United Nations Development Program

Country: MALAWI

PROJECT DOCUMENT

Project Title: Climate Proofing Local Development Gains in Rural and Urban Areas of Machinga and Mangochi Districts - Malawi

UNDAF Outcome: National policies, local and national institutions effectively support equitable and sustainable economic growth and food security by 2016.

UNDP Strategic Plan Environment and Sustainable Primary Outcome: Strengthened national capacities to mainstream environment and energy concerns into national development plans and implementation systems.

UNDP Strategic Plan Secondary Outcome: Promoting climate change adaptation

Expected CP Outcome: National policies, local and national institutions effectively support equitable and sustainable economic growth and food security by 2016:

Expected CPAP Outcome: National policies, local and national institutions effectively support equitable and sustainable economic growth and food security by 2016:

Executing Entity / Implementing Partner: UNDP /Ministry of Environment and Climate Change Management

Implementing Entity / Responsible Partners: MOEPD, MOAFS, MOLHUD, MOLGRD, DICE, LUANAR, University of Malawi, Mangochi and Machinga District Councils.

Programme Period:	5 years
Atlas Award ID:	
Project ID:	_____
PIMS #	4508
Start date:	July 2014
End Date	June 2019
Management Arrangements	NIM
PAC Meeting Date	_____

Total resources required	US$ 41,318,200
Total allocated resources:	US$ 41, 18,200
Regular UNDP	US$ 2,000,000
Other:	
GEF	US$ 5,318,200
Government	US$ 34,000,000

Agreed by (Government): ----------

Date/Month/Year ----------

Agreed by (Executing Entity/Implementing Partner): ----------

Date/Month/Year ----------

Agreed by (UNDP): ----------

Date/Month/Year ----------

Brief Description

Inadequate mainstreaming of CC considerations in Malawi baseline programs exposes development gains from over a hundred million USD investments in agricultural input subsidy, decentralization, irrigation expansion, and disaster risk reduction, making the dependent livelihoods highly vulnerable to climate change related risks; primarily, CC induced droughts, floods and post-harvest losses. While healthy ecosystems can provide a cost effective means of adaptation to CC, the country's natural ecosystems continue to be threatened by over-exploitation and inappropriate /weak management; and, the weak technical capacity, limited knowledge and inadequate financing reduces the effectiveness of resource users and their government's efforts of climate proofing the development programs, at the local, district and national levels.

The IPCC projects that mean temperature is projected to increase by 1.1 to 3.0C by the 2060's, and by 1.5 to 5.0C by the 2090; the future weather is therefore expected to exacerbate current climate variability, leading to more intense cycles of floods and droughts, unpredictable rains. This will continue to challenge the coping mechanisms of the population; especially for communities dependent on subsistence agriculture and living in poorly planned urban areas. The goal of the project is to secure the development and food security gains from the baseline programs by empowering communities to integrate climate risk considerations in the development policies, plans, projects and actions. The project will provide knowledge, tools, capacities and methodologies for the adoption of an ecosystems and community based approach to adaptation, which is more effective in enabling climate vulnerable people to plan for and adapt to the impacts of climate change; benefiting over 458,371 in 91,674 households.

Knoweldge will be generated and used to formulate comprehensive community based adaptation plans. Ecological and physical infrastructure measures for water management will be adopted to regulate baseflow and reduce risk of climate change driven floods while mitigating against droughts. In addition, climate smart agriculture and safe post-harvest management technologies and practices will lead to enhanced production, reduction in grain loss and thus increased food security. Replication and sustainability of these initiatives will be secured through mainstreaming climate change considerations and financing into local development programs and a capacitated extension service and district councils.

The total budget for the five year project is USD 41,318,200: US$ 5,318,200 from GEF contribution; US$ 2,000,000 from UNDP and US$ 34,000,000 is from government.

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List of Acronyms

ADC	Area Development Committee
AFDB	African Development Bank
BCA	Bunda College of Agriculture (LUNAR, Lilongwe University of Agriculture and Natural Resources)
BCPR	Bureau of Crisis Prevention and Recover
CBD	Convention on Biodiversity
CBO	Community-Based Organization
CCA	Climate Change Adaptation
CCD	Convention on Combating Desertification
CDF	Community Development Fund
CDM	Clean Development Mechanism
CGIAR	Consultative Group of International Agricultural Research
CMST	Community Management Skill Training
CPP	Climate Proofing Project
CIAT	International Centre for Tropical Agriculture
CIP	International Potato Centre
CITES	Convention on International Trade in Endangered Species of Fauna and Flora
CIMMYT	International Maize and Wheat Improvement Center
CO	Country Office
CPAP	Country Program Action Plan
CPD	Country Program Document
CSA	Conservation Agriculture
DAESS	Department of Agricultural Extension Services System
DARS	Department of Agricultural Research Services
DCCMS	Department of Climate Change and Meteorological Services
DDMA	Department of Disaster Management Affairs
DEC	District Executive Committee
DFID	Department for International Development, UK
DICE	Department of Information and Civic Education
DOF	Department of Forestry
EAD	Environment Affairs Department
EDO	Environmental District Officer
EPA	Extension Planning Area
EU	European Union
FAO	Food and Agricultural Organization
FRIM	Forest Research Institute of Malawi
GCM	Global Circulation Model
GDP	Gross Domestic Product
GEF	Global Environment Facility
GOM	Government of Malawi
ICARDA	International Centre for Research in Dry Areas
ICRAF	International Centre for Research in Forestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDPs	Internally Displaced Persons
HDI	Human Development Index
IDRC	International Development Research Centre
IFAD	International Fund for Agriculture
IFRM	Integrated Flood Risk Management
INGO	International NGO
IP	Implementing Partner
ISDR	International Strategy for Disaster Reduction
IWRM	Integrated Water Resource Management
KPA	Key Priority Area

LDCF	Least Developed Countries Fund
LEAD (SEA)	Leadership in Environment and Development (South and East Africa)
LMST	Leadership Management Skill Training
MDGs	Millennium Development Goals
M&E	Monitoring and Evaluation
MOAFS	Ministry of Agriculture and Food Security
MOEPD	Ministry of Economic Planning and Development
MOEST	Ministry of Education, Science and Technology
MOGCCD	Ministry of Gender, Child and Community Development
MOLGRD	Ministry of Local Government and Rural Development
MOLHUD	Ministry of Land, Housing and Urban Development
MOYDS	Ministry of Youth Development and Sports
MP	Malawi Polytechnic
MT	Master Trainer
NAPA	National Adaptation Program of Action
NCCP	National Climate Change Program
NEMP	National Environmental Management Plan
NGO	Non-Governmental Organization
NPK	Nitrogen, Phosphorus and Potash
PCB	Pesticides Control Board
PES	Payment for Ecosystem Services
PIF	Project Identification Form
PPG	Project Preparation Grant
PSC	Program Steering Committee
PSD	Program Support Document
REDD	Reducing Emissions from Deforestation and Forest Degradation
RHAM	Rainwater Harvesting Association of Malawi
SBAA	Standard Basic Assistance Agreement
SCCF	Special Climate Change Fund
SLM	Sustainable Land Management
SWHS	Solar Water Heater System
TA	Transitional Authority
TCCC	Technical Committee on Climate Change
TLC	Total Land Care
TOR	Terms of Reference
UNIMA	University of Malawi
UNCT	UN Country Team
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	UN Framework Convention on Climate Change
UNISDR	UN International Strategy for Disaster Reduction
USAID	United States Agency for International Development
VDC	Village Development Committee
WASH	Water, Sanitation and Hygiene
WB	World Bank
WFP	World Food Programme
YLC	Year of Land Care

1 SITUATION ANALYSIS

Country overview

1. Malawi is a landlocked country bordering Mozambique to the South, East and West, Tanzania to the North and Zambia to the West (Figure 1). The country is about 900 km long and 80-161 km wide, with a total area of 118,484 km2 (11.8 million ha), of which 9.4 million ha is land. Population is estimated at 15.9 million people with a growth rate of 2.8% (World Bank 2012). The population density is 158 persons km2 (World Bank 2010 data), making Malawi one of the most densely populated countries in the world. 20% of the population lives in urban areas with a 5.3% rate of urbanization. The World Bank predicts that the population will increase to 20.7 million in 2020 and 49.5 million in 2050. The country's economy is dependent on two key sectors: agriculture, which employs 90% of the formally employed labour force and contributes 28% of GDP; and the service industry, which contributes 33% of the GDP, with a larger part of services linked to the agriculture sector. Although the role of the mineral sector in the economy is increasing with the Kayelekera uranium mine opened in 2009, mining contributes about 2% gross domestic product (GDP). Nearly all total export earnings (90%) come from the natural resource sector with agriculture (tobacco) making the most contribution at 67%.

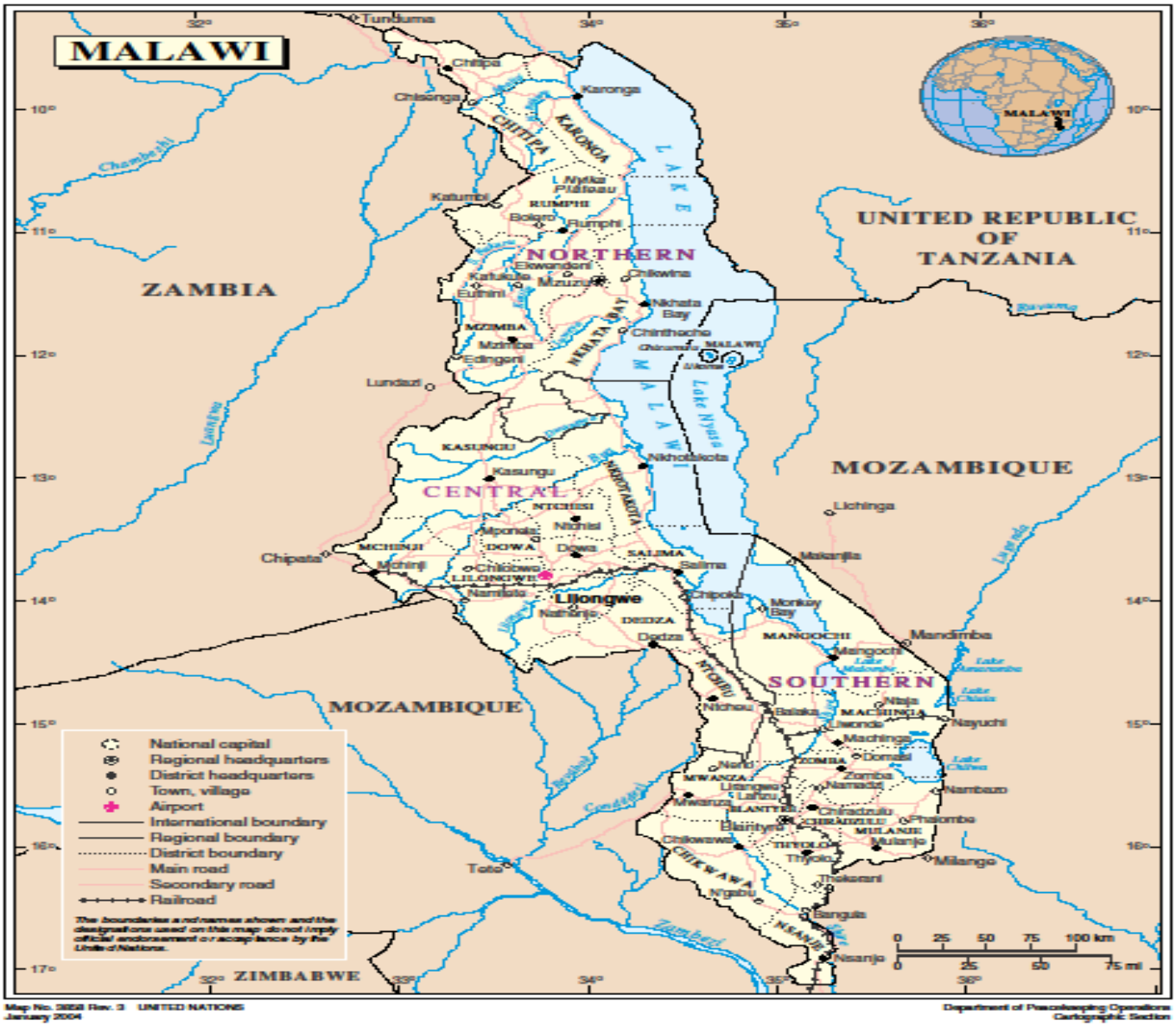
Climate

2. Lying between latitude 9° 22' and 17° 7' S and between longitudes 32° 40' and 35° 55' E, Malawi's climate is tropical continental and largely influenced by the huge water mass of Lake Malawi. There are three main seasons: cool and dry, from May to August; warm and dry, from September to November; and warm and wet, from December to April. The five-month rainy season differs slightly in Southern and Central Regions (November to March). Annual rainfall ranges from 600mm in lower Shire Valley and Karonga lakeshore plains, to over 3,000 mm in high elevation areas with mean annual rainfall being 1,180 mm. Its distribution is mostly influenced by the topography and proximity of Lake Malawi. Temperatures are greatly influenced by the topography and decrease with increasing altitude.

3. The mean maximum and minimum temperatures are 28 °C and 10 °C respectively in the plateau areas, and 32 °C and 14 °C respectively in the rift valley plains. The climate of Malawi and changes in the distribution of rainfall in particular, are strongly influenced by pressure and wind systems governed by movement of the Inter-Tropical Convergence Zone (ITCZ) and associated distribution belts. Disturbances of the ITCZ and shifts in the global circulation pattern, the El Niño Southern Oscillation (ENSO) phenomenon lead to variation in weather patterns.

4. Malawi has a high risk of climatic and hydrological hazards (droughts, storms, floods and associated landslides. Since the 1970s, the country has experienced significant variations in weather patterns, ranging from severe drought (1978-79, 1981-82, 1991/92, 2004/05) conditions to extreme flood events (1996/97, 2000/2001, 2002/2003) and strong winds. Although almost the entire country is vulnerable to drought, the Lower Shire Valley and Rumphi West are at significantly higher risks. Torrential rains regularly cause floods, washouts, and inundation of low lying areas. Indeed, more than 40% of disasters in Malawi have been caused by severe floods, including those experienced in 1942, 1946, 1956 and 1991, with the latest disasters occurring in 1997, 2001/2 and 2003. The four river basin systems that experience regular and severe floods are the Ruo/Shire, Likangala/Thondwe, Limphasa/ Luweya and the Songwe. Heavy rains in these areas cause landslides, severe erosion, flash floods and boulder deposition, threatening lives and livelihoods. Indeed many settlements at the foot of mountains and prominent hills face constant risk of landslides during regular rainfall years. The country experienced several cyclones, with Zomba and Lower Shire Valley being worst hit in 1946 and 1956 respectively. Severe local storms (tornadoes and hailstorms) are regular occurrences in many parts of the country during every rainy season.

Figure 1: Map of Malawi



Map No. 3958 Rev. 3 UNITED NATIONS
January 2004

Department of Peacekeeping Operations
Cartographic Section

Project pilot sites and ecosystems in them

5. The project will be implemented in 6 hotspots in Mangochi and Machinga districts (three hotspots per district – map in figure 2). A hotspot is defined as an area which is highly threatened and/ or vulnerable to climate change, especially floods and drought. This includes areas with resources, developments and populations that are currently relatively better-off but sustainability of which could be adversely affected by the prevailing and/or anticipated bio-physical and socio-economic changes consequent to climate change. An extensive hotspot selection process was conducted during PPG. It included extensive consultations with the District Executive Committees to identify priority issues and possible project areas. This was followed by further consultation with community structures (Agriculture Extension Planning Areas, Traditional Authorities and Chiefs), to confirm areas where the baseline investments (described in section 1.2) were active, and where there were resources under threat from climate risk. The following Hotspot Selection Criteria was then applied to select six most appropriate pilot sites:

    - Social and economic challenges: population density and the degree and potential impact of environmental and climate related challenges;
    - Livelihoods support and development potential e.g. availability of surface and ground water resources that create the potential for domestic water sources, climate smart agriculture and aquaculture development; Potential for agriculture-led economic development;

- Extent of environmental degradation in critical catchments e.g. deforestation, soil erosion and the potential for restoration; and
- Vulnerability to extreme weather events (floods and drought).

6. GIS and Remote Sensing was used to analyse information and produce the vegetation maps showing decline in forest cover since 1990 in the two districts (figure 2). This was followed by ground truthing, including participatory discussions of localized vegetation cover change in the six pilot sites. The detailed Hotspot Identification report is in annex 1 (available on request).

7. Although the six pilot sites will be the focus of the project, activities will however cover the entire districts through up-scaling. The two districts are located in southern region of Malawi and fall within the Great East African Rift Valley system and share an international boundary with Mozambique to the East. The districts have diverse natural resources that form a unique protected area complex which include Lake Malawi National Park, Namizimu forest reserve, Phirilongwe forest reserve, eastern and western tips of southern Lake Malawi, Shire River, Mangochi forest reserve, Liwonde National Park, Lake Malombe, Liwonde forest reserve, Lake Chilwa, Zomba-Malosa forest reserve and Lake Chiuta. The area is characterized by numerous streams and rivers. The major river is Shire that drains from Lake Malawi and is a tributary of Zambezi River. Other notable surface water bodies include Masange and Nkasi rivers. Floods are a common occurrence during the rainy season. The quality of surface water is generally good for domestic use and irrigated agriculture, although water becomes turbid during the rainy season and contaminated with solid waste washed down from the degraded catchment area.

8. Major economic activities for the district are agriculture, tourism, fishing and small-scale businesses. Major cash crops grown in the district are cotton, tobacco, rice and cassava whereas major food crops are maize and rice. According to NSO (2008), 94% of all persons aged 15yrs+ are dependent on agriculture, forestry and fishing as their main source of employment. Major commodity traders include Petroda and Puma for petroleum, Chipiku Stores and Peoples for household utilities, Southern Bottlers for beverages, Liwonde Turnery, and Malawi Fertilizer Company. The sectors that employ the largest number of people are Agriculture, Health, Education, Immigration and Police.

9. The fisheries resources play a significant role to the communities in the district for food, employment and economic benefits, ultimately contributing towards poverty reduction, education and health. Two categories of fisheries are practiced in the district: capture fisheries and aquaculture. Capture fisheries is mostly practiced in Lakes Chilwa and Chiuta and also in the middle Shire River using fishing equipment like gillnets, Chilimira (open water sea net), beach seine nets and hooks and lines.

1.1 Climate change-induced problem

10. Current and future climate-related risks to Malawi and key areas of vulnerability have been analyzed in the country's First and Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), the National Adaptation Programme of Action and the National Climate Change Program (NCCP)[1]. The most up-to-date climate change and vulnerability was conducted by a USAID supported Malawi climate change vulnerability assessment, concluded in October 2013, led by the African and Latin American Resilience to Climate Change (ARCC)[2]. This assessment provided invaluable data, covering the Southern part of the country, including the Machinga and Mangochi Districts, which are the pilot districts for the proposed project[3]. The variability of Malawi's climate is strongly influenced by at least three powerful external drivers: the El Niño Southern Oscillation (ENSO), an Indo-Pacific phenomenon that

[1] Government of Malawi: 2006 and October 2011: National Adaptation Programmes of Action (NAPA) and Ministry of Natural Resources, Energy and Environment. "Second National Communication of the Republic of Malawi under the Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC)."

[2] World Bank. 2012. "Malawi Country Brief." Available at http://web.worldbank.org/: World Bank. 2013. "Malawi Overview: Malawi Economy 2012." Available at: http://www.worldbank.org/en/country/malawi/overview.

African and Latin American Resilience to Climate Change (ARCC): Malawi climate change vulnerability assessment - September 2013

[3] African and Latin American Resilience to Climate Change (ARCC): Malawi climate change vulnerability assessment - September 2013. The ARCC study used thresholds of 36 °C and 20mm, determined in close collaboration with the Malawi DCCMS to be generic thresholds applied currently in Malawi. A temperature reaching 36 °C was considered "very hot" and rainfall of at least 20mm for two days in a row signaled the seasonal onset.

modulates circulation; the Indian Ocean Dipole (IOD), an equatorial pattern that affects rainfall; and the Subtropical Indian Ocean Dipole (SIOD), which may be linked to higher than normal rainfall in southern Africa. Although the uncertainties introduced by these strong external atmospheric drivers contribute to considerable uncertainty in climate projections for the country and greatly restrict the ability to isolate climate change from normal climate variability, ARCCs climate modelling results show that climate change will increase mean annual temperatures and shift the timing of, and amounts of rainfall from the current patterns, and increase the frequency and intensity of existing climate hazards particularly droughts and floods. These changes are described below.

11. **Current changes in temperature**: The ARCC climate modeling determined a range of 1997–2011 temperatures to be as follows:

- Observed annual minimum daily temperatures nationwide range from 13–21 ◦C;
- Observed annual maximum daily temperatures nationwide range from 23–33 ◦C; and
- Observed annual extreme daily maximum temperatures range from 27–39.5 ◦C.

12. These results portray a clear increase over the annual temperature averages often reported by the Malawi Meteorological stations. As reported by ARCC, all the stations assessed showed a relatively sharp increase in temperature, both maximum and minimum, over the years of available data. Changes in maximum temperature were found during the months of November and December, with smaller changes also found in the late summer months of January and February. The study reported that the number of days exceeding the 32 °C threshold in summer was found to be statistically significant at the 95 percent confidence level. The assessment also modeled expected climate change for the 2020 – 2060 period, using thresholds of 36 °C and 20mm, determined in close collaboration with the Malawi Department of Climate Change and Meteorological Services (DCCMS) to be generic thresholds applied currently in Malawi. A temperature reaching 36 °C was considered "very hot" and rainfall of at least 20mm for two days in a row signalled the seasonal onset. The results showed that for the period 2020-2040, monthly mean T_{max} showed the lowest increases in maximum temperature likely to take place during January and February, with changes of between of 0.6 °C to 1.15°C and 0.75 °C to 1.5 °C for the two emission scenarios. The largest increases were seen in the hottest months (October and November), with ranges of between 0.8 and 2 °C. For the period 2040-2060, the early summer months of October and November were projected to be warmer, with an increase of between 1.75 °C to 2.5 °C. In addition, more days of extreme temperatures are projected.

13. These results are in line with the country's climate projections based on Global Circulation Models (GCM) used by the Inter-governmental Panel on Climate Change, which projected that the mean temperature in Malawi is projected to increase by 1.1 to 3.0°C by the 2060's, and by 1.5 to 5.0°C by the 2090. They are also in line with those reported by other models. According to UNDP Climate Change Profile for Malawi[4], the mean annual temperature has increased by 0.9°C between 1960 and 2006, at an average rate of 0.21°C per decade. Likewise, the average number of 'hot' days per year in Malawi has increased by 30.5 between 1960 and 2003, and the average number of 'hot' nights per year has increased by 41 (an additional 11.1% of nights) between 1960 and 2003[5].

14. **Changes in precipitation:** The Malawi ARCC VA (vulnerability assessment) and climate modeling exercise revealed that between 1997–2011, Malawi was exposed to six very wet and five very dry summers, as defined by a ± 0.5 anomaly. There also appears to have been fewer very dry summers than very wet summers. The driest summer occurred during 1999/2000, and was subsequently followed by the wettest summer (2000/2001). On both these occasions, all station clusters (regions) displayed the same anomaly signs. In 2005/2006, the Northern region had a very dry summer while the Southern region had a very wet summer.

15. **Projected changes in precipitation**: In the south, where the two pilot districts are located, the period 2020-2040 projections show a relatively clear tendency toward reduced rainfall in November, a mixed signal in

[4] https://www.google.com/search?q=undp+country+profile+on+climate+change+malawi&aq=f&oq=undp+country+profile+on+climate+change+malawi&aqs=chrome.0.57.893013j0&sourceid=chrome&ie=UTF-8

For detailed results of GCM projects, see Endnotes

[5] Same as above

December and January, increases in February and March, and decreases in April[6]. The changes in rainfall are also reflected in the number of wet days per month, with a decrease in monthly rainfall matching a decrease in the number of rain events, and vice-versa.

16. These changes were also confirmed in the baseline assessment undertaken in Mangochi and Machinga. Community members reported that they have perceived change in the rainy season, making agriculture decisions regarding planting more difficult and less reliable. Community members in all the six hotspots reported three unsettling changes: an unclear start to many/most seasons; heavier rains in certain years or condensed periods of any given year (especially at the end of the season); and extended dry periods (different years stated for each).

17. **Current changes in drought and floods (hazards):** Both the ARCC modelling and baseline data collected in Mangochi and Machinga reported current changes in hazards related to droughts and flooding. Despite an unclear distinction between dry spells, prolonged dry spells and droughts, communities referred to a mixture characterized by significant damage to crops, which is what differentiates them from the "normal" dry spells that occur mid-season, often in January of February (ARCC 2013). Recent "droughts" happened in 2007–2008 and 2010-2011 in Felo; 2009 in Kawelama, 2011–2012 in Chisambamnopa, Liguluche and Kawelama Lupanga.

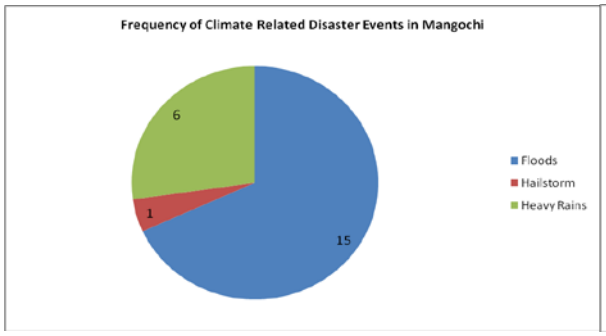
18. Indeed, Machinga and Mangochi are both listed among the 15 disaster prone districts in Malawi (GoM, 2013). All the 14 Traditional Authorities in Machinga reported being affected by climate related disasters, with Liwonde, Nkhokwe, Sitola and Mposa being the more prone to climate related disasters. Baseline analysis of climate related disasters as compiled by the Department of Disaster Management Affairs (DoDMA) for the period 1946 and 2012 shows that Kawinga is the most disaster prone area in the district followed by Liwonde and Nsanama. The most recurrent climate related threats to development gains are: floods, heavy rains and hailstorms. The districts also experienced intermittent episodes of dry spells during the cropping season that ultimately reduces crop yields.

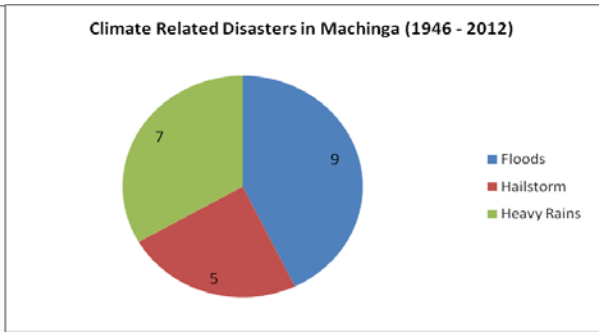
19. Consultations with district technical personnel revealed that: TA Liwonde is affected by floods every year and the area is highly deforested. In 2013, strong winds caused destruction to buildings in the area; TA Nkhokwe has been affected by droughts and heavy rainfall a number of times and crop harvests have been adversely affected especially in Chikweo and Nsanama; TA Sitola is frequently affected by dry spells; and, TA Mposa was adversely affected in 2012 when Lake Chilwa dried up and the fishery was almost depleted resulting in other fishermen migrating to Kachulu and other areas that had some water. The drying of the Lake had devastating effects on the livelihoods of most people that rely on the Lake.

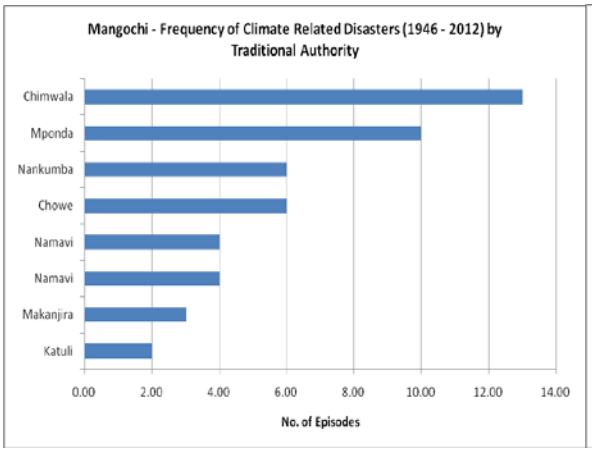
Table 1: Drought-Prone Areas in Mangochi

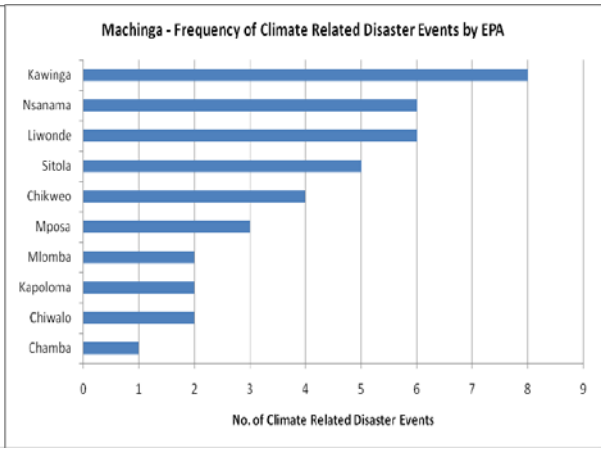
SN	TA	No. of Drought-Prone Sites	Specific Location of Drought-Prone Sites
1	Mponda	4	Makawa, mpondasi, namiasi, maldeco
2	Jalasi	1	Ntiya
3	Makanjira	2	Mpilipili, Lungwena
4	Namkumba	2	Mbwazulu, Mtakataka
5	Chimwala	2	Chilipa, Phirilongwe,
6	Chowe	2	Malombe, Maiwa

[6] African and Latin American Resilience to Climate Change (ARCC): Malawi climate change vulnerability assessment - September 2013









20. These climate change effects will undoubtedly challenge the existing coping mechanisms of the population; especially those communities dependent on subsistence agriculture and living in poorly planned urban areas in the two pilot project districts. The vulnerability of the various sections of the rural population, sectors of the economy and institutions will differ depending on their circumstances. A detailed assessment of the susceptibility of these sectors to the current and projected impacts was beyond the scope of the PPG studies. However, secondary literature, in particular the ARCC vulnerability assessment (VA) provided adequate information on the subject.

21. The analytical framework used by the ARCC was based on the common model of **vulnerability** as a function of **exposure, sensitivity**, and **adaptive capacity** (Intergovernmental Panel on Climate Change (IPCC), 2001; fig 2). The Malawi VA however focused its analysis primarily on exposure, sensitivity, and adaptive strategies (rather than adaptive capacity) (ARCC 2013). In this model, **exposure** aligns to the direct (or "first degree") manifestations of the climate system: temperature, precipitation, winds, and hazards such as flooding and drought. Sensitivity is expressed as second - and third-degree impacts, where the second-degree impacts are the spontaneous adaptation of the biophysical world to the climate changes, and the third-degree impacts are the socioeconomic impacts. The vulnerability assessment (VA) also looked at adaptive strategies, strategies that populations and agricultural market systems use to address the second-and third-degree impacts. Thus, the "degrees of impact" framework aligns to the standard model while enabling a systematic exploration of increasing complexity.

Figure 2: Vulnerability as a function of exposure, sensitivity, and adaptive capacity.

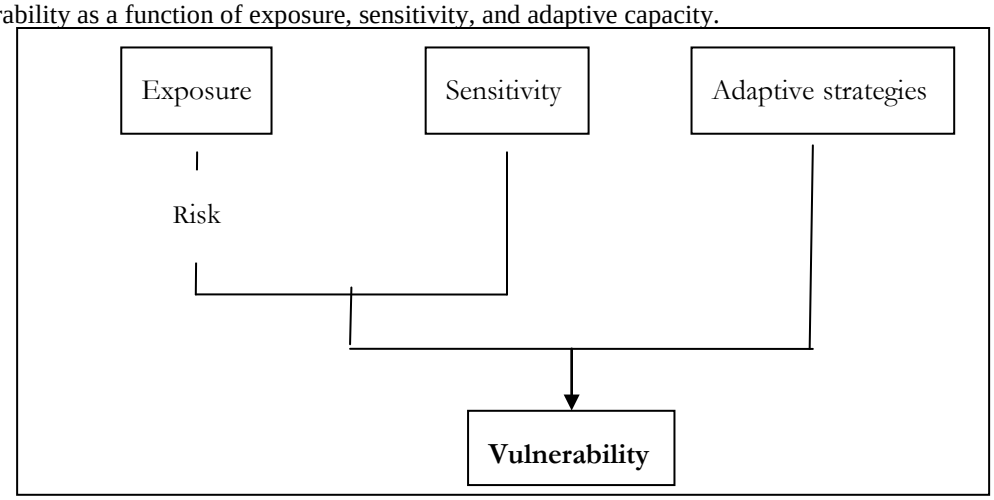


Table 2: Dimensions of exposure & sensitivity to CC events from exposure to hazards to outcomes

Climate Change Events – Exposure to Hazard	1st Level Sensitivity Determinants (this determines for instance the extent of flooding – outcome I)	Outcome I Biogeophysical Impacts	Sectors Exposed to Outcome I	2nd Level Sensitivity Determinants	Outcome II Impacts on socioeconomic system
Floods, hailstorms, heavy rainfall	Biogeological features of the country & the pilot districts • Relief • Geology • Landform • Lake shores	• Erosion • Lake shore shifts • Flood (from upstream watershed) • Changes in run-off due to upstream extreme rainfall events or droughts • Inundation (storms); • Increased rate of evaporation; • Water shortage	• Economy including below: • Infrastructure (including roads, bridges) • Ag-forestry • Fisheries • Aquaculture • Water sector • Energy sector • Rural and urban housing • Health • Industry (e.g. tourism) • Ecological systems Biodiversity	• Ecosystem health and level of degradation of watersheds; • Household incomes and poverty levels; • Degree of sophistication of agriculture (subsistence versus commercial) • Population density • State of health of the fisheries, fishery and aquaculture % of national GDP • Revenues from tourism as % of GDP Historical/cultural importance	• Loss of ecosystem goods and services • Damage to agriculture, fisheries etc, and increased food insecurity; • Increased cost of production and protection of property and infrastructure; • Siltation in rivers, increased cost of production of electricity and portable water; • Loss of property, livestock and poultry; • Damage to infrastructure; • Damage to irrigation systems and consequent economic loss; • Increased risk of diseases • Loss of cultural resources • Forced migration; • Loss of lives
Increase in temperatures, erratic rains and droughts	State of the water basin, including river systems • Physical, geographical & hydrogeological catchment features • Amount of lake or groundwater storage • Size and nature of river systems (perennial, ephemeral				

Key: White cells represent the exposure and sensitivity of the natural systems. Blue cells represent the socio-economic system.

1.1.1 Sectors affected by climate change

22. The impacts of climate change on various sectors are summarised in figure 3, and briefly discussed below.

23. **Water resources:** Impacts of climate change on *water availability* in Malawi are already evident. Erratic rains, extended dry periods, and increased evaporation have combined with population growth and increased water demand to rapidly turn Malawi's historical water abundance into water scarcity. The dominance of precipitation and evaporation on Lake Malawi's hydrologic cycle heightens susceptibility of the system

(ARCC 2013). Outflows from Lake Malawi directly impact water flows into the Shire River system. The Shire is a critical source of water in Malawi; the river made available an estimated 31,310 million litres per day during a typical dry season in 2010, out of the national total of 38,700[7]. There is already historical precedent for the flow of the Shire, with a complete stoppage from 1915 to 1935[8]. The typical seasonal lake level fluctuations in Chilwa have increased from 0.8 to 1 meters in the past to 2 to 3 meters in the recent past, leaving the lake partially or completely dry. The shallow depth and very low total volume lead to conditions of a very fragile system, making the lake particularly vulnerable to precipitation variability and evaporation, both of which are likely to increase with climate change. Indeed, the lake completely dried up in 1995, for the second time in recorded history (Njaya, Friday, 2001, p. 15).

24. As reported by the ARCC vulnerability assessment, the decreasing water availability is accompanied by increasing *water demand* as Malawian farmers and households search for ways to compensate for the water scarcity. The total annual average water demand changes from about 2,900 Ml/day (2010) for normal periods to 3,900 Ml/d during an average dry season, an increase of approximately 35%. During average dry season conditions in 2010, the national total demand for water was only 10% of the nationally available surface water resource. During an extreme drought event, demand increases to 55% (i.e., resources are more constrained but still generally in surplus at a national scale). As a result of low levels in Lake Malawi and the Shire River beginning in 1997, electrical power production has regularly been rationed at the end of dry seasons, typically in October and November (Bootsma and Jorgensen, 2004, p. 262). It is not unusual for pumps to remain dry for two weeks in a row. The fuel and electricity shortages contribute to low economic activity and productivity. Although the influence of current climate change on water availability is certain, the declining water balance (availability minus demand) is largely the result of the national demand exceeding the supply. The rising demand for water is driven more by confounding factors than by climate change; nevertheless, climate change will likely worsen water availability.

AGRICULTURE

25. Agriculture is the most important sector of Malawi's economy, contributing about 90% of export earnings and around 40% of GDP, in addition to employing about 90% of the workforce. The total land area in Malawi is 9.4 million ha, and 56% of that has potential for agriculture. The agriculture sector is "dualistic," comprising smallholders and estates. Estate lands are mainly held under freehold or leasehold tenure; the main crops are tobacco, tea, sugar, and coffee. Tobacco is Malawi's largest export cash crop, accounting for over half of export earnings, followed by tea and sugar. However, most agriculture in Malawi is subsistence, rain-fed agriculture. More than 90% of the rural population comprises of smallholder farmers with customary land tenure. They cultivate small and fragmented landholdings covering approximately 2.4 million ha, and achieve low yields. Average landholding size has fallen from 1.5 ha in 1968 to around 0.8 ha since 2010. Despite the availability of better technologies, the productivity of most crops appears not to have significantly improved during the past 40 years; this may be largely a result of declining soil fertility. Maize is the one exception, having doubled since 2005/06, boosted by the introduction of the Farm Input Subsidy Program. Other factors decreasing productivity include poor access to financial services (for inputs) and markets (for distribution), as well as small landholdings. (Farmers also face the challenge of significant post-harvest losses, estimated to be around 40% of production (IFAD, 2010).

26. The key crops in order of lowest to highest resistance to climate are: maize, groundnuts, pigeon peas, cowpeas, soybeans, and sorghum. Interestingly, the crops fall into a resistance order almost exactly opposite to the areas planted. As temperatures rise and precipitation becomes erratic, and as water becomes less regularly available, agriculture becomes a risky business. The crops require specific quantities of water and certain temperature ranges at specific stages of their growth. The economic cost of climate change on smallholder production of crops was estimated by Wood and Moriniere (2013) under a moderate and extreme

[7] GoM Ministry of Irrigation and Water Development, 2011, p. 124)

[8] Government of Malawi: 2006 and October 2011: National Adaptation Programmes of Action (NAPA) and Ministry of Natural Resources, Energy and Environment. "Second National Communication of the Republic of Malawi under the Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC)."

change in climate relative to the benchmark climate. The greatest cost increases occur when all five climate events combine—late onset, lower rainfall, extended dry periods, early cessation and high temperatures.

27. The detailed effects of climate change on Malawi's key crops at different stages of growth and its economic implications are described in annex 2. In general, the increased prevalence of pests attributed to high temperatures and late onset of rains is an impact of climate change in Malawi that is not being addressed. The most commonly grown crops are not sufficiently pest resistant, yet pest control through chemical means is beyond the affordability of most households. Each crop is affected differently, and to a different degree, by changes in weather patterns due to climate change. The answer to climate change will not be for farmers to plant a specific crop during a specific time period, but rather to build the adaptive capacity that farmers will need to allow them to face a very uncertain climate future. Agricultural diversification and intensification (e.g., agroforestry, permaculture, water harvesting, conservation agriculture, and soil fertility management) and integrated pest management (IPM) will be important in enhancing resiliency.

FISHERIES

28. In 2009, 132 national economies were examined for their vulnerability to climate change using environmental, fisheries, dietary and economic factors (Allison et al., 2009). Countries determined to be most at risk were not necessarily those that are expected to experience the greatest direct environmental impacts on their fisheries. Rather, the most vulnerable countries were those where fish are crucial for diet, income, and trade, combined with a lack of capacity to adapt to problems caused by climate change. Four countries in Africa (Malawi, Guinea, Senegal, and Uganda), four Asian countries, and two South American countries were identified as having the most economically vulnerable fisheries in the world.

29. It appears that significant impacts on fisheries biology, reproduction, productivity and habitats of some fish species may be associated with changes in temperatures, precipitation and runoff into the lakes and linked flooding and drought as well as changes in wind patterns affecting Lake Malawi. In Lake Malawi, evidence suggests that both warming and eutrophication influence fish stocks (Vollmer et al., 2005). There is no evidence to date to determine whether this is due to rising water temperatures, lower and warmer inflows into the lake or limited overturning. At shallow lakes such as Lake Chilwa, surface area and water levels fluctuate with regional rainfall. Fish catches, fishing activity and livelihoods have begun to mirror these observed fluctuations (Jamu, 2011; Jul-Larsen et al., 2003).

Figure 3: Impacts of climate change on critical sectors

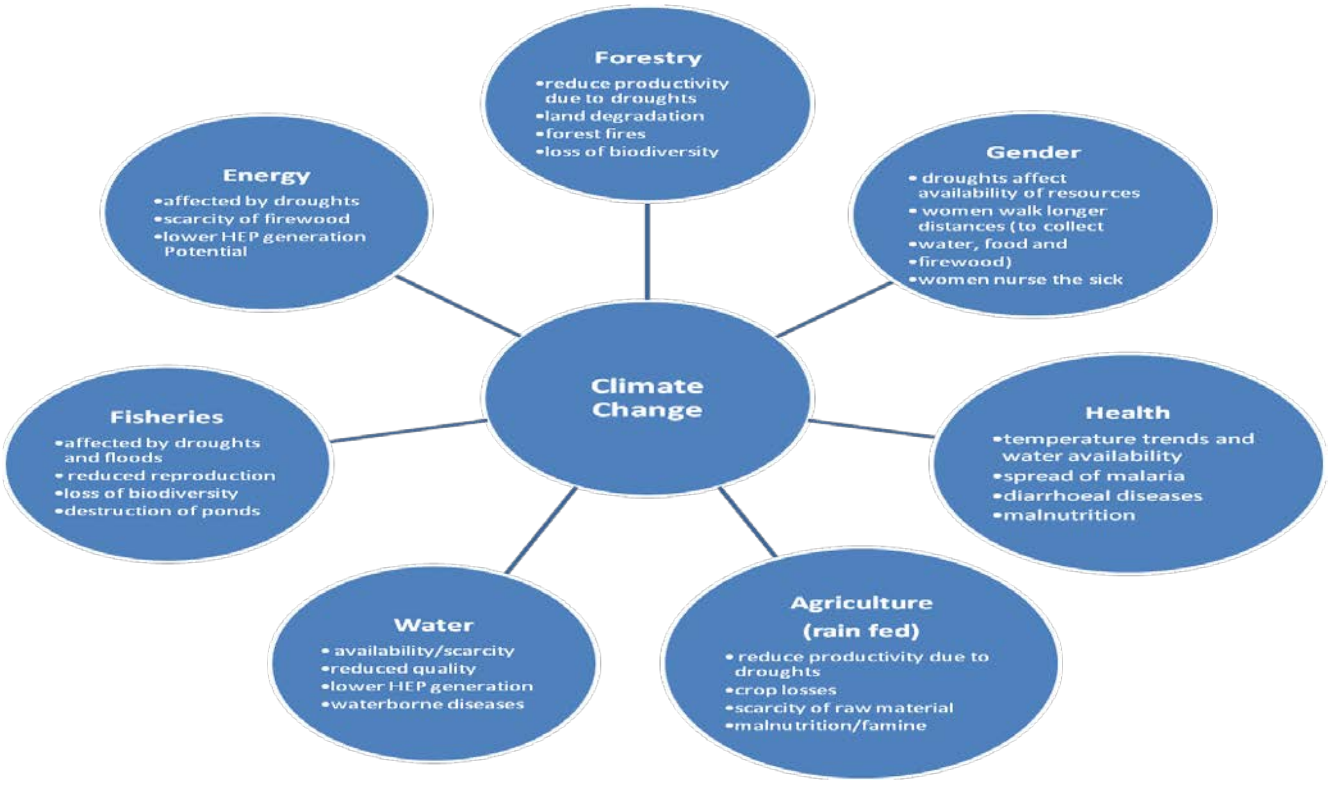
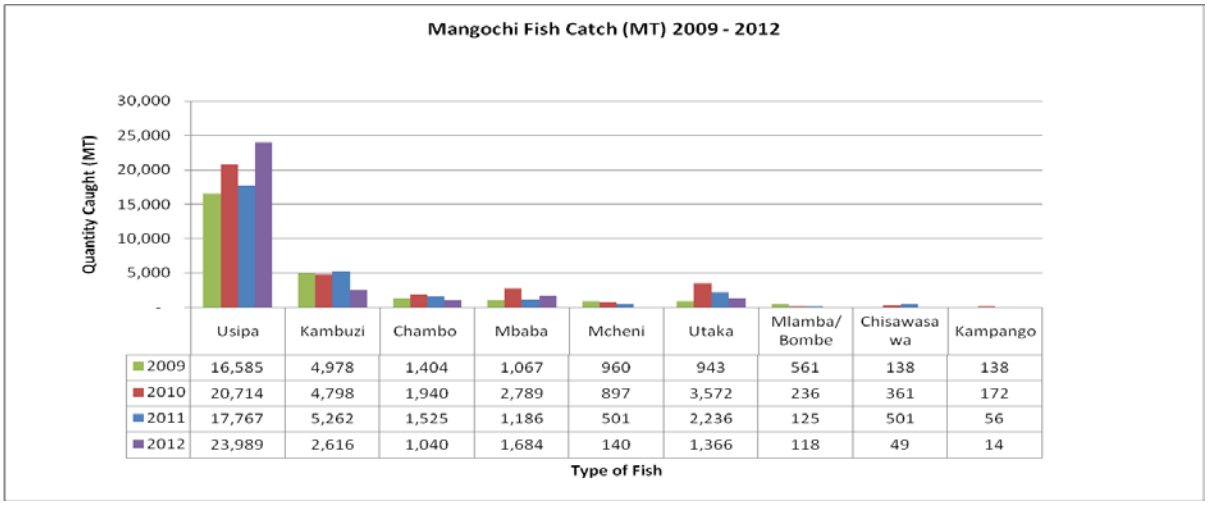


Table 3: Current impacts on fish stocks (ARCC 2013)

Element	How does climate impact the element?	Recent impacts observed
Ecosystem/ Breeding habitats	Rising temperatures may cause some species of fish to migrate to deeper colder waters. There, they adapt (crowding out local species and creating an unbalanced ecosystem) or die. Winds can change upwelling patterns in the lake and may indirectly foster migration of fish to other areas, further from the shoreline (Source: PRA interviews with fisherfolk).	Fish stocks (and inevitably, catches) decline
Fertilization and nest protection	Heavy siltation due to intense rainfall and high rates of runoff and soil erosion creates a murky environment in which fish cannot fertilize their eggs or protect their nests.	Same as above
Migration patterns	Intense rainfall and high rates of runoff cause soil erosion and increase siltation, which hinders fish migration to the larger lakes; erratic rainfall resulting in lower agricultural yields often triggers small-scale stream diversion for irrigation, thereby also interrupting migration patterns	Reduced fish recruitment[37]



Infrastructure

30. Intense rainfall events and increased flood risk may increase the risk of infrastructure damage, including roads. Heavy rains and storms in late 2012-2013 led to flash floods causing loss of lives and destruction of infrastructure in many districts in Malawi[9], with the Southern Region being the most affected. According to the Department of Disaster Management Affairs (DDMA), 12,877 households were affected by destruction of and damage to houses and crops, loss of livestock and contamination of water sources. The displaced families had taken refuge in makeshift camps, in school blocks and other public buildings and are exposed to higher malaria risks.

31. For both Mangochi and Machinga districts, the most recurrent climate related threats to development gains are: floods, heavy rains and hailstorms. Infrastructure developments exposed to climate risk in urban areas include building, roads, bridges and culverts (figure below). Bridges and culverts are normally filled up with sand and silt deposits washed away by rainstorms. Seven of the 14 Traditional Areas in Mangochi district are classified as flood prone: Liwonde, Ngokwe, Chikweo, Mposa, Chamba, Nkula and Kawinga whereas 5 TAs are classified as drought prone: Sitola, Liwonde, Nkula, Ngokwe and Chiwalo. Floods damage or completely wash away roads, bridges, curvets and buildings.

32. Figure 4: Destruction of infrastructure in Mangochi

[9] http://reliefweb.int/disaster/fl-2012-000210-mwi

33. PPG consultations with communities and district technical personnel revealed the relationships between baseline problems and expected interaction with climate change summarised in table 4.

Table 4: Summary of baseline problems and expected interaction with climate change

District	Current Issues	Estimated Directions of Change (2014 -2060)	Summary of Likely Impacts
Machinga District: (Chikweo, Nampeya, Nyambi, Nsanama, Mbonechera) Mangochi District (Nankumba, Chilipa , Mthiramanja, Chimwala, Mponda, Nansenga)	➢ high rates of soil erosion, loss of top soil ➢ livelihoods dependent on subsistence agriculture, fisheries and exploitation of woody resources ➢ dependence on biomass energy, charcoaling ➢ agriculture expansion into new areas leading to deforestation and watershed degradation ➢ failure of gravity fed irrigation systems due to non-compliance with maintenance procedures ➢ Intensive and uncontrolled fishing ➢ Marginalised informal settlements at extremely high risk ➢ Cultivation on hill slopes and riverbanks disregarding environmental by-laws ➢ Eutrophication of water bodies (lakes, rivers, wetlands) and erosion of banks; ➢ Loss of produce from poor post harvest management and handling	➢ Documented history and observed current trend of erosion likely to continue ➢ Increased population and higher population density likely to increase demand for land, continued encroachment into natural habitats and forests, continued watershed degradation, continued loss of ecosystem health, goods and services; ➢ Continued reliance on subsistence agriculture in the absence of industrial revolution, likely to drive land fragmentation further, higher rates of erosion and siltation, higher intensity on fisheries, increasing vulnerability and likelihood of crashed fisheries; ➢ Continued disregard for environmental by-laws with cascading negative feedback loops on state of natural resources, ecosystems, resilience and vulnerability of livelihoods; ➢ Continued reliance on biomass for energy with cascading negative feedback loops on ecosystems, livelihoods and the economy; ➢ Continued damage and destruction of rural infrastructure (e.g. washing away of roads, bridges, blocking of storm water channels, flooding in houses, roofs blown away by winds); ➢ Continued eutrophication of water bodies threatening fisheries, portable water and power generation	➢ Damage and destruction of ecosystems, loss of ecosystems goods and services, increased vulnerabilities of livelihoods and economy; ➢ Increased cost of production for food, reduced yields, reduced food security; ➢ Increased cost of portable water and power generation at a time of higher demand, reduction in households accessing clean water and electricity, reduced productivity of the population; ➢ Increased flooding, erosion of infrastructure (private residences, offices, roads, bridges) with increased cost of protecting them; ➢ Degradation of fisheries ecosystem with further decrease in viability of subsistence fisheries ➢ Decreased cultural and aesthetic value of water systems (lakes)

Root causes

34. The root causes of vulnerabilities in Malawi include inherent physical vulnerability and resilience, threats arising from current land use and development practices, small per capita landholdings, low soil productivity and fertility due to increased levels of soil erosion, over-reliance on rain-fed agriculture, adverse weather – erratic rainfall (changing onset & cessation; amount & distribution), low diversification of agricultural production, high food and agricultural input prices, low access to agri-business capital, low access to agri-business capital, insufficient access to marketing opportunities (including value addition), uncoordinated planning and management (e.g. disintegrated policies; inadequate institutionalised safety nets etc) and low capacity to manage climate related risk & shocks (Human, financial and material resources).

Threats aggravating vulnerabilities to climate change in the pilot districts

35. Malawi is highly dependent on natural resources for its economic development and livelihoods of the largely rural population. The country is also gifted with a large variety of ecosystems, which offer a means of adaptation readily available to the country, particularly the rural poor (a summary description of the countries ecosystems is given in annex 3; table 5 summarizes ecosystems goods and services provided by these ecosystems). Given the low state of economic development and high levels of poverty in the country, the use of technologies and the design of climate resilient infrastructure will remain out of the reach of the majority for some time, making nature based adaptation an important component of the country's strategies for adaptation. Healthy ecosystems provide drinking water, habitat, shelter, food, raw materials, genetic materials, barriers against disasters, natural resources, and many other ecosystem services on which people depend for their livelihoods. A healthy watershed for instance slows down the force of torrential rain, increases infiltration, and reduces soil erosion, the risk of landslides and flooding. Healthy wetlands mitigate seasonal flooding and provide habitat for many animals, fish, amphibians, reptiles and insects, many of which form part of rural diets. In addition, healthy ecosystems, such as forests, wetlands, grasslands and agro-ecosystems, have a greater potential to adapt to climate change themselves, and recover more easily from extreme weather events.

36. Despite their critical importance in providing easily accessible means of adaption, the ecosystems of Malawi have been degrading over time, leading to loss of the provisioning, regulating and supporting services that the country urgently needs in its fight against climate change and economic development. The degradation of ecosystems in the southern Shire basin is caused by a combination of natural forces and human factors, described below.

37. **Deforestation and forest degradation:** At a national level, forest resources in Malawi are under massive pressure from human activities such as agricultural expansion; human settlement; unsustainable harvesting for energy and timber requirements; and uncontrolled fires. As reported in the State of Environment Report (SER - 2010) the greatest deforestation occurred between 1979 and 1999, where the rate of deforestation was reports to be 2.8% (Table 6). Although this rate has been revised by FAO to 1% per year (FAO 2010 – Mutimba 2013), forest cover declined from 50% of the total land cover in 1960 to 34% in 2010 (Mutimba 2013)[10].

Table 5: Ecosystem Services provided to livelihoods and the economy of Malawi

Provisioning Services	Regulating Services	Supporting Services	Cultural Services
➢ Food from crops, livestock, wild plants & animals, fish and wildlife products such as insects, mushrooms, fibre. ➢ Bio-chemicals such as traditional medicine ➢ Wood products e.g. timber, live trees ➢ Biomass energy (for 93% of the population) ➢ Genetic Resources ➢ Skins and hides	➢ Climate Regulation ➢ Protection from floods, drought & other natural hazards ➢ Pollination of food & other agricultural crops ➢ Disease regulation by biodiversity that feeds on pests & disease vectors ➢ Erosion regulation in catchment areas such as Dzalanyama ➢ Water Purification	➢ Primary Production ➢ Soil Formation & retention Nutrient cycling	➢ Ancestral spiritual worship ➢ Religious worship ➢ Cultural functions (e.g. traditional medicine) ➢ Knowledge system Recreation & aesthetic values ➢ Education & inspiration

38. The State of Environment Report (SER) reported a corresponding increase in land under agriculture from 30,700 sq km in 1963 to 44,400 sq km in 2003; area under tobacco alone increased from 1,940km^2 to 2,530 km^2 between 2000 and 2007. Forest degradation is uneven, and influenced by population distribution. Indeed,

[10] Mutimbas charcoal report

the Northern Region has 44% of forests but only 13% of the population; about 26% of forests lie in the Central Region, which has 42% of the population, while 30% of forests lie in the Southern Region, where 45% of the population live (Zulu 2010). In addition, about a third of Malawi forests are on Public Land (unallocated or common access forests) where ownership is on community basis. Forests on these lands are considered free goods and often suffer from over-exploitation.

Table 6: Changes in national forest cover between 1973 and 2010 (state of environment report 2010)

1973	1990	1995	2000	2007	2010
4,451,520	3,896,000	3,731,500	3,567,000	3,402,000	3,237,000

39. Forest resources are particularly under pressure in the hotspots. Mangochi has a total area of 627,300 ha (6,273 km^2) of which 238,374 ha, representing 38% is classified as forest (Kainja, 2001; Forestry Outlook Study for Malawi). Three forest areas are further classified into forest reserves (23%) and forest areas under customary land (15%). The district has five Forest Reserves, the largest of which are Namizimu (62% of all area under forest reserves), followed by Mangochi (27%) and Phirilongwe (11%). The contribution of the other two forests is almost negligible (Table 7). Most of the consumption of forest resources is done on customary land because of open access regime.

Table 7: Forest Area in Mangochi

SN	Name of Reserve	Area (Ha)	% of Total	Established in	Location (TA)
1	Namizimu	86,994	62	1924	Jalasi, Katuli, Makanjila and Namabvi
2	Mangochi	37,553	27	1924	Jalasi, Bwananyambi and Chowe
3	Phirilongwe	16,129	11	1924	Mponda and Chimwala
4	Palm	510	0.4	1980	Mponda
5	Nkopola	52	0.0	1967	Mponda
	Total	141,238	100		

40. Machinga District has two public forest reserves: Liwonde, measuring 24,352 Ha, and Malosa, measuring 2,826 Ha. The two reserves were established in 1924 but sustainability is currently threatened by rampant deforestation. The district also has 20 Village Forest Areas out of which only 7, representing 35% are registered while 13 are not yet registered. Deforestation and degradation is taking place rapidly in Ndaje and Matandika (deforestation) and Chaone and Nchilima (degradation through encroachment). Uncontrolled fires which occur in natural forests annually are particularly destructive to forests in these areas. While controlled fire burning can improve forest cover as is the case in the co-managed Chimaliro Forest Reserve, uncontrolled forest fires destroy regenerants and are among the major causes of environmental degradation and a threat to biodiversity in Malawi (Government of Malawi, 2011). This is especially true for Machinga which has experienced an increased trend of incidences of forest fires since 2003 (fig 5), with a cumulative loss of 411 Ha of public forest. The fires have mainly been caused by bush fires set by charcoal producers and hunters.

Figure 5: Machinga Forest Fires: 2003 - 2012

41. Forest degradation in Malawi and the hotspots is further exacerbated by the dependence on biomass energy. Malawi is categorized as a low and inefficient energy consumer. Annual per capita energy consumption in

Malawi was reported at about 11.4 Giga-Joules (GJ) in 2008[11]. This compares to an average of 80 GJ/c for upper-middle income economies and over 200 GJ/c in high income economies. According to the Energy Policy 2003, Malawi's energy balance is dominated by biomass accounting for 97% of production. 59% of this biomass is used in its primary form as firewood (52%) and residues (7%), the remaining 41% is converted into charcoal in traditional earth moulds at very low thermal efficiencies (less than 10%) compared to modern charcoal carbonisation kilns (for example, Casamance Retorts, Bee-Hives, Mark V) whose efficiency is estimated at between 20 to 35%[12]. The only major sources of commercial fuels are coal (55,000 tonnes in 2000), uranium deposits at Kayerekera in northern Malawi and electricity (almost all hydropower). Urbanization has resulted in more intensive use of charcoal: between 1994 and 2008, the share of urban households using charcoal rose from 24% to 33%, while the share using firewood dropped from 66% to 56%. About 6.08 million standard bags of charcoal are estimated to be used in the four largest urban areas annually (UNDP[13], Kambewa *et. al.*, 2008). This requires 1.4 million cubic metres of wood and about 15,000 hectares of forestland cut per year (Kambewa *et. al.*, 2008). Furthermore, demand for firewood and charcoal exceeds sustainable supply in areas surrounding major urban centres of Blantyre, Lilongwe, Limbe and Zomba. Nearly 60% of the charcoal is produced in Forest Reserves and National Parks while about 40% comes from customary land.

42. Forest ecosystems may also be degrading due to effects of climate change. According to the model simulations conducted under the Second National Communication for Climate Change[14], different forest types will respond differently to adverse effects of climate change. The potential changes will range from no change in forest types such as those of Nyika and Viphya Plateau to drastic changes in those of in the north of Kasungu Game Reserve and South of Vwaza Marsh. The projections showed that changes will favour forest species that adapt to increasing dry or drought conditions. Trees that usually grow in warm parts of the country will now grow in areas such as Dedza and Viphya and species adapted to cold areas might adapt or disappear. The expected increase in droughts may be accompanied by higher incidents of wild fires which might accelerate the rate of forest degradation further.

43. The degradation of forest ecosystems is closely related to **degradation of the agro-ecosystems:** Malawi's agro-ecosystems have been degraded in two critical ways: reduction of varieties of crops grown and reduction of farm sizes. Although farmers still grow a wide variety of crops including cereals (maize, rice, sorghum), legumes (groundnuts, beans, pigeon peas, cowpea), roots and tubers (bananas, guava, oranges, tangerine, lemons), vegetables (cabbage, tomatoes, carrots, onions) as well as cash crops (tea, tobacco, cotton and sugarcane), the balance of crops has shifted over time to be dominated by maize. Indeed indigenous cereals especially sorghum (*Sorghum bicolor*) and millets (*Pennisetum spp.* and *Eleusine coracana*) have been gradually replaced by the introduction of maize. Current agricultural policies favour maize production because it is the main staple food.

44. With limited opportunities for livelihoods outside the agricultural sector, farm sizes have decreased with increase in population. In addition agriculture continues to spread to increasingly unsuitable areas and land systems, particularly on steep hillsides weakening the agro-ecosystems (figure 6 shows transitions in land use and land cover in the two districts over ten years). The national mean land holding size decreased from 1.53 ha in 1968/69 to 0.80 ha in 2000, with ¾ of smallholders cultivating less than 1 ha and 41% cultivating less than 0.5 ha. Jumbe and Angelsen (2011) reported that in the South, over 6 million smallholders (~75%) farm on fragmented customary land with little opportunity for food and income security. Over 60% of rural households in the South (including the hotspots) face annual food deficits since they produce less than they need to feed the family (Noragric 2005).

[11] Mutimba, 2013

12 Mutimba and Kamoto: Review policies and regulations on charcoal and how to promote a systems approach to sustainable charcoal production and use in Malawi: Draft Report for UNDP. 2013

13 Mutimba and Kamoto: Review policies and regulations on charcoal and how to promote a systems approach to sustainable charcoal production and use in Malawi: Draft Report for UNDP. 2013

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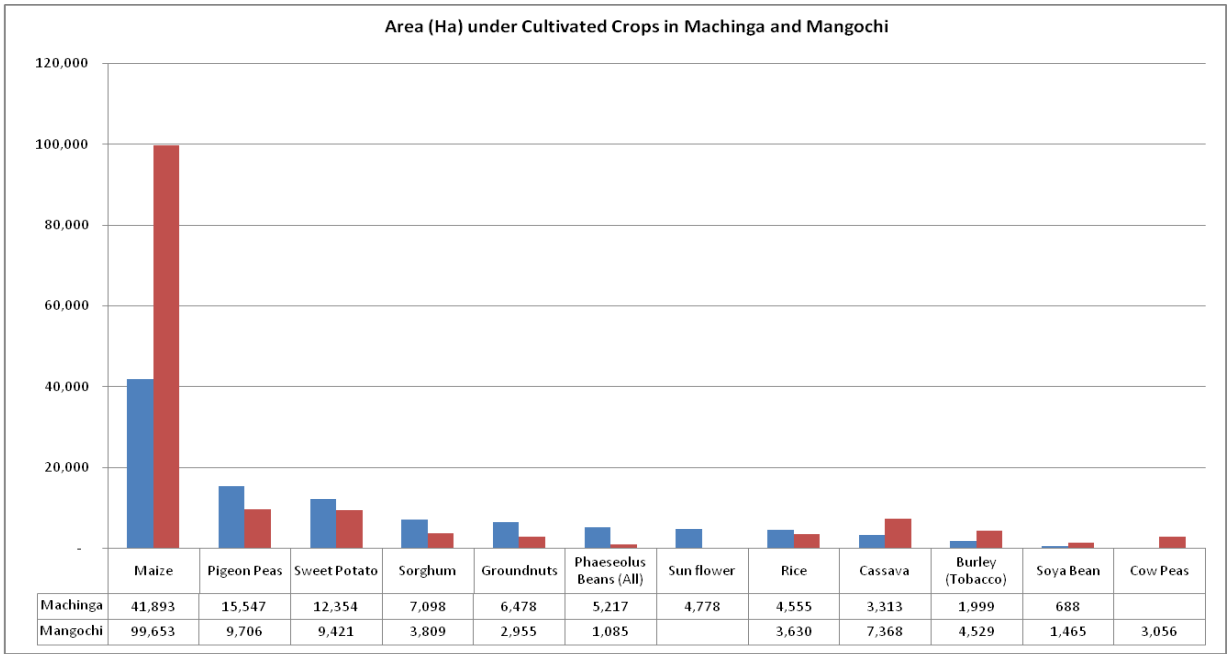
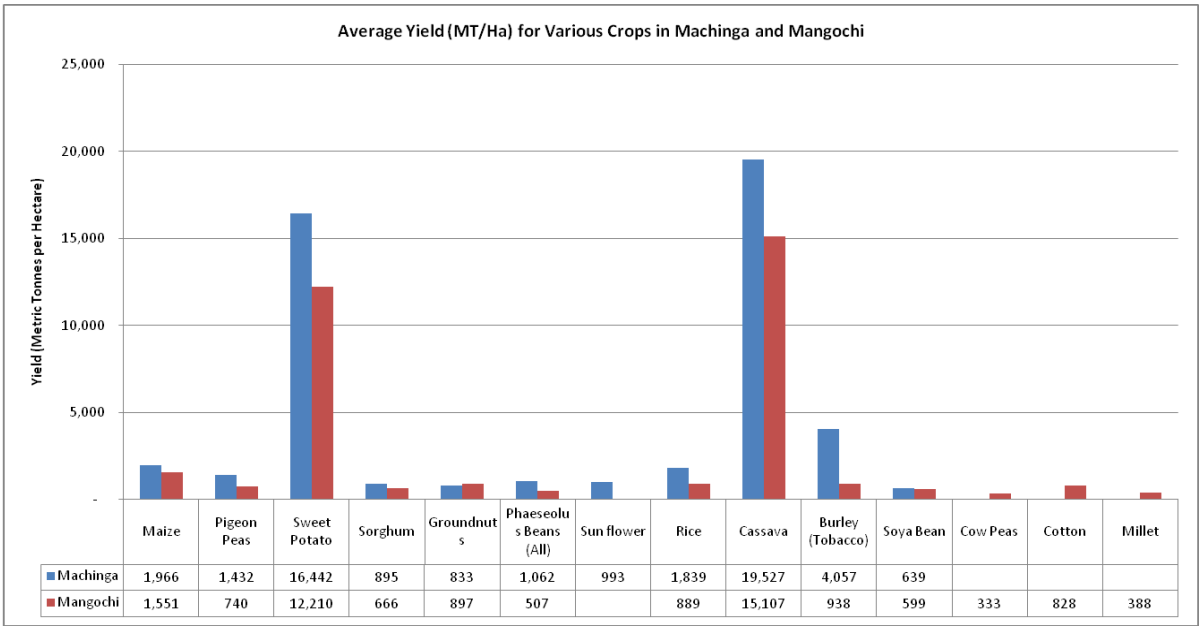


	Maize	Pigeon Peas	Sweet Potato	Sorghum	Groundnuts	Phaeseolus Beans (All)	Sun flower	Rice	Cassava	Burley (Tobacco)	Soya Bean	Cow Peas
Machinga	41,893	15,547	12,354	7,098	6,478	5,217	4,778	4,555	3,313	1,999	688	
Mangochi	99,653	9,706	9,421	3,809	2,955	1,085		3,630	7,368	4,529	1,465	3,056

Figure 6: Comparing hectares under cultivation in Machinga and Mangochi

45. Crop rotation through shifting agriculture is no longer possible, leading to declining soil fertility and crop yields (fig. 7). To survive people have adopted income generating strategies that include felling live trees to make charcoal for sale and encroachment onto riverbanks and even into seasonally dry stream beds to produce winter crops. Additional degradation is associated with continuous cropping without sufficient attention to soil and water conservation measures. Agricultural land that is without any protective tree cover or erosion control measures and subjected to more intense rainfall and higher temperatures is prone to further degradation and a reduction in soil fertility and moisture holding capacity. Soil loss was recently estimated to average 20 tons/ha/year; contributing to a reduction in crop yields of more than 4% per year (Yaron et al., 2011). Indeed, all 8 Extension Planning Areas (EPAs) in Machinga are currently experiencing high rates of soil erosion (Table 8).

Figure 7: Yields per hectare for key crops in Machinga and Mangochi



	Maize	Pigeon Peas	Sweet Potato	Sorghum	Groundnuts	Phaeseolus Beans (All)	Sun flower	Rice	Cassava	Burley (Tobacco)	Soya Bean	Cow Peas	Cotton	Millet
Machinga	1,966	1,432	16,442	895	833	1,062	993	1,839	19,527	4,057	639			
Mangochi	1,551	740	12,210	666	897	507		889	15,107	938	599	333	828	388

Table 8: Extent of Soil Erosion in Mangochi and Machinga

Erosion Status	EPAs Facing with State of Erosion

Very Severe	Mthiramanja Nyuswe – Makanaria catchment, Matanda -- Chamba catchment and Chisisa Mkhwepere
Severe	Ntiya, Katuli and Nasenga Nsanama and Mtubwi, Mbonechera Katundu—Zumulu catchment, Matandika—Chagwa catchment and Mangamba – Masanje catchment
Moderate	Chilipa, Masuku, Maiwa, Mbwazulu and Nankumba Khole—Malembanje catchment
Low	Mpilisi and Lungwena Nampeya (Mikachu catchment)

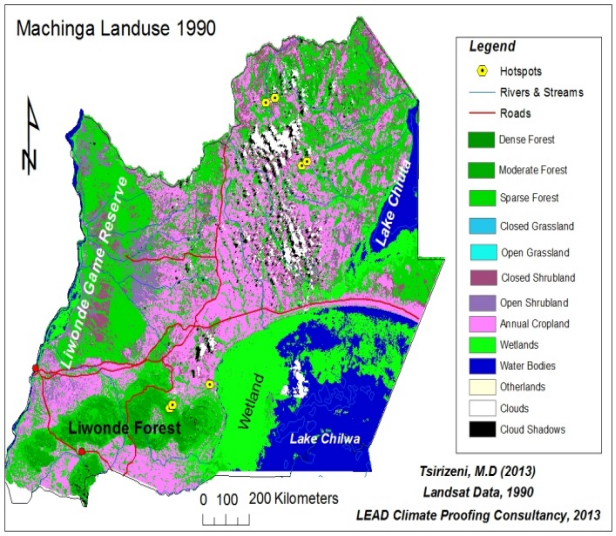
46. Much of this soil is deposited in the country's lakes and rivers, particularly Lake Chilwa and River Shire. Indeed, the combined effect of degradation of forest and agro-ecosystems has led to the **degradation of Aquatic Ecosystems**, which is another important system supporting livelihoods and economic development. The State of Environment Report (2010) reported that many river basins in the country are under severe pressures due to deforestation, unsustainable agriculture, settlements, mining, industry, commerce and climate change. These activities have influenced changes in water quality especially due to sediment loads, industrial wastes, chemicals from agricultural lands, and the proliferation of aquatic vegetation. Soil loads carried by rivers and streams downstream change the channel configuration reducing effectiveness of flow, increasing the risk of flooding. Siltation and water weeds blockages in the River Shire have increased the cost of producing electricity and purifying water for drinking. The State of Environment Report (SER) 2010 reported that the economic costs due to problems of power generation in 2007 alone was MK 1,433 million, representing a 0.3% of GDP and 1.9% discounted over 10 years (Yaron *et. al.*, 2010). Government spends approximately MK134 million annually on weed and silt management. Siltation of the Mudi Reservoir, which supplies water to Blantyre City, has reduced the dam capacity by 80% (Kadewere (2007). Currently Blantyre Water Board spends several million Kwachas in water treatment.

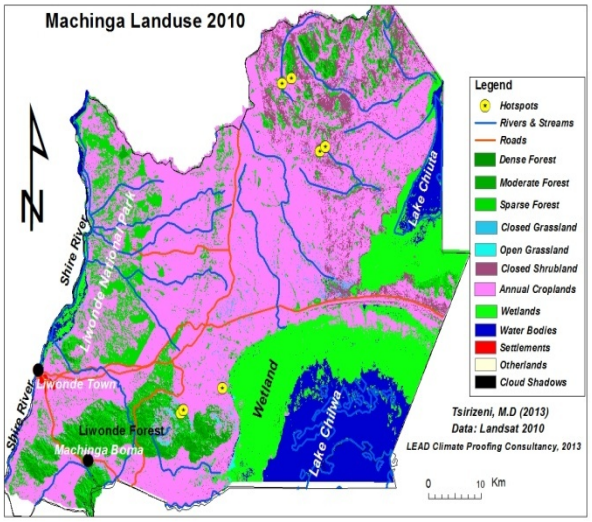
47. Although still very limited, the growth of the industrial sector in Malawi has not been matched by the development of waste disposal mechanisms. Effluent from small and large companies, as well as solid wastes from service centres such as restaurants, is often released into river systems. The effluent is unsightly, unhealthy, and decreases the availability of clean water. Disposal of solid wastes in urban markets has led to high levels of plastics and other waste that often block the few storm drains in urban areas, leading to unnecessary flooding of urban areas and roads. Plastics also end up in rivers and can be a great hazard to birds and other fauna. In addition, agricultural chemicals are increasingly being swept into the water bodies, such as inorganic fertilisers, herbicides and pesticides. These chemicals play a role in the proliferation of algae and weeds in many river channels.

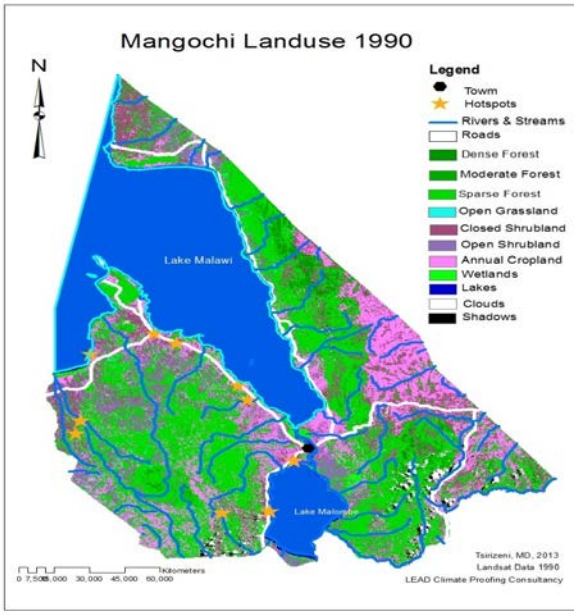
48. The high siltation and eutrophication of the water systems has contributed to the degradation of the fisheries. Fisheries resources in Malawi are already threatened by overfishing and a failure to observe laws and regulations designed to support sustainable use of fisheries. Consequently, fish catches in on the verge of decline with most Malawian water bodies experiencing over-fishing and increasingly impacted by wetland degradation (World Fish Center, 2007; Ambali and Kabwazi, 1999; Banda and Tomasson, 1996). While fish stocks are directly affected by changes in climate variables, the volume of fish catches is much more difficult to attribute to climate because of a multitude of confounding human factors.

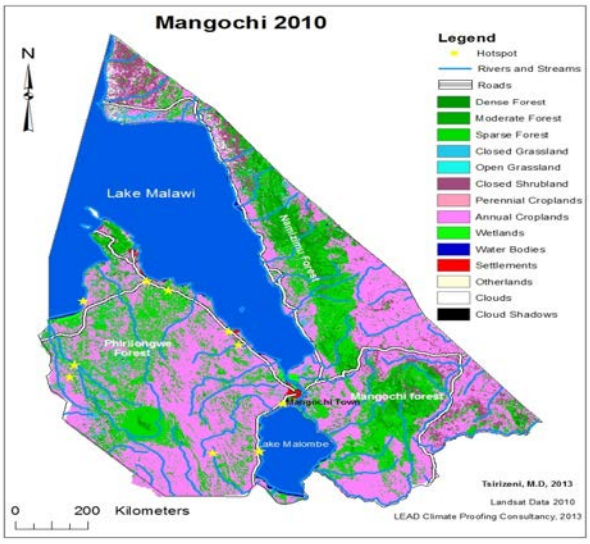
49.

Figure 8: showing changes in vegetation cover over 20 years in both Machinga and Mangochi









50. Loss of ecosystems services has affected livelihoods for rural households particularly those from the poorest segments who depend on natural resources. This includes lowering water quality, with the consequent exposure to water borne diseases. It has also increased the burdens of women and children, who spend more time searching for firewood and forest foods. A comprehensive economic study of the contribution of

renewable natural resources to the national economy (Yaron *et. al.*, 2010) estimated that Malawi is losing US$ 93 million (about 2.4% of the current GDP) due to unsustainable use of forest resources. According to the Economic Study (GoM, 2010), Malawi lost MK7,540 million in the agriculture sector in 2007 due soil losses. This was 1.6% of the GDP at the time and 6.3% discounted over 10 years. This magnitude of loss is reducing the effectiveness and the impacts of the agricultural inputs support program, which is one of the baseline programs that the proposed project will help to climate proof.

51. The sustainability of fisheries resources in the Shire River is also threatened by the proliferation of *Eichhornea crassipes* (water hyacinth), which is one of the world's most invasive aquatic plants that are known to cause significant ecological and socio-economic effects. Water hyacinth can alter water clarity and decrease phytoplankton production, dissolved oxygen, nitrogen, phosphorous, heavy metals and concentrations of other contaminants. In the Shire River, heavy infestation of this weed is feared to adversely affect the generation and provision of various services including fisheries, freshwater for domestic consumption, tourism, energy (power generation) as well as depressing the entire ecosystem.

52. The threats described above are compounded by a number of inherent characteristics of the Malawi rural population to further complicate vulnerability and weaken resilience. Key among them is high poverty levels and a high and rapidly growing population.

53. **Poverty levels:** Malawi is one of the poorest countries in the world, with 74% population living on less than US $ 1.25 per day[15]. The poor do not have enough income to invest on maintenance of their soils and natural resources, rather they extract as much as possible from the ecosystem to help them survive, which leads to degradation, further compounding the vulnerability problems and reducing the effectiveness and impacts of many development investments.

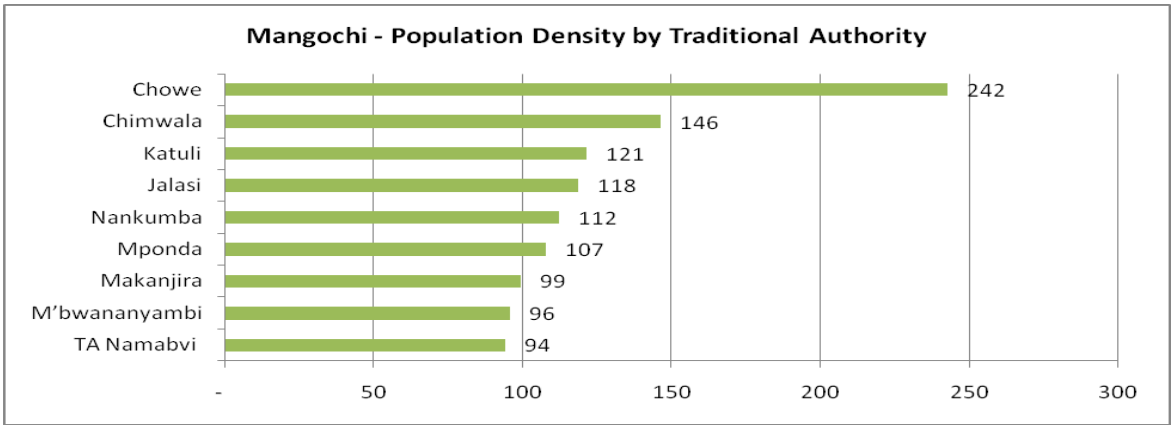
54. **Rapidly growing population:** Although the total fertility rate for Malawi has declined from 7.6 in 1984 to 5.7 in 2013, the total population itself is close to 15 million people with a density of 158 persons km^2 (2010 data - World Bank, 2013). This fertility rate is among the highest in the eastern and southern Africa region; the density makes Malawi one of the most densely populated countries in the world. Furthermore, the World Bank predicts that the population will be 20.7 million in 2020, 28.1 million in 2030, 37.7 million in 2040 and 49.5 million in 2050. Population profiles of the pilot districts reflect the national characteristics closely (table 10). Machinga has a total population of about 578,220 which represents 3.7 per cent of the national population (LEAD, 2013). Most of the people are in TA Kawinga, followed by Liwonde and Sitola whereas TA Chiwalo has the least population. The Total Fertility Rate (TFR) in Machinga is 6.9 compared to the national average of 5.7. The average population density for the district has jumped rapidly from 98 persons per Km^2 in 1998 to 130 persons per Km^2 in 2008. Mangochi has a total population of 803,602, which represents 6% of the National Population. The Total Fertility Rate (TFR) is also higher than the national average (7.0 versus 5.7). The average population density for the district is 127 persons per Km^2. The most densely populated Traditional Authority is Chowe with 242 persons per km^2 followed by Chimwala (146 persons per km^2) and Katuli (121 persons per km^2) whereas the sparsely populated TA is Namabvi (94 persons per km^2). The majority of the population in both districts is female, with 91 males for every 100 females.

Table 9: District population profile compared to national profile

District	Total population	Total fertility rate	Average Density	Ratio of males to females
Machinga	578,220	6.9	130	91 males to 100 females
Mangochi	803,602	7	127	91 males to 100 females
National	14.9[16]	5.7	158	

[15] 2005 statistics reported by United Nations (2010).

[16] This figure is quoted by World Bank Profile of Malawi (2013). Many other references report a population of 11-14 million.



1.2 Long-term solution and barriers to achieving the solution

55. Climate change increases existing development challenges and brings new ones. In Malawi, climate change impacts on ecosystems are increasing pressure on the natural resources that many people depend on for their wellbeing and livelihoods, further threatening development investments. There are three potential strategies to address the vulnerability and impacts of climate change in Malawi's rural landscapes: planned retreat, protection via engineering, ecosystems based adaptation.

56. **(Planned) Retreat** – The loss of resilience, reduction in food productivity, flooding and droughts are allowed to occur, and human impacts are minimized by opening up new areas for agriculture, combined with food aid, using more agricultural inputs, land use planning, early warning and evacuation systems, risk-based hazard insurance, etc.

57. **Protection** – The impacts of lower resilience and increased predictability/reliability of weather patterns, hazards from droughts and flooding are controlled by soft or hard engineering (e.g., use concrete to build rural houses and roads, etc), reducing human impacts in the zone that would be affected without protection. However, a residual risk always remains, and complete protection cannot be achieved. Managing residual risk is a key element of a protection strategy that has often been overlooked in the past.

58. **Ecosystem based adaptation:** Ecosystem services, for example those provided by the country's forests, aquatic and agro-ecosystems can be a cheap, readily available form of adaptation. Healthy ecosystems play an important role in enhancing food and human security and protecting infrastructure, acting as natural barriers and mitigating the impact of (and aiding recovery from) many extreme weather events, such as flooding, droughts, extreme temperatures, fires, landslides, hurricanes and cyclones. Food security is particularly dependent on people being able to benefit from the flow of ecosystem services, both directly and indirectly (Jamu et al., 2003; MA, 2005; Ricketts et al., 2008; Bharucha and Pretty, 2010).

59. Examples of options associated with each of these strategies are presented in Table 11. All the pilot sites have similar yet specific set of problems and circumstances that render one of the three adaptation strategies more or less suitable. Given the low levels of economic and technological sophistication in the two pilot districts however, the ideal situation would be to adopt an ecosystems based approach to adaptation that incorporates various options from the other two strategies wherever relevant. This would be implemented in a Community Based Adaptation (CBA) context, which is more effective in enabling climate vulnerable people to plan for and adapt to the impacts of climate change. Healthy ecosystems play a critical role in adaptation, supplying services to support livelihoods and reinforcing development investments, helping to built resilience of livelihoods, thereby reducing vulnerability to disasters, particular climate related risks. In this context, Ecosystem-based Adaptation can directly meet the needs of Community Based Adaptation and poverty reduction initiatives. Sustainable management of forests can store and sequester carbon by improving overall forest health, thereby enhancing mitigation. The management, restoration and protection of ecosystems contributes to sustainable water management leading to improved water quality, higher groundwater recharge and slower surface water run-off during storms. Collectively, the ecosystems approach and the CBA would therefore provide a community-driven approach to adaptation that complements top-down baseline programmes, building the resilience of vulnerable individuals, households, communities and societies from the ground up. This coincides with the vision expressed by the communities during PPG, where about 75%

thought that "nature-based" solutions would present the most sustainable option for simultaneously increasing resilience and productivity of their livelihood systems.

60. The proposed LDCF project will reduce the vulnerability of current economic development and livelihoods in the two districts, through two interrelated approaches: one, enhancing the capacity of the communities and their technical institutions to mainstream climate change risks into policies, plans and programs; and, two, adopting practical measures to protect existing infrastructure in rural areas (roads, water and electricity) through flood control and other soil and water conservation measures, which will ultimately reduce the risk of damage to the infrastructure emanating from climate risk. In doing so, the project will adopt an ecosystems based approach to adaptation, implemented via a community based approach. The project will therefore facilitate communities to formulate, and start the implementation of community based adaptation plans, informed by detailed vulnerability assessments and technical knowledge of the risks and opportunities presented by the existing ecosystems and their services. It will then to implement these detailed plans, including implementation of measures to secure catchment areas which are the sources of water; the construction of small dams and use of domestic water harvesting techniques to improve water management; enhance technical capacity in irrigated agriculture through staff and farmer training; adoption of climate smart agriculture to increase land productivity; and, expansion of livelihood support systems with climate smart measures (income generating activities, reducing post harvest losses of key products (fruits, vegetables, fish, grains).

Table 10: Three potential strategies for adaptation in Mangochi and Machinga Districts

Retreat	Protect	Ecosystem based
➢ Increase of establish retreat zones ➢ Relocate threatened buildings ➢ Phase out or ban development in areas susceptible to flooding ➢ Rolling easements, erosion control easements ➢ Upland buffers ➢ Emergency planning ➢ Insurance ➢ Modification of buildings to cope with floods (Strengthen and raise) ➢ Improved drainage ➢ Strict regulation in hazard zones ➢ Modification of land use planning	➢ Dikes, levees, floodwalls ➢ Seawalls, bulkheads ➢ Groynes ➢ Floodgates and tidal barriers ➢ Detatched breakwaters ➢ Wetland restoration ➢ Afforestation ➢ Wooden walls ➢ Stone walls	➢ Restoration/Sustainable management of forests, grasslands and rangelands; ➢ Protection of watersheds and riverbanks; ➢ Establishment of diverse agricultural ➢ Systems; ➢ Use of indigenous knowledge of specific crop and livestock varieties; ➢ Maintaining genetic diversity of crops and livestock; ➢ Conservation of diverse agricultural landscapes ➢

61. The Government, its development partners and the general public have increasingly become aware of the declining ability of the land to support livelihoods and economic development, particularly in the South of the country. Collectively they have adopted several measures to boost productivity of the land in the context of an agriculture-led economic development in the rural areas, including decentralization of governance systems and introduction of the agricultural input subsidy. These programs are briefly described below.

62. **Agricultural Input subsidy programme: US$126,000,000 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. The programme works through increasing use of fertilizers and improved seed in both maize and tobacco production in order to increase agricultural productivity and food security. Working through the Ministry of Agriculture Irrigation and Food Security (MoAFS), the programme distributes fertilizer and seed coupons via districts and Traditional Authorities (TAs). The program also supports adoption of post harvesting management practices, advanced through the District Agricultural Extension Service System (DAESS). Both the post harvest management practices and the DAESS are described below. Investment in the programme

has been rising steadily, rising from just over 60% of Ministry of Agriculture and Food Security budget in 2006/7 and 2007/8 to 74% in 2008/9[17]. 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 allocated US$126,000,000 for the farm subsidy programme, targeting 1.4 million people[18].

63. **Agriculture Sector Wide Approach (ASWAp): Agriculture Sector Wide Approach (ASWAp):** Is the main governance and resource support programme of the agriculture sector in Malawi, with the goal of achieving agricultural growth and poverty reduction goals of the Malawi Growth and Development Strategy (MGDS).The focus areas are: Food Security & Risk Management, Commercial Agriculture, Agro-processing & Market Development and Sustainable Agricultural Land & Water management. The two key support services are Technology Generation and Dissemination, and Institutional Strengthening and Capacity Building while the cross-cutting issues are HIV Prevention and AIDS Impact Mitigation and Gender Equity and Empowerment. The ASWAp is consistent with the NEPAD supported Comprehensive African Agricultural Development Programme (CAADP). The ASWAp is implemented by the Ministry of Agriculture and Food Security in collaboration with various stakeholders in the sector, led by the ASWAp Secretariat and through the existing ministerial departments and agencies at National, Regional and District level (e.g. research and extension departments). A multi donor trust fund was established in 2013 tasked with the responsibility of mobilizing resources. Administered by the World Bank, the Trust Fund has so far mobilized USD18million).

64. **Government Flood risk management strategy** – 2009-2019: USD 3,000,000: the government has in place a national 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 has received a boost from a World Bank study which is currently generating 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 location 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.

65. **Decentralization Policy (US$10,000,000) -** The government of Malawi has also invested heavily in decentralization, in a bid to empower regional governance for more effective local level development. This has been driven by the Decentralization Policy, which provides for the establishment of Local Governments as the basis and a framework for the devolution of functions, responsibilities, powers and resources to District Assemblies. The objectives of the decentralization programme and policy are: to create a democratic environment and institutions for governance and development at the local level. The decentralization is supposed to facilitate the participation of the grassroots in decision making and eliminate dual administration (field administration and local government) of the district level with the aim of making the Public Service more efficient, more economical and cost effective. This, in turn, should increase accountability and good governance at the local level and mobilize the masses for socio-economic development. Although elections are still to be held, the Local Government Act of 1998 made the Assemblies the operational units for preparing district development plans and implementing them. This model of devolution is expected to continue until there is a policy change on devolution, which is not likely in the foreseeable future.

66. **District Agricultural Extension Service Systems (US$ 10,000,000**) – 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 innovations in order to increase productivity and production and meet household or market requirements[19]. This is in recognition of the fact that smallholder farmers

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

[19] Department of Agricultural Extension Services (2008) Guidelines for Clusters and Ulimi wa M'ndandanda for various stakeholders –revised (unpublished).

produce both cash and food crops, and are important drivers of the agriculture sector in country. The current agricultural extension policy was transformed in 2000 to allow for a pluralistic, demand driven, decentralized extension services. The policy is implemented through the District Agricultural Extension Services System (DAESS), which is part of the Decentralized governance system. The policy ensures that agricultural extension services are more inclusive to allow other service providers such as farmer based organizations, the private sector and the civil society to take active roles in the delivery of extension services. This is to give the clientele a wider choice of services from diverse service providers.

67. In line with the decentralization policy which gives power to the grassroots people to create and actively implement a vision for local development, the District Extension Services uses the village as the entry point for planning and implementation of all interventions. In their role as coordinators for the delivery of the extension service by the service providers (NGOs, private sector, etc.), the District staff facilitates the assessment of farmer, organizes response by service providers, and facilitates fund raising/acquisition of funds for agricultural extension services from a diverse base of resources. This is done within the six principles spelt out in the guidelines of the DAESS harmonization framework: namely, i) a policy focus and policy environment; ii) identification of gaps and issues; iii) approaches and Strategies; iv) technology packaging; v) out-scaling technologies; vi) monitoring and evaluation. This approach is meant to: increase extension coverage with extension messages; improve coordination and collaboration amongst stakeholders; increase farmers' access to markets for farm inputs and produce; availed agro-dealers a readily available market since farmers are organized; and, make farmers' voice heard to service providers.

68. The extension service delivery itself uses a variety of innovative methods for facilitating farmer access to information, knowledge and technologies, including on-farm harmonized demonstrations, field days, radio, simple publications and mobile vans. Others such as farming clusters and Lead farmers are innovative strategies used in farmer mobilization to adopt innovative technologies for agricultural enterprises of their choices. Farmers are more empowered and organized to mobilize resources to undertake different agricultural enterprises. The DAESS also supports the post harvest management program, which is part of the National Input Subsidy Program. In this regard, it is developing and delivering awareness raising material on the use of post harvest technologies such as storage silos and chemical pest controls. This effort is supported by Bunda College which is currently undertaking post-harvest management research focusing on processing, but and not on storage.

69. **The National irrigation Expansion Strategy: 2010-2015: US$ 2,000,000:** 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.

70. **Transforming agriculture through conservation agriculture in Malawi** – USD 5 million: on-going since 2006, expected to continue until 2014: The government has since 2005 engaged in a program of conservation agriculture that has received technical and financial support from various development partners, notably CIMMYT, Total Land Care and IFAD. The program 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. The program has also developed, tested and actively

promoted the adoption of prototype agroforestry; particularly the systematic inter planting with Faidherbia albida, short term fallows with leguminous shrubs, homestead planting, woodlots, fodder banks and boundary planting (live fences). Other commonly adopted technologies sunder this program include minimum tillage, vetiver hedgerow planting, contour ridging, contour Stone lines, raising of foot paths and garden boundaries, gully reclamation, surface runoff harvesting, point-source water harvesting from common infrastructure, retention ditches/ infiltration trenches/ swales, check dams, storm drains; stream bank protection, etc.

1.2.1 Barriers to securing economic growth and resilient livelihoods in the face of a changing climate:

71. Despite the large baseline programmes, economic development and livelihoods of the communities in the 2 districts of Mangochi and Machinga (part of the Shire River Basin) are still threatened by uncertainties associated with climate change, particularly floods and droughts. This is because under the business as usual, the baseline programmes fail to integrate additional risks expected from the uncertainties associated with the changing climate, due to the barriers described in the section below.

Barriers 1: Limitations in institutional and individual capacities to plan for climate change

72. Despite the high population of Malawi, there is a severe shortage of skilled and professional staff within the environment sector, especially those with the knowledge and skills for addressing climate change, and even more so for mainstreaming ecosystems based adaptation to local resource uses and development. Both National and District agencies do not have the technical capacity to monitor and address climate change risks, assess vulnerability, or design and implement adaptation measures. As in any Least Developed Country (LDC), specialised training programmes are limited particularly in CC issues. Although the country has recently introduced several higher education degrees in environmental science, spanning from Meteorology, Climatology and Geography courses taught at the various public and private universities, these are still early days, and the reach limited to those within the education system.

73. Capacity deficiencies are particularly acute at the district and local levels. The PPG assessment revealed that about 56% of the technical posts were not filled in the two District structures. Consequently, the number of extension workers available to cover Extension Planning Area or the Traditional Authority Areas is very low, which makes it impossible to cover the entire area and make frequent contacts with local communities. This is compounded by lack of training opportunities. Most extension workers, especially those that have stayed in service for longer periods, do not have adequate knowledge about emerging developmental and environmental issues such climate change, resilience and vulnerabilities. There are no systematic programs for updating the skills of extension workers to keep them current with new national development issues and agendas. This is further exacerbated by the high illiteracy levels among farmers. Most smallholder farmers do not know how to read and write. According to the National Demographic and Health Survey report of 2010, 26.5% of all economically active people in Mangochi and 21% in Machinga have no education at all in contrast with 18.9%, nationally. The majority of those that have no education are females (35.3%) compared with males (17.8%) (National Statistical Office, 2011). This poses a greater challenge to disseminate useful information to rural masses using Information, Education and Communication (IEC) materials.

74. This capacity shortage means that although national development policies (such as National Climate Change Policy, 2012, Malawi's Growth and Development Strategy II and Vision 2020) fully recognize the role of climate change and adaptation in securing national development and livelihoods, actual implementation is still hindered by the fact that, across the board, agencies responsible for natural resources management and local economic development lack the climate risk assessment abilities needed to identify and integrate climate risks and appropriate adaptation response measures into natural resources management, in the context of agricultural led economic development. Consequently, decision makers in the Ministries of Planning and Development, and Finance are currently not yet adequately equipped with skills that can effectively negotiate and coordinate CCA investments through a common framework. The coordinating mechanism established in 2009, headed by the Ministry of Environment and Climate Management, is making good progress on National level coordination of Climate Change Interventions. It has however limited influence at the District level planning processes. Consequently, funding for adaptation by development partners still tend to follow specific agendas of the source funds, posing a risk of duplication of CC interventions resulting in a diminished impact on the target communities.

Inadequate on-the ground demonstration of ways to climate proof development investments

75. The Government of Malawi is aware that urgent action is needed to address the threats posed by climate change to the country's population and continued sustainable agriculture-led economic development. Malawi's Growth and Development Strategy II and Vision 2020 states that development should be achieved through better adaptation to, and mitigation against, climate change, with a focus on resilience building for Malawi's citizens. The National Climate Change Policy further states that it will create an environment for the development of a country-wide, coordinated and harmonized approach to climate change management, to guide actions that reduce community and ecosystem vulnerability through adaptation and mitigation. It also aims to guide Malawi to benefit from the global financial, technical and technological opportunities arising from the desire of the international community towards low carbon development.

76. However, there are no proven techniques, tools and methods (or examples) of how the communities can practically climate proof baseline programs, thereby protecting the development gains from further climate risk. This is primarily because the district councils have very limited finance, which compounds the capacity deficit. Like other Least Developed Countries (LDCs), Malawi has high adaptation costs relative to GDP. Adaptation costs are especially high, because of the geography of the country and its dependence on small scale rainfed agriculture, with >40% smallholders in the country with an average landholding of less than 0.28 ha per household. This limits the interest of households to invest in land development, farm mechanization and climate smart agriculture. Currently, the country is facing a range of economic problems including the impacts of the global recession and country's dependence on imports of food, oil and manufactured products. Therefore, budgetary resources for the country's development plan for the next five years are already severely constrained and there are limited resources to meet the additional costs of adaptation.

77. The GoM has shown impressive, albeit declining GDP growth over the past decade ranging from 6.3% (2010) to 4.3% (2011) to 2.0 (2012), expected to rebound to 5.5% (2013) and above 6% in 2014 (IMF 2013[20]). However, even so, poverty remains widespread; declining by less than 2% since 2004/05, highlighting the weak linkages between macroeconomic performance and the bulk of the population in Malawi[21]. Approximately 50% still live below poverty line and most households are unable to meet their food requirements. The country was ranked 170 out of 186 countries in the 2012 UNDP Human Development Report. The Human Development Index was 0.4, below the Sub-Sahara Africa average of 0.463. This wide-spread rural poverty limits the adaptive capacity and capability of individuals, farmers and villagers to respond to natural disasters, flooding, and droughts. Poor farmers/fishermen have limited opportunities to improve yields, increase income, and/or to develop alternative, appropriate farming systems with greater in-built resilience to climate hazards. The challenge ahead still remains to make growth more inclusive and resilient to shocks.

78. Indeed, financial resources available to the public extension service in both Mangochi and Machinga have been decreasing since 1990. During the same period the number of staff has also been decreasing. The Agriculture Sector Wide Approach paper prepared by the Government clearly calls for the districts to prepare annual work plans and access funds, but the districts lack capacity to prepare plans to address the climate change issues holistically. Consequently, very limited resources are allocated to climate change issues. Review of budget allocations for Machinga and Mangochi districts during PPG revealed that the major district budget is allocated for health and education, and less than 2% allocated for agriculture, irrigation, livestock, etc.. The erosion of technical expertise coupled with the worsening financial situation makes the public service largely ineffective and unsustainable. In addition to several positions of the agricultural extension staff being vacant, the dearth of operational funds reduces the ability of the current staff to conduct field visits. As a result, the morale of staff to perform at various levels has markedly decreased especially because of the inadequate funds for day-to-day operations.

[20] http://www.afdb.org/en/countries/southern-africa/malawi/malawi-economic-outlook/

[21] African Economic Outlook, 2011 - http://www.africaneconomicoutlook.org/en/countries/southern-africa/Malawi/).

2 PROJECT STRATEGY

79. The Government of Malawi (GoM) requests the Least Developed Countries Fund (LDCF) to support a Full-Sized Project (FSP) to implement components of NAPA priorities 1, 2 and 3 (1: Improving Community's Resilience to climate Change through the Development of Sustainable Rural Livelihoods: 2 - Restoring forests in the Upper, Middle and Lower Shire Valleys catchments to reduce siltation and the associated water flow problems; and, priority 3: Improving Agricultural Production Under Erratic and Changing Climatic Conditions).

80. The objective of the project is to develop the capacity of communities in Machinga and Mangochi pilot districts to use ecological, physical and policy measures to reduce vulnerability to climate change driven droughts, floods and post harvest losses for rural and urban communities. The proposed project will create the conditions necessary for transforming the baseline programmes described in section 1.2 to make them systematically integrate measures to address additional risks associated with climate change, in order to secure gains on local development and food security from uncertainties related to the changing climate. This will be achieved by empowering communities in the six hotspots with knowledge, capacities, tools, and methodologies necessary for them to adopt an ecosystems based approach to reducing climate risks, implemented in a community based adaptation perspective to complement the top-down baseline programmes. This will enable them to build resilience of vulnerable individuals, households and communities from the ground up. The project will therefore support the communities to select and implement a cost effective and integrated package of ecological and physical measures, implemented at a landscape level, to improve watershed services and water management (and mitigate the effects of drought and floods), reduce soil erosion and increase soil fertility, climate proof post harvest management technologies, and reduce vulnerability of urban infrastructure (housing, roads) to floods. These will be supported by policies and capacities (skills, information and institutions) for mainstreaming climate change considerations into district council-led local development processes, programmes and plans. The proposed project will pilot this approach in six hotspots of Machinga and Mangochi districts (described in annex 1). A strengthened District Extension Service System will be used to support the implementation of the project initiatives and scale it up to other districts; lessons generated will be upscaled through the information management systems of the national climate change programme, and used to influence the national agricultural input subsidy programme and decentralized governance.

2.1 Country ownership: country eligibility and country drivenness

2.1.1 Eligibility per climate change conventions

81. The Project is designed to be distinctly action-oriented and country-driven. It sets clear priorities for urgent and immediate adaptation activities as identified by the Government of Malawi, through the Ministry of Environment and Climate Management. Malawi signed the UNFCCC in June 1992 and ratified it in April 1994. Its Initial National Communication was submitted in 2002, and the Second National Communication was launched in late 2012. The country has prepared a National Adaptation Programme of Action (NAPA) and is among forty-nine countries designated as Least Developed by the UN. It is therefore eligible to receive funding for NAPA implementation under LDCF. The proposed project responds to NAPA priorities 1, 2 and 3.

82. The Project Concept (PIF) for the proposed project was approved by the Director of Environmental Affairs Department in the Ministry of Natural Resources, Energy & Environment (now Environment and Climate Change Management) on behalf of Malawi Government on December 9, 2011. In addition, the Draft Proposal was endorsed by the National Climate Change Technical Committee at a meeting Chaired by the Department of Climate Change and Meteorological Services of the Ministry of Environment and Climate Change Management in October 2013.

83. Malawi's government has undertaken a pro-active role on climate change, by developing and implementing the National Climate Change Programme (NCCP) from 2010, assisted by an array of donors (UNDP, Japan, FICA, DfID, Norway, Swiss Development Cooperation) and Technical Assistance providers (UNDP, World Bank, WFP, FAO). The Planning Phase from 2010 - 2013 was coordinated by the Ministry of Economic Planning and Development, which undertook several diagnostic assessments and laid the foundation for a

climate change response framework. The response Framework is supporting the development of a policy, investment plan, training plan, and a communications plan. It is also setting up national governance and oversight structures (National CC Steering Committee, Climate Change Working Group (composed of government and its development partners), a Climate Change Technical Committee (CCTC). The government has just started the implementation phase of the National Climate Change Programme (NCCP), which is coordinated through the Ministry of Environment and Climate Change Management. This proposed GEF project is an integral part of the National Climate Change Programme (NCCP).

2.1.2 Eligibility per UNDP funding and alignment to UN Country Programs

84. The country is eligible to receive UNDP development assistant, which is delivered within the context of the One UN, as outlined in the 2007 strategy entitled the "Role of the UN Malawi in a changing AID environment"22. The proposed project is in line with the Malawi United Nations Development Assistance Framework (UNDAF) 2012-2016. UNDAF is guided by the UN comparative advantage and informed by the UN Country Assessment and the goals and targets of the MGDS II. The UNDAF's goal is to promote equitable and sustainable growth in Malawi that contributes to faster and more effective poverty reduction and sustainable use of natural resources in a changing climate. It has four priority areas of cooperation deemed to be particularly critical for United Nations support to the people and the Government of Malawi. They are: (i) sustainable and equitable economic growth and food security; (ii) basic social and protection services; (iii) HIV and AIDS; and (iv), governance.

85. Within this context, UNDP specifically supports national development efforts addressing Pro-Poor Policy, Inclusive Economic Growth, Monitoring and Evaluation, Private Sector Development (Trade and Investment), Information Communication and Technology for Development (ICTD), Energy and Environment, and Disaster Preventions and Recovery and Democratic Governance. The focus of UNDP's programs in the country is on capacity development and policy support. This includes leadership development aimed at improving the capacity of the public service to deliver quality services, enhancing strategic thinking, policy-making, risk analysis and management of capacity weakened by the AIDS epidemic and exacerbated by poverty, recurring disasters and food insecurity. UNDP works with government to strengthen national and sub-national coordinating, implementing and monitoring institutions including integrating HIV and AIDS into development policies and strategies, building the capacity of the District Assemblies to coordinate local response and strengthening multi-sector partnerships among stakeholders. All UNDP programs in the country are defined by the national development priorities as drawn in the MGDS, and focused on supporting Malawi achieve the Millennium Development Goals.

2.1.3 Policy, institutional and legal framework for climate change in Malawi

86. **Alignment with national government priorities:** The Government of Malawi (GoM), through its Agriculture Sector Wide Approach (ASWAp; GoM, September 2010), prioritizes investments in three strategic areas: food security and risk management; commercial agriculture, agro-processing, and market development; and sustainable agricultural land and water management. The ASWAp recognizes the potential adverse impacts of climate change on agricultural production and addresses this in collaboration with other ministries. The ASWAp also includes a number of actions to mitigate and adapt to climate change. Concurrently with the ASWAp, the GoM is addressing climate change at the national level through numerous strategies and action plans. For example, Malawi's 2006 National Adaptation Programmes of Action (NAPA; GoM, March 2006) created the momentum to establish the National Climate Change Steering Committee and its Technical Working Group. The GoM has also refocused its efforts to develop its climate change programs further by restructuring and strengthening its institutions and committing to the preparation of a national climate change policy. The Ministry of Environment and Climate Change Management was created in April 2012; several of its units, including the Department of Climate Change and Meteorological Services (DCCMS), have new mandates and more relevant and empowered terms of reference. The Environmental Affairs Department retains its responsibility for implementation of the NAPA and remains the critical hub for climate change coordination. Several donors support elements of the NAPA and have committed resources to strengthening the capacity of critical government entities to conduct analyses, prepare action plans, and

[22] http://www.undg.org/archive_docs/9277-Role_of_the_UN_Malawi_in_a_changing_aid_environment.pdf

implement programs aimed at improving the resilience of local governments and communities. Most of these efforts are now coordinated through the National Climate Change Programme (NCCP) and the National Climate Change Technical and Steering Committees. Because the proposed project is part of the National Climate Change Programme (NCCP), the planning of it has been done in line with, and to meet the national CC priorities.

87. Table 12 provide a summary of key national institutions relevant to the management of natural resources and its interactions with climate change. At the district level, the overall management and governance of the environment and natural resources in the district is under the jurisdiction of the district council as provided for in the Local Government Act of 1998 (Amended 2009). Technically, the Department of Environmental Affairs (EAD) in the Ministry of Environment and Climate Change Management is charged with the co-ordination of environmental activities in order to promote the sustainable utilization of the environment and natural resources. The Department has district offices in all district councils that oversee implementation of environment and natural resources management programs and projects at district and sub-district levels. These offices are manned by Environmental District Officers who are supported by the District Environment Sub-committee (DESC), which is a sub-committee of District Executive Committee (DEC) that coordinates all environmental activities in the district.

88. At the Area level, the responsibility to manage and govern the environment and natural resources is entrusted in Area Development Committees (ADC) headed by the Traditional Authorities. Specifically, the ADC has the following tasks:

- Responsibility for state of the environment and outlook reporting and environmental action planning processes at area level;
- Identification and prioritization of environmental issues that need immediate mitigation actions;
- Development of area environmental action plans and micro-projects;
- Facilitate formation of Village Development Committee (VDC) environmental working groups;
- Collate and approve VDC environmental action plans;
- Mobilize community resources and solicit funds for environmental management purposes;
- Monitor state of the environment and implementation of environmental action plans.

89. At the village level, this responsibility is delegated to Village Development Committees with the leadership of Group Village headpersons. The VDC has the following environmental management tasks:

- Organize environment and natural resources management meetings in the villages;
- Lead the environmental action processes at village level;
- Co-ordinate Community-Based Natural Resources Management activities (CBNRM) with the ADC and communicate feedback from ADC;
- Formulate micro-projects addressing environmental issues and solicit funding for such activities through the District Development Plan (DDP);
- Facilitate the mobilization of community resources for CBNRM self help projects; and
- Supervise and monitor state of the environment and implementation of NRM micro-projects at VDC level

90. Project formulation has been closely guided by the provisions of the various policies, legal frameworks and institutional mandates described in the table below. The implementation will advance local implementation of various policy provisions as described briefly below.

Table 11: Key Institutions involved in climate change management that the project will interact with

Institution/Department	Roles and responsibilities
Ministry of Development Planning and Cooperation (MDPC)	Takes the leading role in the implementation of the National Climate Change program and in mainstreaming attention to climate change in sectoral programs and government policies. The MDCP chairs the National Climate Change Steering Committee.
National Climate Change Steering Committee.	The Climate Change Steering Committee is composed of key stakeholders in the field of Climate Change. The objective of this committee is to provide a forum for effective policy dialogue on frameworks, priority setting, and ways and means of facilitating investment and transfer of technology on climate change initiatives in the country. It will also enhance

	collaborative project development and implementation, with a view to optimize the contribution of climate change abatement and mitigation programmes to sustainable development, taking into account environmental, social, and economic factors.
Technical Committee on Climate Change	The Technical Committee provides update and information related to national climate change programme and reports to the Steering Committee. They work closely with the Government-Donor Technical Working Group and membership includes stakeholders from all sectors.
Ministry of Environment and Climate Change Management (MoECCM); Has two key departments: Environmental Affairs Department (EAD) and Department of Climate Change and Meteorological Services (DCCMS)	A new Ministry recently established by transforming the former Ministry of Natural Resources, Energy and the Environment (MoNREE). The EAD is responsible for preparing and implementing environmental policies and relevant legislations. It prepared the NAPAs and the Communications Strategies. It is also responsible for enforcing the regulations and providing guidance on environmental issues, including climate change. The DCCMs is charged with the leading role in providing data on climate change. The new Department chairs the National Climate Change Technical Committee, which is the secretariat of the National Climate Change Steering Committee - a new national coordination body that aims to assist the government to coordinate international aid assistance related to climate change. The EAD, in collaboration with the DCCMS, is responsible for coordinating climate change issues in the country. Major policy thrusts include the coordination and proper management of the environment and the natural resource base in collaboration with line ministries and departments, the private sector, NGOs, select communities, and other relevant stakeholders at district, national, regional, and international levels.
The Department of Forestry	Has primary authority and responsibility for the management of forest resources and is focused on the control of illegal production of charcoal, the protection of forest reserves, and promotion of reforestation. There are currently very few champions in government to prioritize interventions that build resiliency of rural populations.
Multiple departments	Other multiple departments in the government are involved with various aspects of agricultural development, including land resources, crop production, research, and extension.
District Councils	Each of the 28 districts has a position for a District Environmental Officer (DEO), many of them vacant. The DEOs are responsible for coordinating and overseeing environmental issues and the preparation of the district state of environment reports (SOERs).

2.1.4 Stakeholder baseline analysis

91. The preparation of this NAPA follow-up project was guided by a comprehensive and extensive participatory process involving all stakeholders, including local communities, a multidisciplinary approach (professionals from different sectors participated); and a complementary approach, building upon existing plans and programmes, including national action plans and national sectoral policies. Annex 1 outlines the process of stakeholder consultation. The draft proposal was presented to a wide range of stakeholders at national, district and village levels. At national level, the draft project document was presented to the National Climate Change Technical Committee at a meeting convened by the Department of Environment Affairs in Lilongwe, which reviewed the proposal and provided policy and technical directions. Specifically, the committee provided technical input into the organizational structure of the Program and identified key issues such as conservation agriculture, strengthening of the private sector and adoption of the lead farmer concept for incorporation in the proposal. These inputs were used to further develop the project design and tailor it to the needs and aspiration of government and the people of Malawi.

92. Field level missions were carried out from May to August 2013, visiting the target districts and hotspots to establish the baseline of Communities' vulnerability towards climate change and to assess community priorities for adaptation. A reconnaissance study was conducted in the two impact districts in May, 2013 during which meetings were held with members of the District Environmental Sub Committee (DESC) that provided insight on the state of the environment and climate related disasters in the district, existing vulnerabilities, and development efforts. The DESCs identified areas that are prone to climate related disasters such as floods and droughts and highlighted the associated impacts (minutes attached as part of annex 4).

93. Hotspots identification process was carried out in August 2013 and involved consultations with different groups of stakeholders especially District Executive Committee (DEC) members from the two districts who were oriented in Ecosystems-based capacity and vulnerability assessment, thus enabling them to actively and effectively participate in data collection and analysis with the objective of identifying priority issues and

possible project areas and activities. Through this process, the DEC members engaged local communities, some of which are among the proposed beneficiaries, in the identification of key issues experienced at the village level, root causes of the challenges and driving forces, current and possible interventions from the proposed LCDF intervention. The hotspots identification report presented separately is a product of this process, and is available as annex[23].

94. The Government of Malawi provided continuous technical during the project design. This was done through the Ministry of Environment & Climate Change Management, in collaboration with the departments of Environment, Climate Change and Distaste Risk Management. The inception and subsequent meetings with these institutions provided feedback and direction on key issues requiring attention including elaboration of climate related development priorities for the country as stipulated in the UNDAF and as provided for in the National Climate Change Programme (NCCP).

2.2 Project rationale and policy conformity

2.2.1 Linkages with NAPA

95. The proposed project will address components of the NAPA priorities 1, 2 and 3. It also addresses objective 1 of the National Climate Change Policy (2012) – that of Effectively managing the impacts of climate change through interventions that build and sustain the social and ecological resilience of Malawians; directly contributing to all seven outcomes of the National Policy.

2.2.2 Alignment with LDCF objectives

96. The proposed project targets climate change adaptation measures that are complementary and additional to those funded by the GEF and other bilateral and multilateral donors in Malawi. This is in line with work programme under the LDC Fund, established under decisions 5/CP.7 and 7/CP.7 of the Seventh Conference of the Parties, United Nations Framework Convention on Climate Change. The project contributes directly to CCA1 - Reducing Vulnerability (Reduce vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global level) where it will contribute to Outcome 1.1 and 1.2. It also contributes to CCA2 - Increasing Adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level, where it contributes to outputs 2.1, 2.2 and 2.3. It also contributes to Objective CCA -3 (Adaptation Technology Transfer: Promote transfer and adoption of adaptation technology), outcome 3.1: (Successful demonstration, deployment, and transfer of relevant adaptation technology in targeted areas), where it contributes to Output 3.1.1: (Relevant adaptation technology transferred to targeted groups).

97. The project development was in line with LDCF project eligibility criteria, such as participatory approaches, supporting a "learning-by-doing" approach, multi-disciplinary, and gender equality. The project will serve as a catalyst to leverage additional resources, and efforts have been made to maximize co-financing from other sources (GEF/C.24/12, paragraph 25). The selected sectors (agriculture, water resources management; infrastructure development) are in line with priorities outlined in paragraph 44 of the GEF/C.24/12 document.

2.2.3 Alignment with GEF RBM

98. The increased capacity among community and the technical staff to adopt ecological measures within the context of an ecosystem based adaptation and mainstream climate risks into all local development process will increase resilience of the rural agriculture-led development in Malawi, thereby directly contributing to the goal of the GEF Result-Based Management Framework for Adaptation to Climate Change: that of supporting developing countries to become climate resilient by integrating adaptation measures in development policies, plans, programs, projects and actions. The project will therefore reduce vulnerability of the livelihoods and the economies of the two pilot districts to the adverse impacts of climate change, including variability, contributing to the RBM Framework indicators 1.2.3 (Economic losses through management (establishment, maintenance, etc.) of climate resilient natural assets ($US); **Indicator 1.2.4** Food security through climate resilient agriculture (% of under-nourishment); **Indicator 1.2.5** Clean drinking water availability (% of population); **Indicator 1.2.6** Water availability for agriculture (% of population). It

[23] This is a detailed report including the methodology, results and proposed interventions with maps and photographs of the impact area.

will also increase the number of institutions with increased adaptive capacity to reduce risks of and response to climate variability (**Indicator 2.2.1).** Finally, it will disseminate information on relevant threats to stakeholders (indicator 2.11) and develop (and track) a localized vulnerability and risk perception index, disaggregated by gender (**Indicator 2.1.2).**

2.3 Design principles and strategic considerations

2.3.1 Links with National Policy Processes

99. The project will be aligned closely with the baseline programs described in section 1.2, namely: Agricultural Input subsidy programme; Government Flood risk management strategy; Decentralization Policy; District Agricultural Extension Service Systems; The National irrigation Expansion Strategy; Transforming agriculture through conservation agriculture in Malawi. In addition, the project will coordinate closely with key policies influencing climate change and natural resources management in the country, outlined in table 13 below.

100. As outlined in the risks section, the success of this project is predicated upon shifting the mindset of district administrations, local authorities and land and resource users to accept and act on two issues: i) that the integration of climate change adaptation in development plans, programmes and land use practices makes economic sense and reduces the risks of climate-induced losses and damages over the long term; ii) that a combination of ecological, physical and policy measures provide a more cost effective means of adaptation, and thus of improving the effectiveness of the baseline programmes. It is therefore criticl that the project receive the highest political support and buy-in of the project initiatives. This will be achieved by linking the project closely with the high level management of the Ministries of Finance and Developmentb Planning and Environment and Climate Change Management. The highest policy guidance body for the project will be the National Climate Change Technical Committee as the highest policy body, which is composed of key stakeholders in the field of Climate Change. Chaired by the highly influential Ministry of Development Planning and Cooperation (MDPC), this committee's objective is to provide a forum for effective policy dialogue on frameworks, priority setting, and ways and means of facilitating investment and transfer of technology on climate change initiatives in the country. It also aims to enhance collaborative project development and implementation, with a view to optimizing the contribution of climate change abatement and mitigation programmes to sustainable development, taking into account environmental, social, and economic factors. Day to day operations of the Climate Change Steering Committee is run by the Technical Committee on Climate Change, hosted by the new Ministry of Environment and Climate Change Management. The Technical Committee provides update and information related to national climate change programme and reports to the Steering Committee. This Committee works closely with the Government-Donor Technical Working Group and membership includes stakeholders from all sectors. These linkages will allow the project to inform, while being informed by national developments, particularly the implementation of the recently finalized National Climate Chnage Policy.

Table 12: Key Policies relevant to climate change that the project will interact with

Policy	Details /Focus
Malawi National Climate Change (2012), prepared by the Environmental Affairs Department, Ministry of Climate Environment and Climate Change Management	The overall goal of the Policy is to promote climate change adaptation and mitigation for sustainable livelihoods through measures that increase levels of knowledge and understanding and improve human well-being and social equity, while pursuing economic development that significantly reduces environmental risks and ecological scarcities. The policy has seven key outcomes, namely: Reduced vulnerability to climate change impacts in Malawi; Control net greenhouse gas emissions from Malawi; Increased awareness of climate change impacts, adaptation and mitigation measures; Improved social and ecological resilience; Improved policy coordination and harmonization for climate change; Increased funding in the national budget for climate change adaptation and mitigation; Improved integration of cross cutting issues across policies, strategies and activities
Malawi Growth and Development Strategy (MGDS II 2012–2016).	The Malawi Growth and Development Strategy II (MGDS II) is the overarching medium term strategy for Malawi designed to attain Malawi's long term development aspirations. The strategy covers a period of five years from 2011 to 2016. It follows the successful implementation of the country's medium term strategy, the Malawi Growth and Development Strategy (MGDS) between 2006 and 2011. The objective of MGDS II is to continue reducing poverty through sustainable economic growth and infrastructure development.

	The MGDS II identifies six broad thematic areas, namely; Sustainable Economic Growth; Social Development; Social Support and Disaster Risk Management; Infrastructure Development; Governance; and Gender and Capacity Development.
Food Security Policy 2006	The long-term goal of this policy is to significantly improve food security of the population. The goal implies increasing agricultural productivity as well as diversity and sustainable agricultural growth and development. The specific objective of Food Security, is to guarantee that all men, women, boys and girls, especially under-fives in Malawi have, at all times, physical and economic access to sufficient nutritious food required to lead a healthy and active life.
Agriculture Sector Gender, HIV and AIDS Strategy 2012-2017	The purpose of the strategy is to promote gender equality, prevent the spread of HIV and mitigate the impacts of AIDS in order to increase agricultural productivity in line with ASWAp priorities. The strategy has three strategic pillars namely (i) Quality participation of women and other vulnerable gender categories in ASWAp focus areas and key support services (ii) Gender, HIV and AIDS responsive technology generation and dissemination and (iii) Effective coordination, Capacity Building and resource mobilization.
Malawi Land Policy 2002	The goal of the National Land Policy in Malawi is to ensure tenure security and equitable access to land, to facilitate the attainment of social harmony and broad based social and economic development through optimum and ecologically balanced use of land and land based resources.
Malawi Irrigation Policy and Development Strategy, 2000	The Government of Malawi has produced this National Irrigation Policy and Development Strategy, to provide a clear statement of the Government's aspirations for the irrigation sector and to highlight the strategy for attaining irrigation development objectives. The broad policy objectives of the irrigation sector are: 1. Contribute to poverty alleviation by targeting resource poor small holder farmers for irrigation development to enhance farm income and by supplementing the recommended strategies for rain fed agriculture outlined in Malawi's "The Agricultural and Livestock Development Strategy and Action Plan". 2. Increase agriculture production and enhance food security through irrigation, which will ensure some production during droughts, and the dry season, and this will supplement rain fed agriculture. 3. Extend cropping opportunities and provide a wider variety of crops in both wet and dry seasons to improve nutritional status, especially of children and women. 4. Create an enabling environment for irrigated agriculture; by facilitating and encouraging the private sector to invest in irrigation development, and encourage rural communities to manage irrigation projects in order to fully utilize irrigable land in Malawi. 5. Optimize government investment in irrigation development by applying principles of cost sharing and cost recovery. 6 Enhance human capacity for irrigated agriculture in the public, parastatal and private sector in order to facilitate effective research in irrigation technology and marketing of irrigated produce. 7. Create the spirit of business culture in the small scale irrigated agriculture sector, to promote and provide competitive financing of irrigation projects and improve the marketing system at national and international levels.
Water (Malawi National Water Policy), 2005	The National Water Policy comprehensively covers areas of water resource management and development, water quality and pollution control, water utilization, disaster management and institutional roles and linkages. The Water Policy will guide the country in the management and development of its water resources using the IWRM principles, improving the institutional and legal framework, ensuring sustainable delivery of water supply and sanitation services, effective involvement of the private sector, protection of the environment and conformity with the regional and international conventions and agreements in the management of shared water resources
Energy (Malawi Energy Policy), 2003	The National Energy Policy is the main policy that guides provision of energy services in the country. Its objectives are: “(i) make the energy sector robust and efficient, to support Government of Malawi’s agenda of poverty reduction, sustainable economic development and enhanced labor productivity; (ii) catalyze the establishment of a more liberalized, private sector-driven energy supply industry; and (iii) Transform the country’s energy economy from one that is overly dependent on biomass to one with a high modern energy component.”(Malawi BEST,2009) The policy was directed towards the country moving away from biomass and into electricity, liquid fuels and renewable. This would stimulate economic growth and as a result reduce

	poverty in the country. The policy also set target for future as shown in, to reduce biomass reliance from 93% in 2000 to 50% in 2020.
Forestry (National Forestry Policy of Malawi), 1996	The goal of the National Forest Policy is to sustain the contribution of the national forest resources to the quality of life in the country by conserving the resources for the benefit of the nation.
Wildlife Policy 2000	The goal of the national wildlife policy is to ensure proper conservation and management of the wildlife resources in order to provide for sustainable utilization and equitable access to the resources and fair sharing of the benefits from the resources for both present and future generations of Malawians.
Strategic Plan to Improve Livestock 2003-2008	The main goals of this strategy is to promote livestock productivity, improve livestock based incomes and promote sustainable use of natural resources in partnership with other stakeholders while protecting the general public against zoonotic diseases. This will be done through improved livestock productivity, a functional and well organized marketing system, improved livestock security, broadened livestock ownership and strengthened veterinary public health for food safety
National Fisheries and Aquaculture Policy 2001	The fisheries sectoral policy, aims at maximizing the sustainable yield from the national waters of Malawi and man-made water bodies. Secondary objectives are to improve the efficiency of exploitation, processing and marketing of quality fish products, promote investment in the fishing industry, rural fish farming units and exploit all opportunities to expand existing and develop new aquatic resources. Particular care will be taken to protect endemic fish fauna, not only because these are scientific and educational assets, but also because they represent a major economic resource.
National Environmental Policy 2004	The overall policy goal is the promotion of sustainable social and economic development through the sound management of the environment and natural resources.
National Aquaculture Strategy 2006-2015	To provide framework condition and excellent services for maximization of socio-economic benefit through sustainable utilization and management of capture fisheries and increased aquaculture production.
Food and Nutrition Security Policy 2005	The long-term goal of this policy is to significantly improve the food and nutrition security of the population. The goal implies a rapid and substantial reduction in the degree and severity of malnutrition, in all its forms, i.e., chronic and acute malnutrition and micronutrient deficiencies among the men, and women, boys and girls, especially under-fives, expectant and lactating mothers of the population.

2.3.2 Linkages with other relevant SOF (e.g. GEF- and donor- funded) projects

101. The implementation process of the proposed project will ensure that the LDCF investments builds on all other related investments in the project area (and national level) described in section 1.2, ensuring that it does not duplicate efforts or waste resources. It will be coordinated with the national level initiatives undertaken by other development partners, including the 3 GEF financed projects in the Shire Basin; these are the UNDP SLM project, the Africa Development Bank LDCF project on Climate Adaptation for rural Livelihoods and Agriculture, the World Bank led project on natural resources management and climate change. Although all the three projects share similar objectives on adaptation, none of them overlap geographically. PPG assessments confirmed that there is no project in Mangochi and Machinga districts which makes a targeted effort at integrating climate change adaptation and climate risk management principles into the two important baseline programmes (input subsidy and decentralized development).

102. The project will in particular be linked to the GEF and World Bank financed Shire River Basin Management Program. The objective of the program is to develop Shire River Basin planning framework to improve land and water management for ecosystem and livelihood benefits in target areas. The program has three components: the first component focuses on developing a Shire Basin management plan. This component will finance the development of a modern integrated Shire Basin knowledge base and analytical tools, as well as well-planned structured stakeholder consultation processes, in order to facilitate investment planning and systems operation. The second component focuses on catchment management. Its will finance the protectionand rehabilitation of targeted sub-catchments and protection-worthy areas to reduce erosion and improve livelihoods. The third component will focus on improving water related infrastructure. It aims to mobilize new investments enabling improved regulation of shire flows and strengthen climate resilience.

103. While there are similarities between the two projects, the World Bank Funded Shire River Basin Management Project Phase I focuses on the river and its catchment areas which are in the two forest reserves (Mangochi Forest Reserve in Mangochi district and Liwonde Forest Reserve in Machinga). It also covers other districts along the River Shire. The proposed climate proofing project does not work in the forest reserves – the hotspots are close to Phirilongwe forest in Mangochi district and Liwonde Forest (not forest reserve) in Machinga district. There is therefore there is no geographic overlap with the Shire River Basin Management Project.

104. The proposed project will collaborate closely with the GEF-World Bank Program, to ensure that synergies are identified and utilized to improve impacts for both programs. The two programs will in particular share methods, tools and technologies for watershed rehabilitation, improving irrigation practices, climate safe post harvest management practices and training manuals on SLM.

105. It will also be specifically linked to the AFDB project titled "Climate Adaptation for Rural Livelihoods and Agriculture (CARLA)". The project aims to facilitate formulation of community based resilience building (adaptation palms) and provide the training and materials required to implement components of the action plans. There are more similarities than differences between the IFAD project and the proposed UNDP project. However the main difference between them are that the UNDP project has a greater focus on the role of ecosystems in nature based solutions to reducing vulnerability, and that they are implemented in different districts. The IFAD project will be implemented in Karonga, Dedza and Chikwana Districts while the proposed UNDP project will be implemented in the Machinga and Mangochi districts. The two projects will share training materials, and can facilitate exchange visits between and among communities. The National Climate Change Steering Committee will oversee both projects at the highest policy levels. The project management units will both be represented at the National Technical Steering Committee, where practical ways of synergizing will be explored, and utilized.

106. DFID, the Royal Norwegian Embassy (RNE) and Irish Aid are funding a new project entitled "Enhancing community Resilience to Climate Variability and Change (2011-2015)", which is being implemented by the NGO partners (Christian aid, Concern Universal, CARE and Action Aid). Although there is no geographic overlap with the targetted pilot areas for the proposed LDCF project, the program objectives are similar to the proposed program, making it mandatory to develop close linkages with the initiatives, and also to sensitize its staff on CSA, climate resilient risk reduction and development.

107. EU is financing a major program on Farm Income Diversification through various Departments of the Ministry of Agriculture and Food Security with responsibility for overall coordination resting with the Department of Land Resource Conservation. It is operational in 11 districts throughout the country (Machinga and Mangochi are not included). The program aims to manage natural resources sustainably, improve post-harvest storage and processes, diversification and increase smallholder agriculture productivity and promotion of agri-business. The program has generated a wealth of experience which will be highly beneficial for the present project.

108. Total Land Care (TLC) focuses on sustainable agriculture, micro-enterprise development, water and sanitation, crop diversification, small-scale irrigation (treadle pumps and river diversion), use of energy efficient stoves and natural woodland management, which are also the objectives of the present project. Therefore, the project will develop close linkages with TLC and make arrangements with it to sustain interventions after its completion. The project will in particular seek the collaboration of Totla Land Care in planning and excuting the concept of the "Year of the Land Care".

109. USAID and GOM have signed a 3 year project in March 2013 to implement the "Enhanced Capacity for Low Emissions Development Strategies". Under this project USAID is in the process of designing several climate change projects that will enable communities to embark on carbon sequestration on forest and agricultural landscapes. FAO has demonstrated at many sites conservation agriculture which would be useful as demonstration areas. Likewise, many CGIAR centers are based in Malawi and much of their work is done in the Shire River Basin. These include: International Centre for Tropical Agriculture (CIAT), World Agroforestry Centre (ICRAF), the International Centre for Research in the Semi-arid Tropics (ICRISAT), the International Institute of Tropical Agriculture (IITA), International Potato Centre (CIP) and International Maize and Wheat Improvement Centre (CIMMYT). These centers are involved in the development of sustainable land management technologies and crop varieties. The project will capitalize the experience of

these centers, particularly to obtain seeds of improved crop varieties / multi-purpose tree and shrub species, and learning from post-harvest management practices.

110. DFID is providing £18,000,000 over the five year period 2011-2016. The funding will be focused on providing support to 1.4 million people in vulnerable communities to manage, cope with and recover from the impact of both current and future changes in weather patterns. Funding is mainly being provided to two NGO consortiums (one led by Christian Aid, and one by Concern Universal) to scale up tried and tested interventions in vulnerable communities, such as: assisting communities to understand, plan for and reduce the risks associated with climate change; establishing village savings and loans schemes and implementing adaptation practices such as crop diversification, soil fertility management and irrigation. The project also includes support to the Government's Malawi Vulnerability Assessment Committee (MVAC) to provide annual assessments of those suffering from food insecurity and vulnerability; and to strengthen disaster risk reduction and climate change programmes of key Government Ministries and Departments (DFID Malawi, 2012). The proposed project will partner with both Christian AID and Conern Universal to share lessons, in particular on formulation of the comprehensive community based adaptationplans. These partnerships will be critical in linking communities to other partners who would support implementation of the components of the comprehensive adaptation plans that cannot be financed by the LDCF project.

111. The project will also be closely coordinated with other UNDP programs, particularly those in the area of climate change, environment and natural resources and disaster risk reduction. It will specifically be cloosely coordinated with the LDCF project entitled "Strengthening climate information and early warning systems in Malawi for climate resilient development and adaptation to climate change", currently ebeing formulated by the Department of Climate Change and Meteorological Services under the Office of the President and Cabinet – in collaboration with Department of Disaster Management Affairs and Department of Water Resources Management. The project will: (i) establish a functional network of meteorological and hydrological monitoring stations and associated infrastructure to better understand climatic changes; (ii) tailor weather information packages and early warnings for drought, floods and Mwera winds to meet the needs of end-users, in particular local farmers and fishermen; (iii) integrate weather and climate information and early warning systems into national sector specific policies and District Development Plans in 15 flood and drought prone districts in Malawi; and (iv) establish cooperation agreements with national hydro-meteorological counterparts in Mozambique to improve warnings for tropical cyclones, flooding, Mwera winds and drought. The project is expected to be completed by the end of 2017. The present project will benefit from the forecasts made by the early warning project and train / sensitize the DAESS staff, DECs, TAs, ADCs and VDCs to timely make use of these forecasts.

112. Coordination between the proposed and the other climate change initiatives, as well as other projects in the Shire River basin (and nation-wide) will be ensured through two avenues, described below: i) National Climate Change Steering Committee: This committee is composed of key stakeholders in the field of Climate Change and is hosted by the Ministry of Environment and Climate Change Management. It is chaired by the Ministry of Economic Planning & Development (MoEPD). The objective of the committee is to steer all activities' in climate change in Malawi and provide a forum for effective policy dialogue on frameworks, priority setting, and ways and means of facilitating investment and transfer of technology on climate change initiatives in the country. The Committee aims to enhance collaborative project development and implementation, with a view to optimize the contribution of climate change abatement and mitigation programmes to sustainable development, taking into account environmental, social, and economic factors. The Steering Committee is informed by the Technical Committee on Climate Change, which provides technical guidance, updates and information on CC in the country. ii) The District Councils, which are constituted by ward representatives, Traditional Authorities and Sub-Traditional Authorities, Members of Parliament and representatives of special interest groups, and the secretariat consisting of representatives from all government ministries and departments, NGOs represented at the district and co-opted members. This platform will be used to channel lessons from outside the project area and out of the project implementation to the rest of the country.

2.3.3 National and local benefits

113. The project will address the problems of poverty, environmental degradation and climate-led disasters in the project area and will serve as a model for scaling up in neighbouring districts facing similar problems. By

ensuring that knowledge of ecosystems services at risk of climate change and the impacts of degradation of natural resources to resilience of local economies and livelihoods form the basis of community based adaptation plans, along with building capacity for the implementation of the natural resources management component of such plans, the project will directly contribute to the MDG Goal 7 "Ensure Environmental Sustainability" (Target 7.A: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources). Assisting the district environment teams to mainstream climate risk considerations in the district development plans will further contribute to the target of mainstreaming sustainable development principles in national development policies.

114. The second component of the project will demonstrate practical tools, technologies and capacities for an ecosystems based, community entrenched adaptation program, focusing heavily on water harvesting and conservation, restoration of degraded forests and watershed management, soil conservation and promotion of climate smart agriculture. These interventions will collectively lead towards environmental sustainability and conservation of natural resources, reduce vulnerability of livelihoods to climate risks and increase household welfare (including incomes) of local communities.

115. The project will also contribute to MDG Goal 1"Eradicate Extreme Poverty and Hunger" (Target 1A: Target 1.A: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day). PPG assessments revealed that communities spend most household income on education and health.

116. One of the major beneficiaries of the project will be the DAESS and the VDCs, ADCs, DECs, and elected members of the councils whose capacity will be built in terms of their operationalization which is currently hampered by inadequate financial and technical resources. Component one will provide training of the ADCs and VDCs and facilitate full operationalization of the DAESS. Combined with the implementation of the communication strategy through local and district media, the project will upscale the lessons and capacities delivered through the project to the two districts. Other important beneficiaries of the project will be the planners, policy makers and structural engineers at the national level whose capacity will be built to perform better in the wake of climate change led disasters. The new Department of Climate Change Management will also benefit from capacity building activities, improving its support to the other districts in the country. Above all, the information about climate resilience and disaster preparedness and management will be disseminated through various communication means which will be beneficial for public at large. Scaling up of the project initiatives through the capacitated extension service will upscale the local benefits to other districts, hence affect national targets towards the impacted MDGs.

117. At the micro level, the project is expected to benefit approximately 458,371 (approximately 91,674 households considering five persons per household – table 14). The many activities under component 2 will benefit a large percentage of the population. Tree planting campaigns, access to irrigation water, climate smart agriculture, post-harvest management, training in DRR and facilitation for marketing, adoption of high efficiency energy technologies, engagement in NTFP based businesses are amongst the many examples. One of the biggest challenges within all development programming is how to ensure that individuals and societies adapt beyond the programme cycle of an intervention (in this case beyond 2018). This is crucial to climate change adaptation, because adaptation is a continuous process. People need to acquire the capacity to adapt for generations to come. This project aims to meet immediate needs but also build adaptive capacity for the long-term. This will be done through improving understanding among technical personnel and local communities on the linkages between the social and ecological systems and acquisition of the necessary skills for application of adaptive approaches. In this regard, the communities will in particular benefit from formulating community based adaptation plans. Although the project will not have the resources to finance all the components of the resilience plans, the communities will benefit from the strategic thinking that they will go through in formulating these plans, which will indeed increase their understanding of climate change and its likely impacts on current and future investments in livelihood support systems and local economic development. This is empowering, and prepares them to engage other development partners with a list of priority areas for support.

118. It is estimated that women make about 60% of the beneficiaries since most smallholder farming activities and aquaculture are led by women. Direct beneficiaries also include children in the area because of increased food production and possible higher household incomes. As explained in the section above, it is expected that household incomes accruing to women is spent on health, nutrition and education. Indirect

project beneficiaries include rural households located in proximity of the hot-spot areas/natural forests and wetlands (including those within national parks and forest reserves and on adjacent customary land) whose improved management under the project will provide a more sustainable natural resource base and additional livelihood options. The motivated DAESS, Councils and sub district local governance institutions (ADCs and VDCs) and proper spending of the Government co-financing in an environmentally sensitive manner would help to cover the entire population of the two districts.

Table 13: Population per hotspot

District	Hotspot	Population
Mangochi	TA Nankumba	108,347
	TA Chimwala	112,486
	TA Mponda	109,082
Machinga	TA Chikweo	54,295
	TA Nyambi	48,506
	TA Nsanama	25,655

2.3.4 Comparative Advantage of UNDP

119. UNDP has a long-standing history of supporting climate change adaptation and disaster risk reduction in the world, Africa and Malawi. In Malawi, UNDP is uniquely positioned to provide this support for two reasons: it is a locally-based UN agency with a track-record and comparative advantage in capacity development and successfully implementing up-stream activities; and, can provide a vital co-ordination role (for other UN agencies and more widely between other donors) to catalyse enhanced capacity to adapt to climate change risks and impacts across sectors in Malawi (one of the MDGS II goals). Currently, UNDP's portfolio in Malawi has 30 active projects under 4 clusters namely: Environment/Climate Change/Disaster Risk Reduction, Growth and Millennium Development Goals, Capacity Development, and Governance. The portfolio balances between policy and programme support, spanning from national facilitation to local level implementation support. At the policy level, UNDP is supporting the government to mainstream climate change considerations into national development through the National Climate Change Programme (US$4,200,000, with contributions from DFID, Norway, Spain and Flemish Government, routed through the One UN Fund).

120. The National Climate Change project partners with the Africa Adaptation Programme (US$3,900,000 from the Japanese Government), another project supported UNDP, to build the capacity of national and local government institutions and key civic-society stakeholders towards climate change. Piloted in the 7 NAPA districts, the partnership programme supports the development of comprehensive climate change adaptation strategies linked to long-term investment plans. Coordinated by the Ministry of Finance and Development Planning (MOEPD), the programme works with other Priority Sector Ministries, most notably the Ministry of Natural resources, Environment and Climate Change Management, as well as non-state implementing agencies and coordinating institutions that are represented in the National Climate Change Technical Committee. The programme is overseen by the National Climate Change Steering Committee. Experiences and lessons gained from this partnership will inform component 2 of the proposed LDCF project on: mainstreaming climate change considerations into the district development programs, climate proofing the decentralization policy implementation.

121. Further mainstreaming experience, knowledge and lessons will be provided by additional initiatives: the Poverty and Environment Initiative: UNDP-UNEP Poverty and Environment Initiative (PEI) which supports the Government to include environmental sustainability as a core objective in national development planning (e.g. Malawi Growth and Development Strategy) and implementation so that poverty reduction and other economic development objectives are not undermined by the unsustainable use of natural resources. Build capacity so that decision-makers know: How environmental sustainability contributes to development; and How to include environmental sustainability in development planning & implementation. Further lessons on mainstreaming policy will be provided from the UNDP project titled: "Financial Inclusion in Malawi (FIMA): 2007-2011"; a partnership between UNDP and the United Nations Capital Development Fund (UNCDF) that supports the Ministry of Finance to expand the participation of local communities in the financial sector. Under the new UNDAF 2012 – 2016, emphasis is being laid on the support to Government

to prepare and operationalize the Integrated Rural Development Strategy, in coordination with other Development Partners (Norway, GIZ).

122. Practical field level experiences will be provided through the current portfolio of field-based initiatives, primarily through the expansive Small Grants Programme, which has to-date implemented projects worth USD 7 million in Malawi, several of them on climate change initiatives (both mitigation and adaptation). Under the Governance programme, UNDP is supporting the implementation of a project on "Democracy Consolidation and Improved Local Service Delivery", which aims at increasing the effectiveness of participation of communities in decision-making, and in advocating changes to policies, laws, and practices which affect their livelihoods and rights; including holding public bodies accountable. Through these two initiatives, UNDP has gained useful experience in facilitating local process, particularly with local councils and the land users. This experience will be applied in both component 1 and 2 of the proposed LDCF project.

123. UNDP has also gathered experience in working with District Councils. Under the "Access to Justice Programme", UNDP has worked with the Malawi Human Rights Commission (MHRC) to ensure that human rights are protected and promoted at the district level through sensitization on human rights and their responsibilities to influential local leaders like chiefs, village headmen and other community leaders. In 2010, a total of 52 cases from various districts in the country on allegations of violations of rights were investigated with 26 cases litigated. Alternative Dispute Resolution (ADR) was conducted to identify the appropriate remedies on the major human right issues.

2.4 Project Objective, Outcomes and Outputs/activities

124. The **goal** of the project is to secure the development and food security gains from the baseline programs by empowering communities to integrate climate risk considerations in the development policies, plans, projects and actions. The project **objective** is to provide knowledge, tools, capacities and methodologies for the adoption of an ecosystems and community based approach to adaptation. The project's outcomes are as follows:

Outcome 1: The impact of ecosystems degradation in aggravating vulnerability to climate change risks and reducing resilience of development gains understood and integrated into key decision-making processes at the local, sub-national and national levels.

125. **Baseline:** In order to manage the interactions between current and future climate hazards and development, adaptation action needs to be informed by knowledge and information of current and projected climate risks, incorporating as far as possible scientific climate information as well as local, traditional knowledge into local adaptation planning. But knowledge about climate change risks continues to be uncertain–it is difficult to predict with absolute certainty exactly what we are adapting to, or what 'successful' adaptation looks like. This makes adaptation a unique process –a continuous process responding to uncertain changes, not an end in itself. This uncertainty requires a 'learning by doing' approach, where communities and practitioners are able to track, respond to, and take advantage of changing contexts and surprising events. It therefore requires to be supported by solid continuous knowledge gathering backed by a system for monitoring changes in contexts and in the effectiveness of responses to changing contexts. This requires social learning mechanisms are needed for feeding the information generated by monitoring back into the planning and implementation cycle.

126. Despite the fact that the economy of Malawi and the livelihoods of many of its communities are highly dependent on natural resources, the nature of the ecosystem goods and services delivered by the key natural, agro-ecological and hydrological systems, their vulnerabilities to climate change and the impacts of the current management practices on ecosystems qualities, vulnerabilities and resilience are often unknown, or only partially known.

127. A few studies have been carried out to quantify ecosystems services to economic development but there are almost no studies linking these to increasing vulnerabilities and loss of resilience of both ecosystems and livelihoods. Indeed, although most Malawians survive in precarious economic conditions in an environment prone to slow and rapid onset disasters (droughts, floods, landslides) there is lack of assessments looking at the dynamics of ecosystem services in the context of community "resilience equations" - the combination of factors increasing or weakening resilience. Although this information is becoming increasingly available at the global and national level, the baseline programmes lack the "translators" of climate information at district

and community level, who can bridge the divide between science and field application, assisting communities and planners to understand the implications of their immediate planning decisions. Making climate change information a mandatory part of the baseline programmes would go a long way in transforming current development processes, moving Malawi along the path of low emission climate resilient development trajectory.

128. Providing comprehensive information is important because like most developing countries, reducing vulnerability to climate change in the agriculture dependent economy of Malawi can only be done effectively by managing (and increasing resilience); looking at social and ecological linkages from the level of a household through to that of a community, a region, and so on. In such a case, the governance and institutional elements, the users, the ecosystem components as well as ecological elements should be all part of the same integrated system. Under these circumstances, there are many questions that need to be answered regarding the interplay between the elements, in order for adaptation measures selected to be effective in the short and long term, and without having leakage effects such as weakening other parts of the system. Some questions are simpler such as: which forests are critical for watershed services, understanding the relationships between resource exploitation practices, ecosystem functionality and productivity. Others are more complex such as identifying ecosystem services under risk from climate change. Even more complex is establishing whether the ecosystems are currently in precarious state and if they are about to go through regime shifts, and how this would affect vulnerabilities and loss of resilience of livelihoods. Most socio-ecological systems can exist in more than one state: for example, when an irrigated agricultural system susceptible to salinization crosses over to a salinized state, the structure, function and outputs from the system defines a new, alternate state. For example, a clear lake with fisheries can shift to a murky lake without fisheries when a phosphorus threshold is crossed; similarly grasslands can cross over to shrublands when a threshold is crossed. Vegetation cover can reach a threshold; whereafter abrupt changes in soil properties take place. Once a threshold has been crossed it is often difficult or impossible to return to a previous state without major system inputs.

129. Because such regime shifts occur as a result of slow, almost undetectable changes, understanding how close the critical ecosystems are to crossing over becomes important in selecting cost effective management options that seek congruence between management and ecosystem processes, where the tempo of management interventions and resource use closely match that of ecosystem processes. Understanding the boundaries of acceptable change, the safe operating space within which disturbance occur without lasting impacts, allows managers to monitor and control the slow onset changes and to control management variables in the system to avert an undesirable shifts that are difficult and expensive to reverse.

130. In addition, it is important to understand the costs and benefits of business as usual versus adaptation measures that factor in comprehensive analysis of the resilience of socio-ecological systems. For example, it is possible that sustaining diversity and working with ecological variability as opposed to attempting to control natural variation contributes to resilience. Yet agricultural systems have been consistently simplified in pursuit of efficiencies in production, where mixed crops are systematically replaced by monocrops. Including ecosystem services that are either un-priced or have no market value in decision-making can help to make trade-offs more transparent. The increased use of agricultural fertilizers in past decades has led to declines in other non-agricultural ecosystem services such as fisheries, flood regulation and recreational opportunities. Considering bundles of ecosystem services and managing agriculture as part of a larger landscape can inform decision-making.

131. There is however a dearth of data to provide answers to these questions for Malawi. Furthermore, the available data and information on the ecosystem services and their impacts on economies and livelihoods are dispersed across various ministries and institutions and has not yet been comprehensively assembled or analysed as a whole or shared and disseminated. This means that the applied response strategies are reactive rather than anticipatory with little consideration for the long-term effects of climate change.

132. A key need is to be able to generate a diagnostic of the vulnerability of the livelihoods and investments made via the baseline programs in the hotspots of the Mangochi and Machinga Districts emanating from the degradation of the critical landscapes and ecosystems; by knowing which landscapes/ecosystems are critical for what aspect of vulnerability; how climate change is likely to impact the ability of the critical ecosystems to continue providing ecosystem services that reduce vulnerability; how the management choices affect the

interactions between ecosystems health and resilience of livelihoods and indeed that of ecosystems themselves; how the degradation of natural systems aggravate vulnerability of production systems and livelihoods; and, how this risk and associated impact is likely to evolve in the forthcoming CC scenarios. Updating of guidelines and norms for rural and urban development in the two districts should be based on these vulnerability and climate change risk profiles.

Adaptation alternative:

133. The proposed LDCF project will provide information on climate risks that are currently reducing the effectiveness of the baseline programs described in section 1.2. In particular it will provide information to support the planning for an ecosystem-based adaptation implemented through a community based adaptation context. It will build on the PPG studies to assess the nature of the ecosystem goods and services delivered by the key natural, agro-ecological and hydrological systems, their vulnerabilities to climate change and the impacts of the current management practices on ecosystems qualities, vulnerabilities and resilience, and how the state of the ecosystems services in turn affects vulnerabilities and resilience of livelihoods and the local economy. It will in particular identify ecosystems at risk of tipping over and provide a comprehensive cost benefits analysis of business as usual versus adaptation measures, upon which management options will be based. The project will also facilitate formulation of community based adaptation plans, based on a thorough and holistic analysis of resilience, supported by the knowledge generated above. It will also develop a community based monitoring system to enable stakeholders to understand, monitor and control the changes to the important ecosystems and natural systems that could lead to undesirable shifts that increase the vulnerability of their livelihoods and local economies, and that are difficult and expensive to reverse.

Cost of the alternative

134. Generating knowledge and using it in the CBA planning are additional activities to what the Districts would normally budget for and therefore do in their regular development planning and extension service delivery. The Districts will however contribute technical time of the technical teams at the District, Extension Planning Areas, Village Environment Committees, etc. The Districts have committed to seconding key staff to the project (up to a total of 10 per District). The communities in the six hotspots will contribute their time to participate in the planning. This is a significant contribution, although it does not add up to much dollar-wise. This is because the remuneration in Malawi is low and the opportunity cost of time for many community members without formal salaried jobs are very low. This is however boosted by the huge amounts of money being invested by government in the implementation of the baselines.

Institution	Amount
GEF resources requested	500,000
UNDP Co-finance	200,000
Government through district staff and cash for funding baseline programs	5,000,000
Total	5,700,000

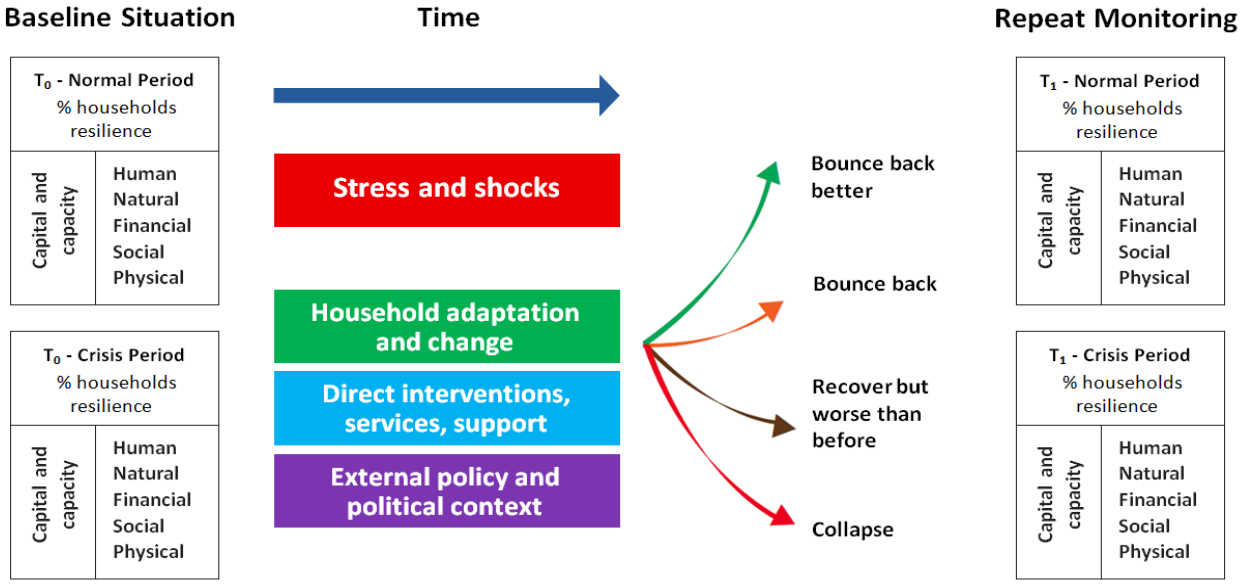
135. The outputs to achieve the outcome are described below:

136. Output 1.1: Information provided on how the state of use and management options of critical resources/ecosystems/landscapes influence effectiveness of baseline programs through its effects on vulnerabilities and resilience of livelihoods and local economies in the hotspots of Mangochi and Machinga: Through this output, the project will facilitate partnerships between the District Council Staff, institutes of higher learning and the communities, that will build on the PPG assessments to further elaborate the relationships between the critical ecosystems, their current state of degradation, the likely impacts of climate change on these systems, the impacts of the state of natural systems on the vulnerabilities of livelihoods and hence the sustainability and impacts of the current baseline programs. In doing, so, the project will ensure that climate risk profiles are developed, based on scientific information, and using a community based adaptation context.

137. It will also provide a scientific backbone to the mainstreaming of climate change consideration into local development, and linked to extension services for dissemination of more up to date information on weather, risks of drought and flooding to farmers and urban dwellers. It is anticipated that the research program will lead to publication of at least 10 original, scientific publications in journals of international repute.

138. Output 1.2: Comprehensive landscape adaptation plans formulated using the information generated under output 1.1, complemented by community based resilience assessments: In order to help communities onto a path of resilience building, a multi-faceted approach to planning is required. This is in sharp contrast to the current fragmented, largely sectoral and project-based approach to interventions. Under this output, the project will advance the knowledge on community perception of resilience of livelihoods and economic systems, and combine it with the information generated under output 1 to formulate comprehensive community based adaptation plans. UNDP-DDC has recently developed a model for Community Based Resilience Analysis (CoBRA – annex 5), which will be modified and used to provide understanding of resilience from a community perspective, and identify adaptation measures needed to increase resilience and reduce vulnerability to climate related disasters. Based on the TANGO resilience assessment framework (2007), CoBRA will enable policy makers and practitioners to have a comprehensive understanding of the factors and processes influencing vulnerability and resilience at the household and community levels. It will reveal important concepts such as how households define and prioritise the characteristics of resilience, (or, in other words, those households that are able to cope with a shock or stress without external assistance); what existing resilient households look like, and how they get to be resilient; what actions need to be taken to increase resilience at the household and community levels, learning from the positive experience of households and communities perceived to be resilient (and informed by the scientific information generated under output 1).

Figure 9: Community-Based Resilience Analysis (CoBRA)



139. The adaptation plans produced from the foregoing process will be comprehensive and their full implementation will be beyond the remit of this project. However, developing them is an important step for the stakeholders: it will provide a conceptual framework that goes a long way in highlighting layers and components of resilience, and define a range of activities, actors and processes that are part of a resilience building system. The project will assist the communities and their support institutions to implement those activities relevant to the use of ecosystems/landscapes/natural resources based adaptation measures that increase the effectiveness of the baseline programs, reduce vulnerabilities and build resilience of the livelihoods and local economies. These activities were identified during PPG (in preliminary form) and are described in component 2. It will also assist the communities to link to providers of services identified to be critical for resilience (such as health provision, improvement of infrastructure, etc.). In addition, the community based plans will form a comprehensive tool to advocate for local development with Malawi's development partners at the local and national levels.

140. Besides the baseline programs mentioned in this document, there are many other sources of funds, for example, the Shire River Basin Management Program Phase I (2012-2018) envisages an investment of US $ 145 million. The Phase II and III aim to invest some 125-150 million during each phase during the period after 2018. The Malawi Agriculture Sector Wide Approach prepared by the Ministry of Agriculture and

Food Security in 2010, envisages mobilizing over US $ one billion during the period 2010-2020[24]. The paper clearly mentions that the funds will be pooled, and the districts will have to access the development funds from this pool by submitting the annual work plans. The project team will support the communities to submit their adaptation plans to the District Governments, for funding from these various funds.

141. Output 1.3: Participatory Monitoring, Evaluation, Reflection and Learning (PMERL) formulated and information gathered used in adaptive management and shared widely: The project will also facilitate the design and use of a Participatory Monitoring, Evaluation, Reflection and Learning for Community-based Adaptation plans. As described in the CoBRA (UNDP, 2013 and PMERL Manual (by CARE International), the formulation and implementation of this system will enhance participation of the communities in learning about the effectiveness of the adaptation measures and the continuous modification of those measures as the circumstances change, to continually improve their efficacy. Under this output, the project staff will monitor the climate / environment / development indicators on yearly basis, and prepare annual plans based on these indicators and also facilitate the publication of annual district report which at present is not produced by any district in Malawi. Due to the capacity deficiencies in the two Districts, the project will hire the services of a local NGO to facilitate most of the field work, under the supervision of a project Technical Advisor. Staff of DEC TAs, MOEPD, DODM, DAESS, DARS, DOF and MOAFS will participate actively in the implementation of activities envisaged under this output.

Outcome 2: Skills and operational capacity of District, EPA and TA level technical officers to support implementation, maintenance and monitoring of the activities under component 1 and to mainstream climate risks into all local developemnt process (skills, legislation, information)

142. Baseline: Malawi has established an innovative climate management and coordination institutional set up, described in section 2.1.3 above. Currently, the operation of this environmental governance structure at the district level is constrained by inadequate resources. For example, the DESC has not been able to discharge its functions effectively in any of the two districts due to non-availability of funds. There are over 250 VDCs in both the districts and none of them is fully functional as the support to them through the Local Government Administration System and DAESS is not adequate.

143. The Agricultural extension system is part of the decentralized governance described in the baseline section (section 1.2). While the reforms undertaken in 2000 have improved the Service, some challenges impede implementation and out-scaling of technologies. These include: i) inadequate operational resources (human, material and financial) to fully out-scale the success stories; ii) inadequate transport capacity reducing poor mobility and the timely reach of extension service; iii) inadequate integration of up-to-date climate change information in the extension package; iv) inadequate capacity building opportunities for staff; v) inadequate coordination, collaboration and networking amongst service providers; vi) weak linkages between research, extension and farmers, thereby weakening the support of current research to the farming communities. Problems with delivering information at a relevant spatial and time scale, difficulty in communicating the information and lack of user participation in development of information systems have all weakened the access to climate risk information in real time, undermining the sustainability of the baseline programmes.

144. The decentralization process provides an opportunity for mainstreaming climate change considerations in the agricultural input subsidy programme. Because local governance and development processes is coordinated by the district councils, mainstreaming mandatory climate change considerations in their policies, programmes and plans would make all local development more resilient to the effects of climate change, including the agricultural input subsidy programme. While agricultural production systems will be expected first and foremost to increase productivity and resilience to support food security, they also provide an opportunity to engage in low emission development trajectories without compromising economic advancement and food security goals. Key requirements for an enabling policy environment to promote local development led by climate-smart smallholder agricultural transformations is greater coherence, coordination and integration between climate change, local level agriculture based development and food security policy

[24] Ministry of Agriculture and Food Security. 2010. Agriculture Sector Wide Approach: Malawi's prioritized and harmonized agriculture development agenda. Government of Malawi, Lilongwe.

processes. But the district councils are still very weak and have unclear policies on climate change and development. In addition, they have no skills or finances to enforce the mainstreaming of climate change considerations in the local development processes.

145. In Machinga at present 87 (62 %) positions of Agri. Extension District Officers are lying vacant. The extension staff and sector specialists in general need to upgrade their skills on climate change matters as well as extension technologies. In Mangochi staffing levels in Agriculture remain low (56 %) especially at the EPA level despite efforts by the MOFSA to recruit new members of staff. For instance, out of 187 sectioned posts established for the district, only 110 are occupied, which has created a lot of pressure on service delivery among extension staff despite incorporating DAPP as a partner under ASWAp to complement the delivery of extension services. Also, in the Crops Department, only 4 out of the 14 established posts are filled. At the EPA level, 3 AEDCs posts are filled out of 11. The District Fisheries Office in Mangochi has 46 established posts out of which only 22 are filled, and he rests are lying vacant. In addition, the district councils are not yet receiving funds needed to actualize the decentralization process; and, less than 2% of the budgets received directly support mainstreaming climate change risks in local development processes.

146. The low levels of capacities have weakened policy implementation at the ground level. Existing laws often are not applied or enforced. This has led to the widespread adoption practices that undermine many of the critical natural resources such as deforestation, overfishing, destruction of river banks and poor use of soil and water conservation measures, where they exist. There are several challenges in the integration, coordination and synchronization of flood management interventions within and between government ministries and departments, District Assemblies, NGOs and donors. This is manifested, for instance, in the duplication of efforts in flood mitigation, in conflicting policies on the use and non-use of riverbanks for agricultural, and in failed resettlement schemes for flood victims caused by insufficient integration of planning. There is an apparent lack of application of basic principles and approaches of Integrated Water Resources Management (IWRM) and Integrated Flood Risk Management (IFRM).

147. In addition to continuing to expose the gains from the agricultural subsidy programme to the additional risks of climate change, these failures are compromising the sustainability of urban development which is currently threatened by the inadequate integration of measures to reduce impacts of floods on public infrastructure, urban houses, health and livelihoods. Although the upper Shire has only a few small towns, urbanization is projected to grow. Given the low levels of planning in rural towns, urbanization increases the risk of floods by altering the hydrology and the geomorphology of the natural landscape around towns. In Malawi, these are exacerbated by inefficient urban management, inadequate planning, poorly regulated population densities, inappropriate construction practices, ecological imbalances, and poor infrastructure. Disaster risk reduction at the district and local level requires a multi-disciplinary approach, with input and expertise required from many fields. However, the scarcity of resources in the District Assemblies exacerbates the uncertainty in future socio-economic status, making it difficult to invest in physical water management and flood control infrastructure solutions.

148. Access to mass media and other IT communication systems in rural areas is low, and illiteracy rates are high which pose a challenge to the dissemination of climate risk information. Average illiteracy level in the two pilot districts higher than the national average. Furthermore, the most illiterate people live in the rural areas. In the absence of LDCF support, valuable new and locally relevant adaptation knowledge and experiences will not be systematically compiled, analyzed and, most importantly, effectively shared with others who would benefit from such information both nationally and internationally. It is important therefore to set up a mechanism through which this exchange of lessons learned can take place.

149. Without the project, country-wide investments by all the baseline programs described in section 1.2 will continue in a “business as usual” mode, thereby exposing the modest development and productivity gains to uncertainties related to climate change.

150. Adaptation alternative: The project will support capacity development in two ways: one, to provide resources to enable government to partner with civil society and the private sector in facilitating communities to mainstream climate risk in the baseline investment programs; and, provide district, TA and EPA technical staff with current skills, tools and technologies to both supervise civil society and private sector engagement with the communities, as well as implement an updated extension service package.

Additional costs of the alternative

151. The Updating the skills of existing technical teams with current climate risk training, and engaging the civil society to boost the capacity of the communities to climate proof gains from the baseline investments are new and additional to regular district strategies and budgets. However, once again these activities will build on the impressive baseline program, particularly the strengthening of the extension service and linking it to the Agriculture Sector Wide Approach. The figures are presented in the table below.

Institution	Amount
GEF resources requested	862,000
UNDP Co-finance	300,000
Government through district staff and cash for funding baseline programs	5,000,000
Total	6,162,000

152. Output 2.1: Operational capacity of the extension service boosted to enable communities to mainstream climate risk considerations in the implementation of baseline programs: The project will support the establishment of a climate based Extension Service (CES) package and booster the capacity for its delivery to strengthen/develop the capacity of vulnerable local communities in the hotspots to transition to climate-resilient livelihoods. This will be done in close cooperation with the Local Disaster Risk Management Committees and the Ministry of Agriculture. The project will also strengthen the Local Disaster Risk Management Committees by providing its members with training on climate change and development risk. It will also strengthen the partnerships between the Local Disaster Risk Management Committees (LDRMC) and other initiatives in the country supporting mainstreaming climate risks into local development, facilitating exchange of lessons for mutual learning. The project will also link the extension service and LDRMC to other projects providing support on the delivery of Agrometeorological Advisory Services. It will therefore work with local CBOS, NGOs and academic institutions to develop training materials relevant to each stakeholder, and deliver them though a systematic skills development program, supported by a communications strategy, through which the project will facilitate partnerships with local media fora and community radio networks to assist in the broadcasting of weather forecasts and adaptation advice such as: adapted planting calendar (sowing/planting/harvesting time), resilient farming methods (plant density, drought resistant varieties of local crops, suitable seed provision, mulch application, etc.), and low-cost water conservation/irrigation technologies in areas prone to diminishing or highly variable rainfall during crop growing season.

153. The training will be further extended to other potential candidates; in particular the Malawi College of Forestry and Wildlife (MCFW) Dedza College will be supported to revise its curricular to emphasize the role of healthy forests in securing development gains and resilience of communities. The revised curricular will be tested and adjusted over three years, during which the project will support training of 50 students (50:50 on gender).

154. Output 2.2: Local and national development policies influenced by the project supported pilots to strengthen policies and policy enforcement for climate consideration. Under this output, the project will sensitize the district authorities, staff of district planning units and officers of the Ministry of Finance, Development Planning and National Housing Development Authority to recognize climate risk problems in new and existing investment projects and apply / recommend / enforce targeted risk reduction and risk management measures. The project will strengthen the capacity of decision-makers and planners to understand how to integrate data and information on the expected impacts of climate change on communities and ecosystems into development policies, plans and programs. The project will forge better links between the District level technical teams and the National Climate Change Program (NCCP), which is taking leadership of developing and monitoring implementation of climate change policy in Malawi. This will allow the incorporation of climate risk consideration in the design, appraisal and approval process of district development initiatives, including the implementation of the agricultural input subsidy program and civil works (infrastructure building). Ultimately, the aim would be for policy-makers to be able to adjust sector budgets appropriately to support effective adaptation in the two districts. This will also support the upscaling of lessons learnt though the field implementation in the hotspots to the rest of the districts and nationally.

155. The activities envisaged under this output are to be implemented by the councils through the DEC and supported by the MOFDP, ADCs, VDCs and DAESS. The project will support the review of all the District Development policies, programs and plans in both districts and prepare an assessment report from the standpoint of climate resilience. It will also review the protocols and procedures for the preparation of development plans, and ensure they mainstream climate risks. The manpower trained in climate resilient development as explained in the earlier outputs will play a key role in developing improved district plans. The members of VDCs, ADCs, AEC, DEC and elected members of the council will be sensitized and familiarized with the new planning process. The revised planning process will ensure the environmental impact assessments of each project, as well as inclusion of climate resilient options in the development process. Deficiencies of law enforcement agencies and gaps in policy implementation will be identified and the districts assisted to lobby national government to fill up gaps that cannot be filled through the project (such as filling out the vacant posts). On quarterly basis, the project /DAESS will give a briefing session to the DEC and MOFDP about the progress achieved in promoting climate adoption technologies and mitigation of risks through the project in the district.

156. In addition to training, the project will provide support to policy makers and planners to visit national and international projects to learn the incorporation of climate resilience in infrastructure development. The project will also support EAD to organize annual symposium on climate resilient construction, CSA, land and water use planning and publication of newsletters and annual journals.

157. **Output 2.3:** Lessons generated at the project/district level fed into the national climate programme, SLM platform and other national planning debates, to lobby and influence the adoption of climate risk considerations as a criteria for accessing agricultural input subsidy benefits: Under this output, the project will support widescale dissemination of information and lessons generated from the pilot initiatives (in conjunction with output 1.3, on M&E). An NGO will be contracted to develop a communications' strategy and support a sustained advocacy campaign to inform the public at large about the new rules and implementation mechanisms. To promote the exchange of experiences, the project will launch "the Year of Land Care", in partnership with other relevant programs, in particular the National Climate Change Program, and the World Bank Program on the River Shire Basin. This will promote the wide scale awareness of the cost effectiveness of integrating ecological and physical measures as a means of mitigating impacts of climate change driven floods and droughts.

Table 14: Indicative activities per output for outcomes 1-3 (component 1)

Outcome/Output	Indicative activities
Outcome 1: The impact of ecosystems degradation in aggravating vulnerability to climate change risks and reducing resilience of development gains understood and integrated into key decision-making processes at the local, sub-national and national levels	
Output 1.1: Information provided on how the state of use and management options of critical resources/ecosystems/ landscapes influence effectiveness of baseline programs	➢ Identify the landscapes/ecosystems/natural resources critical for important livelihood support services such as watershed services, reduction of soil erosion, build up of fertility, reduction of flooding, reduction of siltation and eutrophication in the fisheries, etc.; ➢ Undertake assessment of the current state of degradation of these landscapes /ecosystems/natural resources and the likely future scenarios given the trajectory of climate change; ➢ Assess the costs versus benefits of business as usual to the sustainability and effectiveness of the current baseline programs and what management options are likely to yield the optimum benefits of reducing vulnerabilities of community livelihoods and local economies, and/or increasing their resilience;
Output 1.2: Comprehensive landscape adaptation plans formulated using the information generated under output 1.1, complemented by community based resilience	➢ Agree the lead and implementing partners for the CoBRA assessment; undertake the assessments and analyse information to establish current resilience levels for each target population, factors deemed critical for resilience and action plans necessary to increase resilience, particularly in relation to baseline programs; ➢ Develop the current vulnerability profiles for the different groups of resource users and assess the economic, social and institutional/political context within which adaptation is expected to happen, highlighting how these impact on vulnerabilities to influence effectiveness and sustainability of adaption and baseline programs; ➢ Facilitate the use of data generated in output 1 and the resilience analysis to formulate comprehensive community based adaptation plans;

assessments:	
Output 1.3: Participatory Monitoring, Evaluation, Reflection and Learning (PMERL) formulated and information gathered used in adaptive management and shared widely	➢ Identification and Training of participating community activists and extension workers in participatory M&E system. ➢ Participatory development of process indicators and monitoring schedule to monitor the performance of the project. ➢ Participatory visits of community activists (also from non-project districts) and extension workers to project sites and compilation of monitoring visit report on at least quarterly basis. ➢ Reporting of lessons learnt and best practices from the project, including other similar projects. ➢ Support for the participation of community activists and extension workers in regional and national forums to share the project experiences and success stories. ➢ Monitoring of climatic and environmental indicators in districts and preparation of annual plans based on the indicators. ➢ Production of annual district progress reports and provision of feedback to improve the future plans with the standpoint of climate resilience.
Outcome 2: Skills and operational capacity of District, EPA and TA level technical officers to support implementation, maintenance and monitoring of the activities under component 1 and to mainstream climate risks into all local developemnt process (skills, legislation, information)	
Output 2.1: Operational capacity of the extension service boosted to enable communities to mainstream climate risk considerations in the implementation of baseline programs:	➢ Development of training materials (based on updated training needs assessment from that done at PPG – and directed at implementing the on-the ground adaptation measures described in component 2); might include: 1 week refresher courses for the planners and policy makers at various levels in climate risk reduction and management; Two weeks short course for structural engineers, urban and rural infrastructure staff on climate resilient construction, land use and water resources planning. ➢ Update the extension package with the information gathered from outputs 1 and 2, making them robust in integration of climate risks; ➢ Facilitate partnerships with the relevant on-going developments, projects and institutions to advance the implementation of the comprehensive adaptation plans formulated under output 1.2, including for dissemination of information via community and national media; ➢ Facilitate partnerships with service providers for those components of the comprehensive adaptation plans that cannot be addressed through the project funds; ➢ Formulate and facilitate implementation of communication strategy; ➢ Facilitate the updating of the curriculum of the Diploma and Certificates at the Malawi College of Forestry and Wildlife (MCFW) - Dedza ➢ Facilitate training of 200 forestry diploma students (50:50 on gender) using updated curriculum that incorporates climate change risks to forestry ecosystems;
Output 2.2: Local and national development policies influenced by the project supported pilots to strengthen policies and policy enforcement for climate consideration	➢ Review of current policies / acts for forest, land, water, agriculture, pesticides and food security, enforcement mechanisms and incentive / disincentives under the law and refinement of user-friendly enforcement mechanisms for better operationalization. ➢ Participatory assessment of on-going and in process projects for climate resilience and development of protocols / procedures for the development of climate resilient development plans. ➢ Alignment of on-going and in process projects for climate change risks and modification of designs (where necessary) to manage the climate change risks. ➢ Sensitization of GOM officials, media and communities about the new policies, regulations and enforcement mechanism. ➢ Support for participation of senior level planners and policy makers and staff of universities and colleges in international short courses on climate risk reduction and management.
Output 2.3: Lessons generated at the project/district level fed into the national climate programme, SLM platform and other national planning debates, to	➢ Evidence based advocacy campaigns to influence informed decisions to climate proofing of development gains. ➢ Quarterly briefing to update the district authorities about the progress achieved in promoting climate adaptation technologies and mitigation of risks through the project. ➢ Develop and implement the concept "Year of Land Care": ➢ Development of working paper for the national "Year of Land Care" (YLC) event and its approval from the Govt., other donors and potential partners.

lobby and influence the adoption of climate risk considerations as minimum criteria for accessing agricultural input subsidy benefits	➢ Support for annual symposium organized by EAD to disseminate climate related research findings and emerging issues ➢ Advocacy of the YLC at the national level to mobilize senior Government officials and wider public support for the event. ➢ Production of documentaries (films, booklets) on best practices generated through the project. ➢ Organization of the YLC event at the national level and organization of 'Field Days' throughout the year to disseminate information about sustainable land management, including CSA and climate resilient disaster risk management. ➢ Mobilization of print and electronic media to provide adequate coverage to the YLC. ➢ Compilation of the proceedings of the YLC, printing, and dissemination of proceedings and key messages at a wider scale. ➢ Participation of project experts in national planning debates, conferences, etc., to share the lessons learnt and best practices produced by the project.

Outcome 3: Public and domestic water harvesting, storage and distribution reduces climate change driven flooding and regulates availability of water throughout the year in flood & drought hotspots

158. Baseline: Historical records from 1960-2006 point to a warming trend, particularly in the southern part of the country: the mean annual temperature has increased by 0.^{9o}C between 1960 and 2006, at an average rate of 0.21oC per decade. Likewise, the average number of 'hot' days per year in Malawi has increased by 30.5 between 1960 and 2003, and the average number of 'hot' nights per year has increased by 41 (an additional 11.1% of nights) between 1960 and 2003. The IPCC projects that mean temperature projected to increase by 1.1 to 3.^{0}C by the 2060's, and by 1.5 to 5.^{0}C by the 2090. Thus, the future weather is expected to exacerbate current climate variability, leading to more intense cycles of floods and droughts, unpredictable rains, affecting the over 90% of rural dwellers who depend on rainfed small scale farming. It will also exacerbate problems with infrastructure and dwellings, particularly in poor neighbourhoods in the urban areas.

159. During the last ten years the Shire River Basin experienced some of the worst droughts and floods in living memory. These floods undermine the achievements of the baseline programs described in section 1.2 by causing severe crop losses and hunger, infrastructure damage, disruption of electricity, loss of human and animal life, and compromised water quality (leading to diseases such as diarrhoea, cholera and malaria). Average annual crop and livestock losses range from 4% in Blantyre to 6.8% in Machinga.

160. In Machinga, smallholder farmers are not harvesting rain from rooftops for domestic use. An attempt was made to demonstrate this technology in Mtubwi EPA but it failed because of poor technical support from the extension service. When successfully implemented, this technology eases the workload and reduces time of drawing water for domestic purposes from distant and unhygienic sources. The proportion of smallholder farmers currently harvesting water for irrigation in crop fields is estimated at 35 % of the smallholder farmers that are currently engaged in all forms of irrigation. The methods commonly used for harvesting water at the farm are: river impoundment, flood diversion and spreading, road/foot path rain water harvesting, box ridging; construction of infiltration ponds; contour ridging and infiltration soak pits. River impoundment is done by using sacks filled with sand.

161. Adaptation alternative: The project will support the adoption of landscape level ecological measures complemented by physical water management infrastructure to reduce risk of climate change induced floods and enhance resilience against unusually harsh and frequent droughts in selected hotspots (covering over 500,000 ha of farmlands and 6 urban canters). It will therefore facilitate the construction of public and domestic water harvesting, storage and distribution and small-scale community based flood control structures to reduce climate change driven flooding and regulate availability of water throughout the year in flood and drought hotspots. It will also support the establishment of ecological structures to protect urban infrastructure, including roads and promote the expansion of water harvesting from rooftops of houses in both urban and rural areas.

Additional cost of the alternative

162. The government, the private sector (commercial farms), and individuals have been using dams and other water harvesting infrastructure, including measures meant to protect roads and other infrastructure. However, much of this has not fully factored climate change considerations in the citing or building processes. The project will provide the additional cost of ensuring that such works consider the projected challenges related to the changing climate, to the extent possible. It will also provide the additional cost required to build new and "climate-proofed" structures. The costs are presented in the table below.

Institution	Amount
GEF resources requested	1,272,000
UNDP Co-finance	400,000
Government through district staff and cash for funding baseline programs	6,500,000
Total	8,172,000

163. Output 3.1: Construction of mini dams[25], water ponds, retention ridges, and water diversion structures: construction of water management structures will be done in strategic places to capture and store water, reducing risks of climate change induced floods while regularizing availability of water throughout wet and dry seasons, and recharging ground water-table, thus keeping the wells and boreholes operational in dry season. The baseline survey has identified locations of these dams at Nyuswe-Makanaria catchment and Mpira River area (TA Nyambi) in Machinga and Jalasi in Mangochi district. Besides several ecological benefits, these dams / water ponds will provide drinking and irrigation water to the nearby villages. The project will use the information collected under outcome 1.1 and adaptation plans formulated under outcome 1.2 to confirm the preliminary sites identified during the PPG. A technical agency will be hired to provide technical expertise on the identification of suitable sites and construction of mini dams to ensure that they meet all technical specifications, are robust and cause no unwanted or unintended negative environmental or social impacts.

164. Two types of mini-dams were identified at PPG. These are: i) embankment ponds with a capacity of about 12,000m^3, with wall heights ranging from 3-10 m, and a unit cost of US $ 6,000 to $ 12,000: ii) nullah ponds with wall height from 5-11 m and a unit cost ranging from $ 7,000 to $ 14,000. The nullah ponds intercept water from one medium -sized nullah and the water stored can be used for multiple purposes including domestic use, livestock watering and other activities such as fish production. The Water is often available up to six months after the end of the rainy season but can be sometimes available year round, depending on size and management. The impact of mini-dams can be increased significantly by the provision of a scheme to supply the water from the mini-dam closer to the homesteads where it is being used.

165. These mini dams will be constructed in full-consultation with the TAs, ADCs and VDCs. Lead role will be provided by the EDOs and DAESS, with technical assistance of the technical agency. Dialogues with the local authorities and communities will be held to mobilize their in-kind support (in the form of labor and land, in case the mini-dams are on the private land). As per the feasibility study, water channels will be constructed for the delivery of water to the villages for domestic, livestock and irrigation needs. Members of the VDCs will be trained in the equitable distribution of water, collection of revenues, and operation and maintenance of the dams and water channels. A reasonable amount of revenue will be charged from each water user and the amount will be used for operation and maintenance. To prolong the life of dams, proper watershed management in each catchment will be practiced (described in outcome 5). The activities include the construction of small gabion walls at appropriate sites to stop land sliding and siltation. In particular silt will be checked via construction of dam walls protected by vertivar, elephant grass agave plants.

166. Output 3.2 will focus on construction of physical structures to support infrastructure and expansion of water harvesting from dwellings. In Mangochi town, a great deal of infrastructure is being established to exploit the benefit of tourism along the lake beach. However, this infrastructure is vulnerable to flash floods. The construction of small scale flood reduction / water diversion structures and in this area would be highly

[25] A UNDP funded project in Pakistan was instrumental in the construction of some 170 mini dams in a rainfed district [Lachi Tehsil, District Kohat] which has changed the life of people.

beneficial to protect the infrastructure. The flood reduction structures may also include gabions, culverts, integrated with ecological measures (such as protective vegetation, hillside terraces planted with perennial trees and shrubs, stones bunds, etc.) to improve water drainage and reduce damage from intense climate change induced floods, with the support of a Technical Advice from engineering companies or institutions. The contractor will facilitate formulation of detailed plans in consultation with the DEC, AECs, ADCs and VDCs, based on an assessment of structures at risk from climate related disasters. They will then formulate a plan for protecting the infrastructure, based on assessment of lessons and best practices. This will be accompanied by a fundraising plan for financing those measures that cannot be financed through the proposed project due to limitations of budget. However, it is expected that many of the measures will be simple and can be implemented through a food for work program.

167. Under this output, the project will also facilitate communities to establish roof-top water harvesting structures with the pre-condition that the households improve their roofing structure prior to getting the assistance. These roof-top water harvesting structures will be established by the communities under the supervision of project trained artisans. The project will train at least 50 extension workers and sensitize 1,000 VDC members to construct rainwater harvesting structures (in conjunction with output 1.3), and to develop and implement a cost-sharing and/or cash grants program to finance the adoption of roof top water harvesting technologies.

Outcome 4: Rehabilitation of badly degraded forests, protection of riverbanks, lake shores and urban infrastructure

168. Baseline: Mangochi has a total area of 627,300 ha (6,273 km^2) of which 238,374 ha, representing 38 % is classified as forest. Consumption of forest resources is mainly from customary land because of open access regime, which is responsible for deforestation and degradation. Machinga District is actively participating in tree planting as one way of reversing deforestation and rehabilitating degraded. The District is presently engaged in the implementation of Phase II of the Improved Forest Management for Sustainable Livelihoods Programme (IFMSLP) and the Lake Chilwa Basin Climate Change Adaptation Programme (LCBCCAP), but these initiatives are not being implemented in the selected hotspot. The District has a large number of *Eucalyptus* plantations established in the past, which are contributing to drying up of water bodies, land degradation and loss of biodiversity.

169. Machinga District has two public forest reserves: Liwonde measuring 24,352 ha and Malosa measuring 2,826 ha. The two reserves were established in 1924 but their sustainability is currently threatened by rampant deforestation. The district however has 20 Village Forest Areas (VFAs) out of which only 7, representing 35% are registered while 13 are not yet registered. TA Chiwalo has the most VFAs (5) but they are not registered. TA Nkula has three VFAs, all of which are registered. Registration is a crucial stage in the legitimization of forests in line with standards and guidelines for participatory forestry in Malawi. Degradation is particularly rampant in Ndaje and Matandika (deforestation) and Chaone and Nchilima (degradation through encroachment). Forest fires are among the major causes of environmental degradation and a threat to biodiversity. Such is especially true for Machinga which has experienced an increasing trend of incidence of forest fires plus area of forest damaged by such fire since 2003 (loss of 411 ha of forests since 2003-2012). The fires have mainly been caused by bush fires set by charcoal producers.

170. The pilot districts are also a major source of charcoal consumed in the urban areas (main source of household energy is fuel-wood and charcoal. Although district specific data for charcoal production is not available, it is important to remember that Malawi's energy balance is dominated by biomass accounting for 97% of production; 59% of it used in its primary form as firewood (52%) and residues (7%), the remaining 41% is converted into charcoal in traditional earth moulds at very low thermal efficiencies (less than 10%). As reported in the threats analysis, the four major urban areas use about 6.08 million standard bags of charcoal annually (UNDP[26], Kambewa *et. al.*, 2008), requiring 1.4 million cubic metres of wood and about 15,000 hectares of forestland cut per year (Kambewa *et. al.*, 2008). There are no biogas plants or solar heating or cooking in the pilot districts.

26 Mutimba and Kamoto: Review policies and regulations on charcoal and how to promote a systems approach to sustainable charcoal production and use in Malawi: Draft Report for UNDP. 2013

171. **Adaptation alternative:** The project will put in place measures to secure the current investments from climate related risks. These will include rehabilitation of badly degraded forests, protection of riverbanks, lake shores and urban infrastructure. This will improve land cover, infiltration and base flow; increasing the ability of the landscape to regulate water flow during droughts and floods, offering ecological protection from climate change induced droughts and floods.

172. **Cost of the alternative**: There are several development partners supporting communities to plant trees in a bid to rehabilitate watersheds. Both Districts are presently engaged in the implementation of Phase II of the Improved Forest Management for Sustainable Livelihoods Programme (IFMSLP) and Machinga is involved in the Lake Chilwa Basin Climate Change Adaptation Programme (LCBCCAP), but these initiatives are not being implemented in the selected hotspot. The Districts have large number of *Eucalyptus* plantations established via past development support, which are contributing to drying up of water bodies, land degradation and loss of biodiversity. These, and the investments from the baseline in support of extension services will provide baseline funds upon which the project will build to ensure forest rehabilitation and management program that is built on the scientific information and community based adaptation plans made under component 1. The cost details are provided below.

Institution	Amount
GEF resources requested	1,100,000
UNDP Co-finance	200,000
Government through district staff and cash for funding baseline programs	8,500,000
Total	9,800,000

173. Output 4.1: Degraded watersheds (forest ecosystems) rehabilitated, river Banks and Lake shores protected from direct siltation; Under this output, the project will support communities to rehabilitate critical landscapes identified via the knowledge and adaptation plans formulation (outcome 1.1 and 1.2). The project will in particular facilitate better management, protection and rehabilitation of the community forests amounting to over 220 hectares per hotspot, part of the Phirilongwe and Machinga forests. The project will also support the registration of the 13 Village Forest Areas, bringing the number of registered community forests to 20. It will then support the capacity of the Village Forest Area management committees to enforce compliance with community forest management processes, including the control of wild fires, which burn out young seedlings, hampering regeneration. The project will also facilitate the protection of river banks and lake shores by supporting compliance with the environmental byelaws provisions that prohibits cultivation of annual crops within a certain distance. Communities will be encouraged to plant permanent crops with economic or food security value along river and lake shore banks, such as bananas, fruit trees, elephant grass, etc. Activities to be undertaken will include identification of critical landscapes for rehabilitation, selecting the right measures for rehabilitation, establishing tree nurseries, planting selected multi-purpose trees / shrub species on field boundaries, roadsides and footpath sides, planting of deep-rooted pants species in gullies and creeks on sloping land to control erosion, etc.

174. Output 4.2: provision of improved and sustainable supplies of energy, including adoption of sustainable charcoal: Under this output, the project will facilitate the community to diversify sources of energy and to engage in sustainable charcoal production, building on the experiences, capacity and methodologies being developed for sustainable charcoal by the GEF 4 Land degradation project. Improved energy technologies will include solar lighters and cookers, liquefied petroleum gas (LPG), establishment of biogas from livestock and/or human waste and low energy consuming cookers. This will be supported by establishment of woodlots on individual farms (where possible) and/or community areas.

175. The project will facilitate adoption of biogas from animal and/or human waste in homes and public institutions. A scheme of micro credits and/or grants will be used to encourage uptake. The project will engage a company or an NGO with expertise in rural and decentralized energy to facilitate the output. The contractor will undertake a detailed feasibility study to explore the establishment of market for LPG and its widespread use. The study will be shared with the private sector to encourage them to invest in this sector.

176. The project will also work with charcoal producers to facilitate adoption of sustainable charcoal, where charcoal still remains the viable option. Sustainable charcoal refers to charcoal produced from sustainably managed woodlots, woodlands or forests combined with improved processing and utilization techniques, where the conversion along the charcoaling chain is as efficient as the current levels of technology allow

(ESD, 2007). Sustainable charcoal concept aims at minimizing material and energy losses at all stages of the charcoaling chain. In this case, wood obtained from sustainably produced biomass resource is harvested using efficient ways ensuring minimum waste is generated. The wood is then converted into charcoal using improved and efficient kilns after which proper handling is ensured during packaging, storage and transportation to minimize waste. The generated charcoal is consumed using improved cookstoves such as the Kenya Ceramic Charcoal (KCJ), and finally, the charcoal dust is used as fertilizer.

177. Under this output the project will facilitate access to technology for efficient production, processing and consumption of charcoal is adopted locally and, that key stakeholders strengthen capacities for sustainable charcoal and that local level governance to support sustainable charcoal is improved. The project will therefore facilitate the formation of charcoal associations and train members on improved charcoaling processes, with a view to obtaining improved charcoaling technologies, based on agreements to comply with the provisions of sustainable charcoaling.

178. The charcoal associations will also be vehicles for disseminating information on better conversion methods and sustainable forest management principles. The project will also facilitate access to loans to invest in better production technology. Specific activities will include supporting local governments and communities to review existing local regulations and to make them more accommodating of sustainable charcoal production (ordinances and byelaws), strengthening capacity for the implementation of the revised regulations by both communities and local government.

179. Output 4.3: Diversification of household food basket and incomes via expansion of aquaculture and NTFP to reduce pressure on the forests, river and lake fisheries**:** Forest-based enterprises can be a source of substantial income and hence a motivation towards better management of forests. In Machinga, a total of 90 entrepreneurs have had the opportunity to make a living out of forest products through bee keeping; making curios and growing mushroom. So far, forest-based enterprise development has mainly been confined to TAs Nkula and Sitola, but it is facing difficulties of accessing markets and inputs (for example mushroom production has collapsed due to scarcity of inputs). The project will investigate opportunities for NTFP based enterprises, learning from numerous lessons available in the country and abroad, to select only those that are sustainable, have markets that can be sustained and have potential for boosting incentives for better forest management. The project will then develop criteria to identify community members who have existing interest in establishing businesses and can service loans, issued via microloans arrangements. Women will be particularly encouraged and trained in establishing plant nurseries as enterprises. To encourage their involvement, the project will develop a system of PES and pay to compensate the VDC members based on the number of standing trees.

180. Fisheries play a key role in the economy of Malawi and the household food security in the selected hotspots. However, there has been a downward trend in fish catch in the rivers and lakes with the exception of a spike in Usipa and Mbaba that were caught in large in numbers in 2012. Under this output, the project will also build on the experience gained so far by the aquaculture program, to increase the number of farmers engaged in fish farming, ensuring that construction of ponds is in line with best practices. It will use a combination of grants, micro lending and cost sharing system to establish fish ponds and provide fingerlings. It will then provide training on fish farming. In addition, it will empower the environment management committees to enforce the rules and regulations of sustainable fishing in the rivers and lakes. This will include raising awareness of the communities, particularly the fisherfolk, on the existing byelaws, and strengthening patrols via community guards.

181. Due to the current capacity deficits in the extension service, one or more civil society entities with community facilitation expertise and capacity will be contracted to lead outcome 4 working under the supervision of DAESS, EDOs, DFOs and VDCs, supported by TA, DECs, ADCs and local NGOs such as TLC.

Outcome 5: Productivity of agriculture supported by adoption of climate smart agriculture practices:

182. Baseline: As highlighted in the NAPA and the MGDS (Malawi Growth and Development Strategy), Malawi continues to pursue an agriculture-led rural economic development. The Agricultural Input subsidy program provides inputs (fertilizer and seeds), training on improved farming practices, agroforestry and

improved post harvest management. Nevertheless, soil erosion continues to compromise the potential of the subsidized fertilizer to increase food production by negatively affecting natural soil fertility. Currently, the basin experiences annual losses of up to 11-50 tons of soil per hectare NAPA (2006) even on a normal rainfall year. The consequent loss of soil organic matter reduces the effectiveness of fertilizer, lowering profitability, and undermining sustainability of the program. The 2010 review of the fertilizer subsidy program reported that long-term sustainability of the fertilizer use on maize produced by smallholder farmers was constrained by profitability and affordability, and recommended substantial reductions in fertilizer prices and/or the development of low cost and accessible financial services. However, development of such financial services for fertilizer use in maize production requires that maize be profitable, that smallholders have other sources of cash income that can be used to repay fertilizer loans when the majority of the maize they produce is for home consumption, and that very low-cost systems are used for loan disbursement and recovery. These measures are difficult because rural credit markets are underdeveloped and the costs of credit administration are too high, as are risks for both borrowers and lenders. Poor infrastructure and high transport costs lead to high input costs, inhibiting the development of input supply systems in less accessible areas. Highly variable maize prices add to the risks of input use (whether purchased with cash or credit)[27].

183. There are, however, cheaper and more sustainable ways of making the fertilizer subsidy program more profitable – through the adoption of climate smart farming practices and technologies that reduce soil erosion, increase soil fertility and mitigate the damaging effects of droughts and floods. The use of trees and shrubs in agricultural systems helps tackle the triple challenge of securing food security, mitigation and reducing vulnerability and increasing the adaptability of agricultural systems to climate change. Nitrogen-fixing leguminous trees and shrubs can be especially important to soil fertility where there is limited access to mineral fertilizers, or they increase the use efficiency of added inorganic fertilizers. Studies indicate that fertilizer is more effective in soils with high organic matter.

184. In Machinga, cultivated area covers 56% of the district (140,000 ha out of a total of 249,387 ha), out of which 69% is perceived to be experiencing severe erosion. Out of 11 EPAs in Mangochi, 1 (Mthiramanja) experiences the highest vulnerability to soil erosion (described as very severe) followed by the three EPAs of Ntiya, Katuli and Nasenga where the state of erosion is described as severe. Erosion in the other 7 EPAs is considered to be moderate to low. PPG assessments revealed that in Machinga only 24% of household use some aspects of climate smart agricultural such as short cycle and drought tolerant crop varieties. Presently, the district has 161.5 Ha under Conservation Agriculture with the participation 1,544 smallholder farmers (691 male and 853 female).

185. In Machinga, the area under agro-forestry is estimated at 144.6 Ha with the participation 529 farmers (247 male, 282 female), representing 0.13%. Although about 51% of the households grow fruit trees, the majority grow mangoes and citrus, with over 80% of the trees so old that fruit production is minimal and of poor quality (small fruit with large seed for mangoes). Fruit tree species are usually not prioritized because they take time (3 – 8 years) to bring returns, which is considered too long by most smallholder farmers. Most smallholder farmers look for initiatives that bring quick returns like short cycle crops. On the other hand, most extension workers are also not skilled in fruit tree propagation and this contributes to the low prioritization among the technologies and approaches being propagated. For instance, in Machinga only 4 AEDOs (all male) have fruit tree propagation skills.

186. They major crops grown the in the two impact districts based on area (hectare) under cultivation) are maize, pigeon peas, sweet potatoes, sorghum, groundnuts, cassava, rice and burley tobacco. Other crops cultivated include beans, sunflower, soya bean and cow peas. On an average, over 50 % of all the land under field crops is dedicated to maize production whereas the remaining 50 % is shared among the other dozen crops, and that only signifies the level of importance that is placed on maize as a key crop, not only in this area, but also in entire Malawi. Comparatively, Mangochi has most of its cropland dedicated to maize production (64 %) compared with the Machinga, which dedicates 40 % to maize production. None of the other crops is allocated more than 15 % of crop land.

[27] Andrew Dorward, Ephraim Chirwa, T.S. Jayne – 2010: Review of theMalawi Agricultural Inputs Subsidy Program, 2005/6 to 2008/9

187. Furthermore, analysis of the trend in land allocation to various crops for the period 2008/09 to 2011/12 shows a general increase in land allocation to almost all crops except for pigeon peas. Despite being considered as secondary crops, cassava and sweet potato are the highest yielding crops grown in the area (over 15,000 metric tons per hectare) followed by tobacco and maize while millet and cowpeas are the least.

188. **Adaptation alternative:** The project will facilitate the adoption of climate smart measures to reverse the simplification of the agriculture system that has systematically weakened its ability to secure food supplies for a majority of the families. These measures will also enhance water use efficiency under irrigation, thereby increasing the effectiveness of the agriculture input subsidy and the national irrigation scheme. Measures will include climate smart irrigation practices, conservation agriculture practices, integration of agroforestry species, short-cycle, drought-tolerant crop varieties and multiple-use tree species.

Cost of alternative

189. Under the Agriculture Extension Program, the government is providing extension service covering all aspects under this outcome. The extension message however falls short of the climate smart components and are inadequately provided to farmers due to the low staffing levels, lack of operational funds and low staff morale. Working directly with farmers to adopt these new and additional climate smart technologies and methodologies, dispersed effectively as to reach farmers, land users on time, is additional to the budgets of the District extension services. The contribution from various sources is shown below.

Institution	Amount
GEF resources requested	1,334,200
UNDP Co-finance	400,000
Government through district staff and cash for funding baseline programs	8,500,000
Total	10,234,200

190. **Output 5.1:** adoption of climate smart farming practices including water use efficiency in small scale irrigation systems improved: This output will focus on adoption of climate smart farming practices, which will include diversification of crop mixes on farms, use of conservation agricultural practices such as zero tillage, agro-forestry, adoption of higher yielding varieties, etc. Under this output, the project will promote drought tolerant but high yielding crops such as sweet potatoes and pigeon peas, linked to actual market outlets to increase incentives for adoption. The use of drought tolerant but high yielding maize, in combination with leguminous crops, such as pulses and groundnut will also be promoted where farmers hesitate to replace the dominant maize crop. Legumes have not benefited much from formal arrangements for production research and marketing, yet there is evidence that prices for legumes are better than for maize on international markets. The project will therefore facilitate farmers to overcome the current constraints in production of legumes, which include low productivity of existing varieties, unavailability of seeds of improved varieties, inadequate seed supply systems and inadequate access to high value markets. The project will help identify market opportunities, promote grading and standardization of the products, develop quality management systems and disseminate market specific crop management practices.

191. Seed banks of the drought tolerant crop varieties and legumes will be maintained in the villages. The project will procure the seeds from the market or international research centres and distribute them to selected seed growers. The project will commit to buy back two-third of the seed from the growers and distribute for further distribution to other farmers. This is expected to replace the low yielding varieties in a short-period of time.

192. As part of agroforestry, the project will introduce new and high yielding varieties of mangoes and citrus and train farmers in grafting and orchard management. This will replace the hundreds of native mango and citrus trees currently on farms which are too old, low yielding and produce very low quality of fruits. The communities will also be trained in conservation tillage (no/minimum-tillage, ridge plantation, mulching). Done professionally, adoption of this form of cultivation has demonstrated reduction of production costs because it minimizes the cost of ploughing while increasing yields by up to 20%.

193. Under this output, water use efficiency in small scale irrigation systems will be promoted to address climate induced irregularity of rainfall patterns (drought) while improving productivity of the land. It has

been demonstrated by the DARS that the drip irrigation enhances productivity of maize, tomato and other vegetables to several folds[28]. The project will advocate the uptake of solar water pumps coupled with drip irrigation systems. Communities will be sensitized and trained on installation and maintenance of the pumps plus drip irrigation[29]. This output will benefit from the research conducted at the LUANAR, DARS, CIMMYT, ICRISAT and ICRAF on the farming systems research. Technical expertise will be sourced from these institutions to promote those systems which increase income of the poor on sustainable basis and are also good for the health of the ecosystem.

194. Output 5.2: Uptake of climate safe post-harvest management technologies and practices by more than 30 % of producers reduce postharvest losses by about 35% for grains, fruits, vegetables, fish

195. The sustainability of the impacts of the input subsidy program is further threatened by climate change induced post-harvest losses. This is because the post-harvest management practices advocated through the program have not factored in the new climate change driven challenges to post-harvest management. In Machinga, 6 TAs have additional farm produce to justify investment in post-harvest management practices. These are: Chikweo EPA (T/A Ngokwe area and part of T/A Nkoola); Mbonechera EPA (Mangamba, Chisuwi and Mjahito areas); Nanyumbu EPA (Chiuja, Nanganga and Mpamba areas); Nyambi EPA (T/A Nyambi, Chiwalo and Mapata area in T/A Kapoloma); Nsanama EPA (Saidi Mataka and Lambulira areas); and Domasi EPA (TAs Chamba and Mposa), which produce extras of maize, sorghum and pigeon peas and rice. Generally, all the 11 EPAs in Mangochi have additional farm produce to justify investment in post-harvest management practices. These EPAs produce extra quantities of maize, groundnuts and sorghum. Katuli EPA also produces extra quantities of beans. Majority of farmers produce fruits, and although the fruit is of low quality, much of it rots during peak harvesting season (especially mangoes and citrus).

196. In addition, both districts experience high post-harvest fish losses, although data on losses is currently unavailable. Post harvest losses occurs due to *(inter alia)* poor handling (no chilling after catch and poor cleanliness of the fishing vessels; poor processing methods (use of traditional pit fire for fish smoking, the use of reeds for construction of drying racks instead of chicken wire, poorly spread fish on drying racks, use of unclean facilities and water for washing and processing and long time-lag during processing (fish takes long periods between capture and processing). The species that are mostly affected after catch include: *Usipa, Utaka, Mbaba, Kamnpango, Mlamba and Chambo* in the order of magnitude.

197. Adoption of climate-safe post-harvest management practices is still hampered by several technical, financial, skills and market barriers. Research on post-harvest technologies in the country is limited, and the few innovations have been poorly disseminated. Private sector involvement in market development for post-harvesting technologies has been limited, compounding the inaccessibility of the technologies by farmers, which further reduces the demand for the technologies. This in turn keeps the supply low, which consequently keeps the cost of production (and prices) relatively high. These barriers are compounded by the lack of policy based incentives for both research and private sector involvement in the post-harvest technology development, dissemination and adoption. The productivity gains from the subsidized input program are, therefore, threatened by the lack of an explicit policy based incentives to support the adoption of climate safe post-harvest management practices.

198. Under this output, the project will develop skills and institutional arrangements for individual and/or communal climate safe post-harvest management practices and storage facilities disseminated, leading to adoption of improved practices. The project will firstly undertake a study on the post-harvest losses of grains, fruits, vegetables and fish in the project area and the current post-harvest practices. LUANAR will be supported to undertake research on post-harvest losses and its management. A graduate research program will be developed in which teaching, research and extension institutions will take part so that the recent knowledge developed by the research institutions is taught to the students as well as quickly transferred to the farmers (listed under Output 2.1.3). DAESS staff will be supported to produce district specific datasheets, videos, and radio messages in local languages for a wider dissemination of information. Short-courses and diplomas will be arranged for the farmers, youth and extension workers in post-harvest technologies,

[28] www.cabi.org/gara/FullTextPDF/2008/20083327044.pdf

[29] A company in Lilongwe is already supplying solar water pumps in Malawi

pesticide use / handling, health hazards and precautionary measures. Pesticides Control Board (PCB) will also be taken on board to control quality of the pesticides available in the market, and timely availability of pesticides supplies to the farmers. The project will work closely with VDCs and ADCs through the DAESS, and the community activists will be offered Trainers course in various fumigation techniques (grain bags covered with polythene, construction of improved silos with various materials, sampling methods to determine the need of fumigation, etc.), who will then transfer the technology to other farmers, or set up their own businesses in this trade.

199. Under this output, the project will also set up financial mechanisms, marketing channels and extension services and train local artisan to up-scale and ensure sustainability of the improved climate safe post-harvest management practices and technologies (in conjunction with output 2.2);. The activities under this output will be implemented by DAESS, ADCs and VDCs and supported by the local banks and NGOs. It is planned to undertake a feasibility study for developing entrepreneurship for making tin or cement silos. These will be provided with matching grants to support and scale up their existing entrepreneurship in silos making and fumigation and sale of pesticides. It is anticipated that some of the Trainers will establish their own businesses and others will serve as trainers to sensitize the famers. The project will sensitize at least 1,000 farmers for improved post-harvest management.

200. Output 5.3: will facilitate the establishment of two community-based Climate-Smart Agriculture Centres (CSA Centre) will be established at the most strategic sites, where maximum number of farmers could get advantage. These centres will provide space for agro-input shops (seeds, fertilizers, pesticides, water pumps and drip irrigation systems), repair and maintenance businesses, agricultural implements on rental basis; shops for the purchase of agricultural products from the farmers (shops / dealers linked with the market), grain storage facility on rental basis, cold stores on rental basis, community training halls, worship areas and children playgrounds. These centres will offer training and promotion of climate smart agriculture, and serve as one-stop-shop for the supply of inputs and sale of farm products. These centres will be managed by the ADCs in partnership of the VDCs and supported and guided by the project and DAESS. The project will provide a detailed study of establishing the CSA Centre, however, the financing for establishing these will be provided by the GOM and other donors.

201. Project Management costs

Institution	Amount
GEF resources requested	250,000
UNDP Co-finance	500,000
Government through district staff and cash for funding baseline programs	500,000
Total	1,250,000

Table 15: Indicative activities per output under outcomes 4,5 and 6 (component 2)

Outcome 3: Public and domestic water harvesting, storage and distribution reduces climate change driven flooding and regulates availability of water throughout the year in flood & drought hotspots	
Output 3.1: Construction of mini dams[30], water ponds, retention ridges, and water diversion structures:	➢ Detailed feasibility study on mini dams, water ponds and community based water diversion structures for infrastructure protection in the entire two pilot districts ➢ Preparation of training manuals, IEC material in local languages, production of manuals and provision of training to communities in improved water harvesting techniques (construction of mini-dams, water ponds, pits, retention ridges, etc.). ➢ Mobilization of DECs, ADCs and VDCs (in-kind contribution of land and labor) and construction of mini dams, water ponds, water channels and water diversion structures to provide water to communities for drinking and irrigation purposes and safeguard infrastructure. ➢ Construction of demo roof-top water collection system and storage tanks for improved domestic water supply. ➢ Tree / shrub plantation and bio-engineering campaigns / activities by the community activists to check siltation and increase life of the dams.
Output 3.2	➢ Survey of infrastructure at risk from flooding and other climate risk related disasters;

[30] A UNDP funded project in Pakistan was instrumental in the construction of some 170 mini dams in a rainfed district [Lachi Tehsil, District Kohat] which has changed the life of people.

Construction of physical structures to support infrastructure and expansion of water harvesting from dwellings:	➢ Identification of best practices for securing infrastructure from floods and winds and other climate change related disasters, based on best experiences in the region and abroad; ➢ Formulation of a plan to implement the measures to secure infrastructure from the identified risks, fundraising for those measures that cannot be financed under the project budget (limited budget); ➢ Construction of small scale flood reduction / water diversion structures gabions, culverts, integrated with ecological measures (such as protective vegetation, hillside terraces planted with perennial trees and shrubs, stones bunds, etc.), some of it through food for work programs; ➢ Agreeing maintenance procedures and schedules, roles and responsibilities ➢ Train at least 50 extension workers and sensitize 1,000 VDC members to maintain rainwater harvesting structures (in conjunction with output 1.3); ➢ Design and implement program of cost-sharing and/or cash grants to community members to adopt water harvesting technologies
Outcome 4: Rehabilitation of badly degraded forests, protection of riverbanks, lake shores and urban infrastructure	
Output 4.1: Degraded watersheds (forest ecosystems) rehabilitated, river Banks and Lake shores protected from direct siltation	➢ Using information generated under outcome 1, agree on forest rehabilitation and protection techniques, based on best practices (might include protection of specific areas, enrichment planting and/or protection from fires); ➢ Support the implementation of forest and watershed improvement practices such as enrichment planting, protection from fires, etc.; ➢ Facilitate the registration of the 13 Village Forest Areas, bringing the number of registered community forests to 20. ➢ Support the Village Forest Area management committees to produce and disseminate awareness raising on environmental bye laws related to sustainable management and use of village forest areas; ➢ In conjunction with the capacity building output 1.3, support the Village Forest Area management committees to enforce compliance with community forest management processes, including the control of wild fires, which burn out young seedlings, hampering regeneration. ➢ Facilitate the protection of river banks and lake shores by supporting compliance with the environmental byelaws provisions that prohibits cultivation of annual crops within a certain distance.
Output 4.2: provision of improved and sustainable supplies of energy, including adoption of sustainable charcoal	➢ Develop household energy profiles and assess charcoal production from the two districts, to identify inefficiencies and likely intervention measures; ➢ Facilitate demonstration of energy saving technologies, including biogas, solar lamps and cookers, and adoption, particularly in public institutions (schools, hostels, hotels, army camps, jails, etc.); ➢ Facilitate formation of charcoal producer associations and facilitate them to adopt sustainable charcoal production techniques; ➢ Design a cost sharing program for households and charcoal producers to invest in energy efficient technologies; ➢ Facilitate establishment of household energy woodlots using fast growing species
Output 4.3: Diversification of household food basket and incomes via expansion of aquaculture and NTFP reduce pressure on the forests, river and lake fisheries	➢ Assess potential for NTFP based enterprises, learning from numerous lessons available in the country and abroad, select only those that are sustainable, have markets that can be sustained and have potential for boosting incentives for better forest management. ➢ Develop criteria and apply to select potential entrepreneurs, particularly those with existing interest in establishing businesses and can service loans, issued via microloans arrangements. ➢ Develop and apply criteria to select potential fish farmers from amongst the community members; ➢ Design and implement micro-lending program for the establishment of NTFP based enterprises and fish farms; ➢ Provide training for the implementation of the NTFP enterprises and fish farming, to new and old farmers; ➢ Assist entrepreneurs to link with markets and provide training on improved processing and trading.
Outcome 5: Productivity of agriculture supported by adoption of climate smart systems and measures	
Output 5.1: Adoption of climate smart farming practices including water use	➢ Facilitate access to seeds of high yielding drought tolerant crops such as sweet potatoes and pigeon peas, maize, legumes, groundnuts, sorghums; ➢ Investigate high value markets for unusual crops such as sweet potatoes, sorghums, etc. and facilitate farmers linkages to them;

efficiency in small scale irrigation systems improved	➢ Assess training needs for farmers on the adoption climate smart agriculture, including improving irrigation practices; ➢ Develop training programs and train farmers on conservation tillage (no/minimum-tillage, ridge plantation, mulching), and water efficient irrigations practices using farmer field schools methodology; ➢ Facilitate access to pumps, in particular solar water pumps coupled with drip irrigation systems, including designing and implement cost sharing scheme to enable farmers to acquire pumps and drip irrigation systems
Output 5.2: Uptake of climate safe post-harvest management technologies and practices by more than 30 % of producers reduce postharvest losses by about 35% for grains, fruits, vegetables, fish	➢ Undertake an assessment of the current post-harvest management practices and losses of grains, fruits, vegetables and fish in the project area and the current post-harvest practices (building on the PPG assessment) and identify best practices. ➢ Support LUANAR to establish a graduate research program on post harvest management technologies involving other partners (teaching, research and extension institutions); ➢ Facilitate production of extension material supporting adoption of better post harvest management technologies; ➢ Train technicians to construct better silos, appropriate technology based equipment for fish handling and processes; ➢ Develop and implement a cost sharing scheme to incentivise a widespread adoption of improved post harvesting technologies for fruits, grains, vegetables, fish, etc.
Output 5.3: establish two community-based Climate Smart Agriculture Centres	➢ Identify potential entrepreneurs with interest and threshold capacity to set up climate-smart agricultural centres as viable business ventures; ➢ Assist the selected entrepreneurs to develop business proposals and to link to financial institutions for capitalization; ➢ Provide some level of support for the initiation of the businesses (training, etc.)

2.5 Key indicators, risks and assumptions

2.5.1 Key performance indicators

202. The outcome indicators are elaborated in the SRF, and summarized in the table below.

Table 16: Key indicators

Indicator	Time scale and Measurement
Objective level: ➢ Percentage population believing to be highly vulnerable drops to less than 40% ➢ 35% decline in households facing annual food deficits ➢ 40% reduction in soils going into the water bodies; 50% in EPAs reporting severe rates of erosion ➢ 50% increase in the average scores for both communities and institutions; ➢ At least ten networks and 15 communities through which lessons learned are disseminated (including exchange with communities implementing the IFAD, the WB and UNDP other LDCF projects)	Time Frame: By end of project Measured by: PIR reports; Gender disaggregated data collected using the participatory learning, monitoring system and reported via project reports, publications and PIR
Outcome 1 ➢ At least ten Publications on ecosystems and adaptation ➢ 6 comprehensive community based adaptation plans; ➢ community level indicators for long-term monitoring of adaptation agreed ➢ % of targeted population affirming ownership of adaptation processes (disaggregated by gender)	Time Frame: By end of project Measured by: PIR reports; Gender disaggregated community members survey including vulnerability reduction assessment relative to baseline
Outcome 2 ➢ 50% improvement in Capacity Perception Index ➢ Extension package updated with climate risk management information ➢ New curriculum for Diploma on forestry and 200 forestry diploma graduates (50:50 on gender) ➢ 4 District level policies updated with climate risk management	Time Frame: By mid-term and end of Project Measured by: PIR, Capacity assessment scorecard

Indicator	Time scale and Measurement
provisions. ➢ District allocation to climate change issues increase from less than 2% to about 5%	
Outcome 3: ➢ Over 100% increase in number of physical infrastructures constructed to ensure sustainable water supplies and reduce disaster risks ➢ Over 100% increase in quantity of water stored in newly established structures ➢ Number of homes with water harvesting structures increase from 10% to about 35%	Time Frame: By mid-term and end of Project Measured by: PIR
➢ Outcome 4: ➢ Number of Village Forest Areas registered increase from 7 to 20 ➢ Hectares of forests under improved management increase to 225 ha per hotspot; ➢ Kilometers of river and lake shore under protection increase to about 200; ➢ Number of households using alternate and increase by at least 25% improved energy and decline in quantities of wood used for energy by at least 5 tons ➢ Percentage change in incomes derived from NTFPs and other enterprises increase by at least 25%	Time Frame: By mid-term and end of Project Measured by: PIR
Outcome 5: ➢ No. of hectares on which climate smart farming is practiced, and the % increase in productivity per acre or per unit of land; ➢ Water use efficiency in small scale irrigation systems improved by over 40% ➢ Number of farmers practicing improved post-harvest storage practices ➢ % reduction in post-harvest losses for those engaging	Time Frame: By mid-term and end of Project Measured by: PIR

2.5.2 Risks and assumptions

203. The success of this project is predicated upon shifting the mindset of district administrations, local authorities and land and resource users to accept and act on two issues: i) that the integration of climate change adaptation in development plans, programmes and land use practices makes economic sense and reduces the risks of climate-induced losses and damages over the long term; ii) that a combination of ecological, physical and policy measures provide a more cost effective means of adaptation, and thus of improving the effectiveness of the baseline programmes. The greatest risk to the project is resistance to the inter-departmental collaboration in a harmonised approach to the project implementation, driven by reluctance to change the sectoral approach to development. An additional risk is that development planners prioritize speed over quality of infrastructure investments, especially if the required coordination and cooperation within the sectors is perceived to be difficult and/or complicated.

204. This risk will be mitigated by creating the highest political support and buy-in of the project initiatives, particularly through the involvement of the Ministries of Finance and Developmentb Planning and Local Government and Rural Development. This has already started during the PPG. The project will have the National Climate Change Technical Committee as the highest policy body, hence providing a strong national to local levels interuction processes. This will allow the project to inform, while being informed by national developments, particularly the implementation of the recently finalized National Climate Chnage Policy. This will be complemented by an awareness raising programme and support to a simplified institutional arrangement for the collaboration. The PPG process raised considerable awareness in the project area about the need to deal with the risks of climate change. This awareness is however of a general nature, raised through the considerable work on climate change conducted by UNDP and other development partners, including local NGOs. What is lacking is specific engagement with the key stakeholders, providing them with

specific information, tools and technologies of addressing specific problems. Formulation of the community based adaptation plans and the training programme will provide relevant skills and an incentive for assessing climate risks and mainstreaming mitigation measures in daily life, thruogh policy, developmet programs and land use/resource use practices.

205. There are two additional risks to the long-term impacts of the project: i) that local systems, capacities and skills are inadequately applied to run and maintain the infrastructure introduced through the project, at a personal and/or common/public level, particularly the small dams, the terraces, soil bunds, and, the improved post harvest management systems: ii) that the political considerations cause a reluctance to linking some of the baseline programs (particularly the agricultural subsidy programme) to adoption by district councils of climate smart policies as a prelequisite for a communities/districts accessing the agricultural subsidy benefits. It is the mitigation of the two risks that forces this project to have a strong linkage to the newly established national climate management institutions, in particular the adoption of the National Climate Change Steering Committee as the top policy guidance body. This Committee is composed of key stakeholders in the field of Climate Change. Chaired by the highly influential Ministry of Development Planning and Cooperation (MDPC), this committee's objective is to provide a forum for effective policy dialogue on frameworks, priority setting, and ways and means of facilitating investment and transfer of technology on climate change initiatives in the country. It also aims to enhance collaborative project development and implementation, with a view to optimizing the contribution of climate change abatement and mitigation programmes to sustainable development, taking into account environmental, social, and economic factors. Day to day operations of the Climate Change Steering Committee is run by the Technical Committee on Climate Change, hosted by the new Ministry of Environment and Climate Change Management. The Technical Committee provides update and information related to national climate change programme and reports to the Steering Committee. They work closely with the Government-Donor Technical Working Group and membership includes stakeholders from all sectors.

206. Finally, the project includes the set up of micro credits and/or cash grants. There are several risks related to this component: one that the noble intentions of the funds might be derailed by innefcient bureaucratic systems and/or rent seekers, or mismanaged due to systems and cultural tendencies that don't emphasize on accountability by leaders at the local level. Second, that grants and loans are used to meet needs that are not quite related to the purposes they are intended for, especially given the high poverty levels in te rural areas, where many human needs go unfulfiled due to lack of money. Third, finances to support the establishment of NTFP and other enterprises could be misdirected due to the short duration of the project, with the attendant urgency to implement and show impacts versus the need for careful planning of investments. New businesses in rural areas tend to be prone to higher than average failure rates, especially when the project does not last olong enough to test the viability of the value chains (production standards, packaging, market linkages, etc.).

207. To mitigate these risks, the project will develop clear operational guidelines, apply them diligently; NTFP and other enterprises will engage both men and women with prior inclination/experience in business. Review of the previous cash for work programs (supported by Oxfam's world-wide monitoring and evaluation) shows that beneficiaries of cash-transfer programmes use the cash mainly for food purchase, repayment of loans, school books/fees/uniforms, clothes, livestock, and agricultural inputs. Although insignificant amounts were reported to have been spent on cigarettes and other items considered non-essential in terms of nutrition or livelihoods, it is believed that the same risk exists with in-kind distribution, and that stopping cash distributions will not stop people buying non-essential commodities. The fund will be maintained in $ account in a bank to protect it from local inflation, further the unspent amount will be invested in high-interest schemes to maintain its value. The service charge collected from communities will also help in keeping its value.

RISK ANALYSIS

Risk	Type	Description	Impact & probability *	Mitigating Options

Risk	Type	Description	Impact & probability *	Mitigating Options
Changes to the Farm Input Subsidy Program following elections (May 2014) and/or recommendations from program reviews	Strategic	The country is about to go through tripartite elections; following a new government, the nature of many donor programs, including the FISP may change slightly. The possibilities include continuation of the FISP in its present form, or reducing its proportion of national budget from 60% of the total agriculture sector budget, to a lower subsidized amount, or a gradual shift towards providing a higher % of the inputs provided on loan or credit, e.g. through the already newly introduced Farm Input Loan Program (FILP). The program is due to be evaluated once the new government is in place. There might therefore be some adjustments related to this review.		Consensus is however that after the Tri-Partite Election in May 2014 agriculture development, including provision or appropriate agricultural inputs, will continue to be the mainstay of economic policy of any incumbent president and party, as also clearly articulated in the different manifestos. Partner support to agriculture, including on quality input provision to needy farmers, is however without question. Indeed, any changes that might occur to the FISP are likely to be compensated via the Agriculture Sector Wide Approach program, which has now been included as one of the supporting baseline programs.
Weak capacities of the DAESS and other departments at the district level	Operational	At present the capacities of various departments is weak [vacant posts, lack of operational budget and transport] which may slow down the pace of implementation	Impact = 4 Probability = 3 Risk level = 4*3 =12 medium	The program will put a pre-condition for grant to build capacities of the counterpart departments Provision has been made for community development and mobilization staff in the project budget
Delayed implementation of baseline project by the GOM negatively affects LCDF project outcomes	Political and operational	Due to lack of budget, operational capacity and proper fund disbursement procedures the implementation rate of program could be slow	Impact = 4 Probability = 4 Risk level = 4*4 =16 medium	The funds could be released to UNDP to spend under cost-sharing or fund management modality. Separate account could be opened and GOM funds could be deposited in it and spent by using UNDP financial rules and regulations, but account is jointly managed by the NPM and NPD
Political commitment and will to prioritize climate change	Strategic	Shot-term issues may be prioritized over attention to the medium to longer-term climate change issues. Also some planners and experts do not recognize that climate change is happening	Impact = 4 Probability = 2 Risk level = 4*2 =8 low	Continued advocacy and awareness raising at all levels will be made to ensure that there is commitment to mainstreaming climate change into sector policies, plans and budgets
Climate shocks [floods and droughts] occur during the project implementation phase	Strategic	Major disasters may divert the attention / priorities of the District Government, shifting their attention to relief / emergency interventions	Impact = 3 Probability = 2 Risk level = 3*2 =6 low	UNDP and other UN Agencies will provide support to District Governments through relief project so that the attention from climate change program is not diverted. This will also be an opportunity to highlight the importance of climate change
Community Development Fund [CDF] established under the project may be	Financial	The CDF fund need to grow over time to maintain its value	Impact = 5 Probability = 4 Risk level = 5*4 =20	The project will develop clear operational guidelines, apply them diligently; NTFP and other enterprises will engage both men and women with prior inclination/experience in business.

Risk	Type	Description	Impact & probability *	Mitigating Options
misappropriated, misdirected, used to support other household needs, or lose its value over time due to inflation			High/critical	The fund will be maintained in $ account in a bank to protect it from local inflation, further the unspent amount will be invested in high-interest schemes to maintain its value. The service charge collected from communities will also help in keeping its value
High illiteracy levels in villages may hinder the progress of pilot interventions and/or dissemination of lessons learned as well as long-term maintenance of mitigation technologies;	Operational	Adoption is promoted by more understanding, knowledge of, etc. Maintenance of the structures and practices introduced necessary for long-term impacts	Impact = 5 Probability = 3 Risk level = 5*3 =15 medium	Train management committees and farmers involved in various interventions to ensure that they understand the tasks at hand. Disseminate project lessons via workshops, television and radio programmes in local languages to ensure that they reach a larger audience.

208. *Impact scale = 1 low, and 5 is high; Probability scale = 1= low and 5 = high; Risk Level scale 1-25 [impact score * probability score] 1-8 = Low; 9-16 = medium and >16 high

2.6 Cost-effectiveness

209. Strengthening the resilience of small holder agriculture to climate change impacts and improvement of watersheds in the Shire River Basin were identified in the NAPA as urgent and immediate adaptation priorities, with the highest immediate cost-benefit ratio. Adaptation measures that involve massive engineering solutions and extensive use of technologies are beyond the reach of many rural communities in Malawi. The project's focus on developing adaptive capacity and use of nature based solutions in combination with some soft engineering processes provides practical and locally appropriate "soft" adaptation measures, which are highly cost-effective. The project aims to reach a total of about 91,674 households who will directly benefit from community livelihood enhancement of initiatives. Using a community based approach to adaptation while ensuring that the adaptation plans are informed by scientific information and local knowledge of current and projected climate risks empowers the climate vulnerable communities to plan for and adapt to the impacts of climate change.

210. This approach ensures that adaptation plans are based on local priorities, needs, knowledge and capacities, taking into account social diversity, hence providing an opportunity for communities to build the resilience of vulnerable individuals, households, communities and societies from the ground up. Although the project will not have the budget to support the implementation of all the provisions of the community adaptation plans, the comprehensive assessment of resilience has value to the community since vulnerability to the impacts of climate change has strong overlaps with poverty and marginalisation. It therefore makes sense to examine these dynamics, so as to find ways of addressing climate change impacts along with the underlying development issues. Other alternatives were considered under each outcome, and eventually discarded for the following cost-effectiveness considerations.

211. Under planning, the participatory approach could be replaced by a prescriptive top-down one, where the project formulates adaptation plans without the community involvement and try and enforce them. While this would probably be much cheaper and faster than the preferred consultative approach, experience has shown that such approaches tend to be accompanied by poor implementation due to a combination of factors, chief among them inadequate ownership of the activities/initiatives by communities and poor relevance of selected measures to addressing community needs. This reduces overall impacts and long-term sustainability. Furthermore, the top-down approach constitutes a missed opportunity for community empowerment since it

is now proven that CBA constitutes an effective vehicle for building resilience and addresses social drivers of vulnerability including gender inequality and other factors related to social exclusion. It will therefore complement the top-down baseline programs in an excellent manner.

212. The alternative to the comprehensive (integrated) plans would be to focus on one or two aspects of adaptation, such as rehabilitation of watersheds, or irrigation or introduction of drought tolerant crops, or a combination thereof. While this is an often used and legitimate approach to rural development, climate change is a multi-facetted challenge; in order to help communities onto a path of resilience building, it is therefore clear that a multi-faceted approach at scale is required. Besides vulnerability to the impacts of climate change has strong overlaps with poverty and marginalisation. It therefore builds stronger social capital if adaptation initiatives also empower communities to at least consider addressing the underlying development issues, since adaptation is driven by a range of different pressures–or drivers of vulnerability– acting together.

213. The Participatory, Monitoring, Evaluation, Reflection and Learning system to be developed to support the implementation of the comprehensive adaptation plans is particularly a cost effective innovative tool for building adaptive capacity. The system will engage communities in developing and monitoring against CBA indicators, and in doing so provide a new platform for local stakeholders to articulate their own needs, which is a fundamental part of building adaptive capacity. The dual learning and downward-accountability functions of the system presents an opportunity for building and measuring changes in local adaptive capacity as for facilitating the measurement of 'effective adaptation' that can inform the monitoring and reporting needs of stakeholders across scales. The framework also responds to the need for continuous feedback and joint learning and communication in order for CBA to be flexible in light of the challenge of uncertainty.

214. The project will have strong stakeholder engagement (CSO, multilateral development partners, private sector, academia and research institutions) collaboration where critical results will be contracted to capable partners (as stipulated in the budget notes). In selecting this approach, several other options were considered but ultimately rejected for being less cost effective/innovative. These are use of government structures and staff alone or the use of CSO and private sector in facilitating communities to climate proof baseline programs. The approach chosen takes the best of both, and will ensure a partnership where the government creates the enabling environment for the active involvement of CSO and the private sector in advancing rural development. Use of government staff alone is not viable due to the low staffing levels in the two districts; using project funds to fill up vacant positions would be possible, but in addition to the fact that this would be diverting funds from on-the-ground activities, these positions are unlikely to be sustained after the project ends. Use of CSO and/or private sector alone would probably be more cost effective than involving government, in the short term. This would however also pose sustainability challenges as these bodies will be unavailable to maintain the implementation of the extension package in the long-term, which is the role of government. Through the selected approach, the technical staff of the districts will acquire skills and improve understanding of the horizontal and vertical partnerships and linkages required to support mainstreaming of climate risks into development effectively; as well as becoming clear on the role of government in facilitating legitimate partnerships in the realization of climate secure rural development. The CSO and private sector will bring in considerable expertise and speed to the implementation of the ambitious program of work in the limited project timeline.

215. To reduce pressure from forest resources and reduce siltation in water bodies, the project support community involvement in sharing costs and benefits of watershed rehabilitation, through the registration and empowerment of Village Forest Areas and their management committees, combined with support to reduce amount of wood being used directly (firewood) or indirectly (charcoal); complemented by protection of river and lake shores from direct siltation (planting perennial crops and other measures). These measures have two defining characteristics which make them more innovating than the alternatives considered. These alternatives include protection of the forests by exclusive use forest guards, perhaps supported by the regular and administration police; outright banning of charcoal production, transportation, marketing or use, and the protection of river and shore lakes at critical points via engineering structures.

216. The use of uniformed forces to protect forests has not been proven to work, due to a combination of reasons, chief among them, the low staffing levels in government structures, including the forest guarding sections; the opportunities for rent seekers, given the ineffective policing, the loss of access to benefits by

communities, leading to disillusions which fuels further over exploitation. Banning charcoal production does not work in a country where more than 70% of its urban people don't have means to substitute charcoal or wood, due to the high capital requirement for the switch over to either electricity or gas, and where the police force does not have the capacity to enforce a ban. It however drives the charcoaling business into a chaotic, uncontrolled "black market" affair, where accounting for what is being harvested becomes less possible. Similarly, using engineering measures to protect the riverine and lake shores from direct siltation can only be done on few strategic places; and, while this is indeed an effective measure, it leaves the greater part of the riverine and lake shores unprotected. Combining these measures provides the optimum conditions for success.

217. Overall, integration of climate risk planning into land use planning and the implementation of baseline programs, particularly on agriculture input subsidy, expansion of irrigation schemes and the devolution of governance, including extension service, will reduce physical exposure to climate risks at minimal cost, and help avoid the additional costs that are resulting from mal-adaptive land use and development planning and practice. This is critical for an agriculture-led rural economic development, the strategy the Malawi government is pushing.

218. The project's approach has greater potential for up-scaling and replication across Malawi, unlike the more costly structural adaptation measures. By the end of the project, it will be possible to assess the proportion of the population and the value of critical infrastructure and other economic assets protected as a result of the adaptation measures implemented through the project and to make comparisons with the costs and benefits of alternative hard adaptation measures that have been implemented elsewhere in the region.

219. Access to financial services will strengthen the local economy. The Consultative Group to Assist the Poor (CGAP) has demonstrated that when poor people have access to financial services; they can earn more, build their assets, and cushion themselves against external shocks. Poor households use microfinance to move from everyday survival to planning for the future: they invest in better nutrition, housing, health, and education[31]. Finally with regard to procurement of project inputs, standard procedures of the GoM and UNDP will be carefully applied to ensure value for money in all purchases of goods and procurement of services for the project, and the project will use strict internal and external audit controls that meet international standards.

Table 17: Co-financing plan- - summary

Type	Name	Type of Co-financing	Amount ($)
National Government	GoM	Grant	34,000,000
GEF Agency	UNDP	Grant	2,000,000
Total Co-financing			36,000,000

2.7 Sustainability

220. The GOM is spending a great deal of funds, through the baseline projects, to increase farm productivity, however, the achievement of results is slow as the decentralized structures and DAESS are not fully operational due to several bottlenecks. The decentralization program focuses on establishment and strengthening of grassroots institutions such the VDC, AEC, and ADC, and district-level institutions like the District Council and the DECs[32], thus empowering communities. The present project focuses on the capacity building of the district authorities, utilization of grassroots level organizations, training of community activists and provision of managerial skills to the communities to take charge of their developments in collaboration with the DAESS. Thus the project is strengthening and building the already existing local structures. It has proven in many countries that the involvement of grassroots organizations ensures sustainability of the program. The community savings schemes and micro-credit often serves as a cement to

[31] G8 and CGAP endorsed 11 key principles of Micro-Finance: Key principle 2. www.cgap.org/keyprinciples.html

[32] Department of Local Government (2001). Development Planning System Handbook for District Assemblies

hold the community members together. The project will support the community savings schemes, and micro-credit will be provided through the NCCP which intends to establish a Local Development Fund.

221. Sustainability of the check dams (against siltation) and other infrastructure will be ensured through the parallel ecological measures. The watersheds and the catchment areas of these dams and infrastructure will be extensively planted with multi-purpose trees and shrubs to minimize soil erosion and to regulate / sustain the water flows. The maintenance and operation of these dams and water channels and care of the check dams and dykes will be the responsibility of VDCs and ADCs, who will be collecting revenues from the water users and spending the amount on maintenance of mini-dams, water channels and dykes. Once the communities learn that their survival is dependent on the mini-dams, water channels and dykes and only they are responsible for maintenance, they will automatically care for these. It has been proven that the plantations in watersheds and catchment areas reduce silt load and thus extend the life of water harvesting structures for several years and ensure environmental sustainability.

222. **Institutional sustainability:** The purpose of the program is to promote climate resilient development. In this regard, one component focuses on development of manpower in agriculture, land, water, forestry and infrastructure engineers in climate resilient technologies. The program will sensitize the planners and policy makers to incorporate climate resilience in development. An aggressive advocacy campaign in this regard will be launched through print and electronic media to influence the policy and development process. Thus the motivated and technically strong manpower in teaching and extension institutions will sustain and disseminate the climate resilient programs at a larger scale. This will ensure sustainability and up-scaling of the present and future interventions. Member of ADCs and VDCs will be responsible for participatory monitoring of the program activities during and after the life of project. Policing to implement policies is not a solution; therefore, the community members will be sensitized and trained in participatory approaches to discourage tree cutting as well as for discouraging the eco un-friendly approaches. This will also ensure sustainability of the program interventions (Department of Local Government, 2001).

223. **Financial sustainability:** The program design has several built-in options for scaling up program interventions to ensure financial sustainability. The project will provide funds for setting up demonstration plots in CSA, maintenance of watersheds (tree plantation campaigns), drip irrigation systems, construction of silos, cool boxes for fisheries, and small enterprises to provide services in CSA centres. As the communities are involved in adoption of these interventions (seeing is believing), the program will adopt the formula of 1:3 (community: project contribution), and in the following year 1:1 ratio and finally 1:3 ratio. Initially, it will be mandatory for the communities to provide in-kind contribution in the form of land and/or labour, and in the following years also provide cash contribution. It has been proven in other UNDP projects that this strategy works and the program interventions are scaled up in a short period of time. Coupled with a comprehensive and aggressive communication strategy, the approach works much faster.

224. The program will support to establish CSA Centres at strategic places in the two districts. These centres will have all the inputs available for CSA and also the points for the sale of products to provide an easy market access to the farmers. The training / hall facilities and availability of implement pools on rental basis could provide income for the operation of CSA centres. Likewise, the storage facilities (cold storage as well as for storing grains) on rental basis will provide substantial income for the operation and maintenance of these centres. ADCs / DECs under the supervision of DAESS will operate these centres.

225. Social sustainability: will be ensured through the use of the community based approach to adaptation. This will be supported by the formulation of an exit strategy to ensure that project initiatives are mainstreamed into local processes. The exit strategy of the project will be based on five pillars: (1) sensitization and awareness at all levels to promote climate resilient development, (ii) participatory development and monitoring of plans and policies, (iii) community and NOGs implementation of activities, (iv) development of vibrant community infrastructure envisaged under the decentralization program and (v) capacitated DAESS and District Governments. It is anticipated that the District Governments will revise their plans and promote climate resilient development in future. The capacity built through this program will also enable them to implement several other projects for other donors. The program will be able to earn carbon credits from CDM, REDD+ and thus financial resources will flow regularly, which would help to sustain program activities in collaboration with communities and NGOs.

2.8 Replicability

226. Sharing of methodologies, results and lessons learned will be compiled and disseminated to other Districts and Provinces through the project's web-based platform (to be developed) and through a range of communication media via the ALM and other knowledge networks. A public awareness campaign and field demonstrations will be organised. Implementing the concept of the "Year of Land Care" will build awareness of the importance of ecosystems and healthy natural resources in adaptation. The project will demonstrate how investments in climate-resilient livelihoods can be profitable, thereby promoting the extension of micro-financing services beyond the project sites. With increased awareness of the market opportunities related to adaptation to climate change, the project would be promoting further investments in adaptation. The empowered extension service will also ensure replication in the rest of the districts. Linking the project to the national climate change policy and the national climate change technical committee will ensure that the lessons from the project inform national climate change debate and strategies, thereby ensuring replication.

2.9 Stakeholder participation plan

227. The proposed project will coordinate closely with public, private and communal stakeholders that are involved in the Agriculture Input subsidy programme and the decentralized development process, led by the Ministry of Agriculture, Irrigation & Water Development and Local Government and Rural Development respectively, with heavy involvement of the Ministry of Finance and Development Planning, who apart from setting up and distributing budgets, is also the parent ministry for the National Climate Change programme and chair of the Steering Committee. This project will be led by the Minsitry of Local Government and Rural Development, with the involvement of other government, civil society and private sector entities. Execution will be led by the District Councils of Mangochi and Machinga Districts. All the relevant ministries are represented in the District councils including the following:

- The Ministry of Natural Resources, Energy and Environmental Affairs, which has been instrumental in the formulation of environmental policies, and coordination of their implementation through the other ministries. This includes the national adaptation strategies, which now need to be localized at the district level.
- The ministry of Agriculture, Irrigation and Water development, which drives the agricultural input subsidy programme and is mandated to implement the ASWAp. This ministry hosts the extension service, which is the knowledge hub for drought risk assessment and trains farmer communities on adopting strategies to mitigate negative impacts of climate change on crop production. The ministry has the expertise to train in-service officers on climate change impacts on agriculture and water resources. These programmes are conducted at schools of agriculture and in-service training institutions of throughout the country.
- Ministry of Finance and Development Planning, which approves fiscal flows to regions, monitors the MGDS, and has a stake in ensuring that regional development is balanced and not undermined by environmental risks;
- Ministry of Education, Science and Technology – which is responsible for the development and delivery of basic and higher education, and has a strategic position in ensuring that i) climate change training becomes part of the school curricula; ii) research informs education and the development and/or modification of technologies for addressing climate change risks.
- Transport and Public Infrastructure and Lands, Housing and Urban Development, which are responsible for the infrastructure development, and has a stake in ensuring that climate change risks are factored into existing and new developments, to secure long-term safety.
- Gender, Child & Community Development, responsible for ensuring equitable development across gender and communities.

228. Climate change is affecting women, men and the youth differently in Malawi, making the gender dimension of equality and women's empowerment a critical consideration in the design of the project. The participation of all sectors of the population (men, women, youth) is critical for identifying appropriate adaptation measures and their sustainability. For example, women in Malawi are often in charge of household food security and water management; if they are not consulted about the location of new water collection and storage infrastructure, or their views about household water shortages during dry periods are not integrated into the design of new buffer capacities, the new infrastructure may fail to provide sufficient water security in

times of the greatest need. In addition, improper land use planning of new water infrastructure may actually increase women's burdens. Targeting of project driven solutions is enhanced by the complementarities of the specific knowledge and skills of the gender groups, which will increase the precision of responding to their specific needs and ensuring that both benefit equally from the proposed project.

229. Vulnerable communities and local authorities are the key stakeholders of this project and will be engaged in all project components. They will contribute to the ground-truthing of hazard zonation maps and vulnerability profiles; develop skills in recognizing and addressing climate risk issues in village development plans; and benefit from additional investments that make particular investment plans in vulnerability hot-spots more resilient to climate change-related shocks and stresses. NGOs and CBOs which are active and committed to work on issues of natural resource and disaster risk management in the target districts will be trained through the project to work as local partners on the development of community-based adaptation schemes. Existing institutional relationships that have emerged from the Agricultural input subsidy programme will be utilized, thereby saving costs and avoiding risks of duplication.

230. The proposed project will work closely with Universities in Malawi, Research institutions and professional bodies for engineering, architecture, environment, agriculture, irrigation and others as appropriate to source technical expertise. It will form close partnerships with civil society and advocacy bodies to raise the profile of the climate change issue and support project activities, particularly those aimed at building awareness of the decision makers. Partnerships with public sector training institutions such as the Malawi Institute for Development Administration and the Local Government Institute will support training of civil servants under Outcome 2 of the proposed project.

2.10 Explain compliance with UNDP Safeguards Policies

231. The proposed project was subjected to the environmental and social screening tool, which raised the issues in the table below.

Would the proposed project result in the conversion or degradation of modified habitat, natural habitat or critical habitat? Yes, the project will positively affect modified habitats especially degraded forests and farmlands – by rehabilitating them. It is likely to increase the identification and protection of critical habitats through the community based adaptation planning process for the hotspots. The project will in particular facilitate rehabilitation of degraded forests through enrichment planting, protection from fire and from overharvesting. It will also facilitate protection of riverines and lake shores to reduce direct siltation; it will also introduce trees on farms (via agroforestry). Collectively, these measures will improve all targeted habitats, improving the resilience of these habitats. The project will also introduce sustainable charcoaling as a measure of reducing pressure on the forest and woody resources.
Would the proposed project pose a risk of introducing invasive alien species: Yes, there is a very small chance that the proposed project poses a risk of introducing invasive alien species. The measures to reduce pressure on the forest resources from overharvesting for charcoal and fuel wood include the establishment of woodlots, preferably with fast growing species. The agroforestry component will also involve planting of high nitrogen producing trees. Selection of woodlot and agroforestry species will be informed by lessons learnt from other places; the species selected for planting could possibly become invasive only where the science is incomplete.
Does the project involve significant extraction, diversion or containment of surface or ground water? The proposed project will finance the construction of mini dams, check dams and other water harvesting infrastructure that is expected to improve the management of water (both floods and droughts). Two types of mini-dams were identified at PPG. These are: i) embankment ponds with a capacity of about 12,000m3, with wall heights ranging from 3-10 m, ii) nullah ponds with wall height from 5-11 m. These mini dams will be constructed under the supervision of a company or institution with reputable expertise and experience in international standards. As stipulated in the budget and budget notes, the company will be supervised by the project chief technical advisor, who will also be recruited internationally. Construction will also be closely co-supervised by the District Engineers, and requirement impact assessments will be undertaken, where needed, and provisions stipulated adhered to. The company will also develop a monitoring and maintenance schedules, manuals for training, and train relevant staff to ensure follow up maintenance. To prolong the life of dams, proper watershed management in each catchment will be practiced (described in outcome 5).
Will the proposed project involve the application of pesticides that have a known negative effect on the environment or human health? The baseline program (the agriculture input subsidy includes application of fertilizers and pesticides. The component aimed at reducing post harvest losses will also involve some level of using chemicals to treat, for example grain, before storage. The chemicals could have a negative effect on the environment or human health through harmful toxins that affect human health and damage to non-target species caused by indiscriminate application. However, the program will be supported by the empowered extension service, and involves training of farmers. In addition, selection of pesticides will be

informed by best practices world-wide and negative impacts would occur only where the science relating to the dangers of the chemical use is incomplete.
Is the project likely to significantly impact gender equality and women's empowerment?: Yes, the Project will impact gender equality and women's empowerment positively. The project uses community based adaptation planning, learning, reflection and monitoring. CBA addresses social drivers of vulnerability including gender inequality and other factors related to social exclusion. CBA also constitutes an effective vehicle for building resilience of vulnerable individuals, households and communities from the ground up, while addressing the objectives of wealth creation and poverty reduction. Apart from these interventions, there will be many project activities involving stakeholder participation, including at a management level and equal representation of each gender in these activities will be strongly encouraged especially women's representation.
Will the proposed project have variable impacts on women and men, different ethnic groups, social classes? Yes, the Project will have variable impacts on women and men, different ethnic groups and social classes. This is because men and women are often involved in different activities, ordinarily. For example the PPG assessments reported that more women (60%) are involved in fishing than men, certain types of irrigation are dominated by one gender and not the other. Through the CBA approach, these differences will become clear and the project will strive to target the relevant social or gender group to ensure effectiveness of the project, while at the same time aware of the need for equitable access to benefits of the project. This will in particular be important with the financial tools (mini credit, cash/grants), and the establishment of the income generating activities. No society is homogeneous, and while it is important to spread project benefits equitably, considerations for sustainability requires that capacity and interest be matched carefully with engagement with financial tools, in particular introduction of IGAs. It would be pointless to give loans for IGAs to people who have no interest or inclination to business. However, the project has a huge array of benefits, and the important point will be to develop and apply criteria for matching benefits to social and gender groups, and that the process be done transparently and involve high levels of consultation.
Is the proposed project likely to significantly affect land tenure arrangements and/or traditional cultural ownership patterns? Yes, the proposed project is likely to significantly improve land tenure arrangements, and traditional cultural ownership patterns. The registration of the Village Forest Areas will improve tenure of community forest resources with the attendant benefits

ACTIONS

232. As a result of the analysis above, the project management will in particular ensure the following issues are addressed.

233. **Risk of introducing invasive alien species:** Selection of the agroforestry species will be informed by science and best practices worldwide. The project will invest significantly in preventative and mitigation measures, including adequate assessments for the selection of indigenous tree species for agroforestry and woodlots, and strict monitoring of forestry and agroforestry activities to ensure minimisation of the introduction of exotic and indigenous species that could become invasive.

234. **Mini dams and impacts on surface or ground water:** Ensure that the mini dams are constructed under the supervision of a company or institution with reputable expertise and experience in international standards, and that all relevant impact assessments are carried out professionally, transparently and with widespread participation. Also ensure that technical stipulations and mitigation measures raised by the impact assessments are adhered to strictly.. As stipulated in the budget and budget notes, the company will be supervised by the project chief technical advisor, who will also be recruited internationally. Construction will also be closely co-supervised by the District Engineers. The company will also develop a monitoring and maintenance schedules, manuals for training, and train relevant staff to ensure follow up maintenance.

235. **Application of pesticides and chemicals that have a known negative effect on the environment or human health:** Selection of the pesticides and other chemicals will be informed by science and best practices worldwide. The project will invest significantly in mitigation measures, including minimising pesticide use and investment in pesticides that have minimal impacts as well as encouraging holistic rangeland management and organic pesticides where possible.

3 PROJECT RESULTS FRAMEWORK

Applicable Key Result Area from 2014-2017 Strategic Plan: Environment and Energy
Partnership Strategy: Linkages with UNDAF and CP and the Malawi Growth and Development Strategy and UN partners
Project title and ID [ATLAS Award ID]:
This project will contribute to achieving the following Country Programme Outcome as defined in CPAP or CPD: 3.1 Institutions strengthened to develop and improve policies, strategies and plans for climate change, environmental management, and disaster risk reduction. 3.2 Integrated info systems strengthened for decision-making on disaster risk reduction, climate change and environmental management
Country Programme Outcome Indicators: % of selected districts with microfinance institutions # of women MSMEs established in selected districts # of revised laws, policies and plans # of revised surveys integrating DRR/CC/environment # of districts with residual awareness campaigns
Primary applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one): 1. Mainstreaming environment and energy OR 2. Catalyzing environmental finance OR 3. Promote climate change adaptation OR 4. Expanding access to environmental and energy services for the poor. Promote climate change Adaptation
Applicable GEF Strategic Objective and Program: Objective 1: Reduce vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global level. Objective 2: Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level Objective CCA -3 - Adaptation Technology Transfer: Promote transfer and adoption of adaptation technology
Outcome 1.1: Mainstreamed adaptation in broader development frameworks in targeted vulnerable areas Outcome 1.2: Reduced vulnerability to climate change in development sectors Outcome 2.1: Increased knowledge and understanding of climate variability and change-induced threats at country level and in targeted vulnerable areas Outcome 2.2: Strengthened adaptive capacity to reduce risks to climate-induced economic losses Outcome 3.1: Successful demonstration, deployment, and transfer of relevant adaptation technology in targeted areas
Applicable GEF Outcome Indicators: 1.1.1 No. of adaptation actions implemented 1.2.10: % change in income generation in targeted area given existing and projected climate change 2.1.1 Relevant threat information disseminated to stakeholders on a timely basis 2.1.2 Vulnerability and risk perception index, disaggregated by gender (Score) 2.2.1. No. and type of targeted institutions with increased adaptive capacity to minimize exposure to climate variability 2.2.2. Capacity perception index (Score) (disaggregated by gender) 21.2.2 Capacity perception index, disaggregated by gender (Score) 2.3.2. % of population affirming ownership of adaptation processes (disaggregated by gender) 3.1.1 % of targeted groups adopting transferred adaptation technologies by technology type, disaggregated by gender (Score)

Objective / Outcome	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Objective: Using ecological, physical and policy measures to reduce vulnerability to climate change driven droughts, floods and post-harvest grain losses for rural and urban communities of Machinga and Mangochi Districts of Malawi [reaching over 0.5 million people	Improvement in food security for households participating	Over 60% of 91,670 households face food deficits – don't produce enough to last till the next harvest	At least 50% decline in number of households facing annual food deficits (less than 30% still face food deficits)	The PMERL will be used to develop a food security index (identifying key food basket mix) and to measure change annually	That the current political and social support demonstrated by politicians, technical staff, CSO, private sector and communities for mainstreaming climate change considerations into the development processes, especially in order to secure current development gains of the baseline programs continues. That technical staff of the relevant service departments, the CSOs and communities apply learnt skills, and comply with project supported bye-laws and provisions. That communities engage with and utilize the micro credit schemes and/or cash grants and use the funds to upgrade technologies for climate smart agriculture, improved wood/energy efficiencies, irrigation, NTFPs, etc.
	Percent change in soil erosion and siltation of water bodies	Soil erosion estimated at 20 tons/ha/year and 8 EPAs report "severe" rates of erosion	40% reduction in soils going into the water bodies; 50% in EPAs reporting severe rates of erosion	PMERL, project reports	
	Availability of skills and resources necessary to continue adaptation after conclusion of project (indicator for sustainability)	Average scores for communities and institutions on UNDP capacity scorecard is <20% and >40% respectively	UNDP capacity scorecard for communities and technical teams increase to 50% and 75% respectively	Project monitoring systems, district reports, PMERL reports	
Outcome 1: The impact of ecosystems degradation in aggravating vulnerability to climate change risks and reducing resilience of development gains understood and integrated into key decision-making processes at the local, sub-national and national levels	Number of comprehensive community based adaptation plans integrating traditional and technical knowledge;	None	6, one per hotspot	Project monitoring systems, district reports, PMERL reports	That the project can identify and secure the services of a top-notch institute with technical expertise, interest, availability and willingness to work with communities and the government in an applied research mode. That the current political and social support demonstrated by politicians, technical staff and communities for mainstreaming climate change considerations into the development processes, especially in order to secure current development gains of the baseline programs continues
	Community involvement in monitoring vulnerability	No formal systematic means of involving community in monitoring vulnerability	Set of indicators for monitoring community vulnerability agreed and being actively used	Project monitoring systems, district reports, PMERL reports	
	Quality knowledge products available, shared and being used	No publications on ecosystems, their values and contribution to reducing CC risks	At least 6 knowledge products acceptable for international publishing standards and information evidently being used in training,	Project monitoring reports, PIRs, publications	

Objective / Outcome	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
			planning & implementation of project program		
Outcome 2: Skills and operational capacity enhanced in the District, EPA and TA level technical officers to support implementation, maintenance and monitoring of the activities under component 1 and to mainstream climate risks into all local development process (skills, legislation, information)	Extension packages for key sectors updated with climate risk management information	Current extension packages for key sectors do not contain climate risk management information	Extension packages for key sectors updated with climate change information and current CC management tools and techniques	Project monitoring systems, district reports, PMERL reports, updated extension materials	That the current political support for mainstreaming climate change considerations into the development processes, especially in order to secure current development gains of the baseline programs continues
	District level development plans and policies updated with climate risk management provisions.	Limited content, none fully updated with current CC management/risks issues	4 District level programs, development plans and/or policies updated with climate risk management provisions	Project monitoring systems, district reports	That the current political support for mainstreaming climate change considerations into the development processes, especially in order to secure current development gains of the baseline programs continues Timely implementation of the Training, implementation of activities and timely generation of lessons That political will to allocate a higher proportion of district funds will increase as a result of awareness raising and the mainstreaming of climate risk considerations into the district policies, programs and plans.
	Diploma in Forestry include current climate change content	Outdated curriculum at the College of Forestry, no students receiving training on updated curriculum	New curriculum for Diploma on forestry and 200 forestry diploma graduates (50:50 on gender)	Project monitoring systems, Diploma curriculum, College of Forestry Annual and academic reports	
	Improvement in Capacity Index Score card	On average 50% of positions vacant across local to district levels in both districts; only 25% of current staff have some level of training on CC	Vacant positions less than 40%, 100% of staff in positions have training on CC	Project monitoring systems, district reports, PMERL reports	
	% increase in development funds of the districts	Less than 2% of district funds being allocated to CC related initiatives	At least 3%	Project monitoring systems, district reports	
Outcome 3: Public and domestic water harvesting, storage and distribution reduces climate change driven	Number of physical infrastructures constructed to ensure sustainable water supplies and	About 2 mini dams, several check dams (to be confirmed during inception)	At least 10 mini dams and over 100 check dams, nullahs, and other structures	Project monitoring systems, district reports, PMERL reports	Timely completion of water harvesting infrastructure

Objective / Outcome	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
flooding and regulates availability of water throughout the year in flood & drought hotspots	reduce disaster risks				
	Number of homes with water harvesting structures	Less than 10% of 91,760 households harvest water from rooftops	Over 35% of 91,760 households harvesting water from rooftops	Project monitoring systems, district reports, PMERL reports	Communities apply learnt skills, engage with and utilize the micro credit scheme and use the funds to upgrade roofing materials and purchase/construct water storage structures
Outcome 4: Rehabilitation of badly degraded forests, protection of riverbanks, lake shores and urban infrastructure	Number of Village Forest Areas registered	7	20	Project monitoring systems, district reports, PMERL reports	Legal process of Village Forest Registration can be completed in 5 years
	Hectares of forests under improved management	410 ha under community forest	At least 1,500 ha under community forest	Project monitoring systems, district reports, PMERL reports	Current political and community support for adopting project initiatives remain high. The Traditional institutions of local resource governance are still respected so enforcement of local bye laws are effective
	Kilometers of river and lake shore under protection	5km of lake shore and about 7km of river banks under protection	At least 100 km of lake shore and 100 km of river banks under protection from direct siltation	Project monitoring systems, district reports, PMERL reports	Current political and community support for adopting project initiatives remain high. The Traditional institutions of local resource governance are still respected so enforcement of local bye laws are effective
	Number of households using alternate and improved energy	Less than 5% of 91,760 households currently use any form of energy efficient technologies	At least 35% of 91,760 households adopt high energy efficient technologies and methods	Project monitoring systems, district reports, PMERL reports	Linkages to the private sector; careful use of the grants/credits to finance purchasing of energy efficient technologies.
Outcome 5: Productivity of agriculture supported by adoption of climate smart systems and measures	No. of hectares on which climate smart farming is practiced	In Mangochi 144.6 ha under agroforestry; only 529 farmers adopting climate smart measures – making 0.13% of population. In Machinga 161.5 ha under conservation Agriculture and 1,544 smallholder farmers participating	Over 40% of 91,670 households engaging in some form of climate smart farming system or practices; area under agroforestry in particular increase to over 5,000 ha; area under CA increase to more than 5,000ha	Project monitoring systems, district reports, PMERL reports	Communities apply learnt skills, overcome biases and cultural and other lethargies to embrace new high yielding, drought tolerant seeds and other climate smart farming measures. Also engage with and utilize the micro credit scheme and use the funds to upgrade farming implements, etc.; and no unusual flood and/or drought that are too intense to be contained by the climate risk management measures adopted by the project

Objective / Outcome	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
	Percentage increase in productivity per acre or per unit of land	Baselines for all crops in figure 7: Machinga - maize – 1.9tons/h, sorgum – 95 tons/ha, soyabeans 63tons/ha in Machinga Mangochi – maize – 1.55, sorgum 66, soyabean 59tons/ha	Over 40% increase over baseline yields for key crops	Project monitoring systems, district reports, PMERL reports	
	Area under climate smart small holder irrigation	Currently less than 100 hectares despite potential	At least 1000 hectares under climate smart small holder irrigation	Project monitoring systems, district reports, PMERL reports	Communities apply learnt skills, engage with and utilize the micro credit scheme and use the funds to upgrade irrigation technologies; and no unusual flood and/or drought that are too intense to be contained by the climate risk management measures adopted by the project
	Water use efficiency in small holder irrigation	On average water use efficiency lower than 25%	On average water use efficiency increase to >50% in small holder irrigation	Project monitoring systems, district reports, PMERL reports	
	% reduction in post-harvest losses for those engaging	On average approximately 35% of grains, fruits, vegetables, fish are currently being lost to poor post harvest practices	Less than 10% post harvest loss of grains, fruits, vegetables, fish being lost to poor post harvest practices	Project monitoring systems, district reports, PMERL reports	Communities embrace the correct use of post harvest management technologies – in the absence of legal provisions, people may fail to use the technologies correctly, despite the knowledge the advantages to be accrued from adopting.

4 TOTAL BUDGET AND WORKPLAN

Award ID:		Project ID(s)	
Award Title:	Country Name Project Title: Malawi Climate Proofing Development Gains in Machinga and Mangochi		
Business Unit:	MW10		
Project Title:	Country Name Project Title: Malawi Climate Proofing Development Gains in Machinga and Mangochi		
PIMS no.	4508		
IA (Executing Agency)	UNDP /Ministry of Environment and Climate Change Management		

GEF Outcome /Atlas Activity	Impl. Agent	Fund ID	ATLAS Budget Code	Description	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Note
Outcome 1: Knowledge and plans		62160	72100	Contractual Services-Companies	80,000	40,000				120,000	1
		62160	72100	Contractual Services-Companies	100,000	80,000	30,000			210,000	2
		62160	71600	Travel	10,000	10,000	5,000	5,000		30,000	3
		62160	74100	Professional Services		50,000			50,000	100,000	4
		62160	71400	Contractual Services-Individual	10,000	10,000	10,000	10,000		40,000	5
Outcome sub-total					200,000	190,000	45,000	15,000	50,000	500,000	
Outcome 2: Skills for technical staff and Influencing Policy and Planning Process		62160	72100	Contractual Services-Companies	50,000	50,000	20,000	20,000		140,000	6
		62160	71400	Contractual Services-Individual	50,000	50,000	30,000	30,000	20,000	180,000	7
		62160	71400	Contractual Services-Individual	50,000	50,000	50,000	50,000		200,000	8
		62160	71600	Travel	10,000	10,000	10,000	10,000	10,000	50,000	9
		62160	71400	Contractual Services-Individual	30,000	30,000	30,000	20,000	20,000	130,000	10
		62160	75700	Training, & conferences	10,000	20,000	40,000	20,000		90,000	11
		62160	72400	Audio-visual Equipment	20,000	2,000	10,000	4,000	1,000	37,000	12
		62160	74100	Promotional Material	2,000	10,000	10,000	10,000	3,000	35,000	13
Outcome sub-total					222,000	222,000	200,000	164,000	54,000	862,000	
Outcome 3: Public and domestic water harvesting, storage and distribution reduces climate change driven flooding and regulates availability of water throughout the year in flood & drought hotspots		62160	72100	Contractual Services-Companies	60,000	60,000	40,000	20,000		180,000	15
		62160	71400	Contractual Services-Individual	50,000	50,000	50,000	50,000	50,000	250,000	16
		62160	72100	Contractual Services-Companies	20,000	20,000	20,000	20,000	10,000	90,000	17
		62160	72300	Materials and Goods	100,000	100,000	100,000	75,000	50,000	425,000	18
		62160	75700	Training, & conferences	30,000	30,000	30,000	20,000	10,000	120,000	19
		62160	72400	Audio-visual Equipment	10,000	5,000	5,000	5,000	1,000	26,000	20
		62160	71600	Travel	30,000	30,000	30,000	30,000	30,000	150,000	21
		62160	74100	Promotional Material	10,000	10,000	5,000	5,000	1000	31,000	22
Outcome sub-total					**310,000**	**305,000**	**280,000**	**225,000**	**152,000**	**1,272,000**	
Outcome 4: Rehabilitation of badly degraded forests, protection of riverbanks, lake shores and urban		62160	72100	Contractual Services-Companies	50,000	50,000	50,000	50,000	10,000	210,000	23
		62160	72100	Contractual Services-Companies	40,000	40,000	40,000	20,000	10,000	150,000	24

infrastructure		62160	72100	Contractual Services-Companies	40,000	40,000	40,000	30,000	15,000	165,000	25
		62160	71400	Contractual Services-Individual	40,000	40,000	40,000	40,000	40,000	200,000	26
		62160	71600	Travel	10,000	20,000	20,000	15,000	10,000	75,000	27
		62160	72600	Micro-Capital Grant	75,000	75,000	75,000	75,000		300,000	28
Outcome Sub-total					255,000	265,000	265,000	230,000	85,000	1,100,000	
Outcome 5: Soil Degradation and Climate Smart Farming Systems		62160	72100	Contractual Services-Companies	25,000	25,000	25,000	25,000	10,000	110,000	29
		62160	71400	Contractual Services-Individual	40,000	40,000	40,000	40,000	40,000	200,000	30
		62160	75700	Training, & conferences	30,000	30,000	30,000	30,000	29,200	149,200	31
		62160	72410	Audio-visual Equipment	20,000	10,000	10,000	10,000	5,000	55,000	32
		62160	74125	Promotional Material	20,000	20,000	10,000	10,000	10,000	70,000	33
		62160	71600	Travel	20,000	20,000	15,000	10,000	10,000	75,000	34
		62160	72300	Materials and Goods	50,000	75,000	75,000	50,000		250,000	35
		62160	72600	Micro-Capital Grant	100,000	100,000	100,000	95,000	30,000	425,000	36
Outcome Sub-total					305,000	320,000	305,000	270,000	134,200	1,334,200	
Outcome 6: Project Management		62160	71400	Contractual Services - Individual	25,000	25,000	25,000	25,000	25,000	125,000	37
		62160	72200	Equipment & Furniture	30,000	15,000	10,000	5,000	5000	65,000	38
		62160	72500	Office Supplies	5,000	3,000	4,000	3,000	3,000	18,000	39
		62160	72400	Communication & Audio Visual Equip	8,000	2,000	8,000	2,000	2000	22,000	40
		62160	71600	Travel	2,000	2,000	2,000	2,000	2,000	10,000	41
		62160	74500	Miscellaneous	2000	2000	2000	2000	2000	10,000	42
Outcome Sub-total					72,000	49,000	51,000	39,000	39,000	250,000	
Grand Total					**1,364,000**	**1,351,000**	**1,146,000**	**943,000**	**514,200**	**5,318,200**	

Budget Notes

Note	Explanation
1	This budget will be used to contract an institute of higher learning with expertise on ecosystems based approach to adaptation, particularly assessing how degradation affects resilience and vulnerabilities of communities, livelihoods and local economies. They will use the funds to identify the landscapes/ecosystems/natural resources critical for important livelihood support services such as watershed services, reduction of soil erosion, build up of fertility, reduction of flooding, reduction of siltation and eutrophication in the fisheries, etc.; Undertake assessment of the current state of degradation of these landscapes /ecosystems/natural resources and the likely future scenarios given the trajectory of climate change; Assess the costs versus benefits of business as usual to the sustainability and effectiveness of the current baseline programs and what management options are likely to yield the optimum benefits of reducing vulnerabilities of community livelihoods and local economies, and/or increasing their resilience. This will be done through graduate

	research, thereby contributing to capacity building in Malawi. The findings will be presented for discussion at several national and international conferences, contributing to knowledge on nature based adaptation.
2	This budget will be used to facilitate community based resilience assessments and the use of the findings to formulate comprehensive community based adaptation plans and participatory monitoring, evaluation, reflection and learning plans. A local service provider with expertise on community development processes will contracted to facilitate the two initiatives, under the supervision of the Drylands Development Center (of UNDP), who have developed the CoBRA methodology. The budget will be used to: ➢ Agree the lead and implementing partners for the CoBRA assessment; undertake the assessments and analyse information to establish current resilience levels for each target population, factors deemed critical for resilience and action plans necessary to increase resilience, particularly in relation to baseline programs; ➢ Develop the current vulnerability profiles for the different groups of resource users and assess the economic, social and institutional/political context within which adaptation is expected to happen, highlighting how these impact on vulnerabilities to influence effectiveness and sustainability of adaption and baseline programs; ➢ Facilitate the use of data generated in output 1 and the resilience analysis to formulate comprehensive community based adaptation plans; ➢ Identification and Training of participating community activists and extension workers in participatory M&E system. ➢ Participatory development of process indicators and monitoring schedule to monitor the performance of the project. ➢ Participatory visits of community activists (also from non-project districts) and extension workers to project sites and compilation of monitoring visit report on at least quarterly basis. ➢ Reporting of lessons learnt and best practices from the project, including other similar projects. ➢ Support for the participation of community activists and extension workers in regional and national forums to share the project experiences and success stories. ➢ Monitoring of climatic and environmental indicators in districts and preparation of annual plans based on the indicators. ➢ Production of annual district progress reports and provision of feedback to improve the future plans with the standpoint of climate resilience.
3	This budget will be used to facilitate travel necessary for the delivery of outcome 1.
4	This budget will be used to finance mid-term and terminal evaluations.
5	This budget will be used to hire services of an individual expert who will work in the project to contract the service providers under budget line 1 and 2 and supervise them to ensure delivery.
6	Budgets under notes 6-9 will be used to improving the Skills and operational capacity of District, EPA and TA level technical officers to mainstreaming climate risks into policies, support implementation, maintenance and monitoring of the activities under the project. Budget under note 6 will be used to hire the services of an institution or commpany with expertise in institutional capacity development, which will do the following: ➢ Develop training materials (based on updated training needs assessment from that done at PPG – and directed at implementing the on-the ground adaptation measures described in component 2); might include: 1 week refresher courses for the planners and policy makers at various levels in climate risk reduction and management; Two weeks short course for structural engineers, urban and rural infrastructure staff on climate resilient construction, land use and water resources planning. ➢ Update the extension package with the information gathered from outputs 1 and 2, making them robust in integration of climate risks;
7	Budget 7 will be used to hire the services of an individual contractor to work in the project and supervise the contractors hired under budget 6 and 8 (below). The individual will also lead the formulation and implementation of communication strategy. This will include establishing partnerships between the extension service and relevant on-going developments, projects and institutions to advance the implementation of the comprehensive adaptation plans formulated under output 1.2, including for dissemination of information via community and national media; Facilitate partnerships with service providers for those components of the comprehensive adaptation plans that cannot be addressed through the project funds;
8	Budget 8 will support the inclusion of climate science in the Diploma and Certificates in Forestry Course at the Malawi College of Forestry and Wildlife – Dedza, as follows:

	➢ Facilitate the updating of the curriculum for the Diploma and Certificates in Malawi college of Forestry and Wildlife in Dedza; ➢ Facilitate training of 50 forestry diploma students (50:50 on gender) using updated curriculum that incorporates climate change risks to forestry ecosystems
9	Budget 9 will support travel necessary for implementation of outcome 2.
10	Budgets 10-13 will be used to make sure that local and national development policies are influenced by the project supported pilots to strengthen policies and policy enforcement for climate consideration. They will be used as follows: Budget 10 – will be used to hire the services of an individual contractor with expertise in policy formulation and implementation processes, who will: ➢ Facilitate the District, EPA and TA level technical staff as well as communities to review current policies / acts for forest, land, water, agriculture, pesticides and food security, enforcement mechanisms and incentive / disincentives under the law and refinement of user-friendly enforcement mechanisms for better operationalization. ➢ Participatory assessment of on-going and in process projects for climate resilience and development of protocols / procedures for the development of climate resilient development plans. ➢ Alignment of on-going and in process projects for climate change risks and modification of designs (where necessary) to manage the climate change risks. ➢ Sensitization of GOM officials, media and communities about the new policies, regulations and enforcement mechanism. ➢ Support for participation of senior level planners and policy makers and staff of universities and colleges in international short courses on climate risk reduction and management. ➢ Support implementation of evidence based advocacy campaigns to influence informed decisions to climate proofing of development gains. ➢ Produce Quarterly briefing to update the district authorities about the progress achieved in promoting climate adaptation technologies and mitigation of risks through the project. ➢ The service provider will develop and implement the concept "Year of Land Care", with close collaboration with Total Land Care. In this respect, the contractor will develop a working paper for the national "Year of Land Care" (YLC) event and ensure its approval from the Govt., other donors and potential partners; support an annual symposium to be organized by EAD to disseminate climate related research findings and emerging issues; lead an advocacy campaign for the YLC at the national level to mobilize senior Government officials and wider public support for the event; produce documentaries (films, booklets) on best practices generated through the project; Organize the YLC event at the national level; mobilize print and electronic media to provide adequate coverage to the YLC. ➢ Compilation of the proceedings of the YLC, printing, and dissemination of proceedings and key messages at a wider scale; facilitate participation of project experts in national planning debates, conferences, etc., to share the lessons learnt and best practices produced by the project.
11	Will support training, and conferences needed to review policies and hold the Year of Land Care events.
12	Will be used to purchase Audio-visual Equipment needed to support implementation of outcome 3
13	Will be used to support the Promotional Material Production & Distribution
14	Null and void – there is no budget allocation for note 14!!
15	Budget 15-22 will support the construction and use of mini dams, water ponds, retention ridges, and water diversion structures. Budget 15 will be used to higher an engineering company or institution to undertake the following: ➢ detailed feasibility study on mini dams, water ponds; ➢ Survey of infrastructure at risk from flooding and other climate risk related disasters; ➢ Identification of best practices for securing infrastructure from floods & winds and other climate change related disasters, based on best experiences in the region & abroad; ➢ Formulation of a plan to implement the measures to secure infrastructure from the identified risks, fundraising for those measures that cannot be financed under the project budget (limited budget); ➢ Based on an approved budget, construction of small scale flood reduction / water diversion structures gabions, culverts, integrated with ecological

	measures (such as protective vegetation, hillside terraces planted with perennial trees and shrubs, stones bunds, etc.), some of it through food for work programs; ➢ Agreeing maintenance procedures and schedules, roles and responsibilities ➢ Train at least 50 extension workers and sensitize 1,000 VDC members to construct rainwater harvesting structures (in conjunction with output 1.3); ➢ Design and implement program of cost-sharing and/or cash grants to community members to adopt water harvesting technologies ➢ and community based water diversion structures for infrastructure protection; and, based on approved budget, construct the mini dams, water ponds and community based water diversion structures ➢ Preparation of training manuals, IEC material in local languages, production of manuals and provision of training to communities in improved water harvesting techniques (construction of mini-dams, water ponds, pits, retention ridges, etc.)..
16	Will be used to hire the services of an individual contractor with expertise in engineering, who will work in the project to supervise the companies and/or institutions/NGO/CBO hired to perform tasks under budget 15 and 17 respectively. The individual contractor will also support the District, EPA and TA staff to mobilize in kind contribution of land and/or labour) for the construction of mini dams, water ponds, water channels and water diversion structures and the planting of trees/shrub plantation and bio-engineering campaigns / activities by the community activists to check siltation and increase life of the dams
17	Will be used to hire services of an NGO with expertise and capacity to facilitate the widespread adoption of roof-top water harvesting
18	Will support the purchase of materials and goods needed to implement build water harvesting and conservation structures described under budget 15
19	Will finance the training & conferences necessary for the implementation of outcome 4, in particular training on maintenance of structures build under budget 15
20	Will be used to purchase Audio-visual Equipment needed to implement outcome 4
21	Will finance travel necessary to implement outcome 4
22	Will finance production of Promotional Material Production & Distribution
23	The budget will be used to hire the services of an NGO with expertise and capacity in facilitating natural resources management at the community level to facilitate rehabilitate selected degraded forests, river banks and lake shores. The contractor will do the following: ➢ Using information generated under outcome 1, agree on forest rehabilitation and protection techniques, based on best practices (might include protection of specific areas, enrichment planting and/or protection from fires); ➢ Support the implementation of forest and watershed improvement practices such as enrichment planting, protection from fires, etc.; ➢ Facilitate the registration of the 13 Village Forest Areas, bringing the number of registered community forests to 20. ➢ Support the Village Forest Area management committees to produce and disseminate awareness raising on environmental bye laws related to sustainable management and use of village forest areas; ➢ In conjunction with the capacity building output 1.3, support the Village Forest Area management committees to enforce compliance with community forest management processes, including the control of wild fires, which burn out young seedlings, hampering regeneration. ➢ Facilitate the protection of river banks and lake shores by supporting compliance with the environmental byelaws provisions that prohibits cultivation of annual crops within a certain distance.
24	The budget will be used to hire the services of an NGO with expertise and capacity in facilitating energy issues to facilitate provision of improved and sustainable supplies of energy, including adoption of sustainable charcoal. The contractor will do the following: ➢ Develop household energy profiles and assess charcoal production from the two districts, to identify inefficiencies and likely intervention measures; ➢ Facilitate demonstration of energy saving technologies, including biogas, solar lamps and cookers, and adoption, particularly in public institutions (schools, hostels, hotels, army camps, jails, etc.); ➢ Facilitate formation of charcoal producer associations and facilitate them to adopt sustainable charcoal production techniques; ➢ Design a cost sharing program for households and charcoal producers to invest in energy efficient technologies; ➢ Facilitate establishment of household energy woodlots using fast growing species

25	The budget will be used to hire the services of an NGO or company with expertise and capacity in facilitating income generation at community level to support the diversification of household food basket and incomes via expansion of aquaculture and NTFP reduce pressure on the forests, river and lake fisheries. The contractor will do the following ➢ Assess potential for NTFP based enterprises, learning from numerous lessons available in the country and abroad, select only those that are sustainable, have markets that can be sustained and have potential for boosting incentives for better forest management. ➢ Develop criteria and apply to select potential entrepreneurs, particularly those with existing interest in establishing businesses and can service loans, issued via microloans arrangements. ➢ Develop and apply criteria to select potential fish farmers from amongst the community members; ➢ Design and implement micro-lending program for the establishment of NTFP based enterprises and fish farms; ➢ Provide training for the implementation of the NTFP enterprises and fish farming, to new and old farmers; ➢ Assist entrepreneurs to link with markets and provide training on improved processing and trading.
26	Will be used to hire the services of an individual contractor with expertise in rural development and natural resources, who will work in the project to supervise the companies and/or institutions/NGO/CBO hired to perform tasks under budget 23-25. The contractor will also link the service providers under 23-25 with the district and local technical teams, ensuring their participation and contribution where necessary
27	Will finance travel necessary to implement outcome 5
28	Will finance Micro-Capital Grant to support the uptake of the NTFPs and improved energy technologies. The companies/NGOs/Institutions delivering NTFPs and improved energy technologies will formulate and implement a micro credits/grants, under the supervision of the individual contractor hired under budget 26.
29	Will hire the services of a contract to assist the District and local teams to facilitate communities to adopt improved post harvest technologies, working under the supervision of the Technical Advisor
30	Will be used to hire the services of an individual contractor to facilitate the adoption of climate smart farming practices including water use efficiency in small scale irrigation systems. The contractor will work closely with the District, EPA and TA technical staff to undertake the following: ➢ Facilitate access to seeds of high yielding drought tolerant crops such as sweet potatoes and pigeon peas, maize, legumes, groundnuts, sorghums; ➢ Investigate high value markets for unusual crops such as sweet potatoes, sorghums, etc. and facilitate farmers linkages to them; ➢ Assess training needs for farmers on the adoption climate smart agriculture, including improving irrigation practices; ➢ Develop training programs and train farmers on conservation tillage (no/minimum-tillage, ridge plantation, mulching), and water efficient irrigations practices using farmer field schools methodology; ➢ Facilitate access to pumps, in particular solar water pumps coupled with drip irrigation systems, including designing and implement cost sharing scheme to enable farmers to acquire pumps and drip irrigation systems; Working with LUANAR, the contractor will also facilitate the adoption of improved post harvest management practices. In this regard, s/he will perform the following tasks: ➢ Undertake an assessment of current the post-harvest management practices and losses of grains, fruits, vegetables and fish in the project area and the current post-harvest practices (building on the PPG assessment) and identify best practices. ➢ Support LUANAR to establish a graduate research program on post harvest management technologies involving other partners (teaching, research and extension institutions); ➢ Facilitate production of extension material supporting adoption of better post harvest management technologies; ➢ Train technicians to construct better silos, appropriate technology based equipment for fish handling and processes; ➢ Develop and implement a cost sharing scheme to incentivise a widespread adoption of improved post harvesting technologies for fruits, grains, vegetables, fish, etc. The contractor will also facilitate the establishment of two community-based Climate Smart Agriculture Centres. In this regard, the contractor will ➢ Identify potential entrepreneurs with interest and threshold capacity to set up climate-smart agricultural centres as viable business ventures;

	➢ Assist the selected entrepreneurs to develop business proposals and to link to financial institutions for capitalization; ➢ Provide some level of support for the initiation of the businesses (training, etc.)
31	Will finance the training and conferences necessary to implement outcome 6
32	Will be used to purchase Audio-visual Equipment needed to implement outcome 6
33	Will be used to finance the production and dissemination of Promotional Material Production necessary for the implementation of outcome 6
34	Will finance the travel necessary for the implement outcome 6
35	Will be used to finance the purchase of materials and goods to support climate smart agriculture measures such as high yielding drought tolerant seeds for multiplication by the communities, access to markets for newly established crops, technologies for improved post harvest management, etc.
36	Will be used to formulate and implement Micro-Capital Grants to support the uptake of high yielding drought tolerant seeds, uptake of improved irrigation systems/technologies and improved, climate safe post harvest management practices
37-42	This budget will support project administration and auditing as follows: 37. Cost of administrator at US$ 1,200 per month (including recruitment and benefits); 38. Equipment and furniture; 39. Office supplies; 40. Communication & Audio Visual Equip 41. Travel 42. Miscellaneous.

Table 18: Summary of funds

Outcome	Year 1	Year 2	Year 3	Year 4	Year 5	**Total**
Outcome 1	200,000	190,000	45,000	15,000	50,000	**500,000**
Outcome 2	222,000	222,000	200,000	164,000	54,000	**862,000**
Outcome 3	310,000	305,000	280,000	225,000	152,000	**1,272,000**
Outcome 4	255,000	265,000	265,000	230,000	85,000	**1,100,000**
Outcome 5	305,000	320,000	305,000	270,000	134,200	**1,334,200**
Outcome 6	72,000	49,000	51,000	39,000	39,000	**250,000**
Grand Total	**1,364,000**	**1,351,000**	**1,146,000**	**943,000**	**514,200**	**5,318,200**

5 MANAGEMENT ARRANGEMENTS

236. The project will be executed by the Government of Malawi with support from various technically competent service providers, under the UNDP National Implementation (NIM) modality following NIM guidelines and requirements that are set out in the UNDP Programming Manual. Experience has shown that NIM provides the best opportunity for project support in conformity with Government priorities and to ensure national ownership. The proposed project is a component of the "National Climate Change Program" (NCCP). Overall Policy Guidance will therefore be provided by the National Climate Change Steering Committee (NCCSC), through the National Climate Change Technical Committee. Oversight of project activities will however be provided by a Task Force chaired by the Director of Environmental Affairs, Ministry of Environment and Climate Change Management (or his/her delegated authority), comprising of UNDP and UNDP-GEF, Chair persons of the DECs of Machinga and Mangochi districts, representatives of the concerned line ministries and any other donors contributing towards the project. The Task Force will undertake the following tasks: provide overall local level guidance to the Project; Endorse plans and budgets; Provide directives for cross institutional actions that are necessary for the attainment of the objectives of the project; Link the project firmly into the National Climate Change Program and keep the National Project Steering Committee informed of its progress; solicit the input and/or support of the National Steering Committee (the NCCSC) when needed; Advocacy to secure support and funding through baseline programs; Discuss local level policy issues related to the implementation of the Project and bring them to the attention of the NCCSC when necessary; Ensure that the project is fully linked to the national priorities, policies and coordinated with Government interventions.

237. The National Steering Committee (NCCSC) will undertake the following tasks: Keep itself informed of the project progress, through the National Climate Change Technical Committee; Link the project firmly into the National Climate Change Program; Advocacy to secure support and funding through baseline programs; Discuss high level policy issues related to the implementation of the Project and bring them to the attention of the task force when necessary (through the National Climate Change Technical Committee); Ensure that the project is fully linked to the national priorities, policies and coordinated with Government interventions.

238. Both the National Steering Committees and the Task Force will co-opt members from other organizations on need basis. The Chair will also notify any technical committees on the recommendations of the members to overcome issues of technical nature during the course of implementation. The Project Manager will act as the secretary of the Task Force, and represent it at the National Climate Change Technical Committee. The exact membership of the Task Force will be determined during the inception workshop and it will be notified by the GOM.

239. The National PSC will hold at least one meeting in a year but additional meetings could be called on need-basis. The Lean PSC will hold at least two meeting in a year but additional meetings could be called on need-basis for both, the agenda and supporting documents will be circulated two weeks in advance of the meetings. The regular agenda items will include: presentations on program work plan, progress achieved, problems encountered, proposed activities and budget. Any bottlenecks in program implementation faced by the government, partner NGOs or program management team will be discussed and resolved under the directives of the PSC.

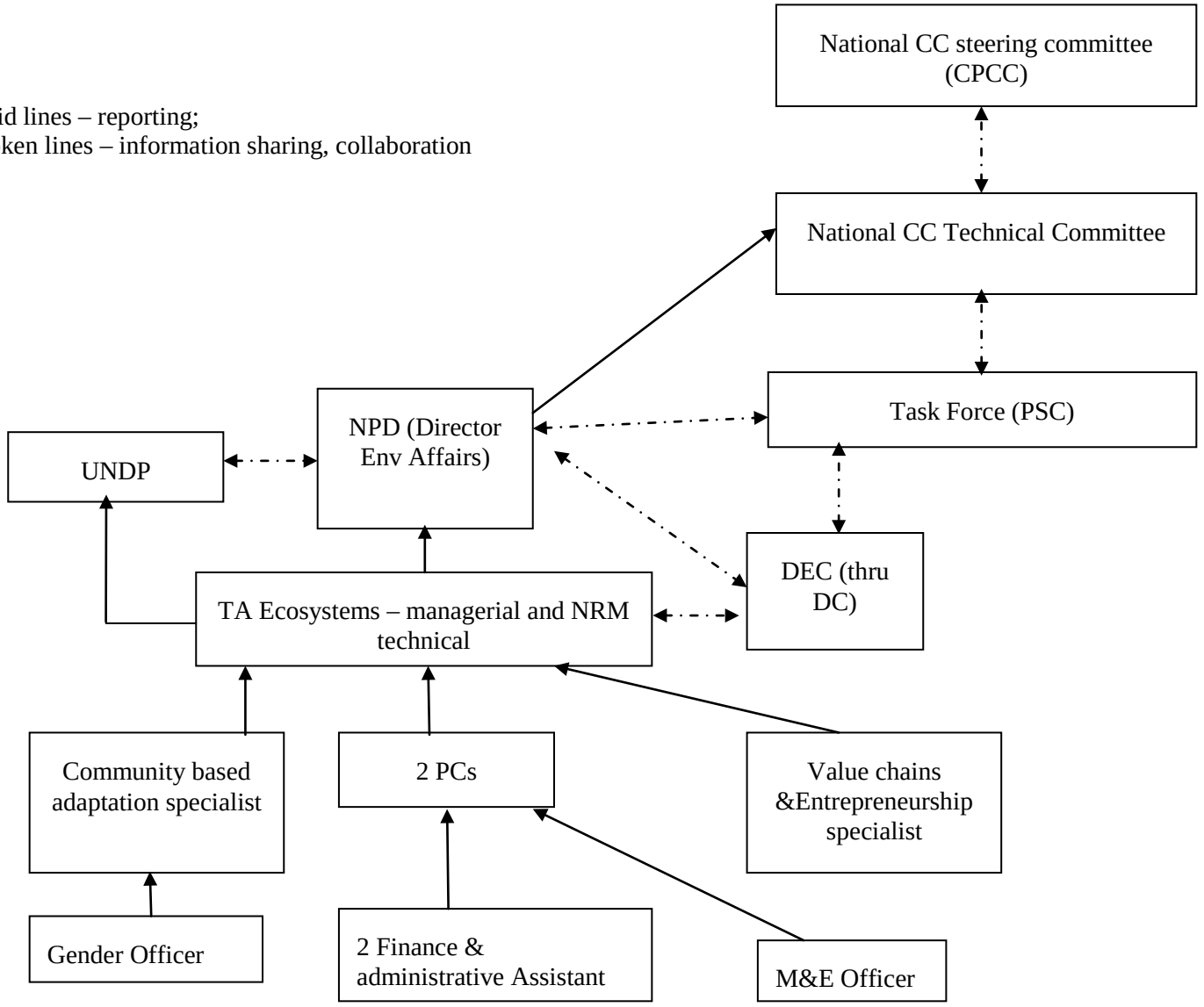
240.

241. Operational oversight will be ensured by UNDP, through the UNDP Office in Lilongwe, and strategic oversight by the UNDP/GEF SLM Regional Technical Advisor responsible for the project. The Implementing partner is the Ministry of Environment and Climate Change Management; whilst the responsible partners will be the District Councils of Machinga and Mangochi, who will execute the activities on the ground. Project management and oversight will be in line with the organigram below.

242.

Key:

1) Solid lines – reporting;
2) Broken lines – information sharing, collaboration



243. Overall project management will be provided by the National Project Director (NPD), who is the Director of Environmental Affairs (it is noted here that the NPD may delegate this role to the Manager of the NCCP or any other officers in the Environmental Affairs department). Since the project is fairly large and embraces many sectors, in two Districts far from the Capital City, a Project Office will be set up to coordinate the implementation of the project on a day-to-day basis. The Project Office will be composed of a Technical Advisor, who will have overall field based project management responsibility as well as provide technical advise on Ecosystems based adaptation, supported by two District Project Coordinators (one in each District). The District PCs will be responsible for day-to-day project coordination and management issues as well as be technically responsible for outputs 2.2 and 2.3, 4.2 and 5.3 (in their districts). The Project Office will also have the following staff members: a community based adaptation specialist, a supply chains and entrepreneurship specialist, a gender officer, an M&E officer and two financial and administrative assistants (one for each district). Their specific roles and responsibilities are described further in the Annexed ToRs – annex 6; their specific responsibilities are outlined in the table below, which will be refined during the inception period.

5.1 Financial and other procedures

244. The Implementing Partner(s) will utilize the FACE and HACT mechanisms and provide at the end of each quarter both the financial report and physical report. In the case of Government procurement, Government procurement rules apply, while UNDP rules will apply in the case of Country Office support to NEX. The Implementing Partner(s) will use the following procedures and transfer modalities for requesting cash and reporting on its utilization – (i) *Direct Cash Transfer* – This will be in the form of an advance disbursed to the Implementing Partner for obligations and expenditures to be made by them in support of activities in annual work plans (AWPs); (ii) *Direct Payments* – This would be payments to vendors and other third parties for obligations incurred by the Implementing Partner in support of activities agreed in AWPs; and (iii) *Reimbursement* – This would be reimbursements to the Implementation Partner for obligations made and expenditure incurred by them in support of activities agreed in AWPs.

245. Since the project will be implemented through a NEX modality, the preferred method of cash transfer is the Direct Cash Transfer (i.e. Advance). Direct Payments and Reimbursements will only be allowed in emergency cases which cannot await processes of an advance (Direct Cash Transfer) and/or UNDP is unable to honor the request for an advance at the time of request (e.g. in cases where the UNDP account has not yet been replenished).

Audit Clause

246. Audit will be conducted according to UNDP Financial Regulations and Rules and applicable Audit policies (only);

Table 19: Indicative Primary Responsibility for various outputs

Output 1.1: Information provided on how the state of use and management options of critical resources/ecosystems/landscapes influence effectiveness of baseline programs	TA (NRM)/contractor/ DEC, DESC, ADCs, VDCs, AEC
Output 1.2: Comprehensive landscape adaptation plans formulated using the information generated under output 1.1, complemented by community based resilience assessments:	TA (SE)/Contractor/ DEC, DESC, ADCs, VDCs, AEC
Output 1.3: Participatory Monitoring, Evaluation, Reflection and Learning (PMERL) formulated and information gathered used in adaptive management and shared widely	TA(SE)/Contractor/ DEC, DESC, ADCs, VDCs, AEC, UNDP-DDC
Output 2.1 Operational capacity of the extension service boosted to enable communities to mainstream climate risk considerations in the implementation of baseline programs:	TA(SE)/contractor, DEC, DESC, ADCs, VDCs, AEC
Output 2.2: Local and national development policies influenced by the project supported pilots to strengthen policies and policy enforcement for climate consideration	PM/ DEC, DESC, ADCs, VDCs, AEC
Output 2.3: Lessons generated at the project/district level fed into the	PM/ DEC, DESC, ADCs, VDCs, AEC

national climate programme, SLM platform and other national planning debates, to lobby and influence the adoption of climate risk considerations as minimum criteria for accessing agricultural input subsidy benefits	
Output 3.1: Construction of mini dams[33], water ponds, retention ridges, and water diversion structures:	TA NRM/ Engineering contractor/ DEC, DESC, ADCs, VDCs, AEC
Output 3.2 Construction of physical structures to support infrastructure and expansion of water harvesting from dwellings:	TA NRM /Engineering contractor/ DEC, DESC, ADCs, VDCs, AEC
Output 4.1: Degraded watersheds (forest ecosystems) rehabilitated, river Banks and Lake shores protected from direct siltation	TA NRM /contractor/ DEC, DESC, ADCs, VDCs, AEC
Output 4.2: provision of improved and sustainable supplies of energy, including adoption of sustainable charcoal	PM/contractor / DEC, DESC, ADCs, VDCs, AEC
Output 4.3: Diversification of household food basket and incomes via expansion of aquaculture and NTFP reduce pressure on the forests, river and lake fisheries	TA SE/Local contractor/ DEC, DESC, ADCs, VDCs, AEC
Output 5.1: Adoption of climate smart farming practices including water use efficiency in small scale irrigation systems improved	TA NRM /contractor/ DEC, DESC, ADCs, VDCs, AEC
Output 5.2: development of skills and institutional arrangements for individual and/or communal climate safe post-harvest management practices and storage facilities disseminated	TA SE/contractor/ DEC, DESC, ADCs, VDCs, AEC
Output 5.3: establish two community-based Climate Smart Agriculture Centres	PM/ DEC

Private Sector, NGO / CBO IMPLEMENTATION

247. Given the nature of the project, credible private sector, civil society (CBO/NGOs), academia, research institutions and other multi-lateral development partners will be engaged to facilitate some of the components (table 20). Selection of relevant contractors will be done following transparent procedures as laid down by government or UNDP (depending on which entity procures the contractors). The contractors will work under the supervision of the Technical advisors and/or the PM, and work closely with the project team, DEC, DESC, ADCs, VDCs, AEC to enhance their capacities. It is envisaged that some of the CBOs/NGOs will carry forward the work, after the completion of the program and thus contribute towards the sustainability of the project.

248. In addition, budget has been allocated to procure specialized input from other agencies, such as FAO / CGIAR centres. The Task Force will make decision regarding the engagement of these experts [whether national or international]. District will ensure that the following staff will be available to engage with the project:

- Water Resource Management Officers
- Forest Management Officers
- Community Development Officers
- Social Organizers
- Agriculture Extension Officers
- Accounts clerks
- Receptionists
- Drivers
- Guards
- Office Attendants

249. The District Governments will cover the salaries of these staff, however, the project will provide funds required for project related issues/duties.

[33] A UNDP funded project in Pakistan was instrumental in the construction of some 170 mini dams in a rainfed district [Lachi Tehsil, District Kohat] which has changed the life of people.

5.2 MONITORING FRAMEWORK AND EVALUATION

250. Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and the UNDP Country Office (UNDP-CO) with support from the UNDP/GEF Regional Coordination Unit. The Project Results Framework provides performance and impact indicators for project implementation along with their corresponding means of verification. The Adaptation Tracking Tool will be used to monitor the project's impact on adaptation (see Annex 7). The M&E plan includes: inception report, project implementation reviews, quarterly and annual reviews, an independent mid-term review and an independent final evaluation. The following sections outline the principle components of the M&E Plan and indicative cost estimates. The project's M&E Plan will be presented and finalized in the Project's Inception Report following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M&E responsibilities.

Project start:

251. A Project Inception Workshop will be held within the first 2 months of project start with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan.

252. The Inception Workshop should address a number of key issues including:

- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and RCU staff vis à vis the project team.
- Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
- Based on the project results framework and the Adaptation Tracking Tool, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- Plan and schedule Project Board meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first Project Board meeting should be held within the first 12 months following the inception workshop.

253. An Inception Workshop report is a key reference document and will be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly:

254. Progress made shall be monitored in the UNDP Enhanced Results Based Managment Platform. Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high. Note that for UNDP GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, or capitalization of ESCOs are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical). Based on the information recorded in Atlas, a Project Progress Reports (PPR) can be generated in the Executive Snapshot. Other ATLAS logs can be used to monitor issues, lessons learned etc... The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

Annually:

255. Annual Project Review/Project Implementation Reports (APR/PIR): This key report is prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1

July). The APR/PIR combines both UNDP and Tracking Tool reporting requirements. The APR/PIR includes, but is not limited to, reporting on the following:

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative); Project outputs delivered per project outcome (annual); Lesson learned/good practice; AWP and other expenditure reports; Risk and adaptive management; ATLAS QPR; Portfolio level indicators (i.e. GEF focal area tracking tools) are used by most focal areas on an annual basis as well.

Table 20: Monitoring and evaluation work plan and budget

Type of M&E Activity	Responsible Parties	Budget [US $]	Time-frame
Inception workshop and report	Project Manager, UNDP CO and UNDP GEF	Indicative Cost: $ 10,000	Within first-two months of project start up
Measurement of Means of Verification of project results	UNDP GEF RTA / Project Manager will oversee the hiring of specific studies and institutions to relevant team members	To be finalized in Inception Phase and Workshop	Start-, mid- and end- of project [during evaluation cycle] and annually when required
Measurement of Means of Verification for Project Progress	Oversight by EAD and District Commissioners, PIU, especially PMERO and implementation teams	To be determined as part of the Annual Work Plan's preparation Indicative cost: $ 30,000	Annually prior to APR/PIR and to the definition of annual work plans
APR/PIR	EAD, DAESS, PIU. UNDP CO and UNDP RTA	None	Annually
Periodic status / progress reports	EAD and project team	None	Quarterly
Mid-term Review	EAD, DAESS, PIU, UNDP CO, UNDP RTA, and external consultants	Indicative cost: $ 30,000	At the mid-point of project implementation
Terminal Evaluation	EAD, DAESS, PIU, UNDP CO, UNDP GEFRTA and external consultants	Indicative cost: $ 60,000	At least 3 months before the end of project implementation
Audit	UNDP CO, NPD, PIU	Indicative cost: $ 5,000 per year [25,000 total]	Yearly
Visits to Field sites	UNDP CO, NPD, Government representatives	For GEF supported projects, paid from IA fees and operational budget	Yearly for UNDP, as required by the Government
Total Indicative Cost [excluding project staff time and UNDP staff and travel expenses		US $ 155,000	

Periodic Monitoring through site visits:

256. UNDP CO and the UNDP_GEF Regional Unit will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Steering Committee and Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and Project Board members.

Mid-term of project cycle:

257. The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation (2016). The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this

review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-EEG. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the UNDP Evaluation Office Evaluation Resource Center (ERC).

258. The relevant Adaptation Area Tracking Tools will also be completed during the mid-term evaluation cycle.

End of Project:

259. An independent Final Terminal Evaluation will take place three months prior to the final Project Board meeting and will be undertaken in accordance with UNDP and SOF (e.g. GEF) guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-EEG.

260. The Final Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC). The Adaptation Focal Area Tracking Tools will also be completed during the final evaluation.

261. During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

Learning and knowledge sharing:

262. Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Finally, there will be a two-way flow of information between this project and other projects of a similar focus.

Communications and visibility requirements:

263. Full compliance is required with UNDP's Branding Guidelines. These can be accessed at http://intra.undp.org/coa/branding.shtml, and specific guidelines on UNDP logo use can be accessed at: http://intra.undp.org/branding/useOfLogo.html. Amongst other things, these guidelines describe when and how the UNDP logo needs to be used, as well as how the logos of donors to UNDP projects needs to be used. For the avoidance of any doubt, when logo use is required, the UNDP logo needs to be used alongside the GEF logo. The GEF logo can be accessed at: http://www.thegef.org/gef/GEF_logo. The UNDP logo can be accessed at http://intra.undp.org/coa/branding.shtml.

264. Full compliance is also required with the GEF's Communication and Visibility Guidelines (the "GEF Guidelines"). The GEF Guidelines can be accessed at: http://www.thegef.org/gef/sites/thegef.org/files/documents/C.40.08_Branding_the_GEF%20final_0.pdf. Amongst other things, the GEF Guidelines describe when and how the GEF logo needs to be used in project publications, vehicles, supplies and other project equipment. The GEF Guidelines also describe other GEF promotional requirements regarding press releases, press conferences, press visits, visits by Government officials, productions and other promotional items.

265. Where other agencies and project partners have provided support through co-financing, their branding policies and requirements should be similarly applied.

6 LEGAL CONTEXT

266. This document together with the CPAP signed by the Government and UNDP which is incorporated by reference constitute together a Project Document as referred to in the Standard Basic Assistance Agreement [SBAA] [or other appropriate governing agreement] and all CPAP provisions apply to this document. Consistent with the Article III of the SBAA, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner. The implementing partner shall put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried; assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

267. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement. The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 [1999]. The list can be accessed via http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

7 ANNEX

7.1 Baseline reports per District and hotspot selection – available on request

7.2 Detailed effects of climate change on important crops

268. **Maize**: Maize yields decrease with higher temperatures (Lobell et al., 2008 and 2010; Ringler, 2010). Sensitivity to heat is intensified in drought conditions, and maize growing in sites with mild temperatures can be negatively affected by warming in the absence of sufficient levels of moisture in the soil (Lobell et al., 2011). Whatever the driver of reduced soil fertility (e.g., continuous cropping, insufficient measures to replenish nutrients and organic matter in the soil), the reduced moisture-holding capacity of the soil is also increasingly aggravated by high rates of rainfall runoff and low levels of soil organic matter. From 1985–2005, maize yields in Malawi averaged approximately 1.3 tons per ha. In 2003/2004, crop production was adversely affected by the late onset of rains and a prolonged dry spell that occurred at a critical stage in crop development, particularly in the southern region (USAID/Malawi, 2005). During the 2004/2005 growing season, drought had a devastating effect on maize yields, and the national average yield fell 40% below the long term average, to 0.76 tons/ha. In November 2005, five million Malawians (or 38% of the population) were in need of food aid.

269. Further, the improved varieties which have been promoted by the GOM and private sector do not perform well compared to traditional varieties without the application of fertilizers. Improved varieties are also more susceptible to dry spells, as commonly occur in January and February, even in a normal season. Although they can survive a normal two-week dry spell, yields are affected by prolonged dry spells, particularly at the crucial tasselling stage. Traditional varieties are better able to cope with more prolonged moisture shortage, though they too will start to lose yield if the period is very prolonged. A further problem with improved varieties is that they are more susceptible to pest damage in storage, as the grains are less dense and easier to "bore."

270. The late onset of rains will lead to increased cost of production. The additional cost is due to the need for replanting, along with the need for additional weeding, ridging, drying/shelling, and pesticides (in storage). The longer dry spells during the rainy season raise the cost of production almost as much as late onset, primarily because extremely long dry periods occurring early in the growing season require a complete re-planting of the seeds, thereby doubling the cost of seeds and of ridging.

271. **Groundnuts:** The combination of heat with longer periods of drought has the potential to impact plant development in both vegetative and reproductive stages of groundnuts. The negative impacts of elevated temperature and reduced water on groundnuts concurs with other reports (Vara Prasad et al. 2003) where it is indicated that this crop can suffer significant reduction in yield due to abiotic and biotic stresses and soil infertility. The main cost, in the case of groundnut due to late onset of rains, will be from having to replant (approximately half of) seeds that did not germinate due to lack of moisture. Additional work on the tier ridges will be another significant cost component. Under the extreme climate scenario, the main cost will be the need to replant more seeds, together with the need for additional weeding, tier ridging, pesticides, drying and shelling.

272. **Pigeon peas:** Pigeon peas withstand low moisture conditions and perform well in areas with low levels of rainfall, such as in Blantyre, Machinga, and Shire Valley districts. Earlier maturing varieties are reportedly more vulnerable to lower yields, especially due to post-harvest pest-related losses, which may increase with climate change. The late onset of rains will cost more due to replanting, approximately half the seed to replace seeds that did not germinate due to lack of moisture. Additional work on the tier ridges is another significant cost component. Under the extreme scenario, there will be need for replanting even more seeds than under the moderate scenario, together with the need for additional weeding, ridging and pesticides.

273. **Cowpeas:** Cowpea is a highly nutritious crop with significant levels of resilience to climate change. Cowpeas are more sensitive to temperatures than to precipitation. High temperatures, drought and poor soil fertility all deter cowpea productivity in Malawi. Cowpea is widely known as the "crop of the poor" because its green pods and leaves are the earliest food available before cereals mature, so serving as "insurance" against food shortages during the "hungry season." Cowpea cultivation areas are frequently inappropriate for the production of other crops such as beans or groundnuts, and cowpea yields in these farmer-managed fields are low, averaging only 388 kg/ha in Malawi. Different abiotic and biotic stresses keep productivity low. The most significant are drought, heat, poor soil fertility, inappropriate agronomic practices, fungal, viral, and bacterial diseases, and parasitic weeds (Striga and Alectra). Cowpea has been reported as particularly susceptible to infestation by several insects with devastating effects on plants in the field and seeds in storage. The late onset of rains will increase the cost of production of cowpeas like pigeon peas, in addition to drying and shelling.

274. **Soybeans**: Interestingly, while soybeans are among the most climate-tolerant of the six studied crops, they are as sensitive to climate-affected pests and diseases as is maize. Soybeans have the potential to counter climate constraints, as they appear to have good levels of drought tolerance. In addition, they can grow in relatively high elevations where excessive heat is less likely to occur, so that mountain regions can benefit from cultivating this crop. In March and April, the crop is drying such that it is negatively affected by heavy rains which augment fungal infections. In addition, heavy rains in April lead to purple seed stain, which increases grading effort and cost. Under the extreme scenario, the late onset of the rainy season will require replanting of more seeds, together with additional weeding and tier ridging. Lower total volume of rain also substantially raises the cost of production.

275. **Sorghum**: Sorghum is more sensitive to temperatures than to precipitation. However, the opposite is true for sensitivity of sorghum pests and disease, which are triggered more readily by precipitation. In Malawi, sorghum production is limited by a number of factors such as the lack of better cultivars, inadequate crop production practices, drought, pests, and diseases. In particular, recent production has been affected by poor and unpredictable rainfall in the growing areas. In extreme scenarios, the late, heavy rains would require additional labor cost for harvesting, threshing and drying, and pesticides. IFPRI report concluded that the sorghum and millet production will be increased in the hot and dry weather[34]

276. **Cassava:** Cassava is the second most important source of carbohydrates in sub-Saharan African, after maize, and is eaten by around 500 million people every day, according to the UN Food and Agriculture Organization. Globally, 280 million tons are produced every year, with half the supply coming from Africa. In Malawi about 3.5 million tons of cassava is produced annually. Studies indicate that cassava becomes even more productive in hotter temperatures and outperforms potatoes, maize, beans, bananas, millet and sorghum - some of Africa's main food crops[35] . The increase in production is 9%, however, it will be attacked by higher densities of pests and diseases in the hotter and dry climate.

277. **Sweet Potatoes** also grow well under hot and dry weather, and the size of tubers doubles with the increase in Carbon dioxide concentrations[36]. The crop performs well in dry weathers, when the maize crop often fails[37]. However, the crop will be attacked more by weevils and butterflies. An IFPRI report indicated that the sweet potato production will decrease by 15% due to rising temperatures[38].

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[34] http://www.ifpri.org/sites/default/files/publications/rb15_20.pdf

[35] http://www.irinnews.org/in-depth/95694/73/

[36] http://www.newscientist.com/article/mg21628924.300-climate-change-may-supersize-sweet-potatoes.html#.Uoe12fmw0us

[37] http://blogs.reuters.com/africanews/2009/12/22/sweet-potatoes-to-beat-climate-change/

[38] http://www.ifpri.org/sites/default/files/publications/rb15_20.pdf

278. **Sugarcane** is also sensitive to higher temperatures, and the yield is negatively affected. Studies conducted in Swaziland indicated that the current water supply schemes will fail to meet the irrigation needs of sugarcane[39].

7.3 Brief description of Malawi's ecosystems

279. Despite being surrounded by land on all sides, the country has great diversity of terrestrial, aquatic and agro ecosystems described below, which supply goods and services to livelihoods and economic development (in the tables below).

280. **Terrestrial ecosystems:** Malawi lies entirely within the Zambezian phyto-region which is characterized by different forms of woodland and thicket, along the gradient of attitude (between 500–2050 m). The highlands: occur above elevations of 1,600 – 3,000m above sea level. With the most prominent highlands being the Mulanje, Zomba and Dedza mountains. *The Plateaux:* are located at elevations of between 1,000 and 1,600m above sea level, and cover extensive tracts of the Central and Northern Regions. Their gently undulating surfaces are characterised by broad valleys and interfluves and thus are drained mainly by "dambo" streams that flow seasonally through shallow and swampy valleys. *The Rift Valley Escarpment:* in Malawi, the East African Rift descends from the plateaux in a series of stepped faults, known collectively as the Rift Valley Escarpment. This zone of often precipitous slopes is, in general, highly dissected and commonly characterised by bare recent erosion surfaces. *The Rift Valley Plains:* are depositional plains largely formed by the deposition of materials eroded from the Rift Valley Escarpment. They are characterised by subdued relief and gentle slopes, and extend along parts of the Lake Malawi shore and the Upper Shire Valley. Average elevations are less than 600m above sea level and decline to below 100m in the Lower Shire Valley.

281. The Miombo woodland zones are the most dominant terrestrial eco-zones. Montane forests occur in high altitude and rainfall areas. Mopane woodlands frequently occur on fertile soils in the south around Shire River and the lakes. Evergreen bush-land/thicket and evergreen shrubland lie within the Afromontane region, mainly above 1500–1600 m, while grassland is most extensive on some of the high plateaux or in dambos at the lower levels. There are enclaves of lowland rain forest with an important proportion of the "Eastern" elements, forming the Eastern (Forest) regional mosaic, altitudinal range 500–1300 m.

282. **Aquatic Ecosystems:** The country has a wide range of aquatic ecosystems, including five lakes (Malawi, Chilwa, Malombe, Chiuta, and Kazuni), numerous rivers (Shire, Bua, Dwangwa, Linthipe, Ruo, Songwe, and the North and the South Rukuru), streams, wetlands, marshes and swamps, dams and ponds, and temporary pools. Collectively, these aquatic ecosystems constitute about 22% of the total surface area of the country. They include 17 major catchment basins, occupying a total area of 94, 276 km^2 with a total storage estimated to be 100 m^3. The Shire Basin with a total drainage area of 18, 945 km^2 is the largest, whilst Chizumulu Island, with an area of 3.3 km^2 is the smallest. Most of the rivers in these basins are perennial but could at times become ephemeral depending on how much rain has been received during the year and the state of catchment. They also include wetlands such as Lake Chilwa and Elephant marsh, which perform many functions ranging from regulation of stream flows, purification of water, water storage and maintenance of biodiversity.

283. These aquatic ecosystems have historically provided Malawi with an abundance of surface water. This abundance has allowed the country to develop significant large irrigation systems and an important hydropower industry, both of which contribute significantly to the nation's economy. The Shire River, fed by outflow from Lake Malawi, is the most critical source for renewable surface water in the country. Small, inland Lake Chilwa is shared by Malawi and Mozambique, and is the source of at least one- quarter of the fish production in Malawi. Surrounded by wetlands and with a maximum depth of just five meters, Lake Chilwa is a very fragile hydrologic system, especially vulnerable to the impacts of climate change.

[39] http://www.sciencedirect.com/science/article/pii/S0308521X09001048

284. Hydropower provides 96% of Malawi's energy needs (Government of Malawi)[40], from just five power plants on the Shire River. Hydropower currently produces 283 megawatts (MW) of energy, while the demand for power is already 347 MW and rising. The Shire River accounts for 96% of national energy production and provides the majority of irrigation water for the southern part of the country.

285. The ecosystems have also provided fish biodiversity. The global importance of Malawi's biodiversity is often cited with respect to fisheries. Malawi has one of the largest number and most diverse communities of freshwater fish in the world, with 800 species of fish, of which 90% are endemic (USAID/Malawi, 2005). Over 15% of the global total freshwater fish species are found in Lake Malawi. Fishing contributes about 4 per cent to Malawi's Gross Domestic Product (GDP) and accounts for 60–70% of Malawians' animal protein intake. It is also the preferred source of protein for most Malawians. An estimated 1.6 million Malawians derive at least some income from fishing, fish processing, marketing and trading, boat and gear-making and allied industries (Brummet and Noble, 1995; Andrew et al., 2003).

286. **Agricultural Ecosystems:** Malawi has a high variability among living organisms associated with cultivated crops and domesticated animals expressed in the breeds used for food, fodder, fuel and pharmaceuticals and species that support production such as soil microorganisms and pollinators. This agro biodiversity is the driving force of the country's agricultural sector and hence the economy. Indeed Malawians grow a wide variety of crops including cereals (maize, rice, sorghum), legumes (groundnuts, beans, pigeon peas, cowpea), roots and tubers (cassava, sweet potato and potato), horticultural (bananas, guava, oranges, tangerine, lemons), vegetables (cabbage, tomatoes, carrots, onions) as well as cash crops (tea, tobacco, cotton and sugarcane). Sorghum (*Sorghum bicolor*) and millets (*Pennisetum spp.* and *Eleusine coracana*) are indigenous cereals that were gradually replaced by the introduction of maize (*Zea mays*). Current agricultural policies favour maize production because it is the main staple food. There are efforts to promote production of the indigenous cereals because they are drought resistant. Beans (*Phaseolus vulgaris*) have high genetic diversity and the popular varieties include red kidney, white, speckled/variegated etc.

287. The country's terrestrial, aquatic and agricultural ecosystems provide critical ecosystems' goods and services upon which the livelihoods of Malawians and their economies depend (table below).

Table 21: Vegetation types of Malawi's Terrestrial Ecosystems[41]

Vegetation Type	Defining Characters	Malawi Examples
Zambezian Woodland		
Zambezian Miombo Woodland	Dominated by species of brachystegia alone or with Julbernardia and Isoberlinia	Occurs widely in forest reserves throughout the country, but used to be the main vegetation of plateau and its scarps
Zambezian Mopane Woodland	Dominated by Colophospermum mopane	Mua Tsanya FR, Vwaza marsh, Liwonde NP and Lower Majete WR
Zambezian Undifferentiated Woodland	Defined by the absence of miombo and mopane dominants but often dominated by *Acacia* and *Combretum* species	Used to be wide spread in Shire Valley, Phalombe, Lilongwe and drier lake shore plains, but much has been destroyed due to farming and settlements
Transition Woodland	They are intermediate between forests & woodlands, may be secondary or ecotonal	Small fragments are found in Nkhata Bay, Vinthukutu, Mulanje Mountain, and Nyika Plateau at upper limit of miombo, just before Afromontane
Deciduous Forests and Thickets	Characterized by canopy species which are deciduous for more than a month and under storey species deciduous for several month	Small patches of deciduous forests found in Lengwe and Liwonde NPs; deciduous thickets are found in Lengwe and Liwonde NPs
Evergreen forest		

[40] "Malawi State of the Environment and Outlook Report," 2010

[41] Adapted from the Malawi State of Environment and Outlook Report (2010): Government of Malawi

Riparian Forest	Characterized by species adapted to banks of river courses or influenced by flood (occurs at all altitudes)	Rivers in Nyika and Viphya Plateaux, Dzalanyama FR
Lowland Rain Forest	Characterized by the presence of only 0–25% of Afromontane species	Foothills around Thyolo and Mulanje Mountains, Malawi Hills (Nsanje), and Kalwe and Nkuwazi FRs
Mid altitude Rain Forest	Defined by flora containing a mixture of lowland and Afromontane elements and confined to lower slopes of high mountains	Mulanje Mountain foothills, Kaning'ina FR, Chipata Mountain
Afromontane Rain Forest	Essentially evergreen, though some emergents may lose their leaves for a week or two	Ntchisi Mountain, Misuku Hills, Mafinga Mountain, Nyika and Viphya Plateaux
Undifferentiated Afromontane Forests	They occur on high plateaux (2250–2450 m) and nearly all species are evergreen	
Hagenia abyssinica forest		Nyika National Park
Juniperous procera forest		Nyika National Park
Widdringtonia whytei forest		Mulanje Mountain
Afromontane Bamboo	Dominated by Arundinaria alpine	Dedza and Mulanje Mountains
Afromontane Evergreen bushland and Thicket	Defined by the dominance of *Erica* species	Widespread and common on larger mountains (Dedza, Mulanje, Nyika)
Afromontane Shrubland	Characterised by stunted individuals of bushland and thicket	Nyika National Park, Mulanje Mountain
Afromontane Grassland	Mainly, secondary, fire-maintained grassland	Misuku Hills, Mulanje Mt, Nyika and Viphya Plateaux, Dedza Mt, Zomba-Malosa Mts.

7.4 Minutes of Meeting – available on request

7.5 Community Based Resilience Analysis (CoBRA – available on request),

7.6 Adaptation Tracking Tool

MAPPING PROJECT OUTCOMES AGAINST THE MALAWI NAPA PRIORITY PROJECTS

NAPA Projects	Proposed LDCF Project outcomes mapped alongside the NAPA projects			
1: Improving community resilience to climate change through the development of sustainable rural livelihoods		Outcome 1.2: Ecological measures complementing physical water management infrastructure to reduce risk of climate change induced floods and enhance resilience against unusually harsh and frequent droughts in selected hotspots [covering over 10,000 ha of farmlands];	Outcome 2.1: Adoption of climate safe post-harvest management technologies and practices by more than 50% of grain farmers reduce climate induced grain loss by more than 30% in Machinga district	Outcome 2.1: District level civil works [infrastructure / building] regulations integrate climate risk information and adaptation measures
3. Improving agricultural production under erratic rains and changing climatic conditions	Outcome 1.1: Public and domestic water harvesting, storage and distribution reduces climate change driven flooding and regulates availability of water throughout the year in flood & drought hotspots			
4. Improving Malawi's preparedness to cope with droughts and floods				

2. Restoring forests in the Upper, Middle and Lower Shire Valleys catchments to reduce siltation and the associated water flow problems		Outcome 2.2: Up-scaling – An up scaling strategy defined and implemented to increase the resilience of upper Shire communities from climate change-induced risks		

7.7 Environmental and Social Screening Procedure

QUESTION 1:

Has a combined environmental and social assessment/review that covers the proposed project already been completed by implementing partners or donor(s)?

Select answer below and follow instructions:
X NO → Continue to Question 2 (do not fill out Table 1.1)
YES → No further environmental and social review is required if the existing documentation meets UNDP's quality assurance standards, and environmental and social management recommendations are integrated into the project. Therefore, you should undertake the following steps to complete the screening process:
1. Use Table 1.1 below to assess existing documentation. (It is recommended that this assessment be undertaken jointly by the Project Developer and other relevant Focal Points in the office or Bureau).
2. Ensure that the Project Document incorporates the recommendations made in the implementing partner's environmental and social review.
3. Summarise the relevant information contained in the implementing partner's environmental and social review in Annex A.2 of this Screening Template, selecting Category 1.
4. Submit Annex A to the PAC, along with other relevant documentation.

Note: Further guidance on the use of national systems for environmental and social assessment can be found in Annex B.

QUESTION 2:

Do all outputs and activities described in the Project Document fall within the following categories?
Procurement (in which case UNDP's Procurement Ethics and Environmental Procurement Guide need to be complied with)
Report preparation
Training
Event/workshop/meeting/conference (refer to Green Meeting Guide)
Communication and dissemination of results

Select answer below and follow instructions:
X NO → Continue to Question 3
YES → No further environmental and social review required. Complete Annex A.2, selecting Category1, and submit the completed template (Annex A) to the PAC.

QUESTION 3:

Does the proposed project include activities and outputs that support *upstream* planning processes that potentially pose environmental and social impacts or are vulnerable to environmental and social change (refer to Table 3.1 for examples)?(Note that *upstream* planning processes can occur at global, regional, national, local and sectoral levels)

Select the appropriate answer and follow instructions:
NO → Continue to Question 4.
X YES →Conduct the following steps to complete the screening process:
1. Adjust the project design as needed to incorporate UNDP support to the country(ies), to ensure that environmental and social issues are appropriately considered during the upstream planning process. Refer to Section 7of this Guidance for elaboration of environmental and social mainstreaming services, tools, guidance and approaches that may be used.
2. Summarise environmental and social mainstreaming support in Annex A.2, Section C of the Screening Template

and select ”Category 2”.
3. If the proposed project ONLY includes upstream planning processes then screening is complete, and you should submit the completed Environmental and Social Screening Template (Annex A) to the PAC. If downstream implementation activities are also included in the project then continue to Question 4.

TABLE 3. 1 EXAMPLES OF UPSTREAM PLANNING PROCESSES WITH POTENTIAL DOWNSTREAM ENVIRONMENTAL AND SOCIAL IMPACTS	**Check box**
Support for the elaboration or revision of global- level strategies, policies, plans, and programmes. *For example, capacity development and support related to international negotiations and agreements. Other examples might include a global water governance project or a global MDG project.*	
Support for the elaboration or revision of regional-level strategies, policies and plans, and programmes. *For example, capacity development and support related to transboundary programmes and planning (river basin management, migration, international waters, energy development and access, climate change adaptation etc.).*	
3. Support for the elaboration or revision of national-level strategies, policies, plans and programmes. *For example, capacity development and support related to national development policies, plans, strategies and budgets, MDG-based plans and strategies (e.g. PRS/PRSPs, NAMAs), sector plans.*	
4. Support for the elaboration or revision of sub-national/local-level strategies, polices, plans and programmes. *For example, capacity development and support for district and local level development plans and regulatory frameworks, urban plans, land use development plans, sector plans, provincial development plans, provision of services, investment funds, technical guidelines and methods, stakeholder engagement.*	**X**

QUESTION 4:

Does the proposed project include the implementation of *downstream* activities that potentially pose environmental and social impacts or are vulnerable to environmental and social change?

To answer this question, you should first complete Table 4.1 by selecting appropriate answers. If you answer "No" or "Not Applicable" to all questions in Table 4.1 then the answer to Question 4 is "NO." If you answer "Yes" to any questions in Table 4.1 (even one "Yes" can indicated a significant issue that needs to be addressed through further review and management) then the answer to Question 4 is "YES":

NO → No further environmental and social review and management required for downstream activities. Complete Annex A.2 by selecting "Category 1", and submit the Environmental and Social Screening Template to the PAC.
X YES→ Conduct the following steps to complete the screening process:
1. Consult Section 8of this Guidance, to determine the extent of further environmental and social review and management that might be required for the project.
2. Revise the Project Document to incorporate environmental and social management measures. Where further environmental and social review and management activity cannot be undertaken prior to the PAC, a plan for undertaking such review and management activity within an acceptable period of time, post-PAC approval (e.g. as the first phase of the project) should be outlined in Annex A.2.
3. Select "Category 3" in Annex A.2, and submit the completed Environmental and Social Screening Template (Annex A) and relevant documentation to the PAC.

TABLE 4.1: ADDITIONAL SCREENING QUESTIONS TO DETERMINE THE NEED AND POSSIBLE EXTENT OF FURTHER ENVIRONMENTAL AND SOCIAL REVIEW AND MANAGEMENT	
1. Biodiversity and Natural Resources	(Yes/No/N/A)
1.1 Would the proposed project result in the conversion or degradation of modified habitat, natural habitat or critical habitat?	Yes
1.2 Are any development activities proposed within a legally protected area (e.g. natural reserve, national park) for the protection or conservation of biodiversity?	No
1.3 Would the proposed project pose a risk of introducing invasive alien species?	Yes
1.4 Does the project involve natural forest harvesting or plantation development without an independent forest certification system for sustainable forest management (*e.g.* PEFC, *the* Forest Stewardship Council *certification systems, or processes established or accepted by the relevant National Environmental Authority*)?	NO
1.5 Does the project involve the production and harvesting of fish populations or other aquatic species without an accepted system of independent certification to ensure sustainability (*e.g. the* Marine Stewardship Council certification *system or certifications, standards, or processes established or accepted by the relevant National Environmental Authority*)?	NO
1.6 Does the project involve significant extraction, diversion or containment of surface or ground water? *For example, construction of dams, reservoirs, river basin developments, groundwater extraction.*	Yes
1.7 Does the project pose a risk of degrading soils?	No
2. Pollution	(Yes/No/N/A)
2.1 Would the proposed project result in the release of pollutants to the environment due to routine or non-routine circumstances with the potential for adverse local, regional, and trans-boundary impacts?	No
2.2 Would the proposed project result in the generation of waste that cannot be recovered, reused, or disposed of in an environmentally and socially sound manner?	No
2.3 Will the propose project involve the manufacture, trade, release, and/or use of chemicals and hazardous materials subject to international action bans or phase-outs? *For example, DDT, PCBs and other chemicals listed in international conventions such as the* Stockholm Convention on Persistent Organic Pollutants, *or the Montreal Protocol.*	No
2.4 Is there a potential for the release, in the environment, of hazardous materials resulting from their production, transportation, handling, storage and use for project activities?	No
2.5 Will the proposed project involve the application of pesticides that have a known negative	Yes

effect on the environment or human health?	
3. Climate Change	(Yes/No/N/A)
3.1 Will the proposed project result in significant[42] greenhouse gas emissions? *Annex E provides additional guidance for answering this question.*	No
3.2 Is the proposed project likely to directly or indirectly increase environmental and social vulnerability to climate change now or in the future (also known as maladaptive practices)? You can refer to the additional guidance in Annex C to help you answer this question: *For example, a project that would involve indirectly removing mangroves from coastal zones or encouraging land use plans that would suggest building houses on floodplains could increase the surrounding population's vulnerability to climate change, specifically flooding.*	No
4. Social Equity and Equality	(Yes/No/N/A)
4.1 Would the proposed project have environmental and social impacts that could affect indigenous people or other vulnerable groups?	NO
4.2 Is the project likely to significantly impact gender equality and women's empowerment[43]?	Yes
4.3 Is the proposed project likely to directly or indirectly increase social inequalities now or in the future?	No
4.4 Will the proposed project have variable impacts on women and men, different ethnic groups, social classes?	Yes
4.5 Have there been challenges in engaging women and other certain key groups of stakeholders in the project design process?	No
4.6 Will the project have specific human rights implications for vulnerable groups?	No
5. Demographics	(Yes/No/N/A)
5.1 Is the project likely to result in a substantial influx of people into the affected community (ies)?	No
5.2 Would the proposed project result in substantial voluntary or involuntary resettlement of populations? *For example, projects with environmental and social benefits (e.g. protected areas, climate change adaptation) that impact human settlements, and certain disadvantaged groups within these settlements in particular.*	No
5.3 Would the proposed project lead to significant population density increase which could affect the environmental and social sustainability of the project? *For example, a project aiming at financing tourism infrastructure in a specific area (e.g. coastal zone, mountain) could lead to significant population density increase which could have serious environmental and social impacts (e.g. destruction of the area's ecology, noise pollution, waste management problems, greater work burden on women).*	No
Culture	(Yes/No/N/A)
6.1 Is the project likely to significantly affect the cultural traditions of affected communities, including gender-based roles?	No
6.2 Will the proposed project result in physical interventions (during construction or implementation) that would affect areas that have known physical or cultural significance to indigenous groups and other communities with settled recognised cultural claims?	No
6.3 Would the proposed project produce a physical "splintering" of a community? *For example, through the construction of a road, power line, or dam that divides a community.*	No
Health and Safety	(Yes/No/N/A)
7.1 Would the proposed project be susceptible to or lead to increased vulnerability to	No

[42] Significant corresponds to CO_2 emissions greater than 100,000 tons per year (from both direct and indirect sources). Annex E provides additional guidance on calculating potential amounts of CO_2 emissions.

[43] Women are often more vulnerable than men to environmental degradation and resource scarcity. They typically have weaker and insecure rights to the resources they manage (especially land), and spend longer hours on collection of water, firewood, etc. (OECD, 2006). Women are also more often excluded from other social, economic, and political development processes.

earthquakes, subsidence, landslides, erosion, flooding or extreme climatic conditions? *For example, development projects located within a floodplain or landslide prone area.*	
7.2 Will the project result in increased health risks as a result of a change in living and working conditions? In particular, will it have the potential to lead to an increase in HIV/AIDS infection?	No
7.3 Will the proposed project require additional health services including testing?	No
Socio-Economics	(Yes/No/N/A)
8.1 Is the proposed project likely to have impacts that could affect women's and men's ability to use, develop and protect natural resources and other natural capital assets? *For example, activities that could lead to natural resources degradation or depletion in communities who depend on these resources for their development, livelihoods, and well-being?*	No
8.2 Is the proposed project likely to significantly affect land tenure arrangements and/or traditional cultural ownership patterns?	No
8.3 Is the proposed project likely to negatively affect the income levels or employment opportunities of vulnerable groups?	No
9. Cumulative and/or Secondary Impacts	(Yes/No/N/A)
9.1 Is the proposed project location subject to currently approved land use plans (e.g. roads, settlements) which could affect the environmental and social sustainability of the project? *For example, future plans for urban growth, industrial development, transportation infrastructure, etc.*	No
9.2 Would the proposed project result in secondary or consequential development which could lead to environmental and social effects, or would it have potential to generate cumulative impacts with other known existing or planned activities in the area? *For example, a new road through forested land will generate direct environmental and social impacts through the cutting of forest and earthworks associated with construction and potential relocation of inhabitants. These are direct impacts. In addition, however, the new road would likely also bring new commercial and domestic development (houses, shops, businesses). In turn, these will generate indirect impacts. (Sometimes these are termed "secondary" or "consequential" impacts). Or if there are similar developments planned in the same forested area then cumulative impacts need to be considered.*	No

(To be filled in after Annex A.1 has been completed)

Name of Proposed Project: Climate proofing local development gains in rural and urban areas of Machinga and Mangochi Districts - Malawi

A. Environmental and Social Screening Outcome

Select from the following:

Category 1. No further action is needed.

X Category 2. Further review and management is needed. There are possible environmental and social benefits, impacts, and/or risks associated with the project (or specific project component), but these are predominantly indirect or very long-term and so extremely difficult or impossible to directly identify and assess.

X Category 3. Further review and management is needed, and it is possible to identify these with a reasonable degree of certainty. If Category 3, select one or more of the following sub-categories:

X Category 3a: Impacts and risks are limited in scale and can be identified with a reasonable degree of certainty and can often be handled through application of standard best practice, but require some minimal or targeted further review and assessment to identify and evaluate whether there is a need for a full environmental and social assessment (in which case the project would move to Category 3b).

Category 3b: Impacts and risks may well be significant, and so full environmental and social assessment is required. In these cases, a scoping exercise will need to be conducted to identify the level and approach of assessment that is most appropriate.

B. Environmental and Social Issues (for projects requiring further environmental and social review and management)

In this section, you should list the key potential environmental and social issues raised by this project. This might include both environmental and social opportunities that could be seized on to strengthen the project, as well as risks that need to be managed. You should use the answers you provided in Table 4.1 as the basis for this summary, as well as any further review and management that is conducted.

Table B – Issues to be addressed

1.1 Would the proposed project result in the conversion or degradation of modified habitat, natural habitat or critical habitat? Yes, the project will positively affect modified habitats especially degraded forests and farmlands – by rehabilitating them. It is likely to increase the identification and protection of critical habitats through the community based adaptation planning process for the hotspots. The project will in particular facilitate rehabilitation of degraded forests through enrichment planting, protection from fire and from overharvesting. It will also facilitate protection of riverines and lake shores to reduce direct siltation; it will also introduce trees on farms (via agroforestry). Collectively, these measures will improve all targeted habitats, improving the resilience of these habitats. The project will also introduce sustainable charcoaling as a measure of reducing pressure on the forest and woody resources.

1.3 Would the proposed project pose a risk of introducing invasive alien species: Yes, there is a very small chance that the proposed project poses a risk of introducing invasive alien species. The measures to reduce pressure on the forest resources from overharvesting for charcoal and fuel wood include the establishment of woodlots, preferably with fast growing species. The agroforestry component will also involve planting of high nitrogen producing trees. Selection of woodlot and agroforestry species will be informed by lessons learnt from other places; the species selected for planting could possibly become invasive only where the science is incomplete.

1.6. Does the project involve significant extraction, diversion or containment of surface or ground water? The proposed project will finance the construction of mini dams, check dams and other water harvesting infrastructure that is expected to improve the management of water (both floods and droughts). Two types of mini-dams were identified at PPG. These are: i) embankment ponds with a capacity of about 12,000m3, with wall heights ranging from 3-10 m, ii) nullah ponds with wall height from 5-11 m. Currently, it is planned that these are small simple dams; their construction will be in line with the appropriate guidelines, such as FAO's "Manual on Small Earth Dams," at http://www.fao.org/docrep/012/i1531e/i1531e00.pdf. In the event that any of these dams turn out to be complex dams (dams of heights between 10 and 15 meters that present special design complexities, including an unusually large flood-handling requirement, location in a zone of high seismicity, foundations that are complex and difficult to prepare, or retention of toