



PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Full-sized Project

TYPE OF TRUST FUND:LDCF

PART I: PROJECT IDENTIFICATION

Project Title:	Strengthening climate information and early warning systems in Eastern and Southern Africa for climate resilient development and adaptation to climate change – Malawi.		
Country(ies):	Malawi	GEF Project ID:	4994
GEF Agency(ies):	UNDP	GEF Agency Project ID:	5092
Other Executing Partner(s):	Department of Climate Change and Meteorological Services, Department of Disaster Management Affairs	Submission Date:	May 18, 2012
GEF Focal Area (s):	Climate Change Adaptation	Project Duration (months):	36 months
Name of parent programme: For SFM/REDD+ <input type="checkbox"/>		Agency Fee (\$):	400,000

A. FOCAL AREA STRATEGY FRAMEWORK:

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Indicative grant amount (\$)	Indicative co-financing (\$)
CCA-2 Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level	Outcome 2.2 Strengthened adaptive capacity to reduce risks to climate-induced economic losses	Output 2.2.1 Adaptive capacity of national early warning networks strengthened to rapidly respond to extreme weather events	LDCF	960,000	10,500,000
CCA-3 Promote transfer and adoption of adaptation technology	Outcome 3.1 Successful demonstration, deployment, and transfer of relevant adaptation technology in targeted areas	Output 3.1.1: Relevant adaptation technology transferred to targeted groups Output 3.2.1: Skills increased for relevant individuals in transfer of adaptation technology	LDCF	2,850,000	5,823,000
Sub-total				3,810,000	16,323,000
Project management cost				190,000	813,749
Total project cost				4,000,000	17,136,749

B. PROJECT FRAMEWORK

Project Objective: To strengthen the climate monitoring capabilities, early warning systems and available information for responding to climate shocks and planning adaptation to climate change in Malawi.						
Project Component	Grant type	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount (\$)	Indicative co-financing (\$)
Transfer of technologies for climate and environmental monitoring infrastructure	INV	1. Enhanced capacity of national hydro-meteorological (NHMS) and environmental institutions to monitor extreme weather and climate change.	1.1 Procurement and installation or rehabilitation (in case of existing) of approximately 10+ hydrological monitoring stations with telemetry, archiving and data processing facilities.	LDCF	2,710,000	3,500,000
	TA		1.2 Procurement and installation or rehabilitation of approximately 40 meteorological monitoring stations with telemetry, archiving and data processing facilities. 1.3 Procurement and installation or rehabilitation of radar for monitoring severe weather. 1.4 Procurement and installation or rehabilitation of upper air monitoring stations. 1.5 Procurement and installation or rehabilitation of satellite monitoring equipment to receive real time climate and environmental information. 1.6 Training of at least 3-5 officers to maintain and repair equipment, computer infrastructure and telecommunications, including cost-effective technologies to interface with existing equipment/software (<i>approx. \$150,000</i>).			
Climate information integrated into development plans and early warning systems	TA	2. Efficient and effective use of hydro-meteorological and environmental information for making early warnings and long-term development plans.	2.1 NHMS capacity to make and use climate forecasts (on daily to seasonal, as well as medium- to long-term timescales) is strengthened by training at least 4 forecasters. (<i>approx. \$150,000</i>)	LDCF	1,100,000	12,823,000
	INV		2.2 Tailored sector-specific early warning products that link climate, environmental and socio-economic information on a range of timescales are developed, based on identified user needs.			
	TA		2.3 National capacity for assimilating forecasts and monitoring into existing development planning, PRSPs and disaster management systems is built, including coordination with systems and warnings developed by other initiatives. (<i>approx. \$390,000</i>)			

	INV		2.4 Communication channels and procedures for issuing warnings (through both governmental and non-governmental agencies) are enabled (e.g. radio, newspapers, mobile phones, television etc).			
	TA		2.5 Plan for sustainable financing for the operation and maintenance of the installed EWS developed and implemented, including public and private financing options. (<i>approx. \$150,000</i>)			
Sub-total					3,810,000	16,323,000
Project management cost					190,000	813,749
Total project costs					4,000,000	17,136,749

C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, (\$)

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount (\$)
National Government	Government of Malawi	Grant	2,000,000
National Government	Government of Malawi/GFDRR	In-Kind	1,114,000
GEF Agency	UNDP	Grant	12,462,749
Bilateral agency	Government of Finland	Grant	1,560,000
Total Co-financing			17,136,749

D. GEF RESOURCES REQUESTED BY AGENCY, FOCAL AREAS AND COUNTRY

GEF AGENCY	TYPE OF TRUST FUND	FOCAL AREA	Country name/Global	Project amount (a)	Agency Fee (b)	Total c=a+b
UNDP	LDCF	Climate Change	Malawi	4,000,000	400,000	4,400,000
Total GEF Resources				4,000,000	400,000	4,400,000

PART II: PROJECT JUSTIFICATION

1. The proposed project responds to priorities and actions identified in the NAPA of Malawi which articulate the need for securing, transferring and installing critical technologies, as well as developing the necessary systems for climate change-related information to permeate into decision-making processes. The technologies required to achieve these aims will increase the capacity of the national early warning network to forewarn and rapidly respond to extreme climate events. The total amount of funding requested, as articulated in the Letter of Endorsement and not including PPG and agency fees is USD 4,000,000.

2. The NAPA clearly identifies a priority project on Early Warning Systems (EWS) along with projects associated with Food security, Water resources and Terrestrial ecosystems. The EWS project is not associated with any one particular sector and is expected to be relevant to multiple sectors, including the food/agriculture, water management, health and energy sectors.

A1. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

A.1.1 The GEF focal area strategies:

3. This project is fully in line with LDCF/SCCF focal area objective 2 “Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level” and objective 3: Promote transfer and adoption of adaptation technology. It is specifically aligned with outcomes linked to these objectives including increased knowledge and understanding of climate variability and change-induced risks at country level and in targeted vulnerable areas, strengthened adaptive capacity to reduce risks to climate-induced economic losses, successful demonstration, deployment, and transfer of relevant adaptation technology in targeted areas and enhanced enabling environment to support adaptation related technology transfer.

A.1.2. For projects funded from LDCF/SCCF: the LDCF/SCCF eligibility criteria and priorities:

4. **Country ownership:** The Government of Malawi has ratified the UNFCCC and is classified among the non-Annex 1 parties. These countries have also developed and submitted their National Adaptation Plans of Action (NAPA) and are entitled to benefit from the LDC Fund for the implementation of priority measures identified in their respective NAPAs. In implementing priority interventions identified in the NAPAs, the project is consistent with the Conference of Parties (COP-9) and also satisfies criteria outlined in UNFCCC Decision 7/CP.7 and GEF/C.28/18.

5. The project focus is aligned with the scope of expected interventions as articulated in the LDCF programming paper and decision 5/CP.9. As climate impacts fall disproportionately on the poor, the project recognizes the links between adaptation and poverty reduction (GEF/C.28/18, 1(b), 29).

6. **Compliance with programme and LDC Fund policies:** The project complies with the NAPA-identified urgent needs, all of which are relevant for supporting national development goals and for achieving MDGs 1, 3, 6 and 7.

7. **Financing:** The project is designed to accommodate the additional adaptation costs of priority actions identified in the NAPAs and build on several other baseline projects and programmes. The co-funding for this project is also within the stated guidelines, with more than \$5m in prospective co-funding. The relevance of the co-financing to the proposed LDCF project is outlined below and will be further elaborated on during the project preparation phase.

8. **Institutional Synergy and Coordination:** The project outcomes will be primarily implemented through national implementation. The PIF therefore outlines project management costs that will be incurred by implementing partners at the national level (below 5%).

9. The project is aligned with the framework of Poverty Reduction Strategy Papers (PRSP). In the case of Malawi, the relevant PRSP pillar is:

- *Improving the Quality of Life for the Most Vulnerable (providing sustainable safety nets)* by reducing vulnerability to natural disasters and *Good Governance* by providing systems that protect and benefit the poor.

