) UNDP will ascertain the national capacities of the Executing Entity by undertaking an evaluation of capacity following the Framework for Cash Transfers to the other executing entities (part of the Harmonized Approach to Cash Transfers -[HACT](#)). All projects will be audited following the UNDP financial rules and regulations noted above, and applicable audit guidelines and policies.

239. The NIM Guidelines are a formal part of UNDP’s policies and procedures, as set out in the UNDP POPP. The NIM Guidelines were corporately developed and adopted by UNDP, and are fully compliant with UNDP’s procurement and financial management rules and regulations.

240. The national Executing Entity, i.e. the MoA is required to implement the project in compliance with UNDP rules and regulations, policies and procedures (including the NIM Guidelines). In legal terms, this is ensured through the national Government’s signature of the UNDP SBAA, together with a UNDP project document which will be signed by the Executing Entity to govern the use of the funds. Both of these documents require compliance. Prior to signature of the project document, all national executing entities like MoA need to have undergone an HACT assessment by UNDP to establish capacities to implement the project. During implementation, UNDP will provide oversight and quality assurance in accordance with its policies and procedures, and any specific requirements in the Accreditation Master Agreement (AMA) and project confirmation to be agreed with the GCF. This may include, but is not limited to, monitoring missions, spot checks, facilitation and participation in project board meetings, quarterly progress and annual implementation reviews, and audits at project level or at executing entity level on the resources received from UNDP.

241. The HACT framework consists of four processes: (1) macro assessments; (2) micro assessments; (3) cash transfers and disbursements; and (4) assurance activities. Assurance activities include planning, periodic on-site reviews (spot checks), programmatic monitoring, scheduled audits and special audits. During micro-assessment, there can be weaknesses identified for which actions are required to address the gaps. When a spot check finds that the gaps are not addressed, it will mean that the level of assurance activities will have to remain higher and modalities of engaging with that Executing Entity will have to be reviewed if necessary. All details are available at: <https://popp.undp.org/SitePages/POPPSubject.aspx?SBJID=167&Menu=BusinessUnit>

242. The project will be audited in accordance with UNDP policies and procedures on audits, informed by and together with any specific requirements agreed in the AMA. According to the current audit policies, UNDP will be appointing the auditors. In UNDP, scheduled audits are performed during the programme cycle as per UNDP assurance/audit plans, on the basis of the Executing Entity's risk rating and UNDP's guidelines. A scheduled audit is used to determine whether the funds transferred to the Executing Entity were used for the appropriate purpose and in accordance with the work plan. A scheduled audit can consist of a financial audit or an internal control audit.

243. All GCF resources will be provided to the Executing Entity, less any agreed cost recovery amount. Under UNDP's NIM, UNDP advances cash funds on a quarterly basis to the Executing Entity for the implementation of agreed and approved programme activities, in accordance with UNDP standard policies and the NIM Guidelines. The Executing Entity reports back expenditure via a financial report on a quarterly basis to UNDP. Any additional requirements will be in accordance with the AMA as and when it is agreed.

244. A draft procurement plan (which will be further discussed and revised prior to UNDP Project Document signature) is provided in Annex V.

G.1. Risk Assessment Summary

245. A significant proportion of the project is associated with soft measures, e.g. training, policy, infrastructure planning, equipment and seeds, advisories, market development, access to finance and insurances which carry very little risk in themselves.

246. The principal areas of risk are associated with social and physical elements. The social risks include: reluctance of communities to adopt climate-resilient agricultural practices; low adoption of water technologies due to perceived high maintenance costs or labour-intensive approaches; and high staff turnover. Limited numbers of government extension staff impede retention of skills and knowledge in the relevant sectors/institutions.

247. Physical risks include: occurrence of extreme climate events during the implementation of the project that can negatively impact construction work; impacts typically associated with construction activities (noise, dust, waste, erosion and sedimentation), which can affect nearby sensitive receptors; potential adverse impacts to habitats and/or ecosystems as a result of changed hydrology through construction of weirs, boreholes and reservoirs; groundwater extraction risks (contamination of source, over-extraction and recharge rates of groundwater reservoirs); there is also the potential to increase health risks associated with waterborne vectors through the construction of open water storages (ponds and dams) and increased irrigation (channels and flooded fields).

248. An assessment of the various potential risks associated with the project resulted in a low to moderate risk profile, and that all risks were deemed manageable with the implementation of mitigation measures. Mitigation measures are described in the project's Environment and Social Management Plan. The risk of inadequate supply of weather and climate information will be averted through the following:

- i. Increasing the modes of dissemination of information: community radio stations, emails, SMS, extension programmes and the participatory integrated climate service in agriculture approach (one-on-one)
- ii. Establishing LoAs/MoUs between ZMD and WARMA and MoA to ensure ZMD is obligated to share collected data and forecasts with WARMA and MoA in a timely manner (real time)

249. Risks related to non-maintenance of meteorological infrastructure will be mitigated by training and lobbying within Government for budget increases. ZMD has commenced a long-term training programme to meet their required professional staff skill levels. This is tailored to ensure sustainable provision of weather information and products for all sectors. In 2013, ZMD was restructured, an activity that has provided more staff at a professional level to meet demands. In the unlikely event (given recent increases in funding) that the Ministry of Transport does not provide funding to sustain activities, mitigation will be through increased engagement with other cooperating partners, through platforms such as the early warning Technical Committee and Disaster Management Consultative Forum. At the regional level, ZMD will use existing collaboration with regional bodies such as South African Development Community, Common Market for Eastern and Southern Africa, and MESA to lobby for funds to sustain activities.

