



**GREEN
CLIMATE
FUND**

Meeting of the Board
2 – 5 November 2015
Livingstone, Republic of Zambia
Provisional Agenda Item 14*

GCF/B.11/04/Add.02

15 October 2015

Consideration of funding proposals – Addendum

Funding proposal package for FP002

Summary

This addendum contains the following two parts:

- (a) A funding proposal entitled “Scaling Up the Use of Modernized Climate Information and Early Warning Systems in Malawi” submitted by the United Nations Development Programme; and
- (b) A no-objection letter issued by the national designated authority or focal point.

These documents are presented as submitted by the accredited entity and the national designated authority or focal point, respectively.

* The agenda item number will be determined when the final sequence of items in the provisional agenda is confirmed by the Co-Chairs.

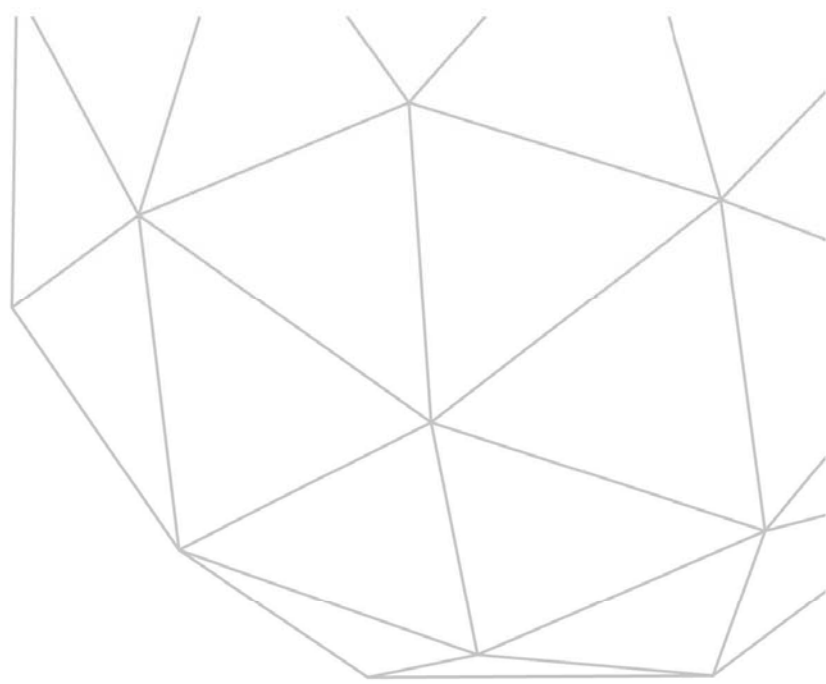
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Funding proposal submitted by the accredited entity

No-objection letter issued by the national designated authority



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Funding Proposal

Version 1.0

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.

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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.1. Brief Project / Programme Information		
A.1.1. Project / programme title	Scaling Up the Use of Modernized Climate Information and Early Warning Systems in Malawi¹	
A.1.2. Project or programme	Project	
A.1.3. Country (ies) / region	Malawi	
A.1.4. National designated authority (ies)	Ms. Tawonga G. Mbale Director, Environmental Affairs Department National Designated Authority (NDA)	
A.1.5. Accredited entity	United Nations Development Programme (UNDP)	
A.1.5.a. Access modality	<input type="checkbox"/> Direct <input checked="" type="checkbox"/> International	
A.1.6. Executing entity / beneficiary	<u>Executing Entity:</u> Department of Disaster Management Authority (DoDMA) # (total) of beneficiaries (people): About 2 million	
A.1.7. Project size category (Total investment, million USD)	<input type="checkbox"/> Micro (≤ 10) <input checked="" type="checkbox"/> Small ($10 < x \leq 50$) <input 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 Date of resubmission	29/07/2015 25/09/2015	
A.1.10. Project contact details	Contact person, position	Srilata Kammila Regional Technical Specialist - Adaptation
	Organization	UNDP
	Email address	srilata.kammila@undp.org
	Telephone number	+66 2 304 9100 ext. 5264
	Mailing address	United Nations Service Building, Rajdamnern Nok Avenue, Bangkok 10200 Thailand
A.1.11. Results areas (mark all that apply)		
<u>Reduced emissions from:</u>		
<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. on-grid, micro-grid or off-grid solar, wind, geothermal, 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.)	

¹ This is the short title; the full title "Saving Lives and Protecting Agriculture based Livelihoods in Malawi: Scaling Up the Use of Modernized Climate Information and Early Warning Systems" is used in some of the annexes, including the No-objection Letter.

Increased resilience of:

- 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.)
- 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)

1. The proposed project supports Government of Malawi (GoM) to take steps to save lives and enhance livelihoods at risk from climate-related disasters. It will address technical, financial, capacity, and access barriers related to weather and climate information (CI) by investing in enhancing hydro-meteorological capacity for early warnings (EWs) and forecasting, development and dissemination of tailored products including for smallholder farmers and fishers, and strengthening capacities of communities to respond to climate-related disasters. The **objective** of the project is to reduce vulnerability to climate change impacts on lives and livelihoods, particularly of women, from extreme weather events and climate change. The **expected key Fund level impact** is increased resilience and enhanced livelihoods of the most vulnerable people communities and regions. The **primary measurable benefits** include approximately 1.4M direct and 0.7M indirect beneficiaries (total 12% of the population) who will gain access to critical weather information.

2. The project is aligned with GoM's strategies such as the Malawi Growth and Development Strategy and the National Adaptation Programme of Action (NAPA) and was designed following extensive stakeholder consultations. It advances a paradigm shift in the use of EWs and CI. By facilitating a demand-based model for climate information and use of mobile platforms, the project promotes private sector participation and market development. It yields sustainable development benefits by saving lives (18 lives per year) and assets (average USD5M) and enhancing agricultural productivity (annual benefit USD3.8M), safety and well-being, soil and water quality, and livelihoods of women (about 160,000). It yields a positive economic rate of return of 31%, leverages domestic financing (USD2.17M), and builds capacities for sustained impact. GCF grant resources address the needs of highly vulnerable populations of Malawi by supporting the non-revenue generating investments in provision of EWs and CI. The NDA has issued a no-objection letter for the project.

A.3. Project/Programme Milestone

Expected approval from accredited entity's Board (if applicable)	N/A
Expected financial close (if applicable)	01/02/2016
Estimated implementation start and end date	Start: 01/04/2016 End: 31/03/2022
Project/programme lifespan	6 years

B.1. Description of Financial Elements of the Project / Programme

3. A grant-financing instrument is used for this project with GoM seeking maximum concessionality to undertake the proposed adaptation investments. Without grant resources, the proposed interventions would not be financially sustainable in the long term. First, as a Least Developed Country and a Low Income Economy, there is limited capacity in the country for concessional debt financing for its adaptation investments. The International Monetary Fund (IMF) in its 2014 update of Malawi's debt sustainability noted that the country's external public debt was at "moderate risk" of debt distress with recent deterioration in public finances.² Second, the project targets highly vulnerable rural populations, more than half of whom are women, living in disaster prone and food insecure districts dependent on climate sensitive and marginal livelihoods. Finally, the public good nature of the solution to address the current deficiencies in climate observation systems and dissemination platforms entails zero cost recovery from the proposed measures to save lives and livelihoods of vulnerable populations in the country.

4. Upgrading Malawi's climate information and early warning system, including the acquisition and maintenance of radar and other conventional weather systems is expensive and very demanding in terms of human resources and supporting infrastructure. Private sector financing, including concessional financing, of these investments is challenging given that at present revenue generation potential is limited, as are cost-recovery opportunities. The public goods nature of these investments means that public financing is required to overcome several barriers that constrain Malawi's ability to scale up the use of early warning systems and climate information. These barriers are detailed in Section C2 and include limited availability of financial, technical and human capacity for hydro-meteorological services, limited availability of tailored, sector-specific climate information and early warning products, lack of access to and awareness of use of early warning and climate information by vulnerable populations, limited demand and markets for generation and use of climate information, and limited accessibility to early warnings and low capacity at community level to prepare for and respond to climate-related disasters.

5. Current financing gaps in domestic financing are hampering Malawi's ability to implement adaptation measures and overcome these barriers. Without GCF resources, Malawi will continue to experience loss of lives and assets due to climate-related disasters. Therefore, GoM seeks to combine GCF grant-resources with co-financing from its budget allocations and from UNDP core resources to achieve the project objective by:

- Investing in meteorological and hydrological observation network and capacities of hydromet agencies to ensure spatial coverage and accuracy covering vulnerable areas;
- Investing in packaging and use of tailored, demand-based climate information/products/services to enhance 'last-mile' access; and
- Investing in empowering the communities in preparedness and response to climate related disasters through participatory and decentralized early warning systems and disaster risk reduction measures.

6. Co-financing sources

- 1) Government funds including DCCMS, DODMA, DWR, DAES, and DoF will also co-finance the proposed measures of the project. (**Total Co-financing USD2,170,000**) Co-financing from DWR (USD400,000) will focus on Operations & Maintenance (O&M) of hydrological sensors, as well as staff support for flood forecasting and operating the decision support system, which will be used to support the investments of the proposed project. Co-financing from DoDMA (USD576,000) will support staff time for coordinating and overseeing the early warning dissemination and disaster risk management activities under the proposed project as well as O&M for community-based EWS. Co-financing from DCCMS (USD535,000) will focus on the O&M of equipment (including AWS, lake buoys and lightning sensors among others), staff training (through Training of Trainers (ToT)), and staff support on formatting and packaging data for the tailored products. Co-financing from DoF (part of Ministry of Agriculture, Irrigation, and Water Development - MoAIWD) (USD227,000) will focus on extension support and community outreach, as well as provision and dissemination of tailored early warning and weather messages for 'safety on lake' for fishing communities targeted under the project. Co-financing from DAES (part of MoAIWD) (USD432,000) will provide extension support, as well as co-development, provision and dissemination of tailored messages for farming communities. Refer to Annex II, Feasibility Assessment, Section 2.3, for additional information on these agencies.
- 2) UNDP Malawi Country office is providing its core resources to co-finance the project contributing to various project activities including: support for capacity building of the hydro-met and DoDMA staff, agriculture and fisheries extension staff, and community members; strategic resourcing for the operational and management

(O&M) plan and sustainability of project outcomes; undertaking M&E activities including sharing of lessons learnt and best practices; and, project management. **(Co-financing of USD1,800,000)**

7. Breakdown of cost estimates analysed by sub-component in local and foreign currency

Component	Sub-component (if applicable)	Amount	Currency of disbursement	Amount	Local currency
Scaling up the use of modernized early warning systems and climate information to enhance lives and livelihoods in vulnerable communities	Expansion of networks that generate climate-related data to save lives and safeguard livelihoods from extreme climate events	4.023	million USD (\$)	1,733,913,000	Malawian Kwacha
	Development and dissemination of products and platforms for climate-related information/services to communities engaged in agriculture based livelihoods	5.451	million USD (\$)	2,349,381,000	Malawian Kwacha
	Strengthening communities capacities for use of EWS/CI in preparedness for response to climate related disasters	2.821	million USD (\$)	1,215,851,000	Malawian Kwacha
Total³		12.295		5,299,145,000	

B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing
(a) Total project financing	(a) = (b) + (c)	16.265	million USD (\$)		
(b) Requested GCF amount	(i) Senior Loans	.....	<u>Options</u>	() years	() %
	(ii) Subordinated Loans	.....	<u>Options</u>	() years	() %
	(iii) Equity	.....	<u>Options</u>		() % IRR
	(iv) Guarantees	.....	<u>Options</u>		
	(v) Reimbursable grants *	.....	<u>Options</u>		
	(vi) Grants *	12.295	million USD (\$)		
* 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 .					

² IMF (2015). Malawi. <http://www.imf.org/external/pubs/ft/dsa/pdf/2015/dsacr1583.pdf>

³ The budget includes project management costs of the executing entity.

	Total requested (i+ii+iii+iv+v+vi)		12.295	million USD (\$)			
(c) Co-financing	Financial Instrument	Amount	Currency	Name of Institution	Tenor	Pricing	Seniority
	<u>Grant</u>	2.17	<u>million USD</u> <u>(\$)</u>	<u>Government of Malawi</u>	() years	() %	<u>Options</u>
	<u>Grant</u>	1.8	<u>million USD</u> <u>(\$)</u>	<u>UNDP(Core resources)</u>	() years	() %	<u>Options</u>
	Lead financing institution: Not Applicable						
* Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution.							

B.3. Fee Arrangement

8. While not included in this proposal as per the instructions of the GCF Secretariat, an additional cost of 10% of the value of the project will be necessary to cover quality assurance and oversight services performed by UNDP as a GCF Accredited Entity over all phases of the project cycle. This includes as follows: (i) oversight of proposal development; (ii) appraisal (pre and final) and oversight of project start-up; (iii) supervision and oversight of project implementation; and (iv) oversee project closure. UNDP awaits confirmation from the GCF Board on this matter and expect that the AE fee, over and above the project cost, will be approved by the GCF Board prior to commencement of implementation activities.

B.4. Financial Market Overview (if applicable)

9. The public goods nature of the proposed project entails no revenue-generation or cost-recovery. With GoM seeking 100% grant resources for the proposed project, the financial market overview is not applicable.

C.1. Strategic Context

10. Malawi is a landlocked country with a population of just over 16 million and is expected to reach 22.8 million by 2025⁴. Approximately 85 percent of Malawi's population lives in rural areas with the majority engaged in smallholder-rain-fed agriculture. Smallholders, primarily subsistence farmers, account for 80 percent of production.⁵ The high level of subsistence farming is a major contributor to poverty with about 56% of rural population living in poverty compared to 25% in urban areas. As one of the poorest economies, Malawi is among the world's poorest economies, ranking 174 out of 187 countries on the United Nations Human Development Index (2013). Agriculture remains a key source of economic growth for the country accounting for 40% of its GDP and over 85% of its total export earnings.

11. Malawi faces a number of climate-induced disasters including floods, droughts, stormy rains, and strong winds. The intensity and frequency of climate-related hazards in Malawi have been increasing in recent decades, due to climate change as well as other factors, including population growth, urbanization and environmental degradation. The impacts of such hazards have already severely disrupted food production, led to the displacement of communities, loss of life and assets, and caused an overall reduction of community resilience. The Lower Shire, for instance, which constitutes a key agricultural region of the country, is prone to cycles of recurrent floods and droughts. Between 1967 and 2003, the country experienced six major droughts and 18 incidences of flooding, which heavily impacted smallholder farmers. The 2011-12 droughts had severe effects on food security in many districts, with ~2 million people affected, particularly in the southern districts.

12. Malawi has just recovered from an intensive flood event in 2015, which left many lives and livelihoods destroyed. The country received rainfall amounts that were the highest on record for the country and which have been associated with changes in climatic systems. These rains caused flooding – predominantly in the Southern Region, exacerbating an already precarious situation for rural households in this region. This led to the declaration of a state of disaster in the 15 districts, some of the poorest in the country. It is estimated that the floods affected 1,101,364 people, displaced 336,000 and killed 104 people⁶. Evidence suggests that the likelihood of past drought and intense rainfall events has increased due to climate change⁷ which, combined with projected increases in temperature, will result in more frequent and intense droughts, floods and severe weather – including the potential for strong winds and waves over Lake Malawi. Climate change impacts in the form of increased temperatures and reduced rainfall are also likely to result in considerable loss of agricultural output and a reduction in the extent of land suitable for rain-fed agriculture production of the staple maize crop. Amidst the backdrop of these climate vulnerabilities (further examined in the baseline section below), there is a strong political context to strengthen adaptive capacity and disaster risk management action.

13. The GoM recognizes that no meaningful reduction in poverty can be achieved in the country without addressing the deleterious impacts of disasters and climate change. Thus, it is indicated in Theme 3 of the Malawi Growth and Development Strategy (MGDS II) for the period 2012-2016 (GoM, 2011) that, in responding to these challenges, the government will implement a number of strategies, including: i) strengthening disaster risk management coordination mechanisms; ii) developing an integrated national early warning system; and iii) implementing mitigation measures in disaster prone areas. This strategy will be supported by focusing on activities ensuring effective early warning systems (supporting agriculture-based statistics and forecasting) and improving weather and climate monitoring, production systems and information and knowledge systems.

14. Other relevant national strategies and policies provide strategic direction for early warning systems, climate information, and preparedness for climate related disasters. These include the Disaster Preparedness and Relief (DPR) Act of 1991, a draft National Disaster Risk Management (NDRM) Policy, and the National Climate Change Policy. The National Strategy for Sustainable Development (NSSD) complies with United Nations Framework Convention on Climate Change (UNFCCC) objectives: i) to provide effective weather and climate disaster early warning and enhance awareness, uptake and response by the general public; and ii) to provide reliable weather and climate information and advisories for use in agricultural production, industrial production and water resource management. Further, Malawi's NAPA (2006) highlights the need for strengthened EWS to support improved

⁴ US Census Bureau (2011), International Database.

⁵ World Bank (2012). Country Assistance Strategy for the Republic of Malawi for the period of FY13-FY16. Report No: 74159-MW

⁶ GFDRR, UN, EU (2015) Malawi 2015 Floods Post-disaster needs assessment report. June 2015.

⁷ Omar Bellprat, Fraser C. Lott, Carla Gulizia, Hannah R. Parker, Luana A. Pampuch, Izidine Pinto, Andrew Ciavarella and Peter A. Stott, Unusual past dry and wet rainy seasons over southern Africa and south America from a climate perspective, *Weather and Climate Extremes*, <http://dx.doi.org/10.1016/j.wace.2015.07.001>

agricultural production under erratic rains and changing climatic conditions, and to improve Malawi's preparedness to cope with droughts and floods, including strengthening drought and flood forecasting and early warning systems through human and technical capacity building. Malawi has initiated the process to formulate a National Adaptation Plan (NAP), and the improved hydromet services will provide a strong basis for vulnerability and risk assessment and implementation of adaptation actions that require detailed weather data.

15. The National Climate Change Investment Plan (NCCIP) (2013-2018) identifies investment gaps in focal areas of capacity development including gaps in hydrological and climate monitoring systems and expertise in modelling and weather forecasting. Enhancing disaster risk management is one of the key priority investment areas for adaptation under the NCCIP. The primary objective for this investment plan is the reduction of loss of life and property due to climate change related disasters. The plan envisages the enhancement of weather and climate monitoring; prediction and information and knowledge management systems; expansion of weather observational networks; strengthening the production of weather and climate seasonal forecasts; developing capacities for CI collection and use; and promotion of telecommunication systems that can target communities.

C.2. Project / Programme Objective against Baseline

Baseline Scenario

16. Malawi is particularly vulnerable to climate change and variability. Observed changes in climate include a shift in the rainfall season, with later onset and cessation, as well as increases in the length of the dry season and reductions in the length of the growing season.^{8,9} Temperature increased by 0.9°C between 1960 and 2006, at an average rate of 0.21°C per decade, with the highest increases during December-February (mid-summer) and lowest during September-November (early summer)¹⁰. The number of hot days per year increased by 30.5 days between 1960-2003, particularly in summer, whilst the average number of hot nights increased by an additional 41 days per year over the same period¹¹. The projected climate change scenario in Malawi shows an increase in mean temperature of between 2 and 3°C by 2050, a decrease in total annual rainfall and water availability and an increase in erratic rainfall events. These changes are projected to lead to an increasing frequency and intensity of droughts, floods and severe weather over the coming decades. Over the last four decades, Malawi has experienced several climatic variations that have resulted in the occurrence of extreme weather events, ranging from droughts (7 recorded) to floods (18 recorded) and flash floods (4 recorded).¹² An Economic Vulnerability and Disaster Risk Assessment¹³ demonstrates that whilst drought poses a more extensive threat than floods in terms of geographical range and economic effects, floods are more common and cause severe economic hardship. Floods occur in the south, particularly in the Lower Shire River valley and the lakeshore areas of Lake Malawi, Lake Malombe and Lake Chilwa, as well as in the lower reaches of the Songwe river in the northern region, and the Bua and Linthipe rivers in the central region.

17. Expected increases in the frequency and severity of extreme events such as floods and storms will increase the hazards faced by both farmers and fishermen. This is true especially on Lake Malawi where fishermen are already forced to search for fish further offshore and hence regularly encounter more severe weather, while taking longer to reach the safety of the shore. With a largely agrarian economy, impacts of extreme events will affect agriculture sector productivity. These events, paired with climate variability and increases in water stress, will negatively affect crop growth^{14,15} and many aspects of the agricultural value chain including drying, storage and transport to market.

⁸ COSMO NGONGONDO, LENA M. TALLAKSEN & CHONG-YU XU (2014) Growing season length and rainfall extremes analysis in Malawi. Hydrology in a Changing World: Environmental and Human Dimensions Proceedings of FRIEND-Water 2014, Montpellier, France, October 2014 (IAHS Publ. 363, 2014). Available online at: http://folk.uio.no/chongyux/papers_SCI/IAHS_363_Cosmo.pdf

⁹ Tadross M., Suarez P., Lotsch A., Hachigonta S., Mdoka M., Uganai L., Lucio F., Kamdonyo D., Muchinda M. (2009) Growing-season rainfall and scenarios of future change in southeast Africa: implications for cultivating maize. *Climate Research*. Vol. 40. 147-161. DOI: 10.3354/cr00821

¹⁰ Vincent, K., Dougill, A. J., Mkwambisi, D. D., Cull, T., Stringer, L. C. & Chanika, D. (2013) Deliverable 1: Analysis of Existing Weather and Climate Information for Malawi. Leeds: University of Leeds.

¹¹ McSweeney, C., M. New and G. Lizcano (2012). UNDP Climate Change Country Profiles. New York: UNDP

¹² EM-DAT (July, 2015) : The OFDA/CRED - International Disaster Database <http://www.emdat.be> Université catholique de Louvain Brussels - Belgium

¹³ IFPRI/RMSI (2010) Malawi: Economic Vulnerability and Disaster Risk Assessment. Economy-Wide Impacts of Droughts and Floods.

¹⁴ Lobell, D.B., M.Bänziger, C.Magorokosho, and B.Vivek 2011. "Nonlinear heat effects on African maize as evidenced by historical yield trials." *Nature Climate Change* 1(1):42-5

¹⁵ Zinyengere, N., O. Crespo, S. Hachigonta, 2013. Crop response to climate change in Southern Africa: A comprehensive review. *Global and Planetary Change*

Monitoring of the predicted increases in temperature and rainfall variability is therefore necessary to allow Malawi to effectively adapt to the impacts of climate change. In particular, daily and seasonal weather information to subsistence farmers and fishermen has proven to be of crucial importance for agricultural productivity and food security. Similarly, information on impending floods, taking into account current environmental and social conditions as well as expected and current rainfall across river catchments, enables preparedness activities, which are critical to reducing the vulnerability of disaster-prone communities and livelihoods.

18. A key objective for the GoM is to take meaningful steps to save lives at risk from climate-related disasters and enhance resilience of vulnerable populations, many of whom are women and reliant on agricultural-based livelihoods, through scaling up the use of modernized early warning systems and climate information and through enhanced disaster risk management at national, sub-national, and local levels. To achieve this objective, GoM aims to mobilize funding for the incremental costs of adaptation investments related to:

- a) Intensifying coverage of the hydromet observational systems and capacities to generate timely, reliable, and geographically relevant early warning and weather forecasting information to respond to and manage climate impacts; this enhanced data coverage will assist in climate vulnerability and risk assessment as part of the process to formulate and implement NAPs.
- b) Enhancing capacities to package, diffuse, and use climate and weather information for disaster response and adaptive planning and implementation of risk transfer mechanisms among public and private sector actors as well as communities.
- c) Mainstreaming and implementing climate risk management across national, sub-national, and local levels to ensure preparedness and urgent response to climate-related disasters.

19. The proposed project will build on existing initiatives (at both national, regional and international levels), including regional African initiatives either through the Southern African Development Community (SADC) or the Climate for development (ClimDev) programme, which is a joint initiative of the African Union Commission(AUC), the United Nations Economic Commission for Africa (UNECA) and the African Development Bank (AfDB). The project will, additionally, complement the following ongoing efforts to address the above investment needs towards GoM's objective: (see Annex II, Feasibility Assessment, Section 4 for further details)

- **“Strengthening climate information and early warning systems in Eastern and Southern Africa for climate resilient development and adaptation to climate change – Malawi” (UNDP, 2013-2017, \$3.6million) (hereafter UNDP EWS project)** funded through Least Developed Countries Fund (LDCF) focuses on 7 disaster-prone districts and aims to establish a functional network of meteorological and hydrological monitoring stations; develop weather and climate information including early warnings and alerts, hazard and vulnerability maps to meet the needs of public and private sector actors; and integrate weather and climate information into national and sectoral plans.
- **Programme Support to Disaster Risk Management (UNDP, PS DRM, 2012-2016, \$ 1.35 million)** focuses on undertaking capacity development at a national, district and community level to reduce disaster risks and shocks to vulnerable communities, contributing to (c) above.
- The **Integrated Flood Risk Management Plan (IFRMP) (World Bank, 2012-2018, \$3.9 million)** for the Shire Basin is a component of the \$100 million World Bank Shire River Basin Management Programme (SRBMP) that supports priorities (a) and (b) above.
- The **Enhancing Community Resilience Project (ECRP, 2011-2016, US\$1.36 million)** is funded largely by the British Department for International Development (DFID). The project focuses on developing flood and drought early warning systems with a focus on mitigation and risk reduction initiatives in 11 vulnerable districts contributing to government priorities (b) and (c) above.
- **The Global Framework for Climate Services (GFCS)** - The Climate Services Adaptation Programme in Africa implemented by World Meteorological Organization (WMO) and Climate Change, Agriculture and Food Security (CCAFS) under the Global Framework for Climate Services (GFCS) is helping develop user-driven climate services for food security, health, as well as disaster risk reduction, and contribute to (b) above. There is no evaluation available of the ongoing project; however, a CCAFS study¹⁶ has assessed these services and delivery.

¹⁶ CCAFS (2015) Which climate services do farmers and pastoralists need in Malawi? Working Paper No. 112. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

Key Barriers addressed by the project

20. The development and dissemination of climate and early warning information and the capacity to use this information for local planning, as well as to take urgent responsive action, is constrained by a number of barriers, as further detailed in Annex II, Feasibility Assessment Section 3.

21. Limited financial, technical and human capacity available for hydro-meteorological services, which has resulted in reduced capacity of DCCMS, DoDMA and DWR to fulfill their core mandates: One of the main reasons for the current state of the climate information and early warning system in Malawi is a lack of public sector support. With limited funding provided to DCCMS, DWR and DoDMA, as well as other engaged ministries, departments and district councils, there has been i) a steady decline in the state of the hydro-meteorological observation networks in Malawi over the last 20-30 years and ii) a limited ability of these entities to issue early warning systems and climate information as per their mandate. There are human and financial capacity and resource limitations constraining expansion of observational network coverage and forecasting as well as appropriate communication and packaging of warnings for local communities. Problems include the spatial and temporal scale of climate information, often not appropriate for decision-making, poor accessibility of information, untimely weather/climate warnings, and lack of explanation of links between locally held and scientific information.¹⁷ These problems are compounded by the low density of hydromet stations and data available to support vulnerability and risk analyses and implementation of risk transfer solutions such as weather index insurance.

22. Limited availability of tailored, sector-specific climate information and early warning products relevant for public and private sector actors: Systematic development of sector-specific information and packaging and dissemination of weather/climate information is still nascent in Malawi, particularly for use in the agriculture and fisheries sectors and for responding to floods and managing water resources. The use of current weather and seasonal climate information by farmers and those undertaking crop and livestock management activities is currently minimal for a variety of reasons, including: the timing when information/advisories are received; the content of the information/advisories (average rainfall change for a seasonal forecast; as opposed to information on onset, cessation and seasonal duration); whether the information is applicable for the local environment; and the ability to interpret information (translation to local languages, scientific concepts and tying in with local knowledge)¹⁷. Forecasts received by fishers are not specific to their lakeshore areas and do not include variables of interest such as wind and wave forecasts, nor warnings of severe weather. Whilst there has been progress on flood forecasting using the Flash Flood Guidance System, forecasts are still for general areas, with no indications of which areas are predominantly at risk, and neither flood nor water resource models are utilised.

23. Lack of access to and awareness of use of early warning and climate information by vulnerable populations for urgent responsive action and adaptation planning: Access to weather/climate information is limited for vulnerable communities as “last mile” dissemination channels are inadequate. At present a range of dissemination methods is used, including radio (national and local), email, television, print media, internet websites, telephone, regional and national workshops and cell phones. There is limited understanding of the effectiveness of these methods and uptake of this information by vulnerable communities, in particular women. This is partly because information, particularly scientific information and concepts, is not understandable or communicated effectively, nor is it clear how to integrate it with local knowledge and socio-cultural and gender-differentiated contexts. Technical and resource constraints limit the capacity of extension services to provide guidance and support adoption of information and products by smallholder farmers and fishers. While the reach of mobile networks is extensive, use of ICT/mobile platforms for EWs and climate information is nascent and faces challenges of technology adoption and cost-effectiveness without scale. There is also limited knowledge generation, sharing, and collective learning to promote awareness and understanding by communities of the importance of weather and climate information and effective use of early warnings.

24. Limited demand and markets for generation and use of climate information at scale across public and private sector actors: Currently, the development and distribution of climate and early warning information products is primarily done by the public sector – driven by DCCMS and relevant line ministries. This has led to a number of

¹⁷ Vincent K., Chanika D., Dougill A.J., Mkwambisi D.D., Cull T., Dixon J., Stringer L.C. (2015) Using climate information to achieve long-term development objectives in Malawi. FCFA policy brief.

challenges, including limited data generated, limited packaging of that data into useful products, and limited ability to disseminate existing products to the private sector. There are limited incentives as well as financing, policy, regulatory and capacity barriers for development and diffusion of climate information/services in Malawi. Sectors important for development, including agriculture, fisheries, energy, transportation, telecommunications, mining, tourism and financial services, need weather information and often lack the access to, or pay higher costs for, this information than could be achieved in collaboration with the hydromet services. Public Private Partnerships (PPPs) can enhance collaboration between DCCMS/DWR and private companies in the collection and analysis of weather data, as well as the communication of the resulting information products and services to the public and business users with specialized data needs. The lack of demand-based, value-added products also restricts private sector engagement.

25. Limited accessibility to early warnings and low capacity at community level to prepare for and respond to climate-related disasters: Communities need to have the appropriate decision-relevant information, as well as gender-sensitive tools, resources and capacity to act upon receiving warnings and advisories. However, decentralized and participatory early warning systems and the capacity to manage them are limited in Malawi. For example, the 2015 flood emergency response highlighted the need for improving the management and effectiveness of district emergency centres. This has led to a limited availability and effective communication of early warnings to communities. According to the 2015 Post-Disaster Needs Assessment, "Decentralisation is key to enhanced preparedness and response and needs to be accompanied by adequate financial and human resources." Currently, except where NGOs are present in the area, most Civil Protection Committees have limited capacity and do not have trained personnel within the villages who can provide support for relocation and rescue activities. Risk assessments and early warning systems are not upgraded and updated to meet the challenges posed by disasters (e.g. the use of automated alerts transmitted from strategically placed sensors directly to communities).

26. This proposed project aims to address the above barriers and improve on the baseline scenario. First, it will enable the use of weather and climate information by the vulnerable communities by expanding coverage of the physical climate and weather observation network. Second, it will help to enhance the capacity of the hydromet staff to generate accurate and timely climate and early warning information. Third, the proposed project will support development and dissemination of tailored information relevant for various sector stakeholders. It will catalyze 'last mile' access for weather and climate information by vulnerable communities through use of ICT/mobile platforms and community outreach channels. Fourth, it will invest in communication, outreach, and knowledge sharing to enable increased awareness and uptake and sustained use of diffused information. Fifth, the project will engage Micro and Small Enterprises (MSEs) in climate-sensitive sectors and service providers such as telecom companies to stimulate demand for specialized information. It will facilitate policy and regulatory support for PPPs and enhance market scope for use of climate information. Finally, the proposed project will establish people-centered, community-based early warning systems to build the capacity of district and community level actors on disaster and climate risk management. The project will use a participatory approach including through sensitization, co-development of information and products, use and evaluation of the products and invest in capacities of institutions and end-users to assure uptake and use of the products by authorities and communities.

27. The main goal of this project is to contribute to climate-resilient sustainable development of Malawi. The project expects to increase the resilience and enhance the livelihoods of the most vulnerable people and communities in the country. The project aims to strengthen the adaptive capacity and reduce exposure to climate risks of vulnerable populations drawing on enhanced generation and use of early warnings and climate information. The project targets rural populations, more than half of whom are women, mainly reliant on agricultural livelihoods and vulnerable to climate disasters and variability. The project expects to result in enhanced capacity of hydromet networks and staff to generate climate-related data and forecast extreme weather and climate change; development and dissemination of tailored climate information/products and decision-support platforms for agriculture, fisheries, and flood risk management; and strengthened capacities of communities for use of EWS/CI in preparedness for and response to climate related disasters.

C.3. Project / Programme Description

28. The proposed project supports GoM to take meaningful steps to save lives at risk from climate-related disasters and enhance resilience of vulnerable populations reliant on agricultural-based livelihoods, many of whom are women. The key component of the project is **Scaling up the use of modernized early warning systems and climate**

information to enhance lives and livelihoods in vulnerable communities. The component comprises three inter-linked “sub-components” (which refer to outputs as per the GCF logic framework) that will (i) Address gaps in the DCCMS and DWR’s existing meteorological and hydrological observation network to ensure spatial coverage and accuracy covering vulnerable and service delivery areas. (Output 1); (ii) Develop and disseminate tailored, demand-based climate information/products/services to support urgent responsive action and adaptation planning for vulnerable populations including farming and fishing communities. Capacities will be strengthened for the service providers as well as end-users to package and assimilate these products to ensure sustained diffusion of EWS/CI. (Output 2); and (iii) Empower the communities to prepare and respond to climate related disasters through participatory and decentralized early warning systems and capacities to implement disaster risk reduction measures (Output 3).

Output 1: Expansion of networks that generate climate-related data to save lives and safeguard livelihoods from extreme climate events

29. The project Feasibility Assessment (attached as Annex II) details the status of infrastructure and current activities to support the use of climate-related information and early warning systems, as well as the gaps and needs which need to be addressed to enhance the delivery of services and products. The capacity and skills required to effectively interpret and analyse measured data to identify climate-related risks and forecast their impacts is also inadequate to provide a sustainable platform for service delivery (as envisioned in Output 2), which is partly linked to the lack of adequate equipment, tools, and human resources/capacity which will be addressed through Output 1. This Output includes two key activities:

- Activity 1.1: Expanding coverage of Meteorological and hydrological infrastructure through installation of AWS, hydrological monitoring stations, lightning detection systems, and lake-based buoys.
- Activity 1.2: Capacity-building of hydromet staff on operations & maintenance, data analysis, modeling, and forecasting.

Activity 1.1: Expanding coverage of Meteorological and hydrological infrastructure through installation of AWS, hydrological monitoring stations and sensors, lightning detection systems, and lake-based buoys

30. This project will support the expansion and scale-up of current Meteorological and hydrological infrastructural investments in targeted districts of Malawi, through the addition of automatic weather stations (for both agrometeorological and rainfall intensity monitoring) and hydrological monitoring stations (for flood forecasting and water resource monitoring), lightning detection sensors (to monitor severe weather) and weather/wave buoys on lake Malawi (to improve severe weather warnings for fishers). These investments build on on-going infrastructure efforts, including that through the UNDP EWS project, and are detailed in Annex II, Feasibility Assessment, Section 5. In particular, the following infrastructure will be established and/or enhanced:

- Hydrological water level stations (37) with telemetry will be procured and installed to improve flood risk monitoring, forecasting and monitoring water resources in areas to which the Operational Decision Support System (ODSS) for flood forecasting and water resource monitoring in the Shire river basin will be extended (See Output 2). These will cover rivers and water resource authorities (catchments) mostly in the central and northern areas, in addition to sensors installed through UNDP EWS project. Automatic Weather Stations (AWS) (34) will be installed in key districts to service both hydrological modelling (i.e. providing information on catchment rainfall for the ODSS) and the need for localised weather data for developing the agricultural advisories (see output 2), and will report/disseminate via DCCMS and DWR. (see Annex II, Feasibility Assessment, Section 2.3)
- Lightning detection sensors (2) will be procured and installed as a proxy for more expensive and difficult to maintain weather radars. They provide information on severe thunderstorms and rainfall for flood forecasting, as well as warnings of lightning strikes and severe weather. This will extend an existing system being installed through UNDP EWS project (installation of 5 sensors), and provide valuable data for developing products that can be combined with existing satellite-based nowcasting systems. This will enable more accurate and timely warnings for fishers over lake Malawi as well as helping forecasters at DCCMS to identify where high intensity rainfall may fall, thus improving their ability to utilise the existing WMO Flash Flood Guidance System (FFGS) and provide more accurate rainfall predictions for use in the ODSS.
- A set of two lake-based weather and wave buoys will be installed on Lake Malawi, to measure weather and wave conditions and provide data and information that is not currently available. This will enable DCCMS to better predict inclement weather, which poses a danger to fishers, as well as improving improve their forecasts of the Lake Malawi region, including the ability to predict Mwera winds. It will also provide weather/wave information, which

will be used as the basis for developing warnings and services for fishers in Output 2. Initially it is proposed to install 2 of these buoys (one in the centre and one in the south of lake Malawi), with a view to installing more once it is demonstrated that the systems and arrangements for operations and maintenance (jointly undertaken with the Malawi Defence Force) work well.

31. Procurement of infrastructure will be through international bidding, though open for local companies. Maintenance and service contracts (for 3 years) are usually bundled in the procurement notices, beyond which O&M is provided by the hydromet agencies through their budget allocations. Data from all observing stations is currently archived in central databases held at DCCMS (currently installing Climsoft) and DWR (Hydrostat) – see Annex II, Feasibility Assessment., Section 2.3.3. Through UNDP EWS project, a Linux cluster system has been established at DCCMS, which will hold the central Climsoft database. However, the establishment of DCICs (see Activity 2.5) allows for a decentralised process (Climsoft databases established at climate centres and local observers trained to analyse climate data) that will be promoted through this project. The target districts for the placement of observing equipment were established through consultations with the GoM, based on requirements to deliver Output 2 services. These infrastructure and the districts in which they will be placed, as well as their geographical coverage (footprint), are detailed in Annex II, Feasibility Assessment and summarized in Annex IX, Figure 1 and 2. Upon project initiation the exact locations for AWS (and target farming communities) within each district will be determined through an analysis of existing risk assessments (on weather/shock prevalence, household insecurity, nutrition, farming systems, etc), as well as consultations with local communities and agricultural extension services.

Activity 1.2: Capacity-building of hydro-met staff on O&M, data modeling, and forecasting

32. Forecasting facilities within DCCMS will be improved through training and implementing new techniques to improve forecasts at the local level. This will include the capacity to use Numerical Weather Prediction tools (enhancing support through UNDP EWS project) and Model Output Statistics applied to internationally available forecast products at DCCMS and the development of satellite-based products, as well as the inclusion of these products into the forecasting decision process (see Annex II, Feasibility Assessment, Section 3.4). This will improve local forecasts by providing objective downscaled and bias corrected data for distribution and use in the tailored products developed through Output 2. These short-term forecasts will allow quantitative assessments of rainfall for planting/farm management decisions, as well as flood risk and warnings to disaster management. Seasonal forecasts will be improved by utilising dynamical seasonal forecasts, as well as the Climate Prediction Tool (CPT), to develop predictions of user-impact variables (e.g. rainfall onset, cessation), where prediction skill allows. These products will also feed into integrated data and information management systems being developed for disaster management through the UNDP EWS project, as well as for developing tailored products for dissemination to agricultural and flood prone communities. Hydromet staff capacities will also be developed for development and communication of information and knowledge products envisioned under Output 2. A long-term benefit will be the production of data and systems for climate hazard, risk and scenario modeling.

33. Currently, DCCMS and DWR develop and submit training plans annually based on the needs for specific trainings. They also conduct refresher courses in use and maintenance of the equipment and generation of information. This activity will align with and build on the training plans of the agencies. Capacity building activities are summarized below (additional details are in Annex XIII, Activity 1.2):

- Training for staff at DCCMS for data rescue of non-digitized data for tailored product development, production of de-biased satellite products to improve accuracy of satellite based estimates of rainfall and severe weather alerts (in combination with lightning data), developing a MOS correction for weather and seasonal forecasts, improved seasonal forecasting techniques (e.g. predicting onset, cessation and user-impact variables), development of climate change scenarios (contributing to the NAP process), as well as the use, operation and maintenance of the lightning detection system.
- Training for staff from DCCMS, DWR and the Malawi Defence Force on O&M of the lake-based weather and wave buoys and to assimilate/combine these data with forecasts to improve the accuracy of forecasts from Numerical Weather Prediction models or international forecasts, as a basis for developing tailored products for fishers.
- Training for technicians at DCCMS and DWR to operate & maintain the installed AWS and hydrological water level stations and associated telemetry systems and calibration of sensors. Training of trainers for both district observers and community-based EWS equipment (including establishing community based responsible technicians) to provide basic maintenance and safety care of the AWS/hydro met stations.

- Training of staff at DWR in the use of flood forecast and water resource models and production of water products (yearbooks etc) for all catchments.
- Training for DCCMS and DWR staff in the development and communication of tailored products (Output 2) for agriculture and fisheries.

Output 2: Development and dissemination of products and platforms for climate-related information/services for vulnerable communities and livelihoods

34. This output builds on and complements the efforts of the LDCF financed UNDP EWS project including (a) generation of weather and climate information and alerts (warnings, integrated cost-benefit analyses and hazard and vulnerability maps) for public and private sector use, b) mainstreaming of weather and CI into operationalization of national sectoral policies, annual budgets, and development plans, c) strengthening of communication channels and Standard Operating Procedures (SOPs) through alert dissemination systems and establishment of a national and sub-national coordination strategy, (c) and development of a business model for revenue streams for the met services. Besides these efforts, there is a significant need to improve dissemination, learning, and knowledge sharing to ensure 'last-mile' access to, awareness, and adoption of weather/climate information by vulnerable communities. This Output will therefore support knowledge sharing and collective learning to improve understanding of weather/climate forecasts and data (including inherent uncertainties), their limitations and how they may be interpreted in light of local knowledge and experience. Risk and vulnerability assessments (such as conducted by the World Food Programme) will be used to clearly identify target users of this information. The tailored products will be co-developed with communities through participatory initiatives and establishment of climate field schools where feasible. This output supports the packaging and adoption of tailored information, stimulating a demand-based model for CI and services to catalyse public and private sector stakeholders, and strengthening knowledge transfer and management through national, sub-national, and local linkages. The key activities under this output are:

- Activity 2.1: Develop tailored weather/climate based agricultural advisories for 14 food insecure districts and disseminate through ICT/mobile, print, and radio channels
- Activity 2.2: Develop and disseminate tailored warnings and advisories for fishing communities of Mangochi, Salima, Nkhata Bay and Nkhotakhota around Lake Malawi
- Activity 2.3: Develop and deploy the flood and water resource modelling and decision support system to enhance coverage for disaster risk and water resource management
- Activity 2.4: Enable a demand-based model for climate information and services stimulating private sector engagement
- Activity 2.5: Knowledge sharing and management for development, dissemination and use of EW and CI to enhance resilience

Activity 2.1: Develop tailored weather/climate based agricultural advisories for 14 food insecure districts and disseminate through ICT/mobile, print, and radio channels

35. The project will build on the pilot intervention being undertaken by the Norwegian-funded GFCS project in Balaka and Nsanje (see Annex II, Feasibility Assessment section 4.11). Discussions with DCCMS (the government lead in the GFCS project) and DoDMA highlighted 14 priority districts (See Annex IX, Figure 3), which are known to be food insecure (see Annex II, Feasibility Assessment, Section 1). Currently, NASFAM (See Annex XIII on details of membership and district coverage) and DAES contribute to the development of content (which is regulated by the national agricultural content development committee for ICT extension) for the 3-2-1 service¹⁸ which allows anyone to access crop advisories through mobile phones. This service will be enhanced to include weather and climate information (seasonal forecast information, weather conditions). NASFAM has also established a two way mobile communications system (using Frontline SMS open source software) in Mchinji and South Mzimba¹⁹ to disseminate information and get quick feedback on service delivery. This enables quick and timely outreach even to remote areas. A similar system has been developed by ESOKO and is used by DAES for interaction with farmers. Agreements with

¹⁸ Human Network International and Catholic Relief Services subsidize the costs to the end-user. An estimated 500,000 farmers nationally use this service.

¹⁹ Currently, there are 1930 NASFAM members in the FrontlineSMS database (392 are from Lilongwe South, the rest are from Mzimba and Mchinji).

telecom operators exist for 3-2-1 and Esoko services but these services do not include weather/climate EWs (see Annex II, Feasibility Assessment, sections 2.3.4 & 4.8).

36. The proposed project will strengthen NASFAM's and DAES' capacity to incorporate climate and weather related information into available communication materials and enable expansion of ICT/mobile platforms. The project will strengthen the engagement of the telecom sector in this service through increased reach and demand for the value-added products (Refer to Activity 2.4). This activity will benefit directly the farmer households that are targeted around 10Km of each AWS installation and the 16000 lead farmers under NASFAM, as well as indirectly benefit the other households in the districts through knowledge sharing as well as the 150,000 remaining members of NASFAM nationally that are provided the information through the lead farmers. An estimated 500,000 farmers avail of 3-21 nationwide and at least half of them can indirectly benefit from the project (as this is not specifically targeted through DAES/NASFAM outreach). Specifically, this activity will include:

- Community-based and gender-sensitive participatory initiatives and sensitisation, including facilitating dialogues with farmers, communities, schools, women, and church groups.
- Capacity building at the district and community levels to provide intermediary support (Extension workers and NASFAM lead farmers) for the interpretation and adoption of new products and information, including co-production of materials and information products.
- Mapping out agricultural areas, farming systems and crop types in target districts and communities, using existing surveys, databases and remote sensing data
- Design and deliver tailored weather/climate and agricultural advisories for assimilation into the 3-2-1, ESOKO, and Frontline SMS services (as well as for range of media including radio, TV and print) given available data and co-exploration initiatives with communities.

Activity 2.2: Develop and disseminate tailored warnings and advisories for fishing communities of Mangochi, Salima, Nkhata Bay and Nkhotakhota around Lake Malawi

37. Department of Fisheries (DoF) emphasized that the information on extreme weather conditions in and around Lake Malawi is currently inadequate and not suitable for planning fishing activities, especially for the majority of fishermen who operate from dugout canoes (and are responsible for 90% of the fish caught). Data on casualties show the impact of extreme weather on lives and property (See Annex XIII, Activity 2.2). Currently fishers receive the general forecast issued by DCCMS, which is a daily forecast of expected general weather (rainfall and temperature) for wide regions (See Annex II, Feasibility Assessment, Appendix B). The proposed equipment in Output 1 (weather/wave buoys and lightning (thunderstorm) detection equipment) will provide enhanced data indicating wave and thunderstorm activity and when extreme conditions are likely to prevail. However, this data needs to be translated into tailored products that will allow fishers to clearly understand and assess the risks, as well as the timing. This activity will support the DoF, in collaboration with the Community Outreach Unit (CoU) and Beach Village Committees (BVCs), in engaging fishing communities in the targeted districts (See Annex IX, Figure 3) to reduce their vulnerability to climate change induced weather patterns. Besides the 30,000 fishers directly targeted, the information will indirectly benefit approximately 30,000 more people reliant on fishing activities (e.g. the fish traders and processors, many of whom are women). It includes:

- Setting up a system to generate and disseminate early warning messages (for safety at sea) and weather advisories targeted to fishers, fish processors, and fish traders in the vulnerable communities of Mangochi, Salima, Nkhata Bay and Nkhotakhota districts²⁰.
- Capacity building for relevant DoF staff and the Community Outreach Unit located in Mangochi (part of the Fisheries Extension Unit) to package and disseminate the information to the targeted communities working in collaboration with the community members of the Beach Village Committees (BVCs) and traditional leaders.
- Promoting dissemination and adoption through community awareness campaigns, including COU mobile units to disseminate messages and trainings, outreach to BVCs, development of communication materials, and enhancing use of community radios.
- Raise awareness of end users in the use of information for responsive action and planning.

²⁰ According to DoF, the fishing communities in Mangochi, Salima and Nkhotakhota districts are highly vulnerable to variations in weather. The districts comprise both small- and large-scale operators (latter mostly in Mangochi). The districts have large areas that are shallow that require fishers to reach deeper areas to access good fish stocks as the shallower areas are generally overfished. This puts the lives of the fishers at higher risk; lack of information on weather variations and early warnings results in accidents and loss of lives.