9. The project outcomes are closely aligned and coordinated with efforts already underway within Malawi to promote development which is resilient to climate change at the national and local levels. The project is focused on strengthening the capacity of national and sub-national entities to monitor climate change, generate reliable hydro-meteorological information (including forecasts) and to be able to combine this information with other environmental and socio-economic data to improve evidence-based decision-making for early warning and adaptation responses as well as planning. The proposed project will be implemented at the country level by the lead Ministry mandated to advance climate monitoring including management of climate data in full collaboration with other relevant line Ministries who rely on the information for planning purposes (Disaster Management, Agriculture, Water, Finance and Planning etc). Sub national authorities (Provincial and/or District officers, Municipalities, civil society (women and youth associations, NGOs, media, farmers' associations) and the private sector will all also be important stakeholders (as end users) and will be provided with the space and opportunity to contribute to the design of the project in each country. Details of the institutional coordination will be spelt out in the project document that is prepared during the PPG phase with the full participation of key stakeholders in each country including GEF OFP, UNFCCC FP, and other key senior Government officials including private sector and civil society representations as well as donor representatives.

10. **Monitoring and Evaluation:** The implementation of the project's activities will reflect UNDP-GEF monitoring and evaluation standards and procedures, in line with the requirements of the LDCF. Details for monitoring and evaluation will be articulated during the project development phase.

A.2. National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NIPs, PRSPs, NPFE, etc.:

11. The link between this project strategy and the NAPA is centered on a common goal of informing climate resilient development planning and sector management through improved national systems that generate relevant climate information.

12. The Malawi NAPA espouses multiple EWS-related needs as its priority adaptation actions. In particular, EWS needs are highlighted for “extension deliveries to the farming communities” (Priority Action 3) and for “sustainable utilization of Lake Malawi and lakeshore areas resources” (Priority Action 5).¹ These priorities have not been implemented comprehensively, though some work on EWS in Malawi has been completed through the UNDP-support, Government of Japan financed Africa Adaptation Programme (AAP) and Disaster Risk Reduction (DRR) projects (see below), as well as by NGOs in some locations.

13. Malawi’s NAPA project priority #4 on “Improving Malawi’s Preparedness to cope with droughts and floods” features the implementation of both flood and drought early warning systems. The project’s includes priority activities for strengthening the “Forecasting and Early Warning system” including “Capacity building (training staff to man the systems).” The lead institution identified in the NAPA is the Department of Meteorology in collaboration with the Ministry of Water Development, Ministry of Agriculture, NGOs, CBOs, local communities and The Malawi Polytechnic (Civil Engineering Dept.).

14. Malawi’s NAPA project priority #5 on “Improving climate monitoring to enhance Malawi’s early warning capability and decision making and sustainable utilization of Lake Malawi and lakeshore areas resources,” features a climate monitoring and early warning system on Lake Malawi and lakeshore areas for pre-disaster preparedness to rural fishing and farming communities. It also benefits fisheries, transport, tourism, water and hydropower energy sectors.

B. PROJECT OVERVIEW:

B.1. DESCRIBE THE BASELINE PROJECT AND THE PROBLEM THAT IT SEEKS TO ADDRESS:

Problem

15. Many countries in Eastern & Southern (E&S) Africa suffer from low rates of development. In particular, Malawi is in the lowest 20% of countries worldwide, ranked by both Gross National Income (GNI per capita) and the 2011 United Nations Human Development Index (ranked 171 out of 187 countries)². These countries are particularly vulnerable to climate-related shocks (either to the economy or to unprotected populations), which threaten to undo years of development assistance and asset accumulation, especially within poor populations. One way to help mitigate the impact of these climate-related shocks is to warn populations, businesses and governments in advance of an impending or likely damaging event through an Early Warning System (EWS).

16. The fundamental problem in many countries such as Malawi is that a complete EWS, which generates knowledge of the risks (vulnerability & hazard), has capacity to monitor, analyze and forecast hazards, provides communication and dissemination of alerts and warnings, either does not exist or does not function as well as it ought to be relevant and useful for long-term planning, management and risk reduction activities. In Malawi this status unnecessarily imperils lives and assets, recently for flood prone

¹ Malawi NAPA, p. ix

² <http://hdr.undp.org/en/reports/global/hdr2011/>

victims in the lower Shire river valley³ and for farmers suffering from drought impacts on cereal production⁴. Reasons for this situation involve a lack of both hard and soft technologies and the capacity to utilise those technologies in an appropriate manner. This results in: i) a limited understanding of current and future risks; ii) limited monitoring and forecasting of climate-related hazards; iii) inappropriate communication and packaging of warnings; iv) restricted responses to impending disasters and v) constrained planning for slow-onset changes due to climate change that will require a transformational shift in economic development and risk reduction efforts. The infrastructure and technology on which to build these services is lacking in Malawi e.g. hydrological stations for monitoring water levels in Lake Malawi and the Shire river, as well as automatic weather stations for monitoring drought conditions in agricultural zones. Without investing in the capacity to generate information, especially the monitoring and forecasting of climate-related hazards, the EWS will never function as optimally as it could. The aim of this proposal is to strengthen the EWS of Malawi, largely through improving national capabilities to generate and use climate information in the planning for and management of climate induced hazard risks. It will achieve this by implementing the transfer of appropriate technology, infrastructure and skills.

Changes in climate-related hazards and likely impacts

17. Africa is the continent expected to suffer the most under anthropogenic induced climate change, both due to expected increases in climate hazards and its already high vulnerabilities to those hazards across a range of sectors. Malawi is classified as a Least Developed Country (LDC), which is recognized by the United Nations Framework Convention on Climate Change (UNFCCC) as among the most vulnerable to the impacts of climate change. These vulnerabilities span many sectors, livelihoods and assets within each country and the region in general.

18. Water is a scarce resource across Africa and its availability both for agriculture and domestic consumption is impacted severely by drought, which has been and will continue to increase in intensity and frequency (due to both changes in rainfall and increasing temperatures), especially in sub-tropical and semi-arid regions. In Malawi temperatures have risen by approximately 0.9°C between 1960 and 2006 and are expected to increase by between 1.1 and 3.0°C by 2060⁵. Hot nights and days will continue to increase in frequency, whilst cold days and nights will become rarer. Statistically significant trends in historical rainfall have been hard to detect though there have been some indications of decreases in seasonal duration and significant correlations of rain days with the El-Nino Southern Oscillation (ENSO)⁶. Future projections of rainfall suggest a likely decrease in rainfall during the June to November period and increases during December to April⁵.

19. These hazardous events often lead to impacts on food security and health such as those seen recently in the south of Malawi⁴. Flooding due to heavy rainfall over a short period of time has wreaked havoc in both urban and rural (river basins/watersheds) environments, with attendant impacts on health and the spread of disease e.g. recent floods in the Shire river. Whilst the upswing in deaths attributed to floods in recent years may largely be due to population dynamics⁷, many deaths can be avoided with

³ <http://reliefweb.int/node/472619>

⁴ <http://af.reuters.com/article/malawiNews/idAFL5E7LV2Z220111031>

⁵ <http://country-profiles.geog.ox.ac.uk/>

⁶ Tadross M., Suarez P., Lotsch A., Hachigonta S., Mdoka M., Unganai 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

⁷ Di Baldassarre, G., A. Montanari, H. Lins, D. Koutsoyiannis, L. Brandimarte, and G. Blöschl (2010), Flood fatalities in Africa: From diagnosis to mitigation, *Geophys. Res. Lett.*, 37, L22402, doi:10.1029/2010GL045467

sufficient early warning. These risks and associated losses are expected to increase due to the increased availability of atmospheric moisture and intensity of rainfall in the future⁸.

20. Severe weather, associated with convective weather, atmospheric heating and moisture, will likely increase in many regions and can result in increases in rain, hail and winds, all of which are damaging to crops and infrastructure. Whilst changes in cyclone frequency are uncertain, most models and observations suggest an increase in cyclone intensity⁹ (or an increase in the frequency of more intense cyclones). Whilst Malawi is currently not directly in the path of cyclones it still suffers increased rainfall and floods when cyclones pass nearby in the Mozambique channel. Furthermore, rises in temperature which affects all regions, results in an increase in the frequency of heat waves and extremely hot days/nights, which in turn affect the health of humans, ecosystems and urban environments.

21. Changes in the above climate-related hazards will negatively affect a range of sectors. Of particular concern is the agricultural sector which is an important component of the economy and forms the basis of many rural livelihoods. Droughts, floods and increases in temperature reduce the ability to grow crops, as well as affecting other aspects of the value chain e.g. drying/storage and transport to market.