G.2. Risk Factors and Mitigation Measures

The risk associated with this is inadequate capacity and maintenance funds. With respect to capacity, the enactment of the Meteorological Act (already cleared by Cabinet) will expand the establishment, improve staff establishment, and hence lead to increased network. In addition, with the ongoing training of staff at graduation, ZMD will have increased human resource capacity at the provincial level. Furthermore, ZMD is in the process of developing an O&M strategy that will provide adequate resources for regular maintenance and replacement.

Selected Risk Factor 1

Description	Risk category	Level of impact	Probability of risk occurring
Risk 1: Communities reluctant to adopt climate-resilient agricultural practices	Social and environmental	High (>20% of project value)	Low
Mitigation Measure(s)			
<p>Extension staff, lead farmers and other trainers will be educated on how to conduct effective awareness campaigns on the benefits of climate-resilient agricultural practices. Farmer-to-farmer exchanges and champion farmers will also demonstrate the positive impacts of the practices, and provide fellow farmers with information for replication. Finally, providing the farmers with a market outlet for the resilient crops will also provide an incentive for practising resilient measures and producing climate-resilient products.</p>			
Selected Risk Factor 2			
Description	Risk category	Level of impact	Probability of risk occurring
Risk 2: Occurrence of extreme climate events during the implementation of the project that can negatively impact construction work	Social and environmental	Medium (5.1-20% of project value)	Low
Mitigation Measure(s)			
<p>The project will undertake careful planning informed by weather and climate information and scheduling of the interventions in conjunction with forecasting information.</p>			
Selected Risk Factor 3			
Description	Risk category	Level of impact	Probability of risk occurring
Risk 3: Low adoption of water technologies due to perceived high maintenance costs or labour-intensive approaches	Social and environmental	Medium (5.1-20% of project value)	Low
Mitigation Measure(s)			
<p>Practices introduced will be founded in evidence-based research to ensure low maintenance costs and alignment with existing and traditional practices. Farmers will also be assisted with market linkages through the project in order to help raise their income to provide enough profit for further investment in their own farm technologies.</p>			
Selected Risk Factor 4			
Description	Risk category	Level of impact	Probability of risk occurring
Risk 4: High staff turnover and limited numbers of government extension staff impedes retention of skills and knowledge in the relevant sectors/institutions	Technical and operational	Low (<5% of project value)	Medium
Mitigation Measure(s)			
<p>While the project will strengthen the capacity of extension staff and build on these existing structures, it will not be dependent only on extension services. It will work with local NGOs and community-based organizations who are also providing this support. In addition, the project will undertake training of trainers to ensure sustainability and accessibility of training to all farmers, as well as target lead farmers and champion farmers, and support farmer-to-farmer exchanges.</p>			

Selected Risk Factor 5			
Description	Risk category	Level of impact	Probability of risk occurring
Risk 5: Potential adverse impacts to habitats and/or ecosystems as a result of changed hydrology through construction of weirs, boreholes and reservoirs	Social and environmental	Medium (5.1-20% of project value)	Medium
Mitigation Measure(s)			
<p>Existing infrastructure will be utilized and rehabilitated where possible. Large water retention structures are not part of this proposal. Initial hydrological assessments have been undertaken and further detailed assessments and design will form part of the project. Weirs will allow high/flood flows to pass. Dams/ponds will not be large and will not be constructed in sensitive environments.</p> <p>Pump tests and hydrogeology assessments will be undertaken to confirm sustainable yields. Yield of boreholes is expected to be approx. 1.4-10 l/s. Therefore, the maximum area of irrigation per borehole to be targeted is from 0.5-20 ha (higher flows and larger areas are for commercial boreholes with electrical power pumps).</p>			
Selected Risk Factor 6			
Description	Risk category	Level of impact	Probability of risk occurring
Risk 6: Project involves extraction, diversion or containment of surface or groundwater. Risks include potential contamination of groundwater as a result of exposing aquifer, over-extraction of water resources, impacts to downstream habitats and users	Social and environmental	Medium (5.1-20% of project value)	Medium
Mitigation Measure(s)			
<p>The size of water storages is relatively small. Ponds will be off-stream.</p> <p>Relatively few boreholes are proposed and volume of water proposed to be extracted is not significant. Drilling of boreholes will be undertaken by experienced drilling companies and all appropriate environmental protection measures will be put in place during drilling. Boreholes will be protected from surface contamination once installed.</p> <p>Water resource management plans and committees will guide allocation and use of water resources.</p>			
Selected Risk Factor 7			
Description	Risk category	Level of impact	Probability of risk occurring
Risk 7: Potential to increase health risks associated with waterborne vectors through the construction of open water storages (ponds and dams) and increased irrigation (channels and flooded fields)	Social and environmental	Low (<5% of project value)	Low
Mitigation Measure(s)			

Disease vector risks already exist and the exacerbation as a result of the project is not considered significant. As an existing risk, mechanisms for minimization already exist (education, preventative equipment (e.g. mosquito nets), management of water bodies, medical treatments, etc.). Fish reduce the incidence of mosquito larvae in ponds.

Large water bodies are not proposed, which will minimize the available habitat for vectors. Wells will be protected and water will be extracted using pumps, thereby creating minimal surface water. Flood irrigation will be carried out to minimize water persistence on surface (and associated high evaporation rates), drip irrigation will be used where appropriate.

** Please expand this sub-section when needed to address all potential material and relevant risks.*

H.1. Logic Framework.

Please specify the logic framework in accordance with the GCF's [Performance Measurement Framework](#) under the [Results Management Framework](#).

H.1.1. Paradigm Shift Objectives and Impacts at the Fund Level¹⁷

Paradigm shift objectives

To enhance the lives and livelihoods of smallholder farmers in Agro-Ecological Regions I and II in Zambia to adapt and become resilient to the impacts of climate change and variability

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	
Fund-level impacts						
<i>A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions</i>	<i>Indicator 1.2: Number of males and females benefiting from the adoption of diversified, climate-resilient livelihood options</i>	MoA databases on smallholder farmers and crop production Project baseline, mid-term and end-term surveys Gender-sensitive field surveys undertaken within the targeted districts	0	160,000 Female 240,000 male	Female: 378,461 Male: 567,692	Completed irrigation infrastructure and sustained O&M Uptake of training and capacity-building related to community supported agriculture practices by farmers
<i>A2.0 Increased resilience of health and well-being, and food and water security</i>	<i>Indicator 2.4: Area (ha) of agricultural land made more resilient to climate change through changed agricultural practices (e.g. planting times, new and resilient native varieties, efficient irrigation systems adopted)</i>	Project baseline, mid-term and end-term surveys Gender-sensitive field surveys undertaken within the targeted districts	0	800 ha	2700 ha	Uptake of changed agricultural practices by communities. There is no major climate extreme event to disrupt the process

¹⁷ Information on the Fund's expected results and indicators can be found in its Performance Measurement Frameworks available at the following link (please note that some indicators are under refinement):

http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf

H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme Level

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	
Project/programme outcomes	Outcomes that contribute to fund-level impacts					
<i>A7.0 Strengthened adaptive capacity and reduced exposure to climate risks</i>	<i>Indicator 7.1: Extent to which target beneficiaries (vulnerable households, communities, businesses, and public-sector services) adopt climate-resilient technologies (improved tools, instruments, strategies and activities to respond to climate variability and climate change)¹⁸</i>	<p>Project baseline, mid-term and end-term surveys</p> <p>Gender-sensitive field surveys undertaken within the targeted districts</p> <p>This indicator will be measured at a qualitative scale, through a survey at least twice in project lifespan (once for baseline data and end of project to assess 'extent of use')</p>	0	40% beneficiaries (male and female) adopt climate-resilient technologies	At least 80% male and female beneficiaries adopt climate-resilient technologies	<p>Completed infrastructure and training on agricultural practices reaches all target smallholder farmer families and they are sufficiently applied to enhance resilience</p> <p>There is continued commitment and uptake of the information by targeted communities in the project</p>
Project/programme outputs	Outputs that contribute to outcomes					
1. Smallholder farmers are able to plan for and manage climate risk to support resilient agricultural production	Percentage of smallholder farmers demonstrating knowledge to plan for and manage climate risk to support resilient agricultural production disaggregated by gender	<p>Progress reports</p> <p>Farmer field school records</p> <p>Qualitative assessment through interviews and surveys</p>	0	45% female and male smallholder farmers able to plan & manage risk	90% female and male smallholder farmers able to plan & manage risk	There is effective dissemination of climate information to smallholder farmers to support planning
	Percentage of population with access to improved climate information, weather and agricultural advisories (disaggregated by gender)	Assessment of weather advisories and dissemination channels	0	52% of female population	62% of female population	Increased observation network coupled with increased capacity of government officials to generate and disseminate advisories

¹⁸ The project management team will use mixed methods to ascertain the level of uptake of new technologies. The first option will be through monitoring of direct beneficiaries after training and receiving support from the programme. To assess the outcome-level change, the project will utilize surveys at baseline, mid-term and final evaluation, and generate a composite index with a relating rating scale to measure utilization and adoption of technologies among various households. The project effects will be captured through cross-sectional surveys.

	<p>Perception of targeted populations on the timeliness, content and reach of weather, agricultural and water advisories</p>	<p>Scorecard</p>	<p>0</p>	<p>79% of male population</p> <p>30% of both female and male populations have a positive perception on timeliness, content and reach of weather, agricultural and water advisories</p>	<p>95% of male population</p> <p>70% of both female and male populations have a positive perception on timeliness, content and reach of weather, agricultural and water advisories</p>	<p>results in enhanced climate information to farmers</p>
<p>2. Resilient agricultural livelihoods are promoted in the face of changing rainfall, increasing drought and occasional floods</p>	<p>Number of farmers adopting new agricultural practices and alternative livelihoods</p> <p>Percentage increase in agricultural incomes in the project sites</p>	<p>Household survey and field assessment of farmers' change in approaches and income levels</p> <p>Data from statistics office on agricultural incomes by district</p>	<p>0</p> <p>0</p>	<p>Female: 40,000</p> <p>Male: 60,000</p> <p>35% of both male and female smallholder farmers show an increase in agricultural incomes by at least 25%</p>	<p>Female: 83,000</p> <p>Male: 124,510</p> <p>70% of both male and female smallholder farmers show an increase in agricultural incomes by at least 60%</p>	<p>Smallholder farmers are willing to learn about new practices being shared and promoted by farmer field schools and learning centres</p>

<p>3. Increasing farmers' access to markets and commercialization of resilient agricultural products</p>	<p>Percentage of resilient commodities produced by target farmers that are sold on the markets</p> <p>Percentage of households accessing financial education programmes related to credit and insurance schemes</p>	<p>Field surveys and reports of the project</p>	<p>0</p> <p>0</p>	<p>40% for both female and malde</p> <p>20%</p>	<p>80% for both female and malde</p> <p>50%</p>	
Activities	Description	Inputs	Description			
<p>1.1. Strengthen generation and interpretation of climate information and data collection to ensure timely and detailed weather, climate, crop and hydrological forecasts are available to support smallholder farmers in planning and management of water resources used in resilient agricultural practices</p>	<p>Activity will focus on strengthening climate information, data collection and product development of key government agencies (ZMD, WARMA, MoA) for the development of relevant weather information and agricultural and water advisories for smallholder farmers</p>	<p>1.1.1. Strengthen climate information and data collection, including enhancing the observation network.</p> <p>1.1.2. Strengthen capacity of staff in the ZMD, MoA and WARMA on implementation and maintenance of climate and water monitoring equipment and infrastructure.</p> <p>1.1.3. Strengthen capacity of the MoA to use crop models for monitoring current conditions and with weather and seasonal forecasts to plan irrigation scheduling, fertilizer application and other agricultural management practices at critical periods within the crop growth cycle</p> <p>1.1.4. Strengthen capacity of ZMD on generation, analysis and modelling of climate information, particularly on the use of Modelling System for Agricultural Impacts of Climate Change (MOSAICC) for shorter-term planning.</p> <p>1.1.5. Engage with and strengthen university programmes targeting climatologists, to enhance overall capacity in Zambia for climate and weather information generation and analysis.</p> <p>1.1.6. Strengthen capacity of Ministry of Water Development, Sanitation and Environmental Protection through WARMA to</p>	<p>Inputs are designed to enhance the necessary infrastructure to strengthen the observation network for both weather and water monitoring and projections. Technical capacity and coordination will also be strengthened among key ministries, including ZMD, MoA and WARMA to analyse information and generate weather information and agricultural and water advisories relevant for smallholder farmers</p> <p>This builds on experience with long-term forecasting using MOSAICC.</p> <p>This includes providing information on groundwater and surface water levels based on rainfall, water run-off, water quality, temperature,</p>			

		<p>develop water user associations related to surface and groundwater management.</p> <p>1.1.7. Support the ZMD and Department of Agriculture to develop tailored crop weather advisories drawing on weather and seasonal forecasts, crop modelling, fertilizer application and irrigation scheduling for target districts.</p> <p>1.1.8. Development of a standard operating procedure for coordination among relevant agencies generating, interpreting and disseminating the climate information through an established and mandated inter-agency coordinating platform.</p>	<p>extraction rates, water balance modelling, etc</p>
<p>Activity 1.2. Strengthen dissemination and use of tailored weather/climate-based agricultural advisories to ensure smallholder farmers receive the information they need for planning and decision-making</p>	<p>This activity will focus on ensuring farmers receive and use the climate-related advisories for agricultural decision-making. This includes scaling up and establishing new dissemination channels for these advisories.</p> <p>This will include a focus on female small holder farmers, and developing manuals / guidelines in line with their needs, and ensuring their participation in the trainings.</p>	<p>1.2.1. Disseminate tailored agricultural advisories by scaling up existing communication channels including use of cell phone, community radio, television, field extension services, print media and effective engagement with media services</p> <p>1.2.2. Facilitate public-private partnerships between ZMD and mobile companies through workshops and meetings, expert consultants to establish SMS dissemination systems to farmers.</p> <p>1.2.3. Facilitate partnerships between ZMD and the private-sector actors including the civil aviation, insurance and tourism sector, who could potentially provide an additional income stream for ZMD to operate and maintain their systems</p> <p>1.2.4. Training of trainers (extension workers and lead farmers from Government and NGOs) on how to interpret climate information/</p>	<p>Builds upon activity 1.1. Inputs will enhance capacity of farmers to access, understand, interpret and apply information received through climate-related advisories, as well as the capacity of policy makers to integrate this information in local and national policies</p> <p>Partnerships could also help to introduce or build on SMS delivery systems for broader socially relevant information for farmers (e.g. health, education) that would also incorporate climate-related products.</p> <p>This approach would use historical climate observations with farmers to develop options to respond to climate variability and change, including options available through Output 2. It would further guide</p>

		<p>advisories and identify options for use of information through decision-making.</p> <p>1.2.5. Support the trainers in further dissemination of training to target smallholder farmers.</p> <p>1.2.6. Support farmer-to farmer-exchanges on how information is being received and applied for selecting resilient practices and applying value chain development.</p> <p>1.2.7. Training of PDCC, DDCC and ward-level policy makers on how to use relevant climate information to inform policies and planning through existing meeting forums and structures.</p>	<p>farmers on the use of weather and seasonal forecasts, disseminated through different media, to adapt to anticipated (forecast) weather/climate.</p> <p>Trainings under 1.2.5 & 1.2.6 would also be linked to the farmer field schools and learning centres of excellence under activity 2.5</p>
<p>2.1. Promote irrigation schemes, water storage and capture as well as other resilient water management strategies to increase access to water for agricultural production in the target districts within Agro-Ecological Regions I and II</p>	<p>This activity will focus on establishing water technologies and infrastructure, along with the capacity of farmers to use these technologies to manage water resources in a sustainable, climate-resilient way.</p> <p>This will include introducing existing irrigation schemes to female smallholder farmers or commencing with new water management practices. This could also ensure supporting women in the development of rural enterprises, business training and capacity/skills building.</p>	<p>2.1.1. Introduce new water management and storage infrastructure in each target district, based on existing infrastructure and remaining needs:</p> <ul style="list-style-type: none"> a. Introduction of 170 farmer-scale ponds to maintain and manage water resources b. Introduction of 25 community-based multipurpose weirs. c. Introduction of 158 boreholes with solar PV or biomass pumping technologies d. Construction of 32 irrigation canals and water distribution systems e. Construction of 54 market facilities <p>2.1.2. Strengthen implementation and maintenance of new small-scale irrigation infrastructure</p> <p>2.1.3. Strengthen management of catchment areas by local institutions and lead farmers</p>	<p>Inputs will include both establishment of the infrastructure, as well as training farmers on how to operate and maintain the infrastructure, and use it to support resilient water management approaches</p> <p>This will include strengthening the capacity of more than 15,000 farming households; water user groups and formal water user associations; enhancing the development plans for each catchment; and strengthening the capacity of various stakeholders on operationalizing these plans.</p>
<p>2.2. Increased access to agricultural inputs (e.g. seeds, soil kits, tools) for resilient crops</p>	<p>This activity will primarily focus on introducing a sustainable and self-sufficient way to ensure access to seeds of climate-resilient crops, as well as the associated soil kits and tools to grow these crops</p>	<p>2.2.1. Provide farmers with access to initial inputs of drought and pest-tolerant seeds to enhance diversification and strengthen resilience.</p> <p>2.2.2. Strengthen or establish cooperatives in</p>	<p>Inputs will include providing seeds, soil kits and tools to target farmers, as well as building capacity of farmers and farmer groups on seed multiplication – including quality assurance</p> <p>This will be done jointly with farmers and existing/new cooperatives</p>

	<p>This will include ensuring female participants receive seeds, soil kits, and are consulted in the dissemination and sharing of knowledge.</p>	<p>each of the 16 districts to manage production and distribution of improved seed varieties 2.2.3. Share information with farmers on the value of improved seed varieties suitable for their local areas, drawing on existing evidence from previous demonstrations and analyses 2.2.4. Integrate newly introduced seed multiplication and distribution practices into local and district-level planning, including raising awareness and training of local policy makers on benefits of the practices</p>	<p>through training on seed production methods to facilitate production of seed for sale in the community</p> <p>This will be done through direct training of extension workers and farmers in each of the 16 districts, and farmer-to-farmer exchanges within and between districts</p> <p>This will be done through site visits, dialogues with smallholder farmers or distribution/presentation of analyses done under M&E processes</p>
<p>2.3. Introduction of new resilient agricultural production practices to strengthen production and diversify crops amidst climate variability and change</p>	<p>This activity focuses on training, technical support and farmer-to-farmer exchange on resilient agricultural practices and introduction of diversified crops</p> <p>This will include ensuring increased adoption of diversified crops for women in target communities, and introducing new agricultural practices for women drawing on their indigenous knowledge strategies</p>	<p>2.3.1. Strengthen farmer/user groups on crop diversification of members considered as champions at each camp to facilitate and oversee the adoption of drought-tolerant and alternative crops by the wider communities (e.g. cassava, cowpeas, soybeans, pulses and horticulture) 2.3.2. Apply different conservation agriculture and other resilient techniques in each of the target communities, drawing on the assessments done under the CCAP on pilot techniques. These practices will include: intercropping, crop rotation, organic manure application, composting, leguminous cover cropping and minimum tillage 2.3.3. Strengthen capacity of farmers'/user groups to maintain selected sustainable agricultural practices in each community 2.3.4. Integrate newly introduced sustainable agricultural practices and diversified crops into local and district-level planning, including raising awareness and training of local policy makers on</p>	<p>Inputs will contribute to capacity development of target beneficiaries in new agricultural practices, including training of lead farmers, technical support from extension workers, and engagement through farmer field schools for further knowledge sharing and farmer-to-farmer exchange</p>

		benefits of the practices. This will be done through site visits, dialogues with smallholder farmers or distribution/presentation of analyses done under M&E processes	
2.4. Introduce alternative livelihoods to strengthen resilience in target communities	<p>This activity will include introduction of successful proven alternative livelihoods, including beekeeping, goat rearing and fish farming</p> <p>This will include ensuring women participate in the community dialogue / conversation and engagement. Those female community members who are working within existing systems and are introduced to alternative livelihoods, and identifying female community members who are not working within existing systems and ensuring they are introduced to alternative livelihoods.</p>	<p>2.4.1. Provide inputs to farmers to introduce and strengthen alternative livelihoods (e.g. beehives and beekeeping equipment, goats, fish)</p> <p>2.4.2. Strengthen or establish cooperatives in each of the 16 districts to manage fish breeding ponds to manage and distribute fish to the rest of the community</p> <p>2.4.3. Strengthen capacity of farmer beneficiaries across all 16 target districts to adopt and maintain alternative livelihoods</p> <p>2.4.4. Integrate newly introduced alternative livelihood practices into local and district-level planning, including raising awareness and training of local policy makers on benefits of the practices</p>	<p>Inputs will provide the necessary equipment and animals required for the selected livelihood practices, as well as training and technical support on implementation of these practices</p> <p>This will be done through site visits, dialogues with smallholder farmers or distribution/presentation of analyses done under M&E processes</p>
2.5. Establish farmer field schools and learning centres of excellence to further document and scale up successful practices	<p>This activity will set up established learning and knowledge management mechanisms, in the form of schools and centres, to ensure knowledge generated from all outputs of the project will be sustained and replicated beyond the life of the project</p> <p>This will include community dialogue / conversation and engagement with women and men to determine local context specific and appropriate training methods for farmer field schools and learning centers of excellence. There will also be the local context specific female appropriate training methods, identifying their specific needs, goals and addressing gaps in existing knowledge and / or previous training, and identifying female community members who are interested in training. The promotion of tailored and targeted gender sensitive training manuals / guidelines / workshops will be crucial, in addition to the development of gender sensitive training on business skills, leadership and decision-making.</p>	<p>2.5.1. Establish or strengthen existing farmer field schools in each of the target camps across the 16 districts</p> <p>2.5.2. Training of trainers (extension staff) to facilitate experiential learning by communities on adaptive practices</p> <p>2.5.3. Establish learning centres of excellence in each of the 16 target districts</p>	<p>These inputs will incorporate both the infrastructure needed to set up the physical space and equipment for the schools and centres, as well as the training and facilitation of the staff to operate and sustain the schools/centres</p>
3.1. Strengthen processing of resilient products	<p>This activity will establish the centres and capacities for farmers to process resilient agricultural products in order to enhance their value and market viability</p>	<p>3.1.1. Establish 54 multipurpose processing centres across each of the 16 target districts</p>	<p>Inputs will focus on construction of multipurpose processing centres, providing the equipment for</p>

	<p>This will require context specific training, understanding, and approach, supported by targeted measures to strengthen women in areas where they suffer gender disadvantage, and taking action to affirm women friendly products including traditionally female crops and small livestock</p>	<p>3.1.2. Provide training to farmers on processing techniques</p> <p>3.1.3. Provide training to farmers on the use and maintenance of processing equipment</p>	<p>processing, and training farmers in how to process specific crops</p> <p>These centres would include equipment and energy sources (e.g. solar) and be multipurpose, depending on the realities of the season and needs of the community. They would be closely tied to the farmer field schools, located in each of the target camps</p>
<p>3.2. Strengthen storage, aggregation and transportation of resilient products to enhance commercialization and linkages to market and SMEs</p>	<p>This project will scale up the ongoing 'Dial-A-Load' project, which provides transporters with a supply-and-demand information platform for more effective use of trucking capacity in rural areas. It will also scale up the toyo cycles loan scheme, which was established by WFP. This scheme provides toys to successful farmer organizations who qualify to purchase them on a hire purchase agreement. In addition, the project also scales up the hermetic storage solution among smallholders to reduce post-harvest losses</p> <p>This will include the promotion of market-orientated and gender sensitive training, improvement of women's role in decision-making by leveraging from the Government's existing initiatives, the addition of gender training into the rollout or curriculum of any agricultural, climate change adaption, business, leadership and entrepreneur training, and providing capacity building training in building agricultural resilience, business and management skills, and leadership.</p>	<p>3.2.1. Scale up ongoing 'Dial-A-Load' project which provides transporters with a supply-and-demand information platform for more effective use of trucking capacity in rural areas</p> <p>3.2.2. Support smallholder farmers with toyo cycles for transport on a loan basis</p> <p>3.2.3. Support the development of a private-sector lead distribution network for household-level hermetic storage solutions</p> <p>3.2.4. Promote the use of hermetic storage among smallholders to reduce post-harvest losses (e.g. airtight bags, metal and plastic silos)</p> <p>3.2.5. Development of marketing strategy for dissemination of post-harvest handling technology for integration into ongoing government programmes</p> <p>3.2.6. Support the establishment of private-sector managed, rural buy/aggregation points with storage and processing facilities where smallholders and buyers can trade and access a variety of agricultural services, including support to ZAMACE</p> <p>3.2.7. Promote and support capacity of smallholder farmers' organizations on the use of ZAMACE and the warehouse receipt system</p> <p>3.2.8. Training to farmers on quality assurance, group marketing and negotiation skills</p> <p>3.2.9. Develop a 'virtual farmers' market' (supply-and-demand information and payment platform)</p>	<p>Inputs for this activity include purchasing and maintaining toyo cycles, setting up the telecommunications and IT network to link farmers with supply-and-demand information for transportation to market centres, and also the distribution and establishment of storage centres and use of storage equipment for farmers. This is all underpinned by training and capacity development of farmers to use these various programmes in enhancing their viability and linkages to markets</p>

		that enables equitable and competitive trade between smallholders and traders	
3.3. Increase access to finance and insurance products for smallholder farmers by strengthening financial education and facilitating engagement with potential financing sources including public, private, bilateral and multilateral sources	<p>This activity builds on the WFP R4, which has already successfully piloted both access to finance for farmers and cooperatives, as well as insurance schemes. These activities would scale up these models to build a foundation to reach more farmers, strengthening capacity and partnerships for farmers to better access finance to further invest in their agriculture-based livelihoods</p> <p>This will include community dialogue and consultation processes, in formal and informal ways in which communities discuss issues affecting women or service providers seek input, opinion and information from women. The systems will also be strengthened for climate and gender-responsive planning and budgeting engaging women. It will be crucial to build and tailor an asset base for female-headed households and poor women, and also in addition to improving access to service providers, including micro-credit and insurance providers.</p>	<p>3.3.1. Facilitate partnership creation between farmers and financial institutions on the provision of credit and access to insurance schemes to smallholder farmers</p> <p>3.3.2. Scale up provision of agricultural credit training and awareness raising on financial education programmes for farmers</p> <p>3.3.3. Undertake research and provide technical support to strengthen development of more area-specific weather-index-based agricultural insurance products</p>	Inputs for this activity include technical expertise to further strengthen insurance products and apply them to the context of the target districts, support initial investments in premiums, and training on financial education and engagement of farmers in these finance and insurance schemes
3.4. Identify available markets and promote climate-resilient products	<p>This activity focuses on establishing a viable market for smallholder farmers to sell resilient products, as well as linking those farmers to those markets in a sustainable way. It will focus on schools as demanders of the products rural farmers supply, as well as strengthening nutrition education to further enhance demand for resilient products</p> <p>This will include the promotion of market-orientated and gender sensitive training, the development of gender sensitive training on business skills, leadership and decision-making, the improvement of women's role in decision-making by leveraging from the Government's existing initiatives. There is also the need for providing capacity building training in building agricultural resilience, business and management skills, and leadership.</p>	<p>3.4.1. Connect rural producers to rural procurement from smallholder farmers of indigenous foods required for the national home-grown school feeding programme</p> <p>3.4.2. Scale up the provision of nutrition education and establishment of school gardens to sensitize schoolchildren</p> <p>3.4.3. Awareness raising of existing wholesale markets for resilient agricultural produce, linking smallholder farmers to local markets</p>	Inputs include training and awareness raising around resilient products for viable markets, establishing gardens at schools, and facilitating links with private-sector value chain actors

H.2. Arrangements for Monitoring, Reporting and Evaluation

250. Project-level M&E will be undertaken in compliance with the UNDP POPP and the UNDP Evaluation Policy at <https://popp.undp.org/SitePages/POPPSubject.aspx?SBJID=137&Menu=BusinessUnit> for monitoring and https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PPM_Programming%20Standards%20and%20Principles_Evaluation.docx&action=default for evaluation. The primary responsibility for day-to-day project monitoring and implementation rests with the Project Manager. The Project Manager will develop annual work plans to ensure the efficient implementation of the project. The Project Manager will inform the Project Board and the UNDP Country Office of any delays or difficulties during implementation, including the implementation of the M&E plan, so that the appropriate support and corrective measures can be adopted. The Project Manager will also ensure that all project staff maintain a high level of transparency, responsibility and accountability in monitoring and reporting project results.

251. The UNDP Country Office will support the Project Manager as needed, including through annual supervision missions. The UNDP Country Office is responsible for complying with UNDP project-level M&E requirements as outlined in the UNDP POPP. Additional M&E and implementation quality assurance and troubleshooting support will be provided by the UNDP Regional Technical Adviser as needed. The project target groups and stakeholders including the NDA Focal Point will be involved as much as possible in project-level M&E.

252. A project inception workshop will be held after the UNDP project document has been signed by all relevant parties to: a) reorient project stakeholders to the project strategy and discuss any changes in the overall context that influence project implementation; b) discuss the roles and responsibilities of the project team, including reporting and communication lines and conflict resolution mechanisms; c) review the results framework and discuss reporting, M&E roles and responsibilities, and finalize the M&E plan; d) review financial reporting procedures and mandatory requirements, and agree on the arrangements for the annual audit; e) plan and schedule Project Board meetings and finalize the first year annual work plan. The Project Manager will prepare the inception report no later than one month after the inception workshop. The final inception report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the Project Board.

253. A project implementation report (PIR) will be prepared for each year of project implementation. The Project Manager, the UNDP Country Office and the UNDP Regional Technical Adviser will provide objective input to the annual PIR. The Project Manager will ensure that the indicators included in the project results framework are monitored annually, well in advance of the PIR submission deadline, and will objectively report progress in the Development Objective tab of the PIR. The annual PIR will be shared with the Project Board and other stakeholders. The UNDP Country Office will coordinate the input of the NDA Focal Point and other stakeholders to the PIR. The quality rating of the previous year's PIR will be used to inform the preparation of the next PIR. The final project PIR, along with the terminal evaluation report and corresponding management response, will serve as the final project report package.

254. An independent mid-term review (MTR) process will be undertaken and the findings and responses outlined in the management response will be incorporated as recommendations for enhanced implementation during the final half of the project's duration. The ToR, the review process and the final MTR report will follow the standard templates and guidance available at the UNDP Evaluation Resource Centre. The final MTR report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the Project Board. The final MTR report will be available in English.

255. An independent terminal evaluation (TE) will take place no later than three months prior to operational closure of the project. The ToR, the review process and the final TE report will follow the standard templates and guidance available at the UNDP Evaluation Resource Centre. The final TE report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the Project Board. The TE report will be available in English. The UNDP Country Office will include the planned project TE in the UNDP Country Office evaluation plan, and will upload the final TE report in English and the management response to the public UNDP Evaluation Resource Centre (www.erc.undp.org).

256. The UNDP Country Office will retain all M&E records for this project for up to seven years after project financial closure in order to support ex-post evaluations. A detailed M&E budget, monitoring plan and evaluation plan will be included in the UNDP project document.

257. UNDP will perform monitoring and reporting throughout the Reporting Period in accordance with the AMA. UNDP has country presence and capacity to perform such functions. In the event of any additional post-implementation obligations over and above the AMA, UNDP will discuss and agree these with the GCF Secretariat in the final year of the Reporting Period, and will prepare a post-Reporting Period plan and budget for approval by the GCF Board as necessary.

258. In addition to UNDP's roles in M&E, the Ministry of National Development Planning of the Government of Zambia, will also contribute to the M&E of the programme. The M&E unit within the NDA office will lead on this, particularly in the context of its mandate to coordinate all GCF-support initiatives in Zambia.

259. A key tool for monitoring and evaluating the project will be field and impact surveys that will be conducted throughout the project (seven impact survey periods done annually) to monitor progress of implementation and progress towards the expected outputs and outcomes. To monitor and verify the expansion of the climate information and water observation networks, field inspection of infrastructure sites will be conducted. Gender-sensitive field surveys will also be conducted at the community level to assess the dissemination of this information and its use for agricultural decision-making (building on the baseline survey done under the LDCF CIEWS project by UNDP). Resilient agricultural practices introduced under Output 2 will also be assessed, drawing on baseline research and methods used by FAO to assess conservation agriculture under the CASU programme. This impact evaluation will be documented and provide further evidence-based research to inform future policies and strategies. Post-production processes will also be monitored through similar gender-sensitive surveys and facilitated interviews with a range of stakeholders, including farmers and private-sector partners, such as SMEs, and intermediaries.

I. Supporting Documents for Funding Proposal

- NDA No-objection Letter
- Feasibility Study
- Integrated Financial Model that provides sensitivity analysis of critical elements (xls format, if applicable)
- Confirmation letter or letter of commitment for co-financing commitment (If applicable)
- Project/Programme Confirmation/Term Sheet (including cost/budget breakdown, disbursement schedule, etc.) – see *the Accreditation Master Agreement, Annex 1*
- Environmental and Social Impact Assessment (ESIA) or Environmental and Social Management Plan (If applicable)
- Appraisal Report or Due Diligence Report with recommendations (If applicable)
- Evaluation Report of the baseline project (If applicable)
- Map indicating the location of the project/programme
- Timetable of project/programme implementation

** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*



Telephone: 0211-252325
0211-252394



Republic of Zambia

In reply please quote:

No.....

MINISTRY OF NATIONAL DEVELOPMENT PLANNING

NDA/6/7/9

To: The Green Climate Fund ("GCF")

Lusaka, 30th June, 2016

RE: FUNDING PROPOSAL BY THE MINISTRY OF AGRICULTURE ON STRENGTHENING CLIMATE RESILIENCE OF AGRICULTURAL LIVELIHOODS IN AGRO-ECOLOGICAL REGIONS I AND II IN ZAMBIA

Dear Madam/Sir,

We refer to the funding proposal by Ministry of Agriculture, Zambia, and United Nations Development Programme on **Strengthening Climate Resilience of Agricultural Livelihoods in Agro-Ecological Regions I and II in Zambia**.

Pursuant to GCF decision B.08/10, the content of which we acknowledge to have reviewed, we hereby communicate our no-objection to the program as included in the funding proposal.

Our no objection communication is subject to the following:

- (a) The program in the funding proposal being a 100% grant;
- (b) The programme will continue to be subject to a national process of stakeholder consultations which were not adhered to at proposal development and that a specific Country Programme will be developed;
- (c) The program in the funding proposal will continue to be in conformity with Zambia's national priorities, strategies and plans;
- (d) In accordance with the GCF's environmental and social safeguards, the program as reflected in the funding proposal will continue to be in conformity with relevant national laws and regulations.

We also confirm that our national process for ascertaining no-objection to the program has been duly followed. We wish to indicate that where this funding proposal achieves other than a 100% grant level in support of project activities, further discussions be held with the National Designated Authority.

We acknowledge that this letter will be made publicly available on the GCF website.

Kind regards,

Name: Chola J. Chabala

Title: Director National Planning and National Designated Authority

C.C. Permanent Secretary (National Planning)

Environmental and social report(s) disclosure

Basic project/programme information	
Project/programme title	Strengthening climate resilience of agricultural livelihoods in Agro-Ecological Regions I and II in Zambia
Accredited entity	UNDP
Environmental and social safeguards (ESS) category	Category B
Environmental and Social Impact Assessment (ESIA) (if applicable)	
Date of disclosure on accredited entity's website	
Language(s) of disclosure	
Link to disclosure	
Other link(s)	http://
Environmental and Social Impact Assessment (ESMP) (if applicable)	
Date of disclosure on accredited entity's website	2018-01-25
Language(s) of disclosure	English
Link to disclosure	http://www.zm.undp.org/content/zambia/en/home/library/environment_energy/environmental-and-social-management-plan.html
Other link(s)	http://www.agriculture.gov.zm/index.php?option=com_content&view=article&id=370:climate&catid=100&Itemid=1546
Resettlement Action Plan (RAP) (if applicable)	

Date of disclosure on accredited entity's website	
Language(s) of disclosure	
Link to disclosure	http://
Other link(s)	http://
Any other relevant ESS reports and/or disclosures (if applicable)	
Description of report/disclosure	
Date of disclosure on accredited entity's website	
Language(s) of disclosure	
Link to disclosure	http://
Other link(s)	http://