Activity 2.3: Develop and deploy the flood and water resource modelling and decision support system to enhance coverage for disaster risk and water resource management

38. The proposed project will address a critical need for an integrated flood modelling system to be implemented in additional river systems because flooding in the high risk areas towards the lakeshore (as categorised by DoDMA – see Annex II, Feasibility Assessment, Section 1) is largely dependent on catchment rainfall that falls in the upper reaches. The project will expand the ODSS developed under the IFRMP (see baseline studies) to provide comprehensive modelling and decision support coverage for the river basins and districts in the central and northern regions of the country. The geographical focus for this expansion is summarized in Annex IX, Figure 3.

39. The upper reaches of targeted river systems are found in neighbouring districts which themselves are categorised as low flood risk and have traditionally been neglected in terms of observing/monitoring equipment. The ODSS applied to the whole basin will allow a more holistic approach to flood forecasting, incorporating rainfall and flows from other districts in these areas. This is expected to significantly improve the forecasting of floods, as well as the modelling and monitoring of water resources in these areas, thereby improving information available for drought management, irrigation scheduling and related activities. Through automated procedures (incorporating weather forecasts [with MOS downscaling] and automated monitoring data from the AWS and hydrological sensors), forecasts will be made every 6 hours or less, increasing flood warning lead times from 6 hours or less to 24-48 hours. The improved lead time will allow flood victims to organize the removal of assets, build flood defenses and evacuate the old and infirm. It will also enable emergency services and disaster management more time to requisition supplies and transportation when needed enhancing disaster preparedness and response. This activity will also support capacity building of the DWR and DCCMS to use monitoring data (from AWS, satellites and hydrological gauges), as well as short-term weather forecasts, to forecast floods and water resources. The activity will directly benefit the populations of the flood-risk communities but also indirectly benefit the populations of upper catchment districts with increased monitoring and forecasting of water resources. This will include:

- Extending the hydro-meteorological database and knowledge base system supporting multi-source data capture, temporal and spatial data processing and analysis, and visualization capabilities;
- Adapting multi-disciplinary mathematical modelling tools (including calibration for new catchments), which accommodate a range of weather and seasonal predictions;
- Extending the web-based platform supporting basin wide and community-oriented early warnings; and
- Supporting a sustainable operational framework, including institutional workflow process guidelines, comprehensive education of staff to ensure competent operation and maintenance of all components
- Capacity building for DWR and DCCMS staff to assimilate data from monitoring stations and short-term weather forecasts to forecast floods and water resources

Activity 2.4: Enable a demand-based model for climate information and services stimulating private sector engagement

40. This activity will enhance nascent opportunities for enabling a demand-based model for tailored and sector-specific information. These opportunities are further detailed in Annex XIII, Activity 2.4 and include:

- **Engaging the ICT and Mobile sector:** As detailed in Activity 2.1, the use of 3-2-1, Esoko, and FrontlineSMS services to provide crop advisory and information regarding markets and agricultural practices presents a viable opportunity to enhance collaboration between telecom and NASFAM/DAES to cost-effectively disseminate the tailored information to reach farmers and farming enterprises and extend reach to other sectors and communities.
- **Promoting Micro and small enterprises (MSEs):** MSEs, such as small-holder farmers, agri-businesses, small-scale fishers, commercial scale fishers, fish processors and traders, are a dominant part of the private sector in Malawi. Through demand-based and value-added products tailored for livelihoods, the project creates opportunities to catalyze MSE engagement. Beyond the dissemination of early warnings, the advisories serve as business information that can lead to enhanced productivity and income gains.

41. This activity will support the development of incentives and enabling conditions for participation of the private sector and market development. It will directly benefit the MSEs and telecom sector but also indirectly benefit other sectors through improved, specialized products and market development:

- Address the barriers around legal and institutional arrangements around PPPs to support the participation of private sector actors while contributing to the operational and financial viability of the national hydromet services.

- Explore viable policy and institutional arrangements for potential investments in O&M of infrastructure and dissemination of EWs and CI through private state actors
- Building on hydromet business development plans (existing and revisions through UNDP EWS project) provide technical support to formulation of PPPs
- Promote market development for the tailored products and packaged information viable through enhanced hydromet capacity
 - Review agricultural, water, and fisheries policies on data and information provision for MSEs and private sector
 - Evaluate costs and benefits of accurate, timely and accessible weather and climate forecasts in these and other sectors such as transport, energy, and insurance
 - Undertake market feasibility (including demand and willingness-to-pay assessments) for the developed tailored information for these various sectors

Activity 2.5: Knowledge sharing and management for development, dissemination, and use of EWs and CI to enhance resilience

42. Knowledge generation, sharing, transfer, application, and iterative learning from experiences are critical needs for building resilience through EWs and/or CI. Continued awareness and learning of climate change risks, impacts, and potential response is needed as knowledge and understanding of climate change evolves and the needs and priorities of targeted communities change. Extension support staff require capacity and training to disseminate and target the end users in their districts and/or communities. At the same time, end-users, small-scale farmers and fishermen, need awareness and training to understand and learn how to use the information and advisories. Existing District Climate Information Centres (DCICs) located in Karonga, Kasungu, Salima, Zomba, Mulanje, Nsanje and Chikwawa can serve as knowledge management hubs to link the information and products generated by Outputs 1 and 2 with the end users including the communities preparing to cope with climate related disasters (Output 3). These DCICs have been supported by a number of programmes, including Africa Adaptation programme, the Africa Climate Adaptation and Food Security Project, and the National Climate Change Programme (NCCP), among others. However, there are key constraints to full effectiveness of these centers due to limited financial and human resources. (See Annex XIII, Activity 2.5)

43. The proposed project will strengthen these 7 DCICs. Currently DCCMS and other technical agencies do not have an open data policy, though the inter-agency/sectoral collaborations with agricultural resource centres, BVCs and COUs will promote the sharing of data between government agencies. Additionally all derived products (not the original data) can be distributed and the use of open source databases such as MASDAP²¹ for wider dissemination will be encouraged. This activity can benefit, conservatively, about 30% of the district populations with improved knowledge and awareness. As an ongoing initiative under DCCMS, costs of maintaining and upgrading are being incorporated in the annual budgets. In addition to central budgets, costs are allocated in the hosting districts as well. DCICs will be strengthened through:

- Radio links: Existing partnerships with local radios will be strengthened and new partnerships will be established for disseminating weather bulletins. The DCICs will be linked to rural radios and the DCCMS will also be linked to Malawi Broadcasting Station (MBC) which is the national media house with wider coverage.
- Information materials and awareness activities: Information flows in local language will be established via different instruments and channels (documents, posters, cell phone, radio, awareness campaigns, Disaster Risk Reduction (DRR)/Environmental School Clubs, etc.) to enhance the understanding among end users, focusing on information needs of women. Field surveys and community meetings will be conducted to provide feedback from farmers and fishermen on the information services provided by the DCICs and other information sources. This will be complemented by the use of mobile technologies for two way communications with farmers under Activity 2.1. Translation services will be included to provide information, documentation and materials in vernacular languages.
- Equipment, transmission and delivery facilities. Infrastructure for communication with DCCMS will be strengthened and facilities upgraded to ensure centers are fully operational – including computers for housing databases and statistical analysis software to undertake locally relevant analyses.

²¹ <http://www.masdap.mw/>

- Capacity building for staff: Capacities will be enhanced for staff as well as end users on how to manage, access and use information, including establishment of databases of local weather/climate information (Climsoft) and training on statistical analysis of these data.

Output 3: Strengthening communities capacities for use of EWS/CI in preparedness for response to climate related disasters

44. A recent assessment of the effectiveness of decentralized EWS in Malawi²² has shown that EWS must be people centered and include an end-to-end warning system with a complete set of components that connects those who need to hear messages to others who compile and track the hazard information of which messages are composed. DoDMA intends to learn from and scale-up best practices (see Annex XIII, Output 3) in community-based flood early warning systems in the country (CBEWS). Both communities and local authorities will be empowered to manage and reduce disaster risk by having access to the necessary information, resources and capacities to implement actions for disaster risk reduction.

45. GCF resources will scale up the best practices and ongoing efforts by catalyzing community-based efforts and investments to enhance community readiness to respond to disasters and mitigate the risk they pose. Both communities and local authorities will be empowered to manage and reduce disaster risk by having access to the necessary information, resources and capacities to implement actions for disaster risk reduction. Community members will be engaged in sensitization and capacity will be built through peer-learning, exchange of best practices, training of trainers approach, and engagement on preparedness and response activities through design to implementation to enable behavior change. This Output builds on Outputs 1 and 2 that aim to strengthen the foundation for the development of an EWS working with communities. It will also be situated inside the comprehensive DRR efforts across local, regional and national systems in the country. Implementation will be coordinated with the UNDP PS DRR programme to ensure that the proposed community-based EWS and disaster preparedness measures informs the development of the enabling policies, planning, and information systems being supported under the programme. The key activities under this Output include:

- Activity 3.1: Scale-up community-based EWS in flood-disaster prone areas of Karonga, Salima, Dedza, Nkhotakota, Nkhata Bay, Rumphu, Phalombe and Zomba
- Activity 3.2: Capacity development of national, district and community level actors on disaster and climate risk management

Activity 3.1: Scale-up community-based EWS in flood-disaster prone areas of Karonga, Salima, Dedza, Nkhotakota, Nkhata Bay, Rumphu, Phalombe and Zomba

46. Community based approaches for establishment of the EWS recognize that the first response to a disaster always comes from the community itself and therefore empowers communities to develop resilience to risks and disasters. This activity will directly benefit about 115,000 people in the target districts (See Annex IX, Figure 4), but can also indirectly benefit the neighboring communities through knowledge sharing and learning related to disaster and climate risk management. The activity will incorporate best practices such as proper linking of up-stream and down-stream communities (through Civil Protection Committees (CPCs)), using schools to disseminate early warning messages to communities, and using local communication channels based on local knowledge. This activity will support:

- Awareness raising at the community level on hazards and vulnerability: The installation of the EWS needs to be preceded by community sensitization on the prevailing hazards and their vulnerability. This activity will create awareness at community level on the intended capacities to ensure security and effective use of the infrastructure. Additional information will be gathered through gender-sensitive surveys on local perceptions of vulnerability to allow a more nuanced and gender-disaggregated view of those at risk. Discussions will involve schools, as well as local women and church groups to ensure a broad set of views are incorporated. Local climate schools will provide training on climate variability and change in larger communities.
- Installation of automated rainfall and hydrological monitoring and telemetry systems in the targeted districts: Installation of automated telemetry systems can lead to more accurate estimates of water levels and hence flooding extent, as well as providing adequate lead time for warnings and enabling emergency procedures to proceed in time. These monitoring equipment will be placed in upstream locations which communities will identify

²² GoM (May 2015) Decentralized Early Warning Systems in Malawi.

as being indicative of flooding which happens downstream, as well as areas where the community will take responsibility for their security. Communities will be trained to provide basic maintenance and servicing of infrastructure (though DCCMS and DWR will be responsible for maintaining the equipment) and consistent and effective monitoring.

- Implementation of risk reduction and management measures: This activity will leverage local indigenous knowledge to implement DRR measures such as simulation training (e.g., using schools as an entry point), evacuation drills and EW testing, emergency response training, and establishment of appropriate communication channels to strengthen the capacity of at-risk communities to receive, analyse and act-on warnings in a timely manner. These measures will focus on needs and vulnerabilities of women to ensure their participation and preparedness.
- Implementation of the existing DRM communication strategy: This activity will support the implementation of the national DRM communication strategy that provides key messages for preparedness and includes EWS as one of the key components. It will promote dissemination of EWs through various communication channels (text messages, blowing of horns/megaphones, drums, radios and TV) for different audiences.

Activity 3.2: Capacity development of national, district and community level actors on disaster and climate risk management

47. The 2015 flood emergency response exposed gaps in capacities at the district and local levels in dissemination of EW information and response. This was particularly noted in the limited capacity and effectiveness in the use of the Cluster System²³ as well as management of the district emergency centers. The Cluster System had just been introduced in the districts that were affected by the January 2015 floods without proper orientation/training of the district councils. Similarly, Emergency Operation Centers (EOCs) were opened in these districts without any orientation/training of the district council on the running and management of the EOCs. EOCs are currently focused on emergency response and do not consider longer term planning e.g. there is limited capacity at the district level to interpret seasonal forecasts of droughts or floods and to disseminate weather/climate-based EWs through Area Civil Protection Committees (ACPCs) and Village Civil Protection Committees (VCPCs)

48. Furthermore, the first responders of any emergency in the country are the community members led by the ACPCs and VCPCs. Most of the members have not been trained in both climate risk management and DRM leaving them vulnerable and ineffective in managing and responding to disaster risks and making provisions ahead of time in light of weather and seasonal forecasts (as distributed by DCCMS through the DCICs). This activity will address capacity barriers at the local level and empower districts and communities to ensure 'last mile' reach and effectiveness of EWs and climate information generated and disseminated through the national and sub-national systems. Capacity building efforts will also be linked to the knowledge management hubs established and utilized through Output 2. This Activity will include:

- Strengthening the Emergency Operation Centers (EOCs): EOCs are critical to planning for disaster preparedness (evacuation plans, contingency plans, media information, etc.), monitoring disasters, mobilizing resources to manage them, and coordinating with relevant stakeholders on DRM activities. Under the current UNDP PS DRM and UNDP EWS programmes, several EOCs will be established; however there are funding and capacity gaps to ensure full and effective operation of these centers. This activity will build upon the efforts of these projects and strengthen the operations of EOCs including:
 - Upgrading the EOCs: equipping them with satellite phones, GPS, computers, emergency lights, GIS information system, and high speed internet
 - Development of operational guidelines for the EOCs
 - Training for staff of EOCs in operations and management of EOCs as well as use of climate information in preparedness activities
 - Learning tours for regional knowledge sharing

²³ Following the declaration of a state of disaster, the GoM, through DoDMA, activated the 'Cluster System' to coordinate disaster responses across sectors. Part of a humanitarian system, the **Cluster Approach**, initiated by the **United Nations Inter-agency Standing Committee (IASC)** in 2005, operates at two levels. At the global level, the aim is to strengthen system-wide preparedness and technical capacity and ensure predictable leadership and accountability in the main eleven sectors. At the country level, the aim is to ensure a more coherent and effective response by mobilising agencies to respond strategically across all key sectors. In this approach sector-specific activities in emergencies are coordinated through the relevant cluster.

- Capacity building of national, district and community level actors on disaster and climate risk management: National and sub-national actors including DoDMA staff, District Civil Protection Committees (DCPCs) and community members will be trained in the disaster-risk priority districts and where CBEWS systems will be installed through Activity 3.1 (Karonga, Salima, Dedza, Nkhotakota, Nkata Bay, Rumphi, Phalombe and Zomba). The national and district level officers of DoDMA will be trained in the use of the cluster system in emergency response, as well as setting, running and management of district EOCs. EOCs will also function as core channels for utilising climate risk management approaches e.g. building resilience through identifying appropriate flood and drought management options based on weather/climate forecasts distributed through the DCICs. Capacity will be built at the Area and Village levels by training of ACPCs and Village Civil Protection Committees (VCPCs) in these target districts. The activity will ensure women participation in the training activities. These include:
 - Short courses (ToT approach) for 10 national and 15 district level staff in DoDMA as well as the EOC staff in the areas of disaster risk management, climate change and climate risk information/early warning information and practices (local, regional, and international), and use of the cluster system.
 - ToT approach to train at least 50 district officers in the DCPCs (which include government and civil society members).
 - Training for at least 200 community members (through ACPCs and VCPCs) on disaster risk management (DRR, preparedness and response), climate change, and utilising early warning information facilitated by DoDMA, DCCMS and DWR.

C.4. Background Information on Project / Programme Sponsor

49. The Disaster Management Affairs in the Department of Disaster Management Affairs (DoDMA) of Malawi is the sponsor for the proposed project. DoDMA is a Government agency in the Office of the President and Cabinet and is mandated to coordinate and oversee disaster risk management programs and projects being implemented by various stakeholders in the country, with the aim to build and improve resilience of households, communities and the nation to disaster risks. The Department was established in 1994 by the DPR Act (1991), which was enacted after the Phalombe floods catastrophe to coordinate and implement measures to alleviate effects of disasters. The Act emphasized establishing the institutional functions required for the coordination of disaster risk management programmes and activities in the country, comprising: i) the Secretary and Commissioner for Disaster Management Affairs in the Department of Disaster Management Affairs (DoDMA); and ii) the National Disaster Preparedness and Relief Committee (NDPRC), Civil Protection Committees (CPCs). The DoDMA has an annual operation and maintenance budget of US\$253,515.

50. DoDMA acts as the mouthpiece through which weather related early warning messages are announced by the DWR and DCCMS. The NDPRC provides policy level guidance to DoDMA and is responsible for coordinating the implementation of measures to alleviate disasters, while the Civil Protection Committees constitute the frontline decentralized institutions at the Area and Village levels (ACPC and VCPC), providing community level coordination of preliminary disaster impact assessments in the affected communities before any relief operations are initiated. These institutions also serve as entry points for any dissemination of disaster early warning information at the community level. DoDMA is coordinating a number of projects and programmes including the UNDP PS DRR, UNDP EWS, and the Malawi Floods Early Recovery Programme funded by World Bank. It has successfully implemented projects in partnership with UNDP. It has undergone a capacity assessment of its financial procedures and standards and has met the UNDP requirements to manage the project of funds on its behalf. In the context of several UNDP supported projects, DoDMA had been fulfilling its responsibilities for all requisite functions according to the management arrangements, including developing implementation and annual work plans together with the District Councils of the target districts; ensuring overall coordination of the project including joint supervision with UNDP of activities implemented through other responsible parties of the project (Line ministries, NGOs, etc.); supervision of the activities coordinated by the District Councils of the priority districts; appropriate use of funds which are advanced to DoDMA in line with the approved budget and annual work plan; accurate accounting and timely reporting of the use of project funds; and monitoring the achievement of results and providing timely progress reports.

51. **Financial status and project support:** DoDMA receives operational funds for disaster response and also manages contributions for DRR/DRM projects with development partners such as UNDP, DFID, and Irish Aid. To date, DoDMA has managed a maximum of USD900,000 per annum. State budget allocations for DoDMA typically range from USD130,000 to USD170,000. For 2015, DoDMA has received an annual allocation of USD620,000 from the government for implementation of recovery programmes in response to the flooding that occurred In January. Detailed

financial assessment has been carried out by UNDP as part of the capacity assessment. DoDMA, as the Implementing Partner, will provide project management support for the project. In addition to carrying out the responsibilities for the functions outlined above, through its cofinancing commitments, DoDMA will support O&M, staff capacity and time, and infrastructure and facilities for project implementation.

C.5. Market Overview (if applicable)

52. The products generated by the project include tailored agricultural advisories, fisheries warnings and advisories, and a flood and water resource modeling and decision-support system. These value-added products are relevant for: (a) MSEs such as small-scale farmer enterprises, agri-businesses, small-scale fishers, commercial fishers, fish processors, and fish traders; (b) Public sector agencies and private service providers in sectors such as agriculture, fisheries, energy, transportation, telecommunications, mining, and tourism. Agro- and hydro-meteorological information is used for informing integrated farm management, water resources management, and energy production, transportation, etc. Finance and insurance services provision could also be tied to hydromet data and tailored products.

C.6. Regulation, Taxation and Insurance

53. There are no applicable licenses or permits for the implementation of the project. In addition, there are no tax implications or regulations applicable to meteorological and hydrological infrastructure. Hydromet departments are responsible for the establishment and calibration of infrastructure and have dedicated engineering units who do this work. There is no licensing or permitting authority for hydromet infrastructure in the country. For activities related to procurement of services, including training, through UNDP, according to the SBAA signed with the GOM, taxes are not applicable. Section 7 of the Convention on the Privileges and Immunities of the United Nations provides, inter alia, that the United Nations, including its subsidiary organs, is exempt from all direct taxes, except charges for utilities services, and is exempt from customs duties and charges of a similar nature in respect of articles imported or exported for its official use. If the services are procured directly by the GOM implementing partners, then the national procedures apply, which entail the payment of the Domestic Tax (VAT) amounting to 16% where applicable (e.g. venue and food for training).

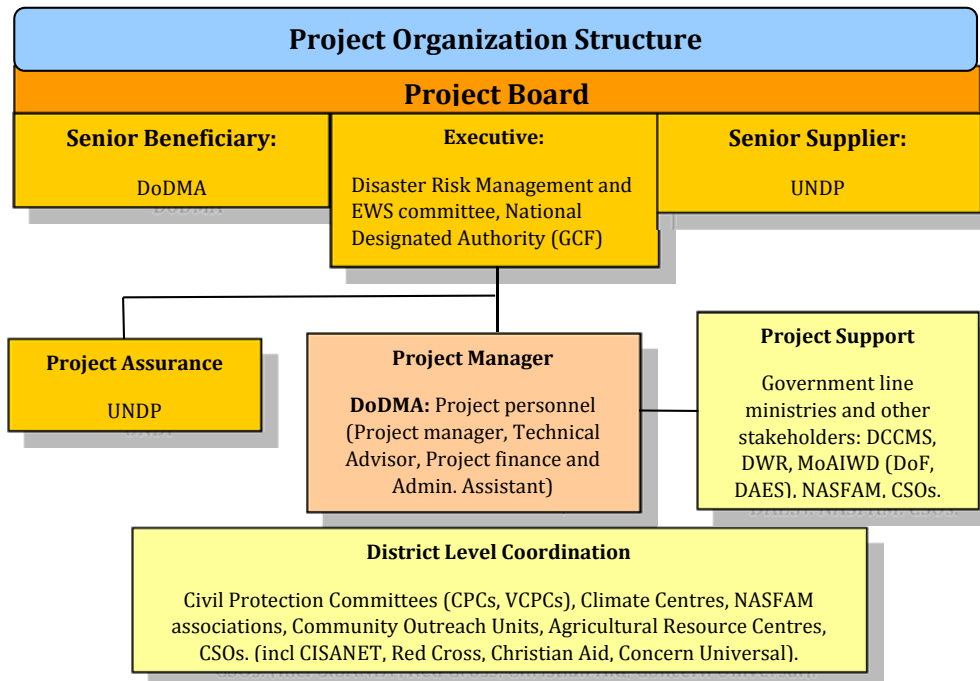
C.7. Institutional / Implementation Arrangements

54. The project will be implemented following UNDP's National Implementation Modality (NIM), according to the Standard Basic Assistance Agreement between UNDP and the Government of Malawi, the United Nations Development Assistance Framework (UNDAF) Action Plan for Malawi (see <http://www.mw.one.un.org/wp-content/uploads/2014/04/UNDAF-Action-Plan-2012-2016.pdf>), and policies and procedures outlined in the UNDP POPP. (see <https://info.undp.org/global/popp/ppm/Pages/Defining-a-Project.aspx>) The national executing entity - also referred to as the national 'Implementing Partner' in UNDP terminology - 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 Standard Basic Assistance Agreement (SBAA), together with a UNDP project document²⁴, which will be signed by the Implementing Partner to govern the use of the funds (once the funds are secured). The Standard Basic Assistance Agreement (SBAA) was signed with the GOM on July 15th 1977.

55. The Implementing Partner for this project is Disaster Management Affairs in the Department of Disaster Management Affairs (DoDMA). DoDMA is accountable to UNDP for managing the project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of UNDP resources. The following parties will enter into agreements with DoDMA to assist in successfully delivering project outcomes and are directly accountable to DoDMA as outlined in the terms of their agreement: DCCMS, DWR, DAES, DoF, and NASFAM. A stakeholder engagement table and map elaborating on the roles of these partners are provided in Annex XIII (Section IV). The management arrangements for this project are summarized in the chart below:

²⁴ An example of a signed project document (cover page) is provided at http://cfapp2.undp.org/gef/documents/1/q4958/q2_19062/Prodoc_Signature_Page_for_PIMS_4958.pdf

A sample letter of agreement between IP and Responsible Party is provided at http://cfapp2.undp.org/gef/documents/1/q4710/q2_19222/2013-12-04_MoU_LDCE2_Final_Signed.pdf



56. **UNDP's overall role** as an Accredited Entity is to provide oversight and quality assurance through its Headquarter and Country Office units. This role includes: (i) project preparation oversight; (ii) project implementation oversight and supervision, including financial management; and (iii) project completion and evaluation oversight. It also includes oversight roles in relation to reporting and knowledge-management. The '**project assurance**' function of UNDP is to support 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 has to be independent of the Project Manager; therefore, the Project Board cannot delegate any of its assurance responsibilities to the Project Manager. A UNDP Programme Officer, or M&E Officer, typically holds the Project Assurance role on behalf of UNDP. The '**senior supplier**' role of UNDP is to represent the interests of the parties which provide funding and/or technical expertise to the project (designing, developing, facilitating, procuring, implementing). The senior supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project. The senior supplier role must have the authority to commit or acquire supplier resources required. If necessary, more than one person may be required for this role. Typically, the implementing partner, UNDP and/or donor(s) would be represented under this role.

57. The **Project Board** is comprised of the following organisations: Disaster Risk Management and EWS Committee²⁵, DoDMA, and the NDA for GCF. As the Senior Beneficiary, the implementing partner is part of the board. Furthermore, as the Senior Supplier, UNDP provides quality assurance for the project and ensures adherence to the NIM guidelines. The Project Board²⁶ is responsible for making, by consensus, management decisions when guidance is required by the Project Manager. Project Board decisions will be made in accordance with standards that shall ensure management for development results, best value money, fairness,

²⁵ Secretary and Commissioner for Disaster Management Affairs, Secretary for Environmental Affairs and Climate Change Management, Director of Meteorological Services and Climate Change, Secretary for Agriculture, Food Security and Irrigation (Both PS' for Water Development and Irrigation and Agriculture and Food Security), Secretary for Economic Planning and Development, Secretary to the Treasury, Secretary for Local Government and Rural Development, Secretary for Lands and Housing, Secretary for Health, Surveyor General, UNDP Resident Representative, Country Representative, DFID - Country Representative, World Bank, Chairperson, Civil Society Network on Climate Change, Secretary General, Malawi Red Cross Society.

²⁶ Sample ToR for Project Board: http://cfapp2.undp.org/gef/documents/1/q5710/q2_20672/PIMS3603TORProjectBoard.pdf

integrity, transparency and effective international competition. In case a consensus cannot be reached within the Board, final decision shall rest with the UNDP Programme Manager (Mia Seppo). The Project Board will meet three times a year.

58. The **Project Manager**²⁷ will run the project on a day-to-day basis on behalf of DoDMA within the constraints laid down by the Project Board. The Project Manager function will end when the final project terminal evaluation report and other documentation required by the GCF and UNDP has been completed and submitted to UNDP. The Project Manager is responsible for day-to-day management and decision-making for the project. The Project Manager's 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.

59. **Project Support** comprises stakeholders including relevant government ministries and departments at national level and local government with local offices in the districts (DCCMS, DWR, MoAIWD), the community members from targeted districts, the civil society and other local and international NGOs. **District level coordination** of project activities will be done through the Directorate of District Planning which is headed by the Director of Planning and Development (DPD). The DPD will be the overall coordinator of the project at the district level. District level planning is further informed by decentralized structures such as the Village Civil Protection Committees (VCPC) and Civil Protection Committees (CPC). VCPCs comprise community members of the village and enable the collective community expression and information sharing. The CPCs (also comprised of community members) coordinate and operate as vehicles of transmitting information and represent communities in decision-making at the District level. Malawi also has Ward Councillors, who as community members, are involved in decision-making at the District level on projects and utilisation of funding based on vulnerable community needs, concerns and interests.

60. Local stakeholders and community members have a key role in the implementation and monitoring of the project. During the inception phase of the project, DODMA working together with UNDP, will consult with all stakeholders, including vulnerable community members, VCPCs, CPCs and the Ward Councillors, and facilitate an understanding of the roles, functions, and responsibilities within the Project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The project Logic Framework (indicators, means of verification, assumptions) will be reviewed and the quarterly and annual plans will be refined engaging the communities from the targeted districts. The stakeholders will also be engaged during the mid-term and final evaluations to assess the progress of the project and enable adaptive project management in response to the needs and priorities of the communities targeted. Community participation will be tracked through tools developed by the project management recognising the existing decentralised government structures to implement the project and the role and views of the community members. Community representation in the Board is through the decentralized structure of the IP, DoDMA.

C.8. Timetable of Project/Programme Implementation

61. Timetable of Project Implementation: The implementation schedule with detailed activity progress timeline and output completion is provided in Annex X. Implementation of the project will follow a schedule that will install all the monitoring equipment in the first 3 years by the time of the midterm evaluation. Whilst some products/services will be dependent on the monitoring equipment and data they collect, efforts to derive and develop new products/advisories/warnings will start immediately upon commencement of the project. This is to ensure that enough time is devoted to co-exploration and sensitization efforts with communities and users of the climate products, so that their views and requirements are taken into account during development. Where products will rely on data from equipment that has yet to be installed or reach a long enough record to be useful, examples will be developed for locations where sufficient data is available and used to explore user/community requirements. Some climate products

²⁷ Sample ToRs for project manager: http://cfapp2.undp.org/gef/documents/1/q5710/q2_20672/PIMS3603TORProjectManager.pdf;

Sample ToR for Project Administrative and Financial Assistant:

http://cfapp2.undp.org/gef/documents/1/q5710/q2_20672/PIMS3603TORProjectFinanceAdmin.pdf

will start to be used when they are available before the project midterm, with all developed and used operationally during years 4 and 5 during which time they will be evaluated thoroughly. The final year of the project will be used to re-design the products to include feedback from users and incorporate any of the new data sources that will have become available. The products will be further tested, refined and operational procedures defined to ensure long term sustainability after the project ends. This approach to product development will ensure that the effectiveness of early warnings will improve from the project outset and there will be improvements in flood warnings (through the ODSS and CBEWS) and weather forecasting by the time of the mid-term assessments ensuring early project impacts and further development, refinement, and incorporation of tailored climate information (including for agricultural and fisheries advisories) will enable long-term adoption and impacts.

D.1. Value Added for GCF Involvement

62. Without GCF involvement to complement ongoing efforts and address gaps, GoM cannot take adequate steps to help vulnerable communities adapt to climate-related disaster risks and impacts. GCF support enables additional investments that allow scaling up existing efforts for transformative reach and impact across the country. GCF involvement is critical to:

63. **Address gaps and barriers to financing:** At present, domestic finance for enhancing climate and early warning systems is negligible in Malawi. A review of the expenditure for the DRM sector during 2006/7 and 2011/12 years revealed that the expenditure incurred through the national budget amounted to US\$4 million. Development partner funding during the same years amounted to about US\$50 million. While improving the disaster risk management systems for the sectors and enhancing dissemination and use of EWs is a key priority for the government given its frequent exposure to and impacts from floods and droughts, implementation is constrained due to limited resources (both financial and human) among the relevant national, sub-national and local level actors. Without GCF supporting the incremental costs of adaptation, adaptation efforts in the country will be constrained, leaving the populations vulnerable to the frequent climate-related disasters the country has been facing. As an LDC and a low-income economy, Malawi is also unable to incur costs of financing of debt instruments and requires maximum concessionality through GCF grants to undertake adaptation measures. There are no other current funding sources available, including from the LDCF or SCCF, for Malawi to draw upon.

64. **Crowd-in other financing both from public and private sector actors and mobilize adaptation investments at the community level:** Modernization of early warning and climate information services will be facilitated by the project, which then creates conditions for investments by public and private sector actors to package and use this information to serve specialized needs across sectors and businesses. The project will remove barriers including those related to adoption to new technologies and practices such as ICT/mobile technologies for EWs and weather advisories. The project will provide the private sector (telecom, small-scale farmer enterprises and fisheries, agri-businesses, commercial fishers, fish processors, and fish traders) with the weather and climate information that is required to make informed decisions to increase productivity and make medium and long term investments. GCF involvement and its ability to leverage public and private sector financing through reduction of barriers for such investments promotes ownership and long-term financial sustainability of the investments and their impacts. In particular, the strengthening of GoM's capacity to modernize its hydromet systems and stimulate an ecosystem of weather and climate information and services creates conditions for enhanced budgetary support and financial viability in the long-term.

65. **Impact highly vulnerable populations:** As noted in Section C.1, over 85% of Malawi's population lives in rural areas and about 56% of them live in poverty. A majority of the population is engaged in smallholder, rain-fed agriculture. The impacts of climate-related hazards in Malawi have already severely disrupted food production, led to the displacement of communities, loss of life and assets, and caused an overall reduction of community resilience, especially affecting women, who are the most vulnerable to climate change impacts. The proposed project is focused on ensuring that the early warning systems and climate information generated by the observational networks is tailored to protect the lives and livelihoods of the rural and vulnerable populations in disaster prone, food insecure, and marginal communities. GCF involvement is critical to scaling up existing efforts and engendering a paradigm shift for sustained generation and use of EWs and CI for enhanced resilience of these populations.

66. Without the proposed project, GoM cannot mobilize development of the national and sub-national systems to provide the requisite information for reducing mortality for its disaster prone populations and decreasing risks on agriculture based livelihoods among small holder farmers and fishers, more than half of whom are women.

D.2. Exit Strategy

67. The proposed project has been designed through extensive consultations and involvement of government, public sector, private sector, NGOs, and CSOs to ensure ownership of the interventions and effectiveness of their impact. Relevant government departments (national and sub-national level), as well as local communities, have been involved in the proposed design and will be leading on implementation of project interventions. This participatory approach has been initiated through collaboration on developing the Feasibility Assessment (Annex II) as well as design of the proposed measures. Building on this foundation, the project ensures that the investments as well as the results are sustained beyond the project duration and for the long-term through the following:

68. Leveraging domestic financing: Domestic resource allocations for the project creates ownership and enables capacity for sustained O&M of the infrastructure as well as planning and management of the generation and use of the products. The proposed project ensures that these activities strengthen the delivery of the mandates of the relevant government agencies and public sector actors. DCCMS and DWR are investing in enhanced staff capacities that will allow these agencies to not only operate and maintain the infrastructure beyond the project time frame but also to plan for new investments and continue to upgrade the technical capacity for data analysis and forecasting. Hydromet agencies have also committed to undertake replacement of equipment such as the community based hydrological sensors through budget investments and will establish SOPs between them and the communities. As the Implementing Partner, DoDMA is investing in enhanced coordination with other stakeholders, project management, and staff capacity for disaster risk management. Furthermore, DAES, NASFAM (non-state actor) and DoF are financing extension support, communication, and messaging to reach vulnerable farming and fishing communities. Furthermore, the project will address the barriers around legal and institutional arrangements around PPPs to support the participation of private sector actors while contributing to the operational and financial viability of the national hydromet services.

69. Ex-post plan for Operations and Maintenance of observing equipment: An O&M plan (project and for 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 Assessment section 5 (Annex II). The plan reflects GoM's vision and commitment for the long-term sustainability of the project activities and outcomes. This will be further refined during project inception and implementation, based on a more detailed examination of current human and financial resources, as well as an accurate estimate of the required increases needed to service the equipment. 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 the human resources, tools, equipment and travel (including site visits) for O&M initially, with a decreasing contribution to these activities towards the end of the project lifetime, after which domestic financing (from the budgets of designated authorities) will continue to support O&M. For this purpose it is planned that both DCCMS and DoF will finance O&M costs associated with lake-based buoys, DCCMS will finance the lightning detection system, DCCMS will finance AWS costs, DWR will finance O&M associated with hydrological stations, and DoDMA will finance O&M associated with the community based rain gauges and water level sensors. The first three years after installation of each set of equipment, spare parts will be covered through bundled maintenance contracts with suppliers. Project resources also include a provision for spare parts to be procured during the last 2 years of the project, which will last beyond the lifetime of the project and are to be used once servicing and maintenance contracts with suppliers have been terminated. There may yet be requirements for spares post-project and these will be supported through domestic financing. Training for O&M will be funded through GCF resources for the lifetime of the project and will not be needed after the project is completed (a train the trainers approach will ensure adequate capacity to train new employees is left in each institution. Contingency funding (for unforeseen events e.g. floods washing away equipment, lightning strikes, vandalism etc) is provided for each of the 6 years of the project. Letters of commitment towards the O&M for project duration and post-implementation (in line with O&M schedule above and detailed in the Feasibility Assessment Annex II) have been provided by DCCMS, DWR, DoDMA, and DoF and appended in the Feasibility Assessment, Annex II.

70. Capacity building: The proposed project invests in building country capacities for generation and use of EWS and CI. The focus of these activities is on ensuring that there is knowledge and skills transfer as well as peer-to-peer learning (e.g. through ‘training of trainers’). Improving forecasting capacity and expanding trained personnel and equipment to operate and maintain the CI and EWS creates the conditions for hydromet agencies to sustain the generation and use of these systems beyond the project time frame. The project also addresses the barriers around legal and institutional arrangements around PPPs to support the participation of private sector actors while contributing to the operational and financial viability of the national hydromet services. MoAIWD’s agricultural and fisheries extension support systems will be strengthened to package and diffuse tailored products; this would enable iterative development and adaptation of the products beyond the project. Training of district councils on operationalization of the Cluster System for DRM will also engender long-term capacity for disaster planning and response. Outreach, engagement, and capacity building of communities and MSEs in the agricultural and fisheries sector as well as the sensitization and training of communities for O&M of CBEWS will ensure communities continue to monitor, prepare for, and respond to disasters beyond the project lifetime. By strengthening last-mile access, the project facilitates effective adoption and use of these systems, which will ensure sustained participation, as well as replication of best practices after the project.

71. Strengthening demand-based model for CI/products: Developing value-added products tailored to agricultural and fisheries that enable livelihood planning and lead to economic and social benefits is foundational to creating a sustainable ecosystem of CI and services catalyzing business opportunities and private sector engagement. NASFAM aims for its members – at the very least, the MSEs and agri-businesses – to value the ICT/mobile services. Through outreach, training, and support, NASFAM foresees that the willingness-to-pay for the tailored agricultural advisories will increase over the duration of the project. There is also potential to both reduce the costs of these services over time through negotiated bundled costs as the reach of the services scales as well as incentivise cross-subsidization for the CI service through packaging with other services offered by the mobile platforms. The project will explore and facilitate these mechanisms through Activity 2.4. There is a value-proposition in the information produced through bulletins and yearbooks through DWR based on the expanded flood and water resource use modeling and decision support systems. This information is valuable for the energy sector (for e.g. hydropower planning), water boards (for water supply systems), and water resource management across other sectors. Through Activity 2.4, market feasibility studies will be developed to explore demand-based, sustained generation and use of these products to meet specialized needs of wider set of public and private sector actors in the long-term.

72. Learning and knowledge management: The project strengthens knowledge generation, transfer, and collective learning to ensure long term sustainability of the resilience building activities and impacts. Through extension support, awareness raising, and community level engagement on use of tailored products and community-based early warning systems, the project promotes participatory and peer-to-peer learning. The District Climate Information Centres (DCICs) will also catalyze knowledge management and sharing acting as learning pathways fostering a culture for information sharing on climate change risks, impacts, and best practices in adaptation and risk reduction for replication and scale across communities. Knowledge generation, sharing, and management through the DCICs not only strengthens the linkages across the national, sub-national, and local levels for diffusion of CI, but it also promotes feedback and adaptive learning to increase the resilience of the populations as climate change risks and impacts evolve.

73. Policy and legal frameworks: The proposed project contributes to the operationalization of key national policies including MGDS, NCCIP, and NDRM policies as well as to the mainstreaming of weather and climate information into the national policies, annual budgets and local development plans, including the National Disaster Risk Management Policy and district development plans supported with UNDP leveraged financing. Furthermore, the data and knowledge will inform decision-making and strengthen the frameworks for disaster risk management (through the EOCs, District Cluster System, etc.). Through this support, the proposed project ensures that the capacities and infrastructure built will continue to be relevant, sustained, and scaled through mobilization of domestic and external financing for long-term 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

74. The project incorporates lessons learned and best practices from several successful international efforts, to enable transformative impact through the scale up of the use of early warning systems and climate information in Malawi. Key lessons and success factors drawn include: i) the use of lower-cost monitoring stations and private sector partnerships in the Philippines²⁸; ii) the effectiveness of community-based flood early warning systems in Mozambique²⁹; iii) strengthening cooperation between NHMS and disaster management agencies in Mozambique³⁰; iv) warnings which save the lives of fishers on Lake Victoria³¹; and v) the critical importance of community-based organizations and volunteers for distributing and organizing responses to early warnings in Bangladesh, Philippines, Cambodia and Vietnam^{32,33,34, 35}.

75. Furthermore, the project focuses on improving the generation, packaging and communication of climate-related information, which has been shown to be critical for the understanding and uptake of flood warnings in Bangladesh³⁶, and agricultural advisories throughout Africa³⁷. Additionally the project emphasizes a participatory approach mechanisms to engage farmers in the co-development of warning and information products, which is critical for uptake³⁷. The use of flood forecasting models, improved meteorological forecasts and mobile phones for dissemination, as incorporated in this proposal, has been shown to improve the lead-time of flood warnings by several days and avoid significant damages in Bangladesh^{38,39}. The project is also backing such advances with critical and targeted investments in the capacity of the NHMS to observe and forecast these hydro-meteorological risks, as demonstrated by PAGASA in the Philippines⁴⁰.

76. Comparable efforts (EWS, climate information, and community-based DRM) have shown effective impact related to saving of lives, assets, and livelihoods. In Nepal, the community based EWS directly benefit over 80,000 people in communities around river basin systems⁴¹. Advanced EWS systems are estimated to be 100% effective in reducing loss of life by cyclones, 60% effective for floods, and 20% effective in case of drought. (Teisberg and Weiher (2009)). In Bhutan, EWS project has enhanced capacities of district and local level authorities and communities in disaster risk and climate risk management.⁴²

77. The project will directly contribute to climate-resilient sustainable development of Malawi. Overall, the project will contribute to Fund level impact of increased resilience and enhanced livelihoods of the most vulnerable people affected by climate related disasters and variability. Please refer to the Project Logframe and Economic Analysis for the assumptions and estimates of the impact potential. Contributing to the Fund Level impacts:

²⁸ <http://weather.com.ph/>

²⁹ http://www.preventionweb.net/files/2919_LosterFloodwarningSystemIntoAction02Mozambique2007.pdf

³⁰ http://www.wmo.int/pages/prog/dra/documents/CDSCaseStudy_Mozambique_V2_Withpictures.pdf

³¹ http://www.wmo.int/pages/prog/wcp/cop16/documents/VCP_factsheets_3_Victoria_EN.pdf

³² IFRC (2006) Red Cross Red Crescent Good Practices in Early Warning. Geneva: IFRC.

<https://www.ifrc.org/Global/Case%20studies/Disasters/cs-earlywarning.pdf>

³³ http://lib.icimod.org/record/26938/files/c_attachment_747_5976.pdf

³⁴ IFRC (2012) Community early warning systems: guiding principles. <https://www.ifrc.org/PageFiles/103323/1227800-IFRC-CEWS-Guiding-Principles-EN.pdf>

³⁵ <https://docs.unocha.org/sites/dms/Documents/Lopez-%20Increasing%20Flood%20Early%20Warning%20and%20Response%20in%20San%20Mateo%20Philippines.pdf>

³⁶ http://pdf.usaid.gov/pdf_docs/Pdacl719.pdf

³⁷ <https://cgspace.cgiar.org/rest/bitstreams/52685/retrieve>

³⁸ <http://www.rimes.int/em/wp-content/uploads/2013/06/Quarterly-Report-April-June-2013.pdf>

³⁹ <http://www.rimes.int/em/weaver-in-sirajganj-bangladesh-received-innovative-voice-flood-warning-messages-on-his-mobile-phone/>

⁴⁰ http://www.preventionweb.net/files/33988_countryassessmentreportphilippines%5B1%5D.pdf

⁴¹ http://practicalaction.org/page/docs/region_nepal/early-warning-saving-lives.pdf

⁴² http://cfapp2.undp.org/gef/documents/1/g3722/g2_16676/Final%20Technical%20Review%20and%20Social%20Impact%20Assessme nt%20EGLOF%20FSP%20Epdf

- a. The project will benefit about 1.4 million people on average directly and about 0.7 million indirect beneficiaries. This is about 12% of the population of Malawi estimated over 16 million as of 2014 (World Bank Data).
- b. The project can potentially (a) reduce loss by lives by saving an average of 18 lives a year⁴³ and damages (excludes valuation of lives) worth 5 million USD in 10 years; and (b) result in an annual benefit of 3.8 million USD to the agricultural sector.

78. One of the major economic benefits of the project is the availability of accurate weather, climate and water information to increase productivity and avoid losses to agriculture, fisheries, construction, etc. This is very crucial for climate change adaptation – climate change poses risks to farmers related to uncertainties of factors that will help them make informed decisions such as when it will rain, how much rain they will get, should they invest in irrigation system, etc. Hansen et al (2011) in their review of seasonal forecasting for agriculture in Sub-Saharan Africa stated that evidence from a combination of understanding of how climatic uncertainty impacts agriculture, model based ex-ante analyses, subjective expressions of demand or value, and the few well-documented evaluations of actual use and resulting benefit suggests that seasonal forecasts may have considerable potential to improve agricultural management and rural livelihoods. Using the 2011 data from Living Standard Measurement Survey (LSMS), 44% of farmers can be reached currently by the government in Malawi. This will be further improved under the project and, following the results in Patt et al. (2009), farmers reached through the early warning system can expect an improved yield of 9%.

79. The project outcome will strengthen the adaptive capacity and reduce exposure to climate risks posed by extreme events and variability through the enhanced capacity for early warnings and forecasting, development and dissemination of tailored products for improved decision making of agriculture and fishing communities and strengthened community capacities to prepare and respond to climate related disasters. The project will enhance awareness of climate risks and impacts through the climate information and products dissemination, community-based disaster response and climate risk management measures as well as the knowledge management facilitated by the DCICs. *The project directly benefits 860,000 males and 860,000 females through improved EWS and risk reduction measures for agriculture livelihoods.*

80. The project will result in enhanced capacity of hydromet networks and staff to generate climate-related data and forecast extreme weather and climate to support adaptation and reduce exposure to climate risks (Output 1). *It enhances national coverage of observational networks to 32% (AWS) and 49% (hydrological stations) and improves the frequency and timeliness of flood warnings to 6 hours or less.*

81. The project will enhance the adaptive capacity and resilience of vulnerable populations through development and dissemination of tailored climate information/products and decision-support platforms for agriculture, fisheries, and flood risk management (Output 2). *It will directly benefit about 195000 farmers in reducing adverse climate impacts on crop yields; more than 30,000 fishers as well as more than 9000 people, of whom more than half are women⁴⁴, engaged in small scale fishing, commercial fishing, fish processing and fish trade in increasing their resilience to and adaptation to weather variability and about 1,400,000 people through disaster risk reduction enabled by expansion of the ODSS system.*

82. The project strengthens communities' capacities for use of EWS/CI in preparedness for and response to climate related disasters through the community-based early warning systems and disaster risk reduction measures (Output 3). *It will benefit about 57,500 number of males and 57,500 number of females in eight target districts through the*

⁴³ The loss of life estimate is an annual estimate using the 2015 PDNA that is based on the severity and probability of the 2015 flooding occurring and because the estimates are available at the district level. Based on the assumption that this is a major event that occurs once every 10 years, the total deaths on average per year as a result of a major flooding is estimated to be about 28 per year in the targeted district. If we base this on the 30% effectiveness assumed in the analysis to prevent loss of life as a result of the EWS system, we have about 9 lives saved per year in total for the country. This number is further reduced to the targeted district for the purpose of this analysis. Lives lost by fishers are also calculated in a similar way with about 9 lives (based on casualties data from DoF, Annex XIII) that can be saved potentially annually with improved Mwera winds forecasting. EMDAT and other sources can potentially be used but typically not available at the district level

⁴⁴ Source: Department of Fisheries

community-based EWS and about 300 national, district, and community level actors with increased capacity in disaster and climate risk management.

E.1.2. Key impact potential indicator

Provide specific numerical values for the indicators below.

GCF core indicators	Expected total number of direct and indirect beneficiaries (reduced vulnerability or increased resilience); number of beneficiaries relative to total population (adaptation only)	Total	1.4 million direct beneficiaries and 0.7 million indirect beneficiaries expected
		Percentage (%)	12

83. The total number of direct beneficiaries (in targeted districts) has been calculated as an aggregate of the estimate of the direct beneficiaries from the targeted district populations who benefit from the tailored products and community-based EWS in Outputs 2 and 3. This is informed by the coverage and effectiveness enhanced by Output 1.

- The project direct beneficiaries are calculated as the difference between the target final number and the baseline number of the beneficiaries as indicated in the Logic Framework for the project.
- Target number of direct beneficiaries of tailored products include the targeted farmers in the 14 districts that receive tailored agriculture advisories (178,000) plus the 16,000 lead farmers under NASFAM that additionally benefit from the FrontlineSMS and 3-2-1 service. In the 14 districts, the beneficiaries were estimated based on the percentage area of the target districts covered by each AWS (assuming those within a 10km radius can realistically be served tailored services). The estimate of 178,000 (target district population serviced by each AWS) assumes 80% of the households in the serviced area engage in farming and that 2 adults per household are direct beneficiaries of the advisories, one male and one female. The target estimate of fishers comes from the data of DoF on their target population of fishers (about 30,000) in the 4 target districts.
- The target level estimate of the beneficiaries of the ODSS expansion (combined with hydrological sensors in upper catchments), which includes the beneficiaries of both flood forecasting and information provided for wider water resource management (dam allocations, flows and water provision), is calculated based on the percent coverage of hydrological sensors in target districts (estimated as target percentage for Output 1, See Section H) and the assumed effectiveness of EWs (see Economic Analysis – 60% international standard, project uses 30% for a conservative estimate): 1,400,000 direct beneficiaries from ODSS (30% effectiveness * percentage coverage of hydrological sensors * target district population). This calculation is assumed to combine the specific beneficiaries of flood forecasts with a wider population group benefiting from better water resource management in the target districts.
- The estimate of the beneficiaries of the automated, community-based EWS is based on DoDMA's estimates of the number of communities effectively covered by number of sensors/rain-gauges installed by the project. Each sensor combination (rainfall gauge + hydrological water level sensor) is assumed to cover 10 villages downstream, each with an average population of 350. Based on the districts covered and the installed equipment, this method yields an estimate of about 115,000 beneficiaries.
- The total final target number of people reached is therefore 1.6M which yields about 1.4M as direct beneficiaries of the project (excluding the 238,000 baseline number of beneficiaries).

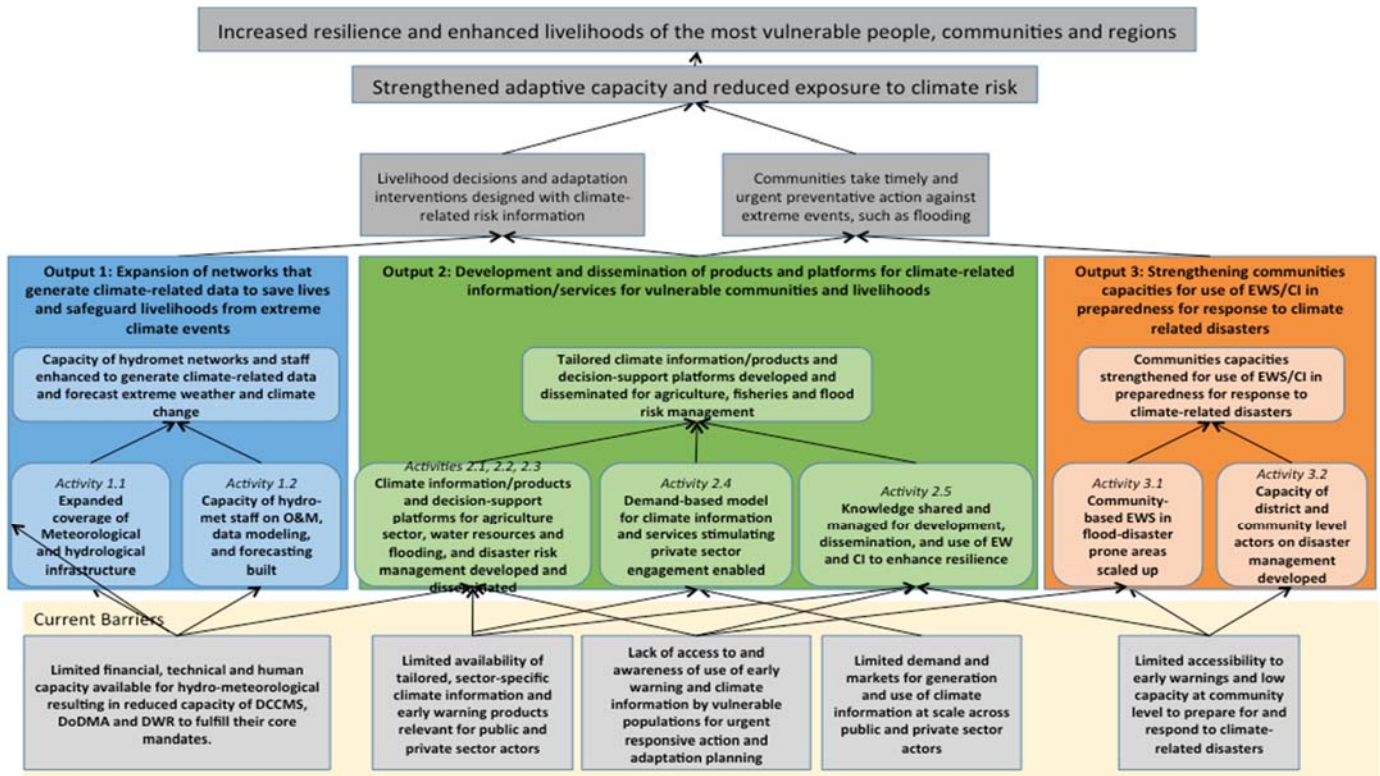
84. The project indirect beneficiaries are calculated as the difference between the target final number and the baseline number of the indirect beneficiaries as indicated in the Logic Framework for the project. Indirect beneficiaries for the project have been defined as those that the project is not directly targeting through tailored products (for agriculture and fisheries: this is also combined with direct outreach, i.e. through extension staff in DAES and DoF or lead farmers of NASFAM; for ODSS: direct beneficiaries are communities benefiting from flood and water resource modeling from this tailored decision support system) or community-based EW systems in the targeted districts. They include, the population, nationally, that benefit from improved EWs and forecasting given the benefit to the national system of increased reliability, frequency, and effectiveness of the EWs nationally. A subset of this population would also include

all those farmers that can receive tailored CI through the 3-2-1 or Esoko services.⁴⁵ Therefore, the total number of indirect beneficiaries nationally has been calculated based on the national population (estimated at 16.3 million), excluding the number of final target direct beneficiaries, and multiplying the percentage national coverage of observational networks (as a result of the project, taking the AWS % estimated as target for Output 1; see Section H) by the conservative estimate of 30% effectiveness of the enhanced networks for EWs and generation of climate information. These estimates are conservative compared to the estimates of existing efforts nationally and internationally as they (i) limit the direct range of AWS to 10km to produce data for localized impact (WMO uses 30km for AWS range in general) and (ii) use a conservative estimate of 30% effectiveness compared to 60% effectiveness used internationally for flood EWs effectiveness.

E.2. Paradigm Shift Potential

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

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



85. 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 to contribute to climate-resilient development in Malawi. Through integration of the specific elements described in the Exit Strategy into the project design and implementation, conditions are created that lead to sustained impacts and potential for scale up of approximately three times the initial impact. The figure below shows that each of the outputs is made up of a series of activities responding to the identified barriers. Each output leads to intermediary outcomes, the longer-term project outcome and ultimately the impact expected from the project. Additionally, the project will promote a climate risk management approach in agriculture, water and disaster management, which will contribute to changing the behavior of farmers, fishers, institutions and communities beyond the lifetime of the project.

⁴⁵ Reach of the mobile services, nationally, and its cost-effectiveness, is included as a relevant indicator for the project. See Section E.6.5.

86. *Output 1* encompasses the establishment of the infrastructure needed to generate climate-related data and the capacity of hydromet staff to analyze it. The installed equipment will contribute to increased amount of relevant and timely data being generated. In addition, hydromet staff at national level will be trained (using the training of trainers approach) to operate and maintain the equipment as well as analyze and interpret the data. This will result in enhanced national coverage (32% AWS, 49% hydrological stations, 100% lightning sensors, 40% lake-based buoys), increased frequency and timeliness of forecasting, and improved formatting of EWs and CI for use by public and private sector actors. With the sustainability assured of these investments through leveraging of domestic finance and capacity building, the project creates the potential for replication and scale of these impacts. The hydromet capacities can be expanded to reach the entire country, which, in aggregate, can lead to about roughly three times the initial impact.

87. Building on these enhanced hydromet capacities, *Output 2* aims to establish products and platforms for climate-related information services (including early warning systems) and disseminate them to vulnerable communities to enhance resilience of lives and livelihoods. The first three activities promote tailored climate information/products and decision-support platforms to be useful for end-users (e.g. farmers, fishermen, water users, etc.). The project targets the expansion of ODSS for flood forecast and water catchment for 13 districts, tailored agricultural products for farmers in 14 districts, and tailored forecasts for fishers in 4 districts. Similarly, the fourth activity aims to set up the enabling environment for PPPs and market stimulation by addressing policy and regulatory barriers and undertaking market feasibility assessments for the products. Finally, the project aims to strengthen the effectiveness of 7 DCICs as knowledge hubs to promote learning and knowledge sharing across national, sub-national, and local stakeholders. Overall, this output targets 12% of the priority district populations for access to specialized information for agriculture, fisheries, and flood risk management. Through capacity development and training of extension support systems, scaling up of use of ICT/mobile platforms, stimulation of demand-based models for climate information, and knowledge sharing, the proposed project promotes sustainability of these impacts. The reach of the agricultural and fisheries advisories and ICT/mobile platforms can be extended to the rest of the population in these districts alone, potentially reaching about 2 million farmers (about ten times the initial impact - tripling AWS coverage and reaching all districts of the country), twice the number of fishers with expansion to communities in the South, and twice the beneficiaries of flood warnings in ODSS targeted districts (with double the coverage of hydrological sensors, increasing effectiveness).

88. Finally, *Output 3* aims to strengthen the capacities of communities to prepare for and respond to climate related disasters through two key activities. First, it establishes community-based early warning systems in flood-prone areas, benefiting 115,000 people in 8 districts. Second, the project will develop the capacity of about 300 national, district, and community level actors on disaster and climate risk management. Through outreach, engagement and capacity building of communities and MSEs, knowledge management and learning and policy coordination, these activities establish conditions for replication and scale up of the community level DRM systems. With sharing of lessons and best practices, promoted by the knowledge hubs, automated CBEWS can be replicated to cover twice as many communities within the districts for about twice the initial impact.

89. Through these output activities, the project establishes pathways for future replication and scale for climate-resilient development of Malawi.

- The observational systems and capacities allow for future replication and scale as they can be easily serviced and linked to modern communication systems to provide public information, more sophisticated commercial weather products and disaster warnings.
- Demand based model and engagement of private sector actors that benefit from the provision or use and dissemination of climate information can further incentivize and advance development and diffusion of this information to a broader network, scaling the use of this information among business and public sector strengthening adaptive capacities.
- Empowered communities and institutions will also be able to take timely and urgent prevention actions, particularly against events such as flooding and generate best practices and learning that can be replicated and scale up across the country to reduce risks of the population to climate related disasters.

90. There is potential to reach more than twice⁴⁶ the number of direct beneficiaries (10 times the number of farmers, twice the number of CBEWS beneficiaries, twice the number of fishers, improved effectiveness to 60% from twice the hydrological sensors/ODSS combined) and six times⁴⁷ the number of indirect beneficiaries (100% EWs coverage, three times the project baseline). Together, this would lead to more than four⁴⁸ times the initial impact. EWs efforts have proven to be replicable and scalable with lessons learned and best practices facilitating these efforts. In Nepal⁴⁹ and Gambia (<http://www.undp-alm.org/resources/communications-products/undp-ews-africa-blog>), successful pilots in EWS are now being scaled up to incorporate latest technologies and lessons learned from earlier efforts.

E.2.2. Contribution to the creation of an enabling environment

91. Enabling effective and sustained participation of private and public sector actors: The proposed interventions reduce barriers to investments in enhanced adaptive capacity of vulnerable populations and create enabling conditions to ensure sustained participation of the various public and private sector stakeholders in the country. By improving the hydro-met observational networks and the forecasting abilities within DCCMS, the proposed project enables the capacity of hydromet staff to provide O&M and support continued generation and use of EWs and CI. Reliable, accurate, and relevant data from the observational networks and capacity building of government and public sector actors helps develop value-added products that stimulate use and adoption by vulnerable communities as well as enables private sector engagement in packaging and dissemination of these products. Strengthening dissemination and outreach channels, raising awareness, and capacity building of end users supports sustained participation of the target communities and enable uptake and adoption of the EWs and CI for enhanced decision making and adaptation.

92. Innovation, market development and transformation: The proposed project promotes innovative use of mobile phone and ICT technologies for development of and 'last mile' dissemination of climate information. In particular, the project will be used to enhance the ICT and mobile platforms for agricultural advisories. The project will help scale the reach of the 3-2-1, Esoko and FrontlineSMS agricultural advisory platforms enhanced with weather and climate information. The project will engage with Airtel and other telecom networks to facilitate cost-effective rates to enable outreach to even the remotest areas. These innovations engender scale-up of the use of climate information for early warnings as well as planning for enhanced livelihoods.

⁴⁶ From 200,000 farmers to 2M (the incremental GCF AWS coverage is 10%, products can be disseminated nationally and with 100% AWS coverage, can reach 2M farmers); 30,000 Fishing-reliant populations in South; 100000 to 200,000 automated CBEWS beneficiaries within districts; twice the coverage from about 49% to 100% of hydrological stations, improving ODSS effectiveness to 60%, can cover twice the population i.e 2.8M. Total about 4.3 M, increasing the % of direct beneficiaries from about 12% of population to 26% of the population (keeping population constant for simple estimate)

⁴⁷ Indirect beneficiaries would be the total national population benefiting from EWs and climate information (excluding the direct beneficiaries already counted) due to 100% coverage of hydromet capacity, 3 times the project target coverage of AWS: scaling from 0.7M to 4.2M, about 25% of the population.

⁴⁸ In total, about 8.5M or 52% of the population impacted, more than 4 times the project target impact.

⁴⁹ http://practicalaction.org/page/docs/region_nepal/sewin-project-summary.pdf

93. The project also fosters synergies between disaster risk reduction and longer-term climate adaptation by strengthening the linkages between disaster response and climate risk management through the EWs and climate information and products and enhancing the awareness and capacities at national, sub-national, and community levels for climate risks and impacts. The project also promotes a pioneering model in the use of DCICs as boundary organizations (as knowledge and learning channels) to promote climate awareness and risk management. The use of demonstrating the design of the project as responsive to GFCS call for greater synergy between producers and users of information, including developing demand for weather and climate services. Lessons learned and best practices from the project can enable creating of enabling environment and incentives for scaling up EWs and CI in other communities across the country and the region.

94. A central element for the paradigm shift is the demand-based model for diffusion of climate and agriculture related information and services and enabling private sector engagement including MSEs. The project is responsive to the GFCS call for greater synergy between the producers and users of the climate information and facilitates the demand for weather and climate services. The project will strengthen the ecosystem of services and stimulate markets for provision and uptake of climate information/services for use in agriculture, fisheries, water resources management. These early gains can be consolidated and expanded on to serve specialized information needs for range of service providers and users. Packaging of weather and climate data and information for a range of other service providers, including applications related to building and management of infrastructure, land and air transport, and the private sector actors in telecommunications, insurance and financial intermediaries, entails opportunities for commercialization of the information for resilience building among the end-users. The project will also address legal and regulatory barriers to create conditions for public-private partnerships enhancing operational and financial viability information and service delivery. Other effective practices and examples, such as the partnership initiated in Burkina Faso between government of Burkina Faso and Telecel for dissemination of climate information, will be assessed to promote PPPs.

95. The project enhances capacity of communities to understand climate and disaster risks and influences behavior and adaptation strategies of the vulnerable communities to effectively protect their lives and livelihoods for transformative impact. The project emphasizes a participatory approach, with focus on women and vulnerable groups, in all phases of planning and implementation including community engagement in vulnerability and risk assessments, sensitization on disaster and climate risks and responses, co-production of climate information and development of 'people-centered' early warning systems, and 'ToT' approach for capacity building for disaster preparedness and response and resilient livelihood strategies. Building on this, knowledge transfer and dissemination through use of mobile technologies and community outreach channels enables behavior change through awareness, trust, and capacity for disaster and climate risk management in the targeted communities.

E.2.3. Contribution to regulatory framework and policies

96. The proposed project supports the implementation and operationalization of key national policies including the MGDS, NCCIP, and NDRM policies. Through the capacity building and engagement of the key stakeholders in the hydromet agencies and line ministries and the robust linkages between the national, sub-national, and local level efforts, the project generates best practices and lessons that will support the monitoring and review of the operationalization of these frameworks. The project contributes to supplementary efforts financed through the LDCF funded UNDP EWS project in integrating weather and climate information into the operationalization of national and sector specific policies, annual budgets and local development plans, including the National Disaster Risk Management Policy and district development plans. Together, the resources will enhance coordination among various agencies and departments on weather and climate information dissemination, early warning preparedness and response, and climate-responsive planning.

97. Further, the community based disaster preparedness will inform the UNDP PS DRR programme that supports mainstreaming of DRR efforts into national policy, planning, and programming. The data and knowledge strengthened through the proposed project will be shared with the programme (operationalized through the inclusion of the PS DRR personnel in the project management structure) to inform decision-making and strengthen the frameworks for disaster risk management (through the EOCs, District Cluster System, etc.). The demand-based model for CI/products will strengthen planning and decision making across the DRM, Water, Agriculture, and Fisheries sectors.

98. The project, through the enhanced coordination and synergies among the various government agencies, enables linkages across disaster risk reduction and climate change adaptation and strengthens policy and institutional frameworks for long-term sustainability of project activities, outcomes, and impacts towards climate resilient development in the country. Furthermore, through the enabling of the demand-based model for weather and climate services and addressing of policy and regulatory barriers for private sector engagement, the project incentivizes and advances development up market opportunities at local, national, and international level further strengthening adaptive capacities across communities, public sector, and the private sector.

E.2.4. Potential for knowledge and learning

99. The project will contribute to the creation and strengthening of knowledge and collective learning processes through EWs and CI knowledge generation, sharing, transfer, application, and iterative learning. The project will enhance the generation and use of collective knowledge and information among hydromet agencies through weather and climate data analysis and forecasting. It will also promote coordination and knowledge sharing among hydromet agencies and line ministries through the proposed interventions to develop tailored products for sector-specific use. Through the diffusion of the tailored products and community engagement, the project will provide continued awareness and learning of climate change risks, impacts, and potential responses as knowledge and understanding of climate change evolves and the needs and priorities of targeted communities change. Furthermore, this learning and use of climate information will promote and guide climate risk management approaches, promoting behavioral change in the long term.

100. The proposed project institutionalizes knowledge generation and learning through the enhancements to the existing District Climate Information Centers (DCIC). Support to the DCICs will be a catalytic factor to strengthen them as hubs for knowledge management and sharing, becoming the centers to connect the ends users of the information to the information sources. The DCICs will serve as knowledge repositories (databases) and provide inter-project knowledge and best practice transfer within Malawi. Evaluation⁵⁰ of existing DCICs has shown that they can serve as decision points and coordination centers for disaster and climate risk management. The DCICs would use means of transferring knowledge that is adapted to local culture, using storytelling and knowledge fairs. Existing partnerships with local radios will be strengthened and new partnerships will be established for disseminating weather bulletins. The DCICs will be linked to rural radios and the DCCMS would also be linked to Malawi Broadcasting Station (MBC), which is the major national media house with wider coverage. The DCICs will help facilitate information flows in local language via different instruments and media (documents, posters, cell phone, radio, awareness campaigns, Disaster Risk Reduction (DRR)/Environmental School Clubs, etc.) and improve understanding of EWs and CI among end users, and help measure the effectiveness of the EWS for continued use.

101. The project will also support sharing of lessons learned and best practices through the continuous monitoring and evaluation of the project. The M&E plan (Section H.2) will include provision for generation of lessons learned and best practices (reports, publications, and other communication and knowledge products for various media) to not only support adaptive project management but also to inform learning across national/sub-national/community levels within Malawi as well as EWs and CI efforts in other countries in the region. The project will contribute to the collective learning in the climate information and services arena through the efforts of various governments, development partners, private sector, and the civil society.

E.3. Sustainable Development Potential

Wider benefits and priorities

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

102. The project will provide broad economic, environmental, and social co-benefits, including gender impacts, to the target countries by providing the means to avoid losses from increased climate variability and climate extremes due to climate change.

⁵⁰ 2015; GoM; "Terminal Progress Report: Africa Climate Adaptation and Food Security Project (ACA)"

Economic benefits

103. The proposed project will strengthen national hydro-meteorological infrastructure and forecasting abilities of the hydromet staff that will improve the accuracy and spatial coverage of available climate information and the use of this information in providing tailored, sector-specific information to sectors and societies vulnerable to the impacts of climate change.

104. Strengthening of extension services, dissemination channels, and communication systems can provide economic benefits at the local level: for example, through improved crop yields and by reducing losses of agriculture produce, improved management strategies for fishing, fish processing and trading, and reduced disruption of livelihoods. The shift in paradigm to demand-based and multi-stakeholder ecosystem of climate information and services will attract private sector investment generating sustainable economic and social impact through new business models, commercialization, and job creation. Overall, the proposed project yields a number of economic benefits as detailed in the economic analyses: saving an average of 18 lives per year, reducing damage and losses to properties and infrastructure worth 5 million USD, and improving agricultural productivity for an annual benefit of 3.8 million USD. However, secondary benefits can include enhanced incomes from capacity building and business information generation and water resource-reliant sector benefits such as hydropower generation improvement from water resource use modeling.

Social Benefits

105. The proposed project advances the social benefits of EWs and climate information including positive changes related to experience and perceptions of safety, security, and personal comfort, trust and confidence, attitudes, preferences or behavioural norms, organizational culture or function, and equitable distribution of benefits. This in-turn has flow-on effects on people's health and well-being, and thus positively benefits communities and social structures. Communities will benefit from the increased safety and security and reduced disruption to educational activities, family and community structures. As the project will strengthen the overall framework and infrastructure for climate monitoring and tailored products for agriculture and fisheries, the programme will benefit women and men engaged in these livelihoods through enhanced food security and resilience of income. Hansen et al (2011) in their review of seasonal forecasting for agriculture in Sub-Saharan Africa stated that seasonal forecasts may have considerable potential to improve agricultural management and rural livelihoods.⁵¹

106. The strengthened capacities of the communities and linkages to sub-national systems can empower and enhance decision-making among community members. Communication channels established through the proposed project can be used for other aspects of community life improving quality of life. For instance, ICT/mobile platforms can be used for health and market services. Community radios can also be used for arranging medical evacuations. The automated EWS will provide downstream communities with information that may in the past not have been forthcoming due to district disputes. With this knowledge for example, during an impending flood, the communities can take proactive steps to ensuring the protection of their assets through moving their belongings, animals etc. to higher ground. This therefore has a significant social benefit as it allows communities to be aware of the actions they need to take and builds resilience within the communities. Further, it also provides a sense of community if individuals are able to help others during these events.

Environmental benefits

107. The project will provide a number of significant environmental benefits. By enabling better predictive management of droughts and floods and risk informed planning for agriculture and fisheries, the project will yield environmental benefits through strengthened ecosystem resilience and improved soil and water quality. Support to water resource use modelling can also enhance sustainable water resource planning and use including for integrated water resource management policies and plans, hydropower planning, and water supply and use, yielding positive

⁵¹ In a study of smallholder farmers in four villages in Zimbabwe (2002/03 and 2003/04 growing seasons, n = 500), of the 75% of farmers who reported receiving seasonal forecast information, 57% reported changing time of planting and cultivation as a response (Patt et al., 2005). This was also observed for farmers that participated in training on the uncertainty that surrounds climate forecasting. Based on elicited crop yields, normalized relative to elicited historic ranges, farmers who reported changing management based on forecast information experienced a 19% yield benefit in 2003/04,

environmental benefits. The project will provide important data that farmers and fishers can utilize in their activities. Additionally, the strengthening of extension will also be invaluable to the way both farmers and fishers conduct their daily lives.

108. Through short and longer term forecasting, farmers gain knowledge and adapt their practices to be more effective, economically and environmentally. Once farmers are more aware of impending events such as droughts and floods, they can undertake alternative farming practices that will potentially use less water for any irrigated crops. Farmers will be able to store water so as the environment is not degraded to get them through drought events. Further, with the additional knowledge, farmers can better plan their activities that will result in a reduction in sediment loss (and any nutrients etc that may be used on their crops) into riverine environment. This will have environmental benefits to those living downstream and also to the water quality of Lake Malawi. The environmental benefits on fishers are also important. With information of incoming Mwera winds, fishers will be able to return to shore and/or not commence trips reducing the potential for accidents that could damage the ecosystem. Further advantages include the identification of harmful algal blooms (through temperature and/or satellite measurements), which poison fish and people – reducing time, money and resources spent fishing for no gain, as well as avoiding impacts on human health.

Gender Benefits

109. It is estimated that women comprise more than 71% of the total full-time farmers in Malawi⁵². Of the targeted farmers in the 14 districts, the project aims to benefit more than 50% of women (about 97,000, see H.1) farmers through gender-differentiated vulnerability analysis, focused capacity building through the extension workers and participatory design of products, and gender-sensitive adoption strategies. More than 5000 women⁵³ in the fishing communities, primarily working as fish traders and processors, would benefit from increased awareness and support on climate change risks and how to incorporate the information in their trades thereby protecting their livelihoods and enhancing adaptive capacities. Therefore, proposed interventions will ensure that women farmers and fishers/fish traders have enhanced access to extension services and weather information that is necessary for moving them up the agricultural and fisheries value-chain and transform them from being mere producers to key players in marketing of products.

110. Additionally, the use of ICT/mobile platforms to scale outreach to NASFAM members will benefit women farmers as NASFAM has taken deliberate efforts to promote gender integration within its structures and within the community and families it serves. Each Association has a gender sub-committee (with male and female representation) to promote gender considerations within all Association activities. The proportion of women in leadership positions has increased steadily over the past years, including amongst farmer trainers. Currently, NASFAM has a paid membership of 164,000, of which 51% are women. Of the 16,000 who will be direct beneficiaries of this intervention, a total of 8160 will be women farmers. People-centered CBEWS will also directly address women's vulnerabilities and exposure to disaster risk as women, often the caretakers and homemakers have limited access to resources to protect their lives and property. During community-sensitization as well as design and implementation of the CBEWS, women beneficiaries (about 58,000) will be targeted for their engagement and ownership of the CBEWS.

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)

111. The projected climate change scenario in Malawi shows an increase in mean temperature of between 2 and 3 °C by 2050, a decrease in total annual rainfall and water availability and increase in erratic rainfall events⁵⁴. The combination of increased temperatures and reduced rainfall is likely to result in considerable loss of agricultural output and a reduction in the extent of land suitable for rain-fed agriculture production of the staple maize crop. Increases in temperature and erratic rainfall will result in more frequent and intense droughts, floods and severe weather – including strong winds and associated storm surges over Lake Malawi. The vulnerability of Malawi's economy and local

⁵² NASFAM

⁵³ Department of Fisheries, GoM

⁵⁴CEPA (May, 2012): Draft Position Paper: Towards Development of Climate Change Policy in Malawi. ECRP and DISCOVER Consortia.

communities to climate change is as a result of a number of compounding factors, namely: i) unique and highly degraded ecosystems; ii) socio-economic and demographic situation – including high population growth rates in combination with high poverty levels – which reduces capacities to cope with climate change; iii) limited financial capacity to finance adaptation measures; iv) over dependence on rain-fed agriculture; v) heavy reliance on natural resources, particularly within the agricultural and fisheries sector; vi) limited knowledge on climate change and variability at community level to inform adaptation practices; vii) sub-optimal agricultural productivity and practices, and limited diversification within the household economy both on and off-farm; viii) limited access to affordable and sustainable clean energy sources; and ix) limited organization at local levels for policy dialogue around climate change.

112. World Bank (2010) showed that between 1970 and 2010, natural hazards killed about 3.3 million people. Malawi's Average Annual Loss (AAL) by flooding is estimated to be about 24.11 million USD. The average annual GDP loss due to floods is estimated to be about 0.7 percent⁵⁵. The Probable Maximum Loss (PML) has been estimated at 110 million USD for flooding. Agricultural output in 2014 was about USD868,263,000. Based on the PML estimate, about 1/8th of the total agricultural output could be lost due to flooding. Increases in temperatures, droughts, floods and severe weather will negatively affect crop growth and many aspects of the agricultural value chain including drying, storage and transport to market. Both the direct and indirect effects of climate change will affect fisheries. The direct effects of climate change include changes in the abundance and distribution of exploited fish species. The increased frequency and severity of extreme events such as floods and storms will increase the hazards faced by fishermen and is likely to damage infrastructure such as fishponds. An analysis of drought risk⁵⁶ demonstrates that the return period for drought is low (i.e. the risk is high) particularly in the districts of Chitipa, Karonga, Rumpfi, Mzimba and Nkhata bay in the north, and Salima, Mangochi, Balaka, Neno and Mwanza in the south and central regions. Recognizing that drought is not the only determinant of food security, analysis of food insecure households was conducted using data collected by the Malawi Vulnerability Assessment Committee (MVAC) over a period of 10 years (Annex II, Feasibility Assessment, Section 1.2). Flood risks were also mapped identifying the high, medium, and low flood risk districts.

113. In the implementation report of HFA 1 (2005-2015) for Malawi, key gaps identified related to priority areas 2 and 4: assess and monitor disaster risks and enhance early warning and reduce the underlying risk factors. The report noted key areas for improvement including identifying synergies with climate change adaptation, strengthening resilience building in communities with particular emphasis on schools, and scaling up mainstreaming of DRR. The 2015-2030 framework for Disaster Risk Reduction which was adopted on 18th March 2015 for the next 15 years aims to achieve substantial reduction of disaster risk and losses in lives, livelihood, health in the economic, physical, social, cultural and environmental asserts of persons, businesses, communities and countries. Taking into account the experience gained through the implementation of the 2005-2015 HFA, there is a need for focused action in Malawi within and across sectors by state at local, national, regional and global levels in the following priority areas: understanding disaster risk, strengthening disaster risk governance to manage disaster risk, investing in disaster risk reduction for resilience; and enhancing, disaster preparedness for effective response, and to build back better in the recovery, rehabilitation and reconstruction.

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

114. Malawi has immense need and gaps in the observational networks and the capacity of the hydromet services to operate and maintain the infrastructure as well as analyze, interpret, and package the data for forecasting and relevant sectoral planning. A survey of 13 hydromet agencies in Africa (Jones, 2010) shows that the average annual budget is \$5.26 million, which is .017% of \$399.7 billion total GDP (2008 nominal numbers from IMF). For comparison, the US National Weather Service has an annual budget of \$959 million, which is .067% of GDP. Managing climate risks and related disaster is a key priority for the country. The NCCIP identifies priority activities under Disaster Risk Management Programme including improving the disaster risk management systems for the sectors and enhancing dissemination and use. The CBEWS have been proven to be effective in saving lives and reduce economic losses. During the 2009 floods in Chikwawa, 6,660 people from 1,332 households and their assets were protected by the warning system⁵⁷.

⁵⁵ World Bank/GFDRR, Economic Vulnerability and Disaster Risk Management in Malawi and Mozambique. Measuring Economic Risks of Droughts and Floods.

⁵⁶ IFPRI/RMSI (2010) Malawi: Economic Vulnerability and Disaster Risk Assessment. Economy-Wide Impacts of Droughts and Floods.

⁵⁷ Christian Aid (2009), 'Community answers to climate chaos: Getting climate justice from the UNFCCC'

115. Implementation of these various national priorities is constrained due to limited resources (both financial and human) among the relevant national, sub-national and local level actors. A review of the expenditure for the DRM sector during 2006/7 and 2011/12 years revealed that the expenditure incurred through the national budget amounted to US\$4 million.⁵⁸ Development partners funding during the same years amounted to about US\$50 million. The project will enable the development of an observation system that national budgets simply cannot afford and until alternative revenue streams are developed at scale to support maintenance and grid upgrades.

116. The merit of hydromet services emerges from the improvement of decisions by economic stakeholders incorporating weather and climate information. Weather services are particularly relevant for sectors such as agriculture, construction, energy, insurance, telecommunication, tourism, transport, logistics and water availability. As an adaptive measure, climate information and early warnings is particularly important for the poorer segments of society, which do not necessarily benefit from large protective infrastructure projects⁵⁹; micro-small and medium enterprises in agriculture and fisheries sector; and hydro-meteorological services and other user-agencies with regards to long-term planning and extension services. The use of weather and seasonal climate information by farmers and fishers is currently minimal for a variety of reasons, including: the timing, reliability, applicability to local context, and the ability to interpret information for use. Additional complications arise due to the scientific limitations of forecasting and being able to convey these concepts in ways that are easy to understand e.g. a probabilistic seasonal forecast.

117. Malawi has significant socio-economic needs as one of the world's Least Developed Countries, with a gross national income per capita of only USD 250 (World Bank, 2007). Of those living in poverty, approximately 40% are extremely poor, living on less than USD 0.33 per day (Malawi Welfare Monitoring Survey, 2008). In Malawi vulnerable groups fall in the categories of women, female-headed households, children, orphans, the elderly, and the disabled. According to the contextual analysis done by Voluntary Services Overseas (VSO) in 2011, women and children are among the poorest, most vulnerable and marginalized groups in Malawi. Of a total population of 13.2 million, 6.8 million are children (Population Housing Survey, 2008). However, other specific poor and vulnerable groups also include youth, child-headed households, people living with HIV, and communities living in disaster-prone areas. The recent flooding in Malawi, where an estimated 1,101,364 people were affected, 230,000 displaced, 106 killed and 172 reported missing, affected the vulnerable groups, variably. Some vulnerable groups, mainly children had to be relocated to camps where further vulnerabilities got experienced (gender-based violence, no health, education and sanitary services). The total economic loss was US\$335 million in just one season, and this would have been minimized if a reliable early warning system and advisories were available in the country. The project will focus on targeting the vulnerable populations, both through the agriculture and fisheries products as well as through the community-based disaster and climate risk management interventions. The vulnerability assessments will pay special attention to needs and priorities of these groups and project activities will be designed to benefit them. For instance, female farmers and fishing tradeswomen will be targeted to enhance livelihoods and adaptive capacity. The needs of the women, children, and the elderly will be incorporated in the design of the disaster response measures and vulnerable community members will be trained in a number of interventions to enhance preparedness and early recovery related to climate related disasters.

118. Malawi also faces capacity gaps and institutional issues related to hydromet services (DCCMS and DWR) to develop reliable and operationally viable systems for observation and analysis at the same time strengthening line ministries to use the EWS/CL for climate-responsive planning and disaster management. The proposed project strengthens the implementation capacity of DoDMA through expanded coverage for the flood modelling and decision support system, strengthening of the DCICs to serve as dissemination channels and knowledge management systems for 'last mile' access and outreach to communities, operationalizing and training staff on EOCs and DRR strategies and implementation. MoAFS (including DoF) will also be capacitated to develop tailored products for agriculture and fisheries and strengthen its extension support system.

⁵⁸ GoM (2014), Public Expenditure Review Report for Malawi's Environment and Disaster Risk Management Sectors

⁵⁹ World Bank.(2010).Natural hazards, Unnatural disasters: Effective prevention through an economic lens. World Bank and United Nations.231 pp.

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

119. By signing and ratifying the UNFCCC, Malawi has, respectively, committed to the adoption and implementation of policies and measures to adapt to climate change and to manage existing climate risks, including enhancing preparedness and response capability to likely disasters. Malawi is also a signatory to the Hyogo Framework for Action (HFA). The proposed project is linked and well-aligned to national priorities and measures identified for implementation reflected in the MGDSII (2011-2016), National Disaster Risk and Management (NDRM) Policy, National Climate Change Investment Plan (NCCIP), and the NAPA. It helps operationalize many of these relevant policies and plans and contributes to their monitoring and review.

120. The Malawi Growth and Development Strategy II (MGDS II 2011-2016) outlines Malawi's five-year development strategy for the period 2011 to 2016 and identifies six thematic areas⁶⁰. The proposed project has been developed in alignment with sub-theme 3.2 Disaster Risk Management which provides a number of strategies for supporting Malawi's preparedness, response and recovery to the increase in magnitude, frequency and impact of disasters as a result of climate change, population growth and environmental degradation. The MGDS II also includes nine Key Priority Areas⁶¹. The project is consistent with expected outcomes of two of the Key Priorities, namely: 1) Agriculture and Food Security; and 9) Climate Change, Natural Resources and Environmental Management.

121. The Disaster Preparedness and Relief (DPR) Act of 1991 and MGDS provide strategic direction to disaster risk management for the country. Two other relevant policy documents that aim to address vulnerability and poverty are: i) National Disaster Risk Management (NDRM) Policy (2015) which includes the aim to enhance the disaster risk management coordination role of DoDMA; and ii) a draft National Climate Change Policy which will guide responses to commitments under the UNFCCC and Kyoto Protocol, specifying various activities to be undertaken for climate change mitigation and adaptation. The National Strategy for Sustainable Development (NSSD) complies with the UNFCCC objectives: i) to provide effective weather and climate disaster early warning and enhance awareness, uptake and response by the general public; and ii) to provide reliable weather and climate information and advisors for use in agricultural production, industrial production and water resource management.

122. Under the NAPA, the development of EWSs is a priority and is expected to be beneficial to multiple sectors, including agriculture, water, health and energy. NAPA project priority 3: "Improving agricultural production under erratic rains and changing climatic conditions" features improved EWSs. NAPA project priority 4: "Improving Malawi's Preparedness to cope with droughts and floods" features the implementation of both flood and drought EWSs. The project includes priority activities for strengthening the "Forecasting and Early Warning system" including "Capacity building (training staff to man the systems)." Malawi's NAPA project priority 5: "Improving climate monitoring to enhance Malawi's early warning capability and decision making and sustainable utilization of Lake Malawi and lakeshore areas resources" features climate monitoring and an EWS on Lake Malawi and lakeshore areas for pre-disaster preparedness to rural fishing and farming communities.

123. Malawi has officially launched its NAP process in 2014 under the leadership of the Ministry of Environment and Climate Change Management. A multi-sectoral NAPs team composed of sector experts from ministries reports to the National Climate Change Technical Committee. Agriculture, Water, Health, Transport, and Infrastructure are included as priority in the NAP process amongst other sectors. The Ministry of Gender is a notable inclusion. Cross-sectoral activities relevant across sectors have been identified. Each sector is expected to undertake stock-taking through an inventory of relevant initiatives and a gap and need analysis. A key component of this process will be to iterate the

⁶⁰ These are: Sustainable Economic Growth; Social Development; Social Support and Disaster Risk Management; Infrastructure Development; Governance; and Gender and Capacity Development.

⁶¹ 1) Agriculture and Food Security; 2) Energy, Industrial Development, Mining and Tourism; 3) Transport Infrastructure and Nsanje World Inland Port; 4) Education, Science and Technology; 5) Public Health, Sanitation, Malaria and HIV and AIDS Management; 6) Integrated Rural Development; 7) Green Belt Irrigation and Water Development; 8) Child Development, Youth Development and Empowerment; 9) Climate Change, Natural Resources and Environment Management.

development of risk and vulnerability assessments and climate and socio-economic scenarios, incorporating the latest projections and observed changes in climate.

124. Finally The United Nations Development Assistance Framework (UNDAF 2012-2016) for Malawi acknowledges that – in the context of climate change – improved disaster management enhances the sustainability of economic growth, particularly in districts that are prone to natural disasters. The proposed project is consistent with three specific output areas from the UNDAF, namely, 1.3.1) Environment, natural resources, climate change and disaster risk reduction mainstreamed in policies, programmes and plans implemented in 14 disaster-prone districts; 1.3.2) Data and knowledge on the impact of climate change, environment and natural resources and disaster risk management made accessible to decision makers and government, private sector and civil society; and 1.3.3) coordination mechanisms and implementation arrangements for climate change, environment and natural resources and disaster risk management established and used at national level and disaster-prone districts.

125. The proposed project has been designed and developed with full ownership of the GoM through a series of consultations, at community, district and national levels. The feasibility assessment for the project required an extensive consultative process that was undertaken by GoM, led by DoDMA, DCCMS, and DWR and supported by DAES and DoF (with technical support provided by UNDP). It involved consultations with diverse stakeholders including government ministries and departments, NGOs, Civil Society, private sector and development partners. Multi-stakeholder consultations were also conducted for concept and proposal development culminating in a GCF concept validation workshop held by DoDMA on June 2015 to obtain input and feedback into the development of the proposal. The list of stakeholders and key outcomes of the meeting are summarized in Annex II, Feasibility Assessment, Appendix A. All key partners were consulted individually as well as collectively to gain and in-depth understanding of the needs and also solicit ideas on how the needs could be addressed through the proposal. The National Designated Authority (NDA) was involved in the entire process. Women representation was emphasized through the participation of the various NGOs and CSOs and by including female staff members of the key agencies. Further details on stakeholder engagement are provided in Section E.5.3.

126. A series of consultations with the NDA in the Environmental Affairs Department (EAD) were conducted to gather feedback and obtain a buy-in on the proposal. Active participation by the NDA also facilitated the consultation process and in coordination with the NDA, a preliminary Local Project Appraisal Committee (LPAC) meeting was held on July 9, 2015 where all the key executing agencies and relevant stakeholders, especially women's groups and civil society, were represented and the proposal was reviewed and endorsed with a few amendments. Noting that the design of the proposal has taken into consideration the national priorities and relevant strategies highlighted above, the NDA has issued a 'no objection' letter for the submission of the proposal to the GCF. As an expression of commitment and ownership, the executing agencies also provided co-financing for the project.

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

127. The proposed project 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 Malawi and globally on: i) establishing and strengthening institutional, policy and legislative mechanisms; ii) building capacity; iii) undertaking risk assessments; iv) mainstreaming climate change adaptation, disaster risk reduction and early warning systems 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.

128. The UNDP Country Office (CO) in Malawi is well placed to oversee the implementation of the proposed project. This is because it has built close connections with DoDMA through its support to the implementation of many disaster management and early warning projects in the country including with financing from the LDCF and the PS DRM programme (See Annex XIII for summary of UNDP's support to climate change in Malawi). UNDP has played a pivotal

role among the UN agencies and other development partners in supporting the government of Malawi, through DoDMA, in mainstreaming DRR and early warning system aspects into national and local level development planning processes. This has also included institutional and policy support which has among others resulted in the development of the National Disaster Risk Management Policy for Malawi. The proposed project has been designed to integrate with UNDP's Programme Support on DRM. This allows the activities under the proposed project to be streamlined with other donor projects in the areas of DRM, as well as climate change, natural resources and sustainable energy. A DRM advisor is also placed in DoDMA to support this structure and the underlying programmes.

129. UNDP can provide a vital co-ordination role for catalyzing enhanced capacity to adapt to climate change risks and impacts across sectors in Malawi. To ensure that the necessary capacities and institutional mechanisms are achieved at both the national and district levels, UNDP will maintain its upstream focus. Furthermore, UNDP will facilitate and ensure transformational impacts at the community level. UNDP also has considerable experience in managing GEF financed projects in the region – in particular those relating to disaster management, early warning and climate change adaptation. UNDP has been using an approach based on the principle of optimizing resources and capacities through multi-sectoral and multi-stakeholder driven partnerships in Malawi. The country office in Malawi is supported by Regional Technical Advisors at the UNDP offices in Addis Ababa, as well as by policy, adaptation, economics and climate modeling experts in New York, Cape Town and Bangkok. The project will be implemented by DoDMA using UNDP's National Implementation Modality, which is designed to ensure domestic systems are used for accountability. The interventions through this programme will be compliant with the Fund's ESS and compliant with stakeholder consultations.

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

130. The proposed project builds on several rounds of discussions with stakeholders at the national level on the topic of climate information and early warning systems, including ongoing support provided by UNDP with financing from the LDCF and bilateral sources such as Government of Japan, Germany and Canada. The programme is part of the overarching DRM support to Malawi, as described in the DRM Project Support Document, which was developed in 2011-2012 following extensive consultations with stakeholders. To develop a project that reflects the needs of national stakeholders and builds on/scales up ongoing EWS and CI efforts, the proposed project has incorporated the information received from three stakeholder consultations conducted from September 2012 to March 2015.

131. Multi-stakeholder consultations including government agencies, NGOs, CSOs, and private sector were conducted during June 2015 culminating in a GCF concept validation workshop held on June 2015 to obtain input and feedback into the development of the proposal. The validation workshop was held by DoDMA on June 11, 2015 with participation from various agencies, NGOs, non-state actors, and the private sector. Representation of women was ensured through the participation of representing NGOs and community-level organizations as well as by including female staff members of the relevant executing agencies. The list of stakeholders and key outcomes of the meeting are summarized in Annex II, Feasibility Assessment, Appendix A. Furthermore, the Feasibility Assessment was developed as a result of extensive stakeholder engagement and details the current status of EWS/CI, gaps and needs (technical and capacity), and recommended investments and approaches for the proposed project. The analysis reflects the learning, knowledge, and experience from the ongoing efforts and priorities and needs of the various stakeholders.

132. Civil Society Organizations (CSOs) play a crucial role in climate change adaptation and disaster risk reduction programmes and activities in Malawi. Several of these NGOs implement community based early warning activities, focusing on vulnerable groups such as women and children, (as summarized in Annex II, Feasibility Assessment, Section 4) and conduct capacity building of Civil Protection Committees (including women community members) to enhance their effectiveness in carrying out disaster related activities in their communities. Several NGO/CBO representatives were consulted in the design of the project, including CISONET, Christian Aid, and Concern Universal. Finally, the proposal incorporates the feedback from GCF review and consultations, both on the initial concept and the first submission of this proposal (See Annex XIV).

133. All consultations were led by DoDMA and facilitated by UNDP. The implementing partners played a central role in determining the activities for the proposed project and were involved in most of the consultations undertaken above. The implementation strategy for the project is dependent on comprehensive stakeholder participation. The project will engage various stakeholders (government agencies, NGOs, CSOs, private sector, and communities) extensively during

implementation to establish the sites for hydromet infrastructure, design and deliver tailored products, and undertake community sensitization and disaster preparedness and response. The detailed stakeholder management plan is provided in Annex XIII.

E.6. Efficiency and Effectiveness

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

E.6.1. Cost-effectiveness and efficiency

Adequacy of financing structure

134. The grant resources will help remove the barriers to support investments that, due to the public good nature of the project, do not entail revenue generation or cost recovery during the project duration and hence, hinder private investments. The financial and technical barriers that prevent installation of a reliable climate information and EWS system in Malawi can only be removed by public investment financed by grant resources from international development institutions. Given that Malawi's private sector is comprised mainly of MSEs, it is difficult to envisage co-financing from them for this project, since such a system doesn't have any direct and immediate revenue generation potential. However, the project does plan to engage the private sector by stimulating demand for climate information-based value added products and services, by engaging with ICT/telecom industry, MSEs with a particular focus on agri-businesses and insurance industry that might generate revenues and co-financing from them in the medium- to long-term, thereby supporting the project's financial sustainability beyond its proposed duration. Nonetheless, such revenues from the private sector and/or end-users are not guaranteed at this point and hence, in accordance with the UNDP's Guidelines for Financial and Economic Analysis of Projects, a financial analysis of this project isn't deemed pertinent. While households will be willing to pay for such information, the strategic nature of such information and the government's responsibilities towards the most vulnerable communities in the country makes a case for public investment. However, these investments, while public in nature, generate significant economic benefits making the project economically viable (Refer to Section F.1 and Annex XII), with an economic internal rate of return (EIRR) of 31%. There is also potential for secondary benefits that can crowd-in public and private sector financing and create conditions for replication and scale.

Efficiency and effectiveness

135. The proposed project activities will build on existing networks, achievements and planned actions by DCCMS, DWR, DoDMA, DAES, DoF, and NASFAM. This will allow institutional capacity to be built cost-effectively, ultimately assisting in planning and implementing the early warning system and climate information products and services. This approach of complementing existing, related projects is more cost-effective than the implementation of a separate initiative, as it will allow the proposed project to be managed within the existing institutional and management frameworks. Additionally this approach builds local capacity and maximizes the baseline EWS on which future investments can build. The proposed project will also work closely with co-financing institutions to co-produce outputs. This will promote cost-sharing, reducing overheads and enhancing cost-effectiveness.

136. Synergies between the proposed GCF financing and LDCF financed UNDP EWS project will be used to enhance the cost-effective hiring of specialized technical staff, coordination of data and information, training (operations & maintenance of equipment; forecasting techniques; tailored advisories and warnings), and effective use of communications and standard operating procedures. The technologies and coverage have been selected to allow minimum numbers of observing/monitoring equipment, whilst being able to provide adequate information to develop informative and specific services. Stakeholders within the DWR and DCCMS were consulted extensively on the likely extent of training that would be required for personnel to operate various equipment types in order to ensure that training as well as procurement is included in cost-effectiveness considerations. For tailored products, the proposed project will integrate weather and climate information services into existing 3-2-1 and Esoko channels, leveraging established infrastructure. In addition, the scale up of these services can help negotiate bundled costs of service ensuring cost-effective reach. Engaging private sector and promoting co-investments for demand-based products will also create conditions for cost-effective delivery of information and services. Finally, training communities in O&M as well as monitoring of community-based EWS enables ownership as well as cost-effective approach to sustained impact.

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

Not Applicable

E.6.3. Financial viability

Expected economic rate of return

137. The public goods nature of this project's outputs doesn't entail revenue generation or cost recovery from the project's direct and indirect beneficiaries during the project duration. Hence, a financial analysis of this project isn't deemed pertinent. The expected economic internal rate of return is 31% for this project, which exceeds 10%, the economic opportunity cost of capital. Under all test cases including a "worst case" scenario with 20% increase in investments costs or a 20% reduction in total benefits, EIRR remains above the minimum threshold.

Financial viability in the long run beyond the Fund intervention

138. GoM through the various departments engaged in service delivery and use of EWs and climate information, is providing co-financing support (USD2,170,000) to the proposed project through their budget allocations. The hydromet agencies (DCCMS and DWR) are providing project support through co-financing of O&M (beyond the service contracts for maintenance included with installation, typically 3 years) for the project established infrastructure, human resources including staff for O&M and data analysis/forecasting, logistics and facilities. The draft O&M budget (including GCF, domestic and UNDP TRAC resources) is presented in the Feasibility Assessment (Annex II) and described in section D.2 above. The scaling up of domestic support throughout the project, combined with contingencies for spare parts and training through GCF, is expected to ensure that O&M can continue throughout the lifetime of the project (10 years). DCCMS and DWR are also committed to replacing community-based EWS related equipment and establishing SOPs with communities. As the executing entity, DoDMA is not only committed to provide project management support, it will co-invest in coordinating the DRM activities with all relevant stakeholders through its human resources support, O&M (jointly with DWR and DCCMS on CBEWS), communication and knowledge management, and facilities support.

139. DAES and DoF are co-financing the development and dissemination of tailored products for agriculture and fisheries-reliant populations respectively. DAES is committed to provide extension services support, co-production of communication materials and tailored advisories, engagement of communities, and use of the Agricultural Resource Centers. DoF is co-financing the dissemination of tailored warnings through its community outreach and extension support staff, creation of web platforms and communication materials, and support for safety measures. Beyond leveraging financing for project proposed measures, the impacts assured through capacity building, knowledge sharing and learning, private sector engagement and operationalization and contribution to relevant policies, strengthen the mandates for these agencies for securing financing through national budgets. The agencies indicated that annually the project costs would be included in the estimated budgets submitted to the Ministry of Finance. Some activities become embedded in department activities. The proposed project could help these agencies apply for public sector investments programmes to further supplement existing budgets. These commitments and mandates promote financial viability of the project in the long-term.

E.6.4. Application of best practices

140. The project has been designed by first identifying the target users of weather/climate information and the services they require (Output 2), as well as ensuring that there are currently mechanisms in place in Malawi to deliver the required services. This incorporates lessons learned from the UNDP implemented EWS project, recognizing that identified services direct the choice of equipment and training/analyses of data and forecasting techniques. As climate-services is a relatively nascent field in Malawi, many of these services offer the potential to be developed further. Best practices, as identified through the DIPECHO, GFCS, Malawi Red Cross, IFRMP, ECRP projects and the MVAC and FEWSNET regional/national programmes (see Annex II, Feasibility Assessment, Section 4), are applied to many of the products that will be developed, including: sensitization of communities, extension officers and other extension agents to derived products; co-production of advisories with extension officers and communities; strengthening dissemination centres within the community; using a variety of dissemination channels including mobile devices, print and radio; translating materials into local languages; using advanced operational decision support systems.

141. The observational equipment that will provide data which will feed into these services has been chosen, based on a number of criteria identified as being important through UNDP (EWS project in Malawi and similar projects across Africa and Asia), including: cost and ability for government to replace/service this equipment; capability of current staff to operate and maintain the equipment; compatibility with existing observing systems (including data transmission, archiving, databases, quality control/quality assurance). Lower cost alternatives have been chosen where available and

applicable e.g. lightning detection systems instead of weather radars (which are recognized internationally as resource and financially intensive to install, operate and maintain) and satellite data to supplement ground observations (which is successfully being used in Ethiopia and Tanzania as part of the GFCS and other projects). Additionally an assessment of the current technical capacity of each institution (see Annex II, Feasibility Assessment, Section 3) identified some international best practices (in weather and seasonal climate forecasting) which can be applied with appropriate training and capacity building, and do not require large infrastructure and/or hardware e.g. application of Model Output Statistics to forecasts, as commonly used by the US national weather service and elsewhere.

142. Output 3 focuses on setting up community based EWS systems for floods, which have proved effective at warning as demonstrated through the Christian Aid work through the DIPECHO and ECRP projects which make use of river level gauges in upstream villages. Warnings are disseminated to downstream village civil protection committees (CPCs) using mobile phones, megaphones, whistles and community flags (see Feasibility Assessment, Annex II, sections 4.2 and 4.3). The use of low-cost measuring systems will ensure that DCCMS and DWR can replace and service the equipment (see discussion on choice of equipment above). Involving the community in servicing, maintaining and using the equipment/information, as well as choosing lead responders/observers and contact people, will further enhance the chances that the equipment will remain working and not be vandalized, as learnt through DIPECHO, ECRP and UNDP EWS experiences (see Feasibility Assessment, Annex II, sections 4.2 and 4.3). The automatic alert system employed in this proposal will ensure that communities are warned in the least amount of time, and the development of SOPs with communities will ensure that responses are better coordinated in the future. Training village committees and working through ACPCs/VCPCs will ensure that established structures and procedures are followed, which is a clear lesson from experiences during the 2015 floods. Best practices from experiences on using manual CBEWS (from discussions with Red Cross and Christian Aid) have also been incorporated into the project design to ensure effective and sustained impact.

143. The proposed project also adopts best practices in capacity building and community engagements. A ToT approach will be used to improve capacities across national, sub-national, and community levels, as nationally trained staff will be used for training of district and community level actors. As informed by consultations with Christian Aid, World Food Programme and Malawi Red Cross for community engagement, credible and established channels (such as women's groups, religious institutions, schools, and libraries) will be used for outreach, knowledge sharing, and collective learning. Where feasible, climate field schools will be formed to target farming and fishing communities for co-production and diffusion of tailored products (as recommended by GFCS partners, Malawi Red Cross and NASFAM). Based on international best practices, DCCMS and DWR staff will engage users of warnings/advisories (farmers, fishers, and flood prone communities) and intermediary/boundary organizations (NASAM, DAES, DoF and CSOs) to design products that are both informative and based on scientifically feasible forecasts and available information.

144. In addition to using and promoting the best practices identified above, this project will also complement and harmonize with these projects through the following actions:

- i. UNDP EWS project: through the use of low cost alternative technologies for monitoring and observing weather and climate in locations not already covered; by tailoring climate products for agriculture and flood forecasting that can be used in areas covered through the UNDP EWS project; by providing extra stimulus and products which can be marketed for the private sector;
- ii. PS-DRM project: by engaging communities and socially active groups to enhance communication and use of climate risk information in areas which are not using or aware of this information; by conducting simulation exercises (particularly including schools) to test and adapt response procedures; by supporting district councils as the key implementation agents in all aspects of the DRM cycle; by using non-state actors and their on-the-ground networks to disseminate and respond to warnings;
- iii. The IFRMP project: through the addition of targeted hydrological and meteorological observations in northern and central areas; by extending the current integrated decision support system to northern and central regions to support issuing of timely flood warnings, hydrological monitoring and modelling for water resource management;
- iv. The ECRP project: by using automatic community-based hydrological measurements which will ensure timely flood warnings including through the night when observers are not present; by sensitizing communities on the need for hydrometeorological equipment and the benefits of warnings, which will ensure community buy in and

- reduce the chance of vandalism/theft; through using radios, megaphones and flags to ensure all community members receive warnings in areas not already covered by the ECRP project;
- v. The GFCS project: through expanding the coverage of tailored agricultural products in 14 additional target districts; through enabling co-production of advisories based on information requirements of farmers and agricultural workers; through training of extension services to interpret and disseminate advisories; through developing area, crop and culturally specific types of information which integrate climate information with local and indigenous knowledge; by delivering information through village meetings in local languages; by ensuring timely forecasts from DCCMS are used to generate products more frequently; by incorporating localised data from AWS into forecast and monitoring procedures; by using and training more extension agents and developing programmes for radio which incorporate weather/climate information; by expanding existing and developing new methods for distributing SMS-based advisories, which incorporate weather/climate information, to more farmers.

E.6.5. Key efficiency and effectiveness indicators

GCF core indicators	Estimated cost per t CO ₂ eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)
	Not Applicable
	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)
	Not Applicable

Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/programme)

The beneficiaries of the tailored agricultural products for the project, as included in the logic framework, are estimated based on the population targeted in the project districts with tailored products through extension and direct outreach support (by DAES, DoF, and NASFAM). These numbers do not specifically highlight the reach of the mobile platforms in disseminating the tailored products.

Therefore, the indicator below allows us to estimate the reach of the tailored products and CI through mobile services, nationally.

- Estimated cost of EWs/CI dissemination per farmer benefiting through mobile services: (Investment cost in tailored products for Esoko, 3-2-1, FrontlineSMS) / (Number of beneficiaries reached)
 - Cost of development of the tailored products for dissemination through the mobile platforms is USD554,000.
 - SMS costs are currently about USD13,000 for Frontline and USD6000 for Esoko. For 3-2-1, upto 4 calls are free for a month.
 - The reach of the platforms is estimated at 647,000 (3-21:500,000 farmers; Esoko: 120,000; NASFAM: 27,000 farmers).
 - The target for this indicator (without accounting for potential opportunity for lowered costs in partnership with telecom operators) is: USD0.88 per farmer annually (for 2-4 calls per month)

F.1. Economic and Financial Analysis

145. Economic analyses of the projects were carried out in accordance with the Guidelines for the Economic Analysis of Projects of United Nations Development Program (UNDP 2015). The feasibility of the investments was determined by computing the economic internal rates of return (EIRR) and economic net present value and comparing the EIRR with the assumed 10% economic rate of return. The period of analysis covers 10 years.

146. The use of 10% discount rate is based on the consideration of the cost of capital in Malawi (a developing country) and the nature of the benefits from the project (environmental values and lives saved). Normally for environmental goods we will like to argue for discount rate lower than the conventional 10% but considering the cost of capital in the country we cannot justify using a lower rate. While many EWS projects in developing countries assume 5 years useful life on average because of lack of O&M funds and trained personnel (Rogers and Tsirkuov, 2013), we assume a 10-year useful life of the EWS system given the training and O&M provision in this project.

147. The economic benefits that are valued in the economic analysis of the project is based on flooding and marine wind forecast (asset loss and damage reduction), and improvement in the agriculture sector due to tailored climate information and improved extension services that provides advice for a wide variety of crops. Economic analysis was prepared for this base case.⁶² Other benefits such as capacity building, potential for business information generation, and hydropower generation improvement are not easily quantifiable and confidence in the values are lower. We also do not include other benefits of improving the EWS system such as drought forecast, improved flight safety, and storm forecast to mention a few.

148. Assuming a 10-year useful life of the EWS system and a 10 percent discount rate will give us a discounted net present value of about 13.5 million USD. The economic internal rate of return is 31%, which exceeds 10%, the economic opportunity cost of capital.

149. All proposed investments are economically feasible, with positive NPVs and EIRRs exceeding the minimum threshold of 10%. Under all test cases including a “worst case” scenario combining 20% increase in investments costs with a 20% reduction in total benefits, the EIRR remains above the minimum threshold. Based on the above analysis and the public good nature of the investment, a grant as a source of financing for the project is justified. The benefits of the project to the people of Malawi are higher than the assumed cost of capital of 10% even with conservative estimates of the benefits of the project.

F.2. Technical Evaluation

150. This project has been designed by first identifying gaps in currently available weather/climate related services in Malawi, with a focus on sectors critical for enhancing and protecting livelihoods and reducing the impacts of weather/climate related disasters: agriculture (including both the growing of crops and fishing), flood and water resource forecasting, community-based early warnings for floods. The technological approaches to deliver these services have been specifically designed, and the associated observing/monitoring equipment adapted to fit the service requirements. Additionally, the costs of operating & maintaining equipment, providing human resources and the necessary burden this imposes on the GoM, ensured an approach that minimizes the numbers of observing/monitoring equipment and their costs, whilst being able to provide adequate information to develop informative and specific services.

151. The technologies required to deliver these services were identified as the following: use of medium-cost weather stations to provide observed weather/climate for developing agricultural services in 14 districts, medium-cost hydrological sensors to provide water-level data to be used for flood forecast and water resource modeling, low-cost raingauges and water level sensors to provide alerts directly to vulnerable communities, expanding the lightning

⁶² Though it is standard practice include benefit from loss of lives saved using Value of Statistical life, we exclude this in the cost benefit analysis based on guidance from the GCF secretariat. The implication of this is an undervaluation of the benefits of this project especially in light of the investments on Buoy boys largely to help reduce loss of lives of fishers while at sea. The lives lost currently by fishers because of lack of warning is estimated at about 9 per year. The lives that can be potentially saved for fishers alone is valued at more than 1.5 million USD per year.

detection network to provide severe weather warnings (for floods and fishers) as a low-cost alternative to weather radar, and installing two lake-buoys to provide information on weather and waves on lake Malawi as a basis for developing warnings for fishers. All these technologies provide essential ground observations that enhance the ability to monitor long-term climate change as well as develop services and serve as the basis for developing satellite-based products which can enhance the application of these observations.

152. A second area of technological applications is in the use of mobile phone technology to distribute and receive communications, warnings and advisories. This is a low cost technology that enhances the reach of these services and is available to a large number of farmers, fishers and those vulnerable to floods. However, it is recognized that costs can become significant if a large number of users are engaged and hence the project targets lead farmers as intermediaries, as well as using alternative traditional means of engagement through radio, TV and community centres. In an effort to reduce communication costs (including data telemetry costs for observing stations), telecommunication companies will be approached to test the feasibility of public-private partnerships.

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

153. 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. UNDP's Social and Environmental Standards were reviewed by the GCF accreditation panel and deemed sufficient to accredit UNDP to submit low and medium risk projects. The overall social and environmental risk category for this project is: **Low**. Specific project risks are listed in Section G below, together with appropriate mitigation measures.

154. With respect to environmental impacts, the only real impacts that will occur will be very short term spatially limited impacts during the construction and installation of the EWS. For example, this may include the disturbance of sediment when installing equipment on land and or in the riverine environment. It is anticipated that any impacts will be remediated during installation. There will be very little waste generated as all equipment will be purpose built prior to installation. Further, the systems placed within riverine environments will not result in any changes in hydrological conditions due to their size. Likewise, the installation of buoys in Lake Malawi will have very limited spatial and temporal impacts. The impacts associated with the buoys will be during installation. Depending on the depth and location of the buoys (which will be assessed during project implementation with an engineering study), either anchors will be drilled into the substrate and/or concrete blocks will be used to moor the buoys and ensure they cannot be moved and/or do not move in an event. This infrastructure actually provides habitat for aquatic organisms and as such, it is beneficial, as it will attract fishes that can potentially be caught by fishers.

155. Social impacts will be limited to the installation and maintenance of the EWS. Prior to installation, stakeholder consultation will be undertaken with potential landholders to ensure the location of any infrastructure does not impact detrimentally on their livelihoods. Further, it will be important to not place the EWS in a location that might be culturally important to communities and relevant information will be obtained from stakeholders. When available, infrastructure should be placed on government land which will allow unlimited access during maintenance. Where this is not available, the EWS should be placed in a location that does not require GoM staff to traverse across additional people's land to undertake maintenance. Where available, local people will be employed to undertake maintenance, thereby providing a social benefit to the community. No peoples or their property will be displaced as a result of the project.

156. The project will have focus on gender sensitive planning and implementation to ensure the highest gains in the fight for gender equity. Since women are responsible for planting and weeding while farming, household chores such as collection of water, firewood, fetching and preparing food, caring for children, the elderly and sick members, women and female children are more exposed to climate risks such as late rains and flooding. They are also more vulnerable as they have limited access to land, education, and have lower incomes⁶³. However, due to the close link between their roles and natural resources, women can be empowered to adapt to climate change. A recent study in Malawi suggested that more women than men are likely to be linked to adaptation strategies such as conservation agriculture, winter cropping, crop diversification and engaging in small business. The project, therefore, focuses on

⁶³ In Malawi, female headed households reported lower monthly incomes (\$30.94) than male headed households (\$42.26) (UNDP Gender and Climate Change Report, Malawi, 2014)

gender-differentiated outreach and engagement. Many of the project beneficiaries will be women, especially within the agriculture and fisheries sector where they often make up the majority of smallholder farmers and fishing communities, yet are most vulnerable to climate shocks and variability. In the food insecure and disaster prone communities, women often bear the brunt of the vagaries of the weather, low productivity, and disrupted livelihoods. By focusing on tailored products that include gender-sensitive adoption strategies, the project will ensure that women are empowered to benefit from the information and can cope with climate change impacts.

157. Gender-sensitive methods, including gender-sensitive vulnerability analysis and surveys will ensure that women are targeted by CI/EW systems established. Women would also need to be able to access climate information as easily as men – even if it is through differing mediums – otherwise there is the risk of the information either not being used at all or not being fully understood by women. Therefore, the communication channels and capacity building efforts will be developed with special attention to the needs of women in relation to the uptake and adoption of EWs and climate information. The project will have significant gender benefits. (See Section E.3.1)

F.4. Financial Management and Procurement

158. The financial management and procurement of this project will be guided by UNDP financial rules and regulations available here: https://info.undp.org/global/documents/frm/Financial-Rules-and-Regulations_E.pdf. Further guidance is outlined in the financial resources management section of the UNDP Programme and Operations Policies and Procedures available at <https://info.undp.org/global/popp/frm/Pages/introduction.aspx>. UNDP has comprehensive procurement policies in place as outlined in the ‘Contracts and Procurement’ section of UNDP’s Programme and Operations Policies and Procedures (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 here: <https://info.undp.org/global/popp/cap/Pages/Introduction.aspx>.

159. The project will be implemented following the National Implementation Modality (NIM) following NIM guidelines available here: <https://info.undp.org/global/documents/layouts/WopiFrame.aspx?sourcedoc=/global/documents/frm/National%20Implementation%20by%20the%20Government%20of%20UNDP%20Projects.docx&action=default&DefaultItemOpen=1>. UNDP will ascertain the national capacities of the implementing partner by undertaking an evaluation of capacity following the Framework for Cash Transfers to Implementing Partners (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.

160. The NIM Guidelines are a formal part of UNDP’s policies and procedures, as set out in the UNDP Programme and Operations Policies and Procedures (POPP) which are available here: <https://info.undp.org/global/popp/Pages/default.aspx>. The NIM Guidelines were corporately developed and adopted by UNDP, and are fully compliant with UNDP’s procurement and financial management rules and regulations.

161. The national executing entity DoDMA - also referred to as the national ‘Implementing Partner’ in UNDP terminology - 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 Standard Basic Assistance Agreement (SBAA), together with a UNDP project document which will be signed by the Implementing Partner to govern the use of the funds. Both of these documents require compliance. Prior to signature of the project document, all national Implementing Partners like DoDMA need to have undergone a Harmonized Approach to Cash Transfer (HACT) assessment by UNDP to assess 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 Implementing partner level on the resources received from UNDP.

162. The Harmonized Approach to Cash Transfer (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 weaknesses identified for which actions are required to addresses 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 implementing partner will have to be reviewed if necessary. All details are available here: <https://undg.org/wp-content/uploads/2015/02/2014-UNDG-HACT-Framework-English-FINAL.pdf>.

163. 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 currently being negotiated with the GCF. 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 implementing partner's risk rating and UNDP's guidelines. A scheduled audit is used to determine whether the funds transferred to the implementing partner 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.

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

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

G.1. Risk Assessment Summary

166. Risk factors associated with the project implementation include mainly technical, operational, and institutional aspects, as equipment installation does not cause major social and environmental impacts from the project (please refer to section F.3). The risks may affect information generation due to delays in procurement and installation of equipment, vandalism, or lack of maintenance. Other risks may affect the delivery of information to end users including the risks that local ICT/telecom infrastructure restricts the delivery of information or delays timely dissemination of information to end users. Risk related to lack of commitment of communities or lack of capacity may affect the proper use of information and products disseminated. Technological failure might lead to a risk in alert information not being generated or lack of coordination can hinder reach of that information to communities. There are also risks that private sector will resist in engaging with public sector activities related to weather/climate data. A key risk arising from Activity 4 is related to the identification of viable business models, given weak private sector capacity in the country, that can support the demand for weather and climate services. The environmental and social risks are detailed in Section F.3 as well as added in the table below.

167. The proposed project includes several mitigation measures to address these risks. Effective administration and planning can mitigate the risk of delays in establishment of infrastructure. Appropriate and proven technologies have been chosen to mitigate the risk of technical failure or constrained delivery due to local conditions and infrastructure (such as telecom). Community awareness, participation, and training will help mitigate the risk of vandalism or low commitment and uptake of the disseminated early warnings and CI. Training based on the most up to date scientific and technical advances in the fields of hydrology and meteorology will mitigate the risk that relevant alerts/forecasts are not generated. Data sharing mechanisms and protocols will be established to promote information flow and coordination among agencies and communication channels will be strengthened to ensure last-mile reach. To address the risks related to enabling demand-based model, the feasibility studies will also include willingness-to-pay and a broader scope of business actors including MSMEs, larger private sector actors, public sector institutions to identify market for weather and climate information, in particular for project supported, value-added products. Studies will also identify incentives and partnerships to enable private and public sectors to engage in climate information services. Private sector actors, such as telecom, will also be supported to collaborate directly with DCCMS independent of regulatory constraints.

G.2. Risk Factors and Mitigation Measures

Selected Risk Factor 1

Description	Risk category	Level of risk	Probability of risk occurring
Procurement and installation of hydro-meteorological and telemetry equipment, including hardware and software, is delayed because of complications with the release of funds and/or national procurement procedures.	Technical and operational	High (>20% of project value)	Medium

Mitigation Measure(s)

An effective administrative planning will be implemented, with support from UNDP CO, which will include procuring equipment at an early stage in the project implementation phase. The mitigation measures will lower the probability of this risk occurring to low.

Selected Risk Factor 2

Description	Risk category	Level of risk	Probability of risk occurring
Local information technology and telecommunications infrastructure restricts the transfer of data from installed equipment to necessary recipients, and restricts communication amongst key players and end-users.	Technical and operational	High (>20% of project value)	Low

Mitigation Measure(s)

The project has been designed in accordance with local conditions, taking into account, where applicable, the latest available international technology into account. Furthermore, similar hydromet infrastructure has been put in place through ongoing efforts and is reporting consistently where mobile network coverage is sufficient.

Selected Risk Factor 3

Description	Risk category	Level of risk	Probability of risk occurring
Installed hydro-meteorological and telemetry equipment fails because it is vandalized or not properly maintained.	Technical and operational	High (>20% of project value)	Medium

Mitigation Measure(s)

Awareness raising activities will be undertaken in target communities to highlight the importance of the installed equipment. Community-based observers and technicians responsible for servicing equipment will be identified and will be involved in communicating the purpose of the equipment, as well as engaging in co-production of information products based on the data. In addition, the equipment will be housed within a secure fence. Project finances include budgets for spare parts (which will be ordered with equipment to ensure they are available) as well as funding for O&M activities (travel and vehicle maintenance) and training courses. A draft O&M plan for post-project sustainability has been developed in partnership with DCCMS, DoDMA and DWR, which will be refined during the project (developed in part using UNDP allocated finances). The mitigation measures should lower the risk to low.

Selected Risk Factor 4

Description	Risk category	Level of risk	Probability of risk occurring
Lack of commitment from communities where EWS are established undermines the effectiveness of the project.	Other	Medium (5.1-20% of project value)	Low

Mitigation Measure(s)

Awareness and local community training and capacity building will encourage participation in project activities. Additionally target communities will be identified based on local consultations and a demonstrated willingness/history of engagement in similar activities. The mitigation measures should keep the risk level as low.

Selected Risk Factor 5

Description	Risk category	Level of risk	Probability of risk occurring
Alerts and warnings required by communities are not feasible to produce due to scientific or technological failure.	Technical and operational	Medium (5.1-20% of project value)	Medium

Mitigation Measure(s)

The proposed project will ensure that the training provided is based on the most up to date scientific and technical advances in the fields of hydrology and meteorology. A regional team of experts will be available on a full-time basis to provide support to work towards ensuring use of state-of-the-art technology and scientific methodology suitable to the local context. Engagement and co-production of information products with the local communities will establish the required level of acceptable skill levels. A significant amount of development will involve using monitoring data (with less uncertainty and requirements on forecast skill) to improve the information content. The mitigation measures should lower the risk to low.

Selected Risk Factor 6

Description	Risk category	Level of risk	Probability of risk occurring
There is a risk that data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks).	Other	Medium (5.1 – 20% of project value)	Medium

Mitigation Measure(s)

Data sharing mechanisms, protocols and agreements will ensure that all eventualities are covered, including technical failures, with appropriate backup and access mechanisms for all relevant stakeholders. Cost recovery measures may also be applied to ensure costs of databases and tailored product operationalizing are covered. The mitigation measures should lower the risk level to low.

Selected Risk Factor 7

Description	Risk category	Level of risk	Probability of risk occurring
There is a risk that demand-based models remain weak and the private sector will resist dialogue and changes in the regulatory environment governing their access to weather/climate data.	Other	Medium (5.1 – 20% of project value)	Medium

Mitigation Measure(s)

Broad set of public and private sector actors will be scoped including MSMEs and corporations to identify needs for weather and climate services. The project will support feasibility studies that will include willingness-to-pay assessments and identification of incentives, partnerships, and business models for generation and use of EWs and CI, in particular for the value-added, tailored products. Furthermore, DCCMS and other institutions can engage the private sector and develop their own cost recovery strategy without the integration into National Budget Frameworks. Market development efforts can incentivize private sector without changes in regulatory frameworks. The mitigation measures should lower the risk level to low.

Selected Risk Factor 8

Description	Risk category	Level of risk	Probability of risk occurring
Delays in communication lead to ineffective monitoring and timely dissemination of alerts to affected communities.	Other	Low (<5% of project value)	Medium

Mitigation Measure(s)

Communications systems are put in place that relay information in relevant terms and in a timely manner to local communities and end users (farmers, fishermen). The mitigation measures should lower the risk level to low.

Selected Risk Factor 9

Description	Risk category	Level of risk	Probability of risk occurring
Loss of credibility for early warning system due to failure to warn of a disaster on time (due to technical or operational issues), or providing too many false alarms.	Technical and operational	Medium (5.1-20% of project value)	Medium

Mitigation Measure(s)

As stated for risk 5, the proposed project will ensure that the best and most up to date training is provided as well as the use of state-of-the-art technology and scientific methodologies suitable to the local context, as well as engaging with communities to understand the information needs and co-produce the desired information. Further to these activities it will be necessary to ensure that populations and communities are aware of any limitations and that forecast concepts, such as probability, are clearly understood. The work with DCICs and EOCs will also need to clearly explain the benefits of responding to EWs, even if they turn out to be false alarms, as well as clearly explaining why any failures to predict disasters occurred. A transparent process (not hiding scientific limitations) will be followed in each case. The mitigation measures should lower the risk to low.

Selected Risk Factor 10

Description	Risk category	Level of risk	Probability of risk occurring
Installing equipment on land and or in the riverine environment can lead to disturbance of sediment.	Social and environmental	Low (<5% of project value)	Medium

Mitigation Measure(s)

When undertaking the installation of weather stations, erosion and sediment control will be established to ensure runoff does not flow into riverine systems. The mitigation measures should lower the risk level to low.

Selected Risk Factor 11

Description	Risk category	Level of risk	Probability of risk occurring
Lake-based buoys installed break mooring during installation and implementation.	Social and environmental	Low (<5% of project value)	Low

Mitigation Measure(s)

Full engineering assessment of the proposed anchoring method will be undertaken prior to implementation. The mitigation measures should keep the risk level as low.

Selected Risk Factor 12

Description	Risk category	Level of risk	Probability of risk occurring
Location of infrastructure leads to detrimental social and cultural effects.	Social and environmental	Low (<5% of project value)	Low

Mitigation Measure(s)

Stakeholder consultations will be undertaken prior to the selection of infrastructure sites to ensure no adverse impacts. The mitigation measures should keep the risk level as low.

Selected Risk Factor 13

Description	Risk category	Level of risk	Probability of risk occurring
Staff turnover impedes capacity building and retention of skills and knowledge in the relevant institutions	Technical and operational	Low (<5% of project value)	Medium

Mitigation Measure(s)

The project capacity building activities will be undertaken with inclusion and ownership of staff at all levels and across agencies using a 'training of trainers' approach to ensure that the skills and knowledge are replicated and sustained across the relevant institutions. Community members will also be capacitated for use of the products as well as engaged in the development of climate products and measures to ensure ownership. The mitigation measures should keep the risk level as low.

H.1. Logic Framework

H.1.1. Paradigm Shift Objectives and Impacts at the Fund level⁶⁴

Paradigm shift objectives						
<i>Increased climate-resilient sustainable development</i>	The proposed project contributes to climate-resilient development pathways in Malawi through the sustained impact of project measures that have high potential for replicability and scale. Overall, these impacts can be scaled to reach 100% of national coverage for observational networks benefiting about 2 million of the country's farmers (about 10 times initial reach) and twice as many flood-prone communities with automated CBEWS. The project stimulates a demand-based model for climate information and use of ICT/mobile platforms to enable public and private sector participation, innovation, and market development. It contributes to key policies in the country and supports co-financed efforts to mainstream climate information into development plans. It institutionalizes knowledge generation and learning through the enhancements to the DCICs and strengthens country capacities to sustain project impacts.					
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>	Total number of direct and indirect beneficiaries (% of whom is female)	Gender-sensitive field surveys undertaken within the priority districts and targeted communities, Review of climate monitoring database to estimate coverage of EWS infrastructure	Total (912,6,00) of which 30% female 238,000 ⁶⁷ (direct) 675,000 ⁶⁵ (indirect)	Total (1,500,000 of which 40% female) 500,000 (direct) 1,000,000 (indirect)	Total (3,000,000 of which 50% female) 1,600,000 ⁷⁰ (direct) 1,400,000 ⁶⁶ (indirect)	There is continued commitment and uptake of the information by targeted communities in the project
	Percentage of beneficiaries relative to total population in Malawi		6%	9%	18%	

⁶⁴ 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)): http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf

⁶⁵ Indirect beneficiaries are assumed to be the effective national population that benefits from the total national coverage of infrastructure, capacity of forecasting, and effectiveness of use of EWs and climate information. Therefore, as a proxy, and conservatively, the total AWS coverage is used. A subset of this population would also be those benefiting from mobile services. The estimate excluded the direct beneficiaries already counted. Malawi's population is estimated at 16.3 million. For baseline estimate: with % national coverage of hydromet assumed at 21% (21% AWS from Output 1.1 baseline) and effectiveness assumed at 20% (given lower access/dissemination); indirect beneficiaries baseline is (16.3M minus the direct beneficiaries baseline, 238,000) * 21% * 20% (about 675,000). For target, assumed national coverage is 32% (AWS coverage, conservative estimate), assumed effectiveness is 30%, indirect beneficiaries is (16.3 M – target direct beneficiaries (1.6M) * .32 * .3) – about 1.4M (note target final level *includes* baseline number)

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					
A7.0 Strengthened adaptive capacity and reduced exposure to climate risks	Number of males and females reached by climate-related early warning systems and other risk reduction measures established/strengthened.	Gender-sensitive field surveys in priority districts, Review of climate monitoring database	238,000 ⁶⁹ (of which 30% female)	500,000 (of which 40% female)	1,600,000 ⁷⁰ (of which 50% female)	There is continued commitment and uptake of the information by targeted communities in the project
Project/programme outputs	Outputs that contribute to outcomes					
1. Capacity of hydromet networks and staff enhanced to generate climate-related data and forecast extreme weather and climate change	1.1. Percentage of national coverage of climate monitoring network (fully operational)	Field inspection of AWS sites; review of climate monitoring database	AWS– 21% ⁶⁶ national coverage Hydrological stations– 28% ⁶⁷ national coverage Number of lightening detection sensors (5) - 71% Number of lake based buoys - 0%	AWS– 32% national coverage Hydrological stations– 49% national coverage Number of lightning detection sensors (7) - 100% Number of lake based buoys(2) - 40%	AWS– 32% national coverage Hydrological stations– 49% national coverage Number of lightening detection sensors (7) - 100% Number of lake based buoys(2) - 40%	Baseline projects are implemented according to the timeline identified and achieve the desired outcomes and objective.
	1.2. Number of trained personnel that are proficient with generation of EWS/CI and related activities	Surveys/tests of proficiency at the beginning and end of training	0	25	50	Government identify suitable candidates for training and are prepared to employ new staff when required.

⁶⁶ Area Malawi 94,276 km², assumed 10km radius = 300 AWS needed to cover country. Currently 53 functioning AWS + 11 through LDCF financed UNDP EWS project (baseline – 21%); Target (34 through GCF so total national coverage includes baseline + GCF investments: 98 AWS – 32%)

⁶⁷ 176 hydrological stations needed for 100% coverage. Baseline – 50; target includes baseline plus 37 through GCF

2. Tailored climate information/products and decision-support platforms developed and disseminated for agriculture, fisheries, and flood risk management	2.1 Percentage of population with access to tailored climate information and early warnings for agriculture, fisheries and flood risk management in the 21 target districts (disaggregated by gender)	Reports from NASFAM / DAES; Field surveys; DWR reports on ODSS	2% ⁶⁸ (of which 30% women)	6% (of which 40% women)	12% ⁶⁹ (of which 50% women)	Functional ICT/telecom exist, are best suited to the local context and do not restrict the transfer of information to communities
	2.2 Percentage of population in targeted districts that are satisfied by level and quality of services provided by DCICs and other district level information sources	Reports from Agricultural resource, community lakeshore and district climate information centres; Field surveys.	0	10%	25%	Population has easy access to resources and is motivated to use resource centres.
	2.3 Assessments of private sector engagement and market feasibility for tailored products developed	Reports on market feasibility studies and associated dialogues	0	1	2	That there are 2 sectors/businesses that are able and willing to pay for climate/weather related services.
3. Communities capacities strengthened for use of EWS/CI in preparedness for and response to climate related disasters	3.1. Number of males and females reached by community-based automated early warning systems and other risk reduction measures established	Gender-sensitive field surveys undertaken within the target districts, representative of the local population	0 ⁷⁰	75,000(of which 50% are women)	115,000 ⁷¹ (of which 50% women)	Awareness raising activities, and the training will ensure the continued commitment of the communities in the project in use and O&M of CBEWS
	3.2 Number of district and community level		0		300 (of which 50% are women)	Active participation and learning of the district

⁶⁸ Whilst generic information is available, no tailored products are currently distributed. It is assumed that 30% of fishers currently receive warnings (30% of 30,289), no agriculture products are currently received and current effectiveness of flood warnings in areas covered where ODSS will be applied is 20% is 228,772 (20% effectiveness * percentage coverage of hydrological sensors at baseline). Total about 238,000; Total population in all 21 target districts = 13,381,091, about 2%

⁶⁹ For target: agriculture products localized within 10km of installed AWS (so only count incremental AWS coverage from baseline) – this yields 194,615 direct agricultural beneficiaries; 30,289 direct fisher beneficiaries; 1,402,280 direct beneficiaries from ODSS (ODSS increases effectiveness to 30%) so 30% * percentage coverage of hydrological sensors at target level * target district population); Total about 1.6M; Total district population ~ 13M, about 12%. (Note the target final % population *includes* baseline %)

⁷⁰ Sensors will be placed in areas not already covered by CBEWS. Currently no automatic relaying of CBEWS – only manual systems

⁷¹ Each sensor combination (rainfall gauge + hydrological water level sensor) is assumed to cover 10 villages downstream, each with an average population of 350; 115,500 (rounded down to 115,000)

	actors in targeted communities that show increased knowledge and use of EWS/DRM	Surveys of level and quality of knowledge of actors trained		100 (of which 30% are women)		and community level in the training sessions.
Activities	Description	Inputs	Description			
1.1. Expanding coverage of Meteorological and hydrological infrastructure	Increase the area coverage by hydro-meteorological instruments and equipment	1.1.1. Installation of 33 AWS 1.1.2. Installation of hydrological stations 1.1.3. Installation of 2 lightning sensors 1.1.4. Installation of 2 lake-based buoys	Installation of hydromet infrastructure			
1.2. Capacity-building of hydro-met staff on O&M, data modeling, and forecasting.	Capacity building activities to enhance the technical capacity of hydro-met staff	1.2.1. Training for DCCMS on data rescue of non-digitized data (4 sessions), debiased satellite product, forecasting, O&M (LS) (1 session each year) 1.2.2 Training for DCCMS, DWR, MDF on O&M of lake-based buoys (DCCMS: 4 sessions and a session with communities based on location, every 2 years; DWR: 3 a year) 1.2.3 Training for DCCMS, DWR on O&M of AWS/HS (DCCMS: factory training, and refresher session every 2 years; DWR: 1 field management training and 1 workshop annually) 1.2.4 Training for DWR in use of ODSS (3 sessions per year)	Training activities (using ToT approach) on operating and maintaining technical equipment and instruments (AWS, Lightening sensors (LS), Hydrological sensors (HS), as well as modeling and seasonal weather forecasting; Data rescue of non-digitized data and development of a debiased satellite rainfall database			
2.1 Develop tailored weather/climate based agricultural advisories for 14 food insecure districts and disseminate through ICT/mobile, print, and radio channels	Development of agriculture advisories through community participation and co-development and dissemination through various channels such as print/radio/ICT/mobile networks in partnership with DAES and NASFAM	2.1.1 Carry out Community Based Participatory initiatives for sensitization and co-production of products (number of communities covered need to be determined as of yet through a consultation process; a preliminary estimate is that project would target about 280 communities) 2.1.2 Map agricultural areas, farming systems, and crop types in target districts (estimated 248,000ha covered) 2.1.3 Train extension workers for co-production and interpretation of product (400 staff trained) 2.1.4 Design and produce advisories for range of media (print, TV, radio)	Through community participation, co-design and develop tailored agricultural advisories incorporating weather/climate information; carry out training, awareness, and outreach activities to support diffusion.			

		<p>2.1.5 Design and produce advisories for 3-2-1, Esoko, and FrontlineSMS services</p> <p>2.1.6 Carry out dissemination and communication/outreach</p>	
<p>2.2 Develop and disseminate tailored warnings and advisories for fishing communities of Mangochi, Salima, Nkhata Bay and Nkhotakhota around Lake Malawi</p>	<p>Development of tailored warnings for fisheries and dissemination through CoU and BVCs.</p>	<p>2.2.1. Training and courses for extension workers on approaches and skills for dissemination of warnings/info (28 trainings over 6 years)</p> <p>2.2.2 Design and produce tailored messages on extreme weather, safety at sea, preparedness and response</p> <p>2.2.3 Build CoU and BVCs capacity (facilities and skills) for community outreach and dissemination including production of information materials for various media</p> <p>2.2.4 Awareness raising and training for end users on use of information</p> <p>2.2.5 Establish search and rescue for sea safety</p> <p>2.2.6 Review workshops for DCCMS/DoF/stakeholders (24 workshops over 6 years; 4 quarterly per year)</p>	<p>Participatory design and development of tailored warnings and advisories for fishing communities; Capacity building for department staff, extension support, end users to support diffusion of information</p>
<p>2.3 Develop and deploy the flood and water resource modelling and decision support system to enhance coverage for disaster risk and water resource management</p>	<p>Calibrate and apply the ODSS decision platform for water catchments in central and northern Malawi for improved water resource and flood modeling</p>	<p>2.3.1 Develop Integrated Visualization and Analysis platform</p> <p>2.3.2 Improve hydro-meteorological forecasting</p> <p>2.3.3 Deploy ODSS for northern and central catchments</p> <p>2.3.4 Establish dissemination systems and communication channels</p> <p>2.3.5 Assess performance and report on weaknesses and potential improvements (A report produced)</p> <p>2.3.6 Train DCCMS and DWR staff on use of system (200 DCCMS, 100 DWR staff)</p>	<p>Develop and extend the ODSS platform carrying out analysis and modeling; deploy the system and build capacity for use and assessment.</p>
<p>2.4. Enable a demand-based model for climate information and services stimulating private sector engagement</p>	<p>Generate value-added products, stimulating demand for CI information and services, and enable market development for CI/services</p>	<p>2.4.1. Review and report on existing policy and institutional arrangements for PPPs (1 Report developed)</p> <p>2.4.2 Technical support to formulate PPPs</p> <p>2.4.3 Review and report on agriculture, fisheries, water sector for provision of information to private sector/MSEs (1 report with sector-specific analysis)</p>	<p>Analyze the market for and evaluate the costs and benefits of accurate, timely and accessible weather and climate forecasts in agriculture, water and fishing sectors; produce feasibilities and provide technical support for public private partnerships reviewing policy and institutional arrangements.</p>

		2.4.4 Market feasibility for tailored products (1 report covering all sectors)	
2.5. Knowledge sharing and management for development, dissemination, and use of EWs and CI to enhance resilience	Strengthening of District Climate Information Centres (DCIC) as hubs for knowledge management and sharing	2.5.1. Upgrade of facilities, software and hardware, and connection of new DCICs to nearby Met Stations including radio links 2.5.2 Communication materials including translation services 2.5.3 Workshops for capacity building and collective learning across the entire information sharing chain (2 workshops per district in year 1 and 1 per district for 4 more years; and on average a 100 participants)	Set up links to rural radios; Installation of software and hardware; translation of materials to local languages; Capacity building of DCIC personnel; training of end users on how to use information and engage in knowledge sharing
3.1. Scale-up community-based EWS in flood-disaster prone areas of Karonga, Salima, Dedza, Nkhotakota, Nkhata Bay, Rumphu, Phalombe and Zomba	Scale up best practices and ongoing efforts to enhance community readiness	3.1.1. Awareness raising workshops to sensitize communities (3 per district per CBEWS; 99 workshops in total. Average number of participants per workshop 50; 5 from each of the 10 villages covered per CBEWS) 3.1.2 Installation of 33 automated rainfall and hydrological monitoring and telemetry systems 3.1.3 Training of community members on O&M and effective use (50 DCPC members + 150 community members; 200 per district) 3.1.4 Implement simulation training, EW testing, emergency response 3.1.5 Set up communication channels and train on use	Awareness raising to sensitize communities prior to installation of equipment in flood-prone districts; training on O&M and use and implementation of DRR measures including communication systems.
3.2. Capacity development of national, district and community level actors on disaster and climate risk management	Address capacity barriers at national and local level and empower districts and communities to ensure 'last mile' disaster preparedness and response	3.2.1 Upgrade EoCs with satellite phones, GPS, computers, emergency lights, GIS system, internet 3.2.2 Develop operational guidelines for EoCs 3.2.3 Training and learning tours for EOC staff (10 staff) 3.2.4 Short courses for national and district staff of DoDMA (10 national and 28 district level staff) 3.2.5 Training for at least 50 DCPC members and 200 community members (ACPCs/VCPCs)	Strengthening the Emergency Operation Centers (EOCs) and capacity building at national, district and community levels on DRM/climate EWS/and climate risk management

H.2. Arrangements for Monitoring, Reporting and Evaluation

168. Project-level monitoring and evaluation will be undertaken in compliance with the [UNDP POPP](#) and the [UNDP Evaluation Policy](#). 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 Monitoring & Evaluation (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.

169. 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, implementation quality assurance, and troubleshooting support will be provided by the UNDP Regional Technical Advisor 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.

170. A project inception workshop will be held after the UNDP project document has been signed by all relevant parties to: a) re-orient 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, re-assess baselines as needed, and discuss reporting, monitoring and evaluation 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.

171. A project implementation report will be prepared for each year of project implementation. The Project Manager, the UNDP Country Office, and the UNDP Regional Technical Advisor 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.

172. An independent mid-term review 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 terms of reference, the review process and the final MTR report will follow the standard templates and guidance available on the [UNDP Evaluation Resource Center](#). 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. An independent terminal evaluation (TE) will take place no later than three months prior to operational closure of the project. The terms of reference, the review process and the final TE report will follow the standard templates and guidance available on the [UNDP Evaluation Resource Center](#). 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 terminal evaluation in the UNDP Country Office evaluation plan, and will upload the final terminal evaluation report in English and the management response to the public UNDP Evaluation Resource Centre (ERC) (www.erc.undp.org). The MTR and TE will be carried out by an independent evaluator. The evaluation report prepared by the independent evaluator is then quality assessed and rated by the UNDP Independent Evaluation Office.

173. 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.

174. Implementation of the project will follow a schedule that will install all the monitoring equipment in the first 3 years by the time of the midterm evaluation. The phased approach to product development (elaborated in Section C.7) will ensure that the effectiveness of early warnings will improve from the project outset and there will be improvements in flood warnings (through the ODSS and CBEWS) and weather forecasting by the time of the mid-term assessments enabling early impacts from the project. A key tool for MRV for the project is the field and impact surveys that will be conducted throughout the project (6 impact survey periods) to monitor progress of implementation and progress towards the expected outputs and outcomes. To monitor and verify the expansion of hydromet coverage and capacity, field inspection of infrastructure sites will be conducted. Installations are captured in the climate-monitoring database that will be reviewed during the mid-term and final evaluations to report on progress. The development and diffusion of tailored products will be monitored through gender-sensitive field surveys (for community groups, lead farmers in NASFAM, fishers, etc.), reports from NASFAM and DAES extension workers, Agricultural resource centers, DoF extension support (in particular the COU), and reports from DWR on ODSS expansion. Communities would also be surveyed through the VCPC and end-user surveys. All reporting will follow the above stated arrangements.

175. UNDP will perform monitoring and reporting throughout the Reporting Period, including semi-annual reporting, in accordance with the AMA and Funded Activity Agreement (FAA). 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 project and will prepare a post-implementation monitoring plan and budget for approval by the GCF Board as necessary.

SECTION I

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

I. SUPPORTING DOCUMENTS FOR FUNDING PROPOSAL

- NDA No-objection Letter **Annex I**
 - Feasibility Study **Annex II**
 - Integrated Financial Model that provides sensitivity analysis of critical elements (xls format) **Annex III**
Not Applicable. *The public goods nature of this project's outputs does not entail revenue generation or cost recovery from the project's direct and indirect beneficiaries during the project duration. Hence, a financial analysis of this project is deemed to be no pertinent.*
 - Confirmation letter or letter of commitment for co-financing commitment **Annex IV**
 - Term Sheet/Confirmation (as per AMA) **Annex V (a)**
 - Term Sheet/Confirmation (as per AMA) **Annex V (b)**
 - Environmental and Social Impact Assessment (ESIA) **Annex VI**
 - Appraisal Report or Due Diligence Report with recommendations **Annex VII**
 - Evaluation Report of the baseline project **Annex VIII**
Not Applicable. *While the project builds on ongoing efforts, it is not an extension or subsequent phase of a completed project. Evaluations for the ongoing efforts are not yet available.*
 - Map indicating the location of the project/programme **Annex IX**
 - Timetable of project/programme implementation **Annex X**
 - Project/programme confirmation **Annex XI**
- Additional Information**
- Economic Analysis **Annex XII (a)**
 - Economic Analysis **Annex XII (b)**
 - Additional Background Details **Annex XIII**
 - Responses to GCF comments on Concept Note **Annex XIV (a)**
 - Responses to GCF ITAP Comments **Annex XIV (b)**
 - Letter of Endorsement for the proposed project by UNDP Senior Management **Annex XV**



No-objection letter issued by the national designated authority



GREEN
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Annex I – NDA No-objection Letter GREEN CLIMATE FUND FUNDING PROPOSAL

Telephone: +265 (0) 1 771 111
Telefax No.: +265 (0) 1 773 379
Our Reference No.:
Your Reference No.:

All communications should be addressed to:
Director of Environmental Affairs



ENVIRONMENTAL AFFAIRS DEPARTMENT
LINGADZI HOUSE
CITY CENTRE
PRIVATE BAG 394
LILONGWE 3
MALAWI

27th July, 2015

The Secretariat
Green Climate Fund

Re: Funding proposal for the GCF by United Nations Development Programme (UNDP) regarding "Saving Lives and Protecting Agriculture based Livelihoods in Malawi: Scaling up the Use of Modernized Climate Information and Early Warning Systems"

Dear Madam, Sir,

We refer to the project "Saving Lives and Protecting Agriculture based Livelihoods in Malawi: Scaling- up the Use of Modernized Climate Information and Early Warning Systems" in Malawi as included in the funding proposal submitted by UNDP to us on July 21, 2015.

The undersigned is the duly authorized representative of Environmental Affairs Department, the National Designated Authority of Malawi. Pursuant to GCF decision B.08/10, the content of which we acknowledge to have reviewed, we hereby communicate our no-objection to the project as included in the funding proposal.

By communicating our no-objection, it is implied that:

- (a) The government of Malawi has no-objection to the project as included in the funding proposal;
- (b) The project as included in the funding proposal is in conformity with Malawi's national priorities, strategies and plans;
- (c) In accordance with the GCF's environmental and social safeguards, the project as included in the funding proposal is in conformity with relevant national laws and regulations.

We also confirm that our national process for ascertaining no-objection to the project as included in the funding proposal has been duly followed. We acknowledge that this letter will be made publicly available on the GCF website.

Kind regards,

Name: Tawonga Mbale (Ms)

Title: Director of Environmental Affairs and National Designated Authority for the GCF