Underlying causes

22. Whilst the EWS in many different countries serve different sectors or users, they also currently share common problems; i) insufficient meteorological and hydrological observing stations to monitor the current state of the climate and hydrology, map risks and detect long-term trends; ii) insufficient use of satellite data for monitoring different aspects of the environment and providing information in regions not covered by the meteorological and hydrological stations; iii) limited use of climate forecasts on daily to seasonal timescales and; iv) limited packaging of different sources of information to inform risk reduction efforts in different sectors; v) inappropriate communication of EWS messages and vi) lack of trained personnel to effectively run and maintain the different aspects of the EWS.

23. A lack of meteorological and hydrological monitoring stations in Malawi has meant that many important regions and populations vulnerable to climate hazards are not monitored e.g. drought conditions (rainfall) are not monitored for important agricultural lands, intense rainfall is not monitored in areas prone to landslides and flooding, and rapid rises in rivers as a precursor to flooding goes unnoticed. Therefore many potentially threatening hazards are not forewarned because of a lack of monitoring stations. Where stations exist they are often manually operated and do not report measurements for days to weeks after the climate hazards have passed. Equipment failure is also common and regular checks and maintenance often neglected due to insufficient funds, incentives and regulatory policies resulting in poor quality and unreliable data for making management decisions related to climate change induced disaster risks.

24. It is now common practice to utilize satellite imagery as a useful tool for monitoring areas where meteorological and hydrological monitoring stations do not exist and aspects of the environment useful for assessing current risks e.g. vegetation monitoring helps assess crop performance and images of floods help understand which areas are more at risk. Additionally satellite data may be used to predict rainfall or monitor severe weather. However, many developing countries do not utilize these technologies because they do not have the necessary equipment to access the data or do not have the human resources to use the data.

⁸ IPCC, 2012: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, UK, and New York, NY, USA, 582 pp

⁹ Knutson T, McBride J, Chan J, Emanuel K, Holland G, Landsea C, Held I, Kossin J, K Srivastava and M Sugi (2010). Tropical cyclones and climate change. *Nature Geoscience*. doi: 10.1038/ngeo779.

25. The radar network for monitoring severe weather is limited in Malawi, often to airports where its main application is for air traffic control. This is largely a consequence of the high costs (for infrastructure, maintenance and human resources to run the equipment). Given most radar have a range of approximately 75-200 km covering large areas becomes very costly.

26. Climate forecasts for the coming 1-7 days are produced using a combination of Numerical Weather Prediction (NWP) models and predictions either from neighboring countries or international centres. Seasonal forecasts are also produced using tools developed at international centres. In situations where forecasts are externally sourced, forecasters are dependent on the applicability of the forecasts to local conditions and restricted in their ability to apply local observations to develop better forecasts.

27. Often forecasts and climate information is given in the same standard formats for different users and this restricts their interpretation and application. For example, agricultural extension officers require information about the start of the rains, or the frequency of days with rain, whereas those monitoring floods require information on rainfall intensity. Extracting these particular attributes from forecasts is currently not undertaken. This information is then more useful when packaged with other sources of data e.g. satellite maps showing current vegetation and rainfall, or soil moisture as an indication of flooding potential etc.

28. Further problems are caused by a lack of trained personnel who are capable of maintaining an observational network, generating information for specific sectors, as well as interpreting the data in ways that non-technical stakeholders can understand. This human capacity is required to:

- Replace components of the observing networks when they fail;
- Manage and run any forecast models;
- Understand how users interpret data and design information packages that address these needs;
- Be able to combine, manipulate and overlay different data to identify areas at risk.

Long-term solution and barriers to achieving it:

29. It is expected that as climate change unfolds the frequency and intensity of climate related shocks will change, therefore improving EWSs is one way to adapt to a changing climate. As an adaptive measure EWS also benefit the poorer segments of society, those who do not necessarily benefit from large protective infrastructure projects¹⁰. Furthermore, improving the EWS also provides benefits for long term planning and helps NHMS and other institutions build capacity to service other needs e.g. for land-use and agricultural planning, hydro-electric power etc.

30. To allow countries to better manage severe weather related disasters, food security and agricultural production, scarce and dwindling water resources and make their socioeconomic development process less vulnerable to climate-related risks it is essential to:

- enhance the capacity of hydro-meteorological services and networks for predicting climatic events and associated risks;
- develop a more effective, efficient and targeted delivery of climate information including early warnings;
- support improved and timely preparedness and response to forecast climate-related risks and vulnerabilities.

31. These objectives require developing robust weather and climate observation, forecasting, and monitoring infrastructure, which can be rapidly deployed, is relatively easy to maintain, and simple to use. Such a weather and climate monitoring system can provide countries with the capacity to develop: (i) an early warning system for severe weather; (ii) real-time weather and hydrological monitoring; (iii)

¹⁰ World Bank (2010). Natural hazards, Unnatural disasters: Effective prevention through an economic lens. World Bank and United Nations. 231 pp.

weather forecasting capabilities (Numerical Weather Prediction); (iv) agro-meteorological information and services (including integrated crop and pest management); (v) applications related to building and management of infrastructure; (vi) land, air and maritime transport management; (vii) integrated water resources management; (viii) coastal zone and land management; and (ix) planning and policy making processes.

32. However, there are significant policy, institutional, financial, technological and informational barriers that prevent the desired situation from emerging. These barriers include:

Lack of weather and climate monitoring infrastructure

33. In Malawi there has been a steady decline in infrastructure dedicated to monitoring the climate, hydrology, environment and severe weather (e.g. meteorological and hydrological observing stations, satellite receivers and weather radar) for the last 20-30 years. Whilst this situation has been ameliorated by specifically targeted project interventions, this has often benefitted a particular aspect of the early warning system (e.g. African Monitoring of the Environment for Sustainable Development (AMESD)¹¹ to improve use of satellite data or the “Weather for all” initiative to improve weather station coverage¹²). Recently the need for a systematic improvement of the observing network is recognized by the Global Climate Observing System (GCOS)¹³ which in its reports to the UNFCCC notes that “Developing Countries have made only limited progress in filling gaps in their in situ observing networks, with some evidence of decline in some regions, and capacity building support remains small in relation to needs”. The installation of new infrastructure also requires several practical considerations: i) safety of the equipment; ii) power sources; iii) long term durability; iv) access for maintenance and v) transmission and archiving of data.

Limited knowledge and capacity to effectively predict future climate events

34. The scientific and technical capabilities required to effectively identify hazards and forecast their potential impacts on vulnerable communities are often weak. This may be due to a lack of either infrastructure (i.e. computational equipment), software (model code and associated routines) or human capacity/skills to programme and run the model code. Running forecast models is a highly skilled task and requires many years of education and training. Forecasters, with highly sought skills, are often lured into more lucrative work.

Inconsistent use of different information sources across and within country borders

35. If there is not a clear legal mandate for the issuing of warnings then messages may be confused (between different sources) and not acted upon. There needs to be an official process for generating warnings that include communication between sectoral ministries and with communities where disasters are experienced. Representatives from different ministries convene, assess the situation and warning messages are conveyed. This allows a wide range of views and evidence to be considered (including information from international and regional sources), though the process needs to be clear and act efficiently if warnings are to be issued in time.

No systematic forecasting of climate hazards, risks and timely dissemination of warnings

36. When climate information is available (monitoring and forecasts), it should be translated into specific hazards experienced by different sectors and users e.g. heat units for agriculture or wave heights for managing coastal shipping. Without translation into information that can be easily understood by users, the information is unlikely to be used. This information should then be combined with known vulnerabilities to identify areas and communities at risk. This is currently not part of the process for issuing warnings in most cases.

¹¹ <http://www.amesd.org/index.php?start=25>

¹² <http://www.un.org/apps/news/story.asp?NewsID=31193&Cr=weather&Cr1>

¹³ <http://www.wmo.int/pages/prog/gcos/index.php>

Lack of environmental databases for assessing the risks posed by climate variability and change

37. Calculating risks for known vulnerabilities requires a comprehensive archive of information related to vulnerable communities, infrastructure, roads, shipping, access to markets, flood prone areas, cropping patterns etc. This information are held in disconnected databases or computers spread across different government departments and ministries. All the information required to assess vulnerability and calculate risks needs to be accessible, either through a central database/repository, or through distributed networks.

Long-term sustainability of observational infrastructure and technically skilled human resources

38. The maintenance of monitoring equipment, the human capacity to use and repair this equipment, process data and develop early warning packages, all require constant income streams and annual budgets. These are needed beyond the lifetime of this project and therefore require suitable business models and financial mechanisms to be developed. The NHMS often struggles to pay for the maintenance and upgrade of existing equipment which is recognized as a limiting factor¹⁴ and various levels of public-private partnership have been suggested, including the use of an intermediary organisation¹⁵. Regardless of the business structure it is clear that delivery of targeted services, such as those proposed here, are essential for generating products and revenue that both public and private clients will pay for. This revenue can then support the maintenance of the observational infrastructure and the salaries of skilled staff to use it and generate the early warning products.

Baseline Project(s) the project will build on:

39. In Malawi the UNDP's **Africa Adaptation Programme (AAP)** project "**Building Capacity for Integrated Comprehensive Approaches to Climate Change Adaptation in Malawi**" (with financing of **\$3m**) has a component related to EWS. One of its outcomes is to evaluate the effectiveness of disaster risk responses and implementation of early warning systems supported to decrease vulnerability to natural disasters¹⁶. This project does not include any specific budget lines for implementation of EWS technology. It primarily seeks to strengthen hazard mapping capacity, communication and awareness around DRR and emergency management programmes.

40. **SADC Regional Meteorology Project (SAMPRO)**. Financing: **\$10.4m**. SAMPRO is a regional development cooperation project based on an agreement between the Government of Finland and the Secretariat of the Southern Africa Development Community (SADC). An Inception Phase executed by the Finnish Meteorological Institute (FMI) in collaboration with the Meteorological Association of Southern Africa (MASA). The objective of the Inception Phase is build basis for multiyear regional project in Southern Africa and to strengthen the implementation of meteorology services in Southern Africa by building capacity and to make the function of early warning systems more effective. The purpose of cooperation in meteorology is based on the regional meteorology priorities set by the SADC ministers responsible for Transport and Meteorology. At present it is not clear how this investment will be distributed between countries and activities – for this PIF it is assumed that 15% is taken to be for Malawi-specific activities (details will be clarified during the PPG phase).

41. **UNDP - Enhancing National and Local Disaster Risk Reduction in Malawi**. Financing **\$2,310,350**. This initiative seeks to develop a Disaster Risk Management (DRM) policy, review the 1991 Disaster and Relief Act, document economic impact analysis of disasters and enhance DRR knowledge, develop and implement DRR/DRM road map, develop DRR Framework, DRM Handbook and Flood

¹⁴ see WMO Global Framework for Climate Services

¹⁵ See GFDRR WCIDS: <http://www.gfdr.org/gfdr/WCIDS>

¹⁶ <http://www.undp-aap.org/countries/malawi>

Risk Management Strategy, strengthen emergency preparedness and contingency planning process in selected vulnerable districts¹⁷.

42. **UNDP National Programme for Climate Change in Malawi – CCP.** Financing **\$4,152,399**. The objectives of this project are to develop an evidence-based strategic framework, comprehensive funded programme for managing response to climate change in Malawi. To develop a strategic response to the challenges that climate change poses for sustainable economic development and national food security in Malawi. To address the problems that some of the communities are currently facing due to the impact of climate change by piloting few projects that the country has had on adaptation and mitigation.

43. **UNDP Programme Support to Disaster Risk Management 2012 – 2016** (under development). Financing **\$6m**. This programme follow from the earlier support to the Department of Disaster Management Affairs and the recently completed The National Disaster Risk Management (NDRM) policy, which lists the main priorities of the government of Malawi (GoM) on disaster preparedness, response and recovery. Multi-sector preparedness and planning and response capacity will be developed at national, district and community levels to reduce disaster risks and shocks on vulnerable people. Specifically, mainstreaming disaster risk reduction into sustainable development policies and planning processes at all levels of government; the establishment of an effective system to identify, assess and monitor disaster risks under data and information knowledge including early warning systems (EWSs); and strengthening coordination are the main focus areas.

44. **GFDRR. Disaster Risk Management in Malawi Country Plan.** Financing **\$914,000**. This project serves as a framework for investments in DRM in Malawi over a period of three to five years. Goals are mostly centred on DRM, though it has a component on EWS which may involve an infrastructural component:

- Developing and strengthening institutions responsible for DRM; instituting necessary DRM mechanisms;
- Implementing mitigation measures in disaster prone areas;
- Developing and strengthening coordination of institutions in disaster management and relief services;
- Establishing an early warning system for Malawi;
- Timely provision of emergency relief assistance to affected populations.¹⁸

45. **GFDRR. Phase 1 of an activity to support national Red Cross and Red Crescent societies.** Financing **\$200,000**. This project seeks to accomplish the following:

- Advocacy with and advice to the National Governments of the countries concerned aimed at policy, strategy and action plans in disaster risk reduction to ensure that community level delivery is well reflected.
- An advocacy plan leading to a disaster risk reduction capacity building component for taking the process of community level delivery forward.
- A systematic review of safety nets and the identification of needs for the promotion of micro insurance.¹⁹

46. **Government Flood risk management strategy – 2009-2019:** Financing **\$3m**. the government has developed a flood risk management strategy which focuses on risk mitigation, preparedness, response and recovery. Under this strategy, the districts prepare flood disaster contingency plans and establish rapid response teams. They also prepare and disseminate early flood warnings messages, using seasonal weather forecasts from the Department of Meteorology. Implementation of this strategy in the River Shire

¹⁷ Project Information Sheet under “Disaster Risk Reduction” at:

http://www.undp.org.mw/index.php?option=com_content&view=article&id=466&Itemid=197

¹⁸ http://www.gfdr.org/gfdr/ca_projects/detail/3654

¹⁹ http://www.gfdr.org/gfdr/ca_projects/detail/1677

has received a boost from a World Bank study²⁰ which generates flood inundation maps for use in spatial planning to zone development away from high risk flood areas. These maps will assist in the refining flood mitigation measures including the placement of structures such as dams, culverts, bridges, levee heights, etc. These sets of data will form the basis of a flood forecasting model to be developed in the future and inform the emergency planning and response units. 10% of this project is assumed as potential co-financing for the proposed project at this point. However, during the preparatory phase, a thorough analysis will be conducted and the exact co-financing will be reflected in the project document.

47. **District Agricultural Extension Service Systems.** Financing: **\$10m** – Reformed in 2000 and projected to continue for the foreseeable future: The objective of Malawi’s Agriculture Extension Service is to promote adoption of agricultural technologies and farmer innovation in order to increase productivity and production so as to meet household or market requirements²¹. This is in recognition of the fact that smallholder farmers producers of both cash and food crops are important drivers of the agriculture sector in country. 10% of this project is assumed as potential co-financing for the proposed project at this point. However, during the preparatory phase, a thorough analysis will be conducted and the exact co-financing will be reflected in the project document.

48. **The National irrigation Expansion Strategy: 2010-2015.** Financing: **\$2m**: The government has established a National irrigation strategy to supplement rainfed cropping and optimize the cost of irrigation. The implementation of the irrigation strategy in the Shire Basin is being supported by “**The Irrigation, Rural Livelihoods and Development project (IRLADP)**” project, a World Bank/IFAD financed initiative which started in May 2006 and is expected to continue until 2016. The total budget for the project was US\$52.5 million out of which US\$40.0 million grant from IDA, US\$8.0 million loan from IFAD and US\$2.8 million GOM. The project is engaged in developing new irrigation mini-schemes and rehabilitating existing ones. It is also building capacity of local institutions to effectively engage in irrigation through training and provision of micro loans. In this regard, the project has supported 4 large schemes totalling 1,797ha namely: Muona in Nsanje, Likangala in Zomba, Nkhate in Chikhwawa, and Limphasa in Nkhata Bay. It has also supported smaller schemes in other districts namely Chitipa and Rumphi in the north, Lilongwe, Dedza and Salima in the centre, and Phalombe and Blantyre in the south. Currently over 1500 hectares of land are already under irrigation; this expected benefit about 197,000 farming households in 11 of Malawi’s 28 districts by the end of the project. 10% of this project is assumed as potential co-financing for the proposed project at this point. However, during the preparatory phase, a thorough analysis will be conducted and the exact co-financing will be reflected in the project document.

49. **Transforming agriculture through conservation agriculture in Malawi.** Financing: **\$5m**. Ongoing since 2006, expected to continue until 2014: The government has since 2005 engaged in a programme of conservation agriculture that has received technical and financial support from various development partners, notably CIMMYT, Total Land Care and IFAD. The programme has facilitated an innovative network of researchers, extension agencies and lead farmers to demonstrate the techniques and benefits of conservation agriculture. The network engages in participatory interaction and dialogue with farmers and encourages them to raise social capital, subsequently boosting interest in the conservation agriculture within their own communities and the surrounding areas. The project has also linked farmers to input suppliers and local banks, increasing access to soft loans for herbicides and improved seed. 10% of this project is assumed as potential co-financing for the proposed project at this point. However, during the preparatory phase, a thorough analysis will be conducted and the exact co-financing will be reflected in the project document.

²⁰ World Bank, Global Facility for Disaster Risk Reduction and others: 2009; Economic Vulnerability and Disaster Risk Assessment in Malawi and Mozambique: Measuring Economic Risks of Droughts and Floods

²¹ Department of Agricultural Extension Services (2008) Guidelines for Clusters and Ulimi wa M’ndandanda for various stakeholders –revised (unpublished).

B.2. Incremental/Additional cost reasoning: DESCRIBE THE INCREMENTAL (GEF TRUST FUND) AND THE ASSOCIATED Global environmental benefits TO BE DELIVERED BY THE PROJECT:

50. The first component of the proposed project seeks to establish a functional network of climate (meteorological and hydrological) monitoring stations and associated infrastructure (satellite and severe weather monitoring) as a basis for understanding climate change and building an early warning system to increase resilience to climate-related shocks. The second component concerns itself with developing connected systems and processes to enable the data from such a network to be translated, combined, reinterpreted and communicated to intended users. It will also develop the human capacity to make such a system work. The third component will coordinate activities with ongoing projects and regional activities to ensure best practices and maximise the effectiveness of implemented infrastructure and systems.

Component 1: Transfer of technologies for climate and environmental monitoring infrastructure

51. This component will procure and install infrastructure to improve access to climate and environmental information for a functioning EWS. Details of this procurement will vary depending on the required types of EWS (e.g. for floods, drought, severe weather etc.), existing infrastructure and telecommunications, capacity to utilise the equipment and associated data. Additionally, during the PPG phase potential climate change hotspots (where both vulnerabilities and hazards are expected to be high) will be considered when deciding where to place infrastructure e.g. meteorological stations in vulnerable regions etc.

Baseline Situation including Projects

52. The following describes the baseline situation and projects regarding existing infrastructure and related activities in Malawi.

53. The present network of meteorological stations comprises 22 full meteorological stations, 21 subsidiary agrometeorological stations, and over 400 rainfall-only stations²². The Department of climate change and meteorological services (Malawi Meteorological service) lists among its services tropical cyclone warnings, Mwera warnings and flood forecasts. However, the existing flood early warning system has several perceived weaknesses related to existing infrastructure:

- No nighttime measurements taken at gauging and rainfall stations because these are manual measurements;
- No models for flood forecast and prediction;
- Many rivers still lack gauging stations.

54. The Malawi Meteorological service has a satellite receiver and regularly receives imagery from Meteosat 2nd generation satellites. It wishes to develop an EWS comprising of

- National Flood Early Warning System (F-EWS)
- National drought Early Warning System
- Wildfire Early Warning System

55. Information regarding radar and hydrological stations in Malawi was not found at this time and will be elucidated during the PPG phase, particularly taking note of equipment being installed as part of the governments flood risk programme.

²² <http://www.metmalawi.com/about.php>

Additional cost reasoning

56. Under this component of the project the Government of Malawi will be able to use LDCF resources to procure, install and/or rehabilitate critical infrastructure required to build and/or strengthen the climate-related observational network. In all equipment purchases an assessment of existing equipment will be made, noting the manufacturer, whether it is still working and whether the NHMS has an interest in continuing with particular makes/models. This will need to be weighed against the costs of potentially cheaper solutions and the added costs of training personnel to service different products.

57. Under **Output 1.1** of the proposed project, LDCF resources will be used for the procurement and installation or rehabilitation (in case of existing) of approximately 10+ hydrological monitoring stations with telemetry, archiving and data processing facilities, which will enable the NHMS to monitor river and lake levels. In turn this allows the NHMS to identify dangerous floods before they occur, issue warnings for dam/transport managers downstream and alert communities at risk. For example, it was estimated that monitoring equipment needs to be installed at approximately 100 locations (the exact nature of which is to be verified/estimated during the PPG phase) in order for the Flood Early Warning System and monitoring of Lake Malawi levels to function effectively. All stations will be fitted with appropriate means for relaying data to central servers (e.g. via GPRS or satellite telemetry).

58. Under **Output 1.2**, LDCF resources will be used for the Procurement and installation or rehabilitation of approximately 40 meteorological monitoring stations, also with telemetry, archiving and data processing facilities. Comparison of the network coverage with the risk and vulnerability maps, calculated or sourced during the PPG phase, will be used to identify underserved locations where data from additional stations will be most useful. As early warning and up to date monitoring is a priority, Automatic Weather Stations (AWS) using GPRS mobile telecommunications will be prioritised and where this is not available the feasibility of using more costly satellite communications will be assessed (including implications for budgets and future running costs). In cases where stations have been neglected but the site (fences, towers etc.) are still functional, LDCF resources will be used to replace existing sensors and data loggers as historical observations from the site can be used with newly acquired data to create longer timeseries for detecting climate changes. Preliminary estimates of costs for purchasing needed additional weather stations (based on government estimates) are \$1m for 40 stations.

59. Under **Output 1.3**, LDCF resources will be used to procure equipment for monitoring severe weather. Radar equipment for doing this is costly (purchasing and maintaining the equipment, as well as training and paying personnel to operate it) and budgets will only allow for the purchase of 1-2 such items. Depending on the type of radar and function the useful range is of the order 75-200 km. This limits the practical use of this equipment for specific locations with either a high vulnerability to extreme weather (e.g. large urban or coastal areas prone to flooding), or high values services/assets such as airports. Alternative options using different technology to achieve similar results will be investigated and assessed, depending on the application e.g. combining satellite and in-situ observations, and lightning detection as a proxy for extreme weather.

60. Upper air monitoring stations, through either radiosonde ascents or other remote sensing technologies, are useful for improving regional numerical weather predictions and global climate models run by international forecasting centres. There were no baseline activities identified with this activity, besides regular procedures implemented by the NHMS. Through **Output 1.4** LDCF funds will be used to procure the equipment needed to make upper air soundings. The exact number of installed upper air stations will be decided as part of the PPG phase given other equipment needs. None of the ongoing baseline projects suggest that new upper air stations are being implemented, but stations to monitor upper air have been requested by the government.

61. LDCF resources will be used for the procurement of satellite receiving equipment and establishment of data/image processing facilities (**Output 1.5**). This output will build on the AMESD and

recently launched SERVIR²³ programmes at the regional level, as well as Malawi’s current installation of satellite reception equipment. The potential uses of satellite data and imagery for planning and management purposes in the context of food security, and water management will be established based on country specific contexts, users of information, needs (in the short-term disaster management, medium-long term planning) etc. This will involve coordination with other projects such as FEWSNET etc. If online data is not available in time to support required decisions then satellite receiving equipment will be purchased and systems established to provide the required information.

62. Under **Output 1.6**, LDCF resources will be used to develop the human technical capacity required to maintain and use the equipment made available through the LDCF. Personnel responsible for the running of the equipment and receiving/archiving the data that it produces (including manually operated stations where necessary) will be trained, along with back up personnel and replacements. This includes ensuring that there is an incentive mechanism in place to sustain the system that is set up with the LDCF resources. The training will stress that cost-effective technologies are utilized, which are able to interface with existing systems and which minimise dependence on external suppliers of hard and software. No baseline activities were identified with this output besides routine NHMS activities.

Table 1: Summary of needs that are relevant to Component 1 (to be developed in detail during the PPG phase):

Malawi
Weather radar; (purchasing, installation)
Weather Radar; training meteorologists on interpretation, training of technicians on maintenance
Automatic Weather Stations (purchasing and installation)
River gauging equipment and installation
Upper Air weather Stations equipments (purchasing and installation)
Maintenance support of stations

Component 2: Climate information integrated into development plans and early warning systems

63. Much of the value of early warnings (whether a user changes their actions or lives/assets are safeguarded) is dependent on the packaging, communication and dissemination of those warnings. The effectiveness of warnings can be improved either through improving the forecasts/monitoring information, communications or the decision-making process. This component is primarily concerned with improving these aspects of the EWS. Specific details on the exact type of EWS information and risk management tools (for flood warnings, agricultural extension advisories, weather index insurance, transport planning etc) will be determined at the PPG phase and additional actions designed to meet those priority needs.

Baseline Situation including Projects

64. In Malawi the Department of Disaster Management Affairs (DoDMA) is mandated to provide early warnings, drawing on the hydrology and meteorology services to provide climate and hydrological

²³ http://www.servir.net/africa/index.php?option=com_frontpage&Itemid=1

information. There is an existing Flood Early Warning System, though perceived weaknesses of this system include:

- Lack of training for what to do when an EW-message is received;
- Communication of EW-messages could be standardized; currently they are sent via cell-phone service, which is not always reliable;
- Southern flooding can result from heavy rainfall in Mozambique, indicating a need for cross-border cooperation.

65. UNDP Malawi is also implementing a programme on Disaster Risk Reduction, entitled, “Enhancing National and Local Disaster Risk Reduction in Malawi.” The project activities are to develop a Disaster Risk Management (DRM) Policy; review the 1991 Disaster and Relief Act; document economic impact analysis of disasters and enhance DRR knowledge; develop and implement DRR/DRM road map; develop DRR Framework, DRM Handbook and Flood Risk Management Strategy; strengthen emergency preparedness and contingency planning process in selected vulnerable districts²⁴

66. UNDP is also starting a programme to extend this work and include multi-sectoral preparedness and planning, community-level response measures and establishing an effective system to identify, assess and monitor disaster risks (including elements of an EWS).

67. GFDRR is currently contributing to the project, “Disaster Risk Management in Malawi Country Plan,” which serves as a framework for investments in DRM in Malawi over a period of three to five years. This programme began in 2010. Its goals are mostly centred on DRM, though it has a component on EWS which may involve an infrastructural component:

- Developing and strengthening institutions responsible for DRM; instituting necessary DRM mechanisms;
- Implementing mitigation measures in disaster prone areas;
- Developing and strengthening coordination of institutions in disaster management and relief services;
- Establishing an early warning system for Malawi;
- Timely provision of emergency relief assistance to affected populations.²⁵

68. Another GFDRR project, “Phase 1 of an activity to support national Red Cross and Red Crescent societies” seeks to accomplish the following:

- Advocacy with and advice to the National Governments of the countries concerned aimed at policy, strategy and action plans in disaster risk reduction to ensure that community level delivery is well reflected.
- An advocacy plan leading to a disaster risk reduction capacity building component for taking the process of community level delivery forward.
- A systematic review of safety nets and the identification of needs for the promotion of micro insurance.²⁶

69. The USAID-funded FEWS NET also maintains an existing National Food Security Early Warning System. This system is perceived as having multiple strengths in terms of its monitoring capabilities and equipment, but it has weak feedback to the local (affected) population, which is very limited and not on a regular, standardized basis²⁷.

²⁴ Project Information Sheet under “Disaster Risk Reduction” at:

http://www.undp.org.mw/index.php?option=com_content&view=article&id=466&Itemid=197

²⁵ http://www.gfdr.org/gfdr/ca_projects/detail/3654

²⁶ http://www.gfdr.org/gfdr/ca_projects/detail/1677

²⁷ UNDP Malawi “CONSULTANCY TO ASSESS THE CURRENT HAZARD MAPPING CAPACITY AND EFFECTIVENESS OF SCENARIO BASED TOOLS FOR LONG TERM PLANNING MECHANISMS.” Final Report. Jan. 2012.

70. The Department of Forestry maintains a Wildfire Early Warning System for state-owned forest plantations. While people working/living in the forest plantations are warned in time, there is no standardized procedure to inform people living in the vicinity of the plantations or outside of state-owned plantations. The Malawi Meteorological department also issues agrometeorological bulletins every 10 days during the rainfall season, though this is mostly climate data which is useful to agriculture e.g. 10 day rainfall totals.

71. Existing district-level EWS are only in 3 districts, supported with interventions by NGOs. The UNDP Malawi consultancy found these to be largely effective, although their recent implementation means they have yet to be fully tested.

Additional cost reasoning

72. The capacity to make and use daily to seasonal climate forecasts will be developed through **Output 2.1**. This will link to ongoing activities at the NHMS and will ensure the capacity to run numerical weather prediction models, or be able to usefully generate and use data from these models run elsewhere with the region or at international centres. The data from these models should be linked to tailored products developed in output 2.2 and the decision processes in output 2.3. The gaps between existing forecasts systems and those required for climate resilient planning purposes will be evaluated during the PPG phase, including use of indigenous knowledge when useful (see CC DARE project^{Error! Bookmark not defined.}). Data sharing with regional NHMSs will be encouraged as this helps develop forecast products and the observations from other countries, collected through output 1.2, help understand the errors in the forecast models.

73. **Output 2.2** will develop new tailored products to serve the information requirements of users in different sectors and locations. These products will be developed through consultations with the intended users of the information and appropriate research organizations. Information and data from the monitoring infrastructure (weather and hydrological stations, radar, and satellite monitoring) will be combined to produce new user-relevant information. As an example, satellite and weather station observations can be combined to derive a spatially continuous dataset and estimate rainfall for locations which have no meteorological stations. Using these data the water balance of crops can be estimated for wider regions and these can be used as part of agricultural advisories. Improved availability of data to generate these products will also be implemented e.g. where important climate records reside in paper format, they will be digitised and used to better describe local microclimates, hence improving the baseline hazard mapping. It is currently not clear which projects are currently undertaking this work and this will be determined during the PPG phase.

74. Assimilating the forecasts from output 2.1 and tailored products from output 2.2 into existing EWS activities and processes will be the aim of **Output 2.3**. This will involve assessing the information needs of different decision-making processes e.g. for flood warnings, drought warnings, food security, water management etc and designing a set of information products that will inform the process. Existing EWS for particular sectors (e.g. Wildfire and floods) can be used to extend knowledge and skills to other sectors which need similar EWS and experience. Climate monitoring information from component 1 and forecasts from output 2.1 will be combined to identify regions where risks are currently high and likely to get worse. Where necessary satellite imagery will be used to assess the current extent of climate-related hazards and this information will be combined with agricultural (crop), flood risk or other sectoral models to help the decision making process. Training on the use of these technologies will be provided where needed. Several baseline projects are currently undertaking these activities, including FEWSNET, UNDP and GFDRR. Coordination for this output will therefore be important and any new systems that are implemented will need to consider compatibility with existing systems and processes, as well as how to best combine different sources of information.

75. **Output 2.4** will establish communication strategies and processes targeted to each identified sector and user. The aim is to effectively communicate early warnings, and advisory packages developed through Output 2.3, in the most useful way for different users/audiences. These strategies will vary as communications technologies, language and cultural norms vary. Using software and technology in innovative ways will be explored e.g. Google earth for presenting forecasts and identified risks. Lessons and experiences in other parts of Africa will be assessed for their potential to upscale e.g. using innovative techniques to communicate agrometeorological advisories²⁸. This will build on the work undertaken by GFDRR, UNDP and government, with the potential to extend lessons learnt to other countries.

76. **Output 2.5** will assess the sustainability of the EWS, taking cognizance of the current funding mechanisms and allocated budgets. It will assess where funding shortfalls are most acute and where budgets are likely to be reduced in the future. A comprehensive needs assessment for climate services will be carried out (how needs are currently met, opportunities for private partnerships and gaps in the current services), as well as the willingness and ability to pay for such services across a range of stakeholders, both private and public. Where suitable legal arrangements exist and where governments are willing, private companies will be approached to test their willingness to engage in a public-private partnership with the NHMS or associated entity. Similar activities within the country or region will be approached to learn from their experiences (e.g. the Weather Information for Development (WIND) initiative in Kenya). No baseline projects were identified with this output at this stage.

Table 2: Summary of needs that are relevant to Component 2 which will be developed further during the PPG phase:

Malawi
Hazard Mapping capacity
Data Management systems and capacity
Modelling and monitoring capacity (including vulnerability and GIS mapping)
Flood early warning, agricultural advisories, Lake Malawi severe weather

B.3. DESCRIBE THE SOCIOECONOMIC BENEFITS TO BE DELIVERED BY THE PROJECT AT THE NATIONAL AND LOCAL LEVELS, INCLUDING CONSIDERATION OF GENDER DIMENSIONS, AND HOW THESE WILL SUPPORT THE ACHIEVEMENT OF GLOBAL ENVIRONMENT BENEFITS. AS A BACKGROUND INFORMATION, READ [Mainstreaming Gender at the GEF.](#):

77. The project is expected to deliver benefits at both the national and local levels. The installation of weather, upper air, radar and other observation and computer infrastructure will benefit the NHMS staff (through training and technological advancement). Other national institutions that will benefit from this endeavour will be Ministries of Agriculture, Water, Energy and Disaster Management, through strengthening of their computer databases, access to information and ability to communicate with other regions. One important benefit will be the improved coordination between government departments and

²⁸ <http://www.rockefellerfoundation.org/what-we-do/current-work/developing-climate-change-resilience/grants-grantees/african-agriculture-climate-change>

the sharing of information, which can lead to improved products and services. It is then possible that these institutions can start marketing such information and products (satellite monitoring and climate forecast products in particular) to private entities that will pay for the services.

78. At the local level early warnings and climate hazard mapping, disseminated correctly and acted on appropriately, can provide economic benefits through reducing losses of agricultural produce, infrastructure (roads and bridges) and disruption to peoples livelihoods. This has further knock-on effects on people's health and wellbeing and thus affects communities and social structures. Communities will immediately benefit through warnings related to agriculture, coastal management, water and flood management, wildfires etc. This total population benefiting from these developments has the potential to grow hugely if warnings extend to a reasonable percentage of the total population e.g. through a mobile phone relay or similar system. Many of the beneficiaries will be women, especially within the agriculture sector where they often make up the majority of smallholder farmers, yet are most vulnerable to food insecurity. There may also be other benefits to developing the communication systems associated with early warnings - for instance radios can also be used for arranging medical evacuations.

79. Perhaps the largest economic benefits are associated with improved transport planning, especially shipping which will take advantage of improved forecasts of winds and waves, and aviation which can take advantage of improved local forecasts. These and commercial agriculture likely represent some of the largest private clients for early warning services and tailored forecasts. Together with satellite imagery used for land-use planning and monitoring these can provide environmental benefits, including monitoring of illegal logging which has global consequences in terms of deforestation and the global carbon budget.

B.4. INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS THAT MIGHT PREVENT THE PROJECT OBJECTIVES FROM BEING ACHIEVED, AND IF POSSIBLE, PROPOSE MEASURES THAT ADDRESS THESE RISKS

Risk	Level	Mitigation
Unavailability of requisite human resources and data	High	The issue of the unavailability of requisite human resources will be mitigated by recruitment of international consultants who will work closely with in-country counterparts and by targeted capacity building activities. Training activities of local personnel will also be part of all aspects of the work and the relevant institutions will be encouraged to expand the staff base if it is weak in particular areas.
Local IT and telecommunications infrastructure weak e.g. international bandwidth and local mobile telecommunications networks	Medium	Cost-effective solutions for each particular situation will be used e.g. satellite and/or radio communications. Where feasible automatic weather and hydrological stations reporting over the mobile telecoms network will be preferred.
Insufficient institutional support and political commitments	Medium	The proposed project is strongly supported by Governments and other key stakeholders and development partners. The project, in conjunction with UNDP, will therefore take advantage of this opportunity to seek substantial support from the Governments and forge strong partnership with other development partners. Direct linkages to existing and planned baseline development activities implemented by government, securing of the necessary co-financing, as well as local buy-in will also minimize this risk. It will also be important to establish buy in from all government departments early as the project will utilize data and information from a wide range of departments.
Work progresses in a compartmentalized fashion and there is little integration e.g. government departments refuse to share data and information	Medium	This risk is always present in a project such as this. By ensuring that capacity is built across a range of departments and implementing ‘quick win’ measures early (developing products based on internationally available data), these issues can be mitigated.
Non-compliance by primary proponents for the successful implementation of this project	Medium	Ensuring that the project is designed and implemented in a participatory and inclusive manner, following established UNDP procedures, will mitigate the risk. Since the activities correspond to the urgent needs as expressed by the primary proponents the risk of non-compliance should be reduced
Climate shock occurring during the design and implementation phase of the project	Low to medium	There may be some delays as more urgent priorities may need to be addressed by some of the stakeholders (e.g. NHMS or disaster management) but it is unlikely that this will derail the project.

B.5. IDENTIFY KEY STAKEHOLDERS INVOLVED IN THE PROJECT INCLUDING THE PRIVATE SECTOR, CIVIL SOCIETY ORGANIZATIONS, LOCAL AND INDIGENOUS COMMUNITIES, AND THEIR RESPECTIVE ROLES, AS APPLICABLE:

Stakeholder	Relevant roles
Regional	
SADC Regional Meteorology Project (SAMPRO)	Not clear as yet – project is just starting but will likely invest in hard technologies e.g. weather stations and radars
Climate for Development in Africa	Promoting the use of climate information for development – potential partner for

Programme (ClimDev-Africa)	TA
African Monitoring of the Environment for Sustainable Development (AMESD)	Installing and promoting the use of satellite equipment and technology for environmental monitoring
Global Climate Observing System (GCOS)	Coordinating body for the climate observing system worldwide
Southern African Development Community Hydrological Cycle Observing System (SADC-HYCOS)	Coordinating the installation and use of hydrological monitoring equipment and information for water resource management
Global Facility for Disaster Reduction and Recovery (GFDRR)	Working mostly with disaster management, the programme also has a facility for advising on infrastructure development
IGAD Climate Prediction and Applications Centre (ICPAC)	Climate forecasts and the seasonal outlooks
Famine and early warning system network (FEWSNET)	Working across Africa to implement climate monitoring and forecasting for early warning in the food security sector
UNDP Bureau for Crisis Prevention and Recovery (UNDP-BCPR) and Environment and Energy Group	Working with disaster management, disaster and loss databases and climate risk assessments UNDP's AAP programme is investing in both hard technology and the use of climate information for risk management
Malawi	
Department of Disaster Management Affairs	Coordination of Disaster Risk Management, operationalization of the DRM Policy, including EWS, contingency planning, etc. Falls under the Office of President and Cabinet (OPC)
Department of Climate Change and Meteorological Services	Provide weather and climate related data, including forecasting. Falls under Ministry of Natural Resources, Environment and Energy
Department of Water development	Providing hydrological data and flood forecasting
Ministry of Agriculture, Irrigation and Water Development	Mandated on food production and security
Ministry of Finance and Development Planning	Planning and budgeting following the Malawi Growth and Development Strategy (MGDS), including monitoring its progress. Social Protection and Disaster Risk Management is one of the main themes in the MGDS
Survey Department	GIS operations and houses the National Spatial data Centre
Ministry of Local Government and Rural Development	Mandated to govern the District and local structures, including of DRM, as well as Integrated Rural Development
CISONECC	Overarching Civil Society Network on Climate Change. Also linked to DRR activities. Consisting of some 20 NGOs (National and International)
Development Partners	Main Development Partners active in DRR / EWS: Irish Aid, DfID, Norwegian Embassy, EU, UNDP, UN-Habitat, UNICEF, WFP, World Bank

B.6. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:

80. **Climate for Development in Africa Programme (ClimDev-Africa)** is a joint initiative of the Commission of the African Union (AUC), the African Development Bank (AfDB) and the United Nations Economic Commission for Africa (UNECA). ClimDev-Africa has received strong political endorsement from AU heads of state and government, African Ministers, several key stakeholders and the International Community. In general, the ClimDev-Africa programme supports Africa's response to climate variability and change by building regional, sub-regional and national policy capacity. It will improve the quality and availability of information and analysis to decision-makers.

81. The **African Monitoring of the Environment for Sustainable Development (AMESD)** Project. The European Union funded project Preparation for the Use of MSG in Africa (PUMA) made available data and products from EUMETSAT's latest satellites, promoting African National Meteorological and Hydrological Services to provide accurate weather forecasts, monitor extreme weather phenomena, and improve disaster management. The African Monitoring of the Environment for Sustainable Development (AMESD) initiative takes PUMA a stage further by significantly extending the use of remote sensing data to environmental and climate monitoring applications.

82. The **Global Climate Observing System (GCOS)** is intended to be a long-term, user-driven operational system capable of providing the comprehensive observations required for: Monitoring the climate system; Detecting and attributing climate change; Assessing impacts of, and supporting adaptation to, climate variability and change; Application to national economic development; Research to improve understanding, modelling and prediction of the climate system. GCOS is a joint undertaking of the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP) and the International Council for Science (ICSU). It includes both in situ and remote sensing components, with its space based components coordinated by the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS). GCOS is intended to meet the full range of national and international requirements for climate and climate-related observations.

83. The **Southern African Development Community Hydrological Cycle Observing System (SADC-HYCOS)** is a regional component of the World Meteorological Organisation (WMO) programme aimed at improving the basic observation activities, strengthening regional cooperation and promoting free exchange of data in the field of hydrology. The programme is guided by the World Hydrological Observing System (WHYCOS) International Advisory Group (WIAG). The aim is to ensure that participating countries, individually and collectively, attain the technical capability, effective management and equitable use of the freshwater resources of the sub-region and to establish a Water Resources Information System as an effective decision making tool

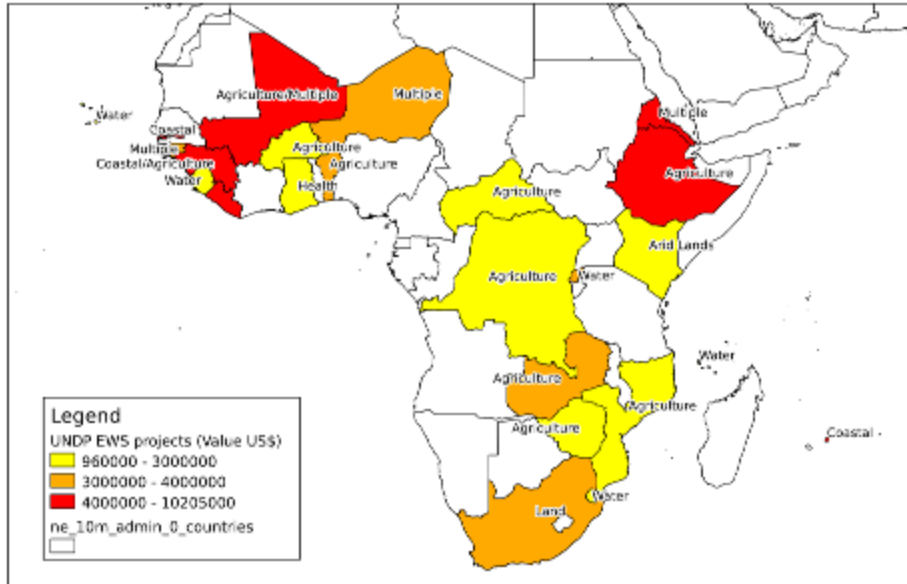
84. **Agricultural Input subsidy programme:** Financing: **\$126m** per year (started in 2006 and projected to continue to 2015): Following severe food security difficulties in the early part of this century, and particularly after the poor 2004/5 production season, the government introduced a very large scale input subsidy programme across the country. The core objective of the programme is to increase food security and incomes for resource poor farmers, through improved access to subsidized agricultural inputs. Working through the Ministry of Agriculture Irrigation and Water Development (MoAIWD), the programme distributes fertilizer and seed coupons via districts and Traditional Authorities (TAs). The programme also supports adoption of post harvesting management practices, advanced through the District Agricultural Extension Service System (DAESS). Investment in the programme has been rising steadily, from just over 60% of Ministry of Agriculture and Food Security budget in 2006/7 and 2007/8 to 74% in 2008/9. In 2009/10, it accounted for 80% of the public budget to agriculture and 15% of the total national budget. During the 2011/2012 agriculture season government has allocated \$126m for the farm subsidy programme, targeting 1.4 million people²⁹

C. DESCRIBE THE GEF AGENCY'S COMPARATIVE ADVANTAGE TO IMPLEMENT THIS PROJECT:

85. The proposed project is aligned with UNDP's comparative advantage, as articulated in the GEF matrix, in the area of capacity building, providing technical and policy support as well as expertise in project design and implementation. Additionally UNDP has close links with governments, as well as a high level of experience managing other LDCF projects in the region, in particular those with an early warning component. The figure below shows the value and sectoral focus of projects currently managed by UNDP which have a EWS component. UNDP is therefore already working with EWS in many countries and many sectors, strengthening its capability to coordinate and providing the flexibility to handle changing needs between countries. The country offices are supported by Regional Technical Advisors at UNDP offices in Pretoria, as well as by policy, adaptation, economics and climate modeling experts in New York, Cape Town and Bangkok.

²⁹ Andrew Dorward, Ephraim Chirwa, T.S. Jayne – 2010: Review of the Malawi Agricultural Inputs Subsidy Programme, 2005/6 to 2008/9

86. As seen in the list of baseline projects, UNDP is already conducting several programmes and initiatives that directly relate to this project proposal e.g. the national programme to support disaster risk reduction and supporting the country programme on climate change. The Malawi country office is therefore already connected to important government agencies that will be instrumental in implementing this project e.g. Meteorological service and disaster management.



C.1. INDICATE THE CO-FINANCING AMOUNT THE GEF AGENCY IS BRINGING TO THE PROJECT:

87. The total funding that UNDP is bringing to this project is \$12,462,749. The details of these projects have been outlined above.

C.2. HOW DOES THE PROJECT FIT INTO THE GEF AGENCY'S PROGRAMME (REFLECTED IN DOCUMENTS SUCH AS UNDAF, CAS, ETC.) AND STAFF CAPACITY IN THE COUNTRY TO FOLLOW UP PROJECT IMPLEMENTATION:

88. Activities and results that will be developed under this project are also fully consistent with the UNDAF outcome 2.1 "Improved sustainable Natural Resource Utilization and food security", 2.2 "Improved access to sustainable livelihoods opportunities in an innovative and competitive private sector", and UNDAF outcome 2.3 "Improved access to sustainable basic infrastructure".

89. UNDP's comparative advantage in implementing this project is underpinned by our energy and environment programme strategy which aims to mainstream environment and disaster prevention measures into national and local development policies, strategies and plans and our overarching role of capacity development.

90. Public service reform and institutional building is one of UNDP's flagship programming areas. The proposed capacity development activities in all components of the LDCF project will benefit from UNDP's overarching and strategic role in this area, helping to ensure that related outcomes are sustainable in the long-term.

91. There are other LDCF, SCCF and Adaptation Fund -financed projects within the region with similar objectives (see figure above) currently supported by UNDP, which means that there is substantial in-house technical expertise within UNDP that can be brought to bear to support the Government with the project as outlined above. UNDP country office operations are supported by regional advisory capacity based in the UNDP Regional Centre in Pretoria. UNDP has dedicated Regional Technical Advisers focusing on supporting adaptation programming and implementation in a range of technical areas relevant to this project including capacity development, coastal zone management, disaster management, infrastructure development, and ecosystem based adaptation. Our network of global Senior Technical Advisers provide additional technical oversight and leadership helping to ensure that programmes on the ground achieve maximum policy impact.

92. UNDAF and CPD priorities will be outlined after conclusion of the PPG phase.


PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):

NAME	POSITION	MINISTRY	DATE (MM/DD/YYYY)
Dr Aloysius Kamperewera	Deputy director	Environmental Affairs Department, Malawi	04/24/2012

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for project identification and preparation.

Agency Coordinator, Agency name	Signature	Date	Project Contact Person	Telephone	Email Address
Yannick Glemarec Executive Coordinator UNDP/GEF		May 18, 2012	Mark Tadross Technical Advisor Gr-LECRDS	+27 21 6502884	Mark.tadross@undp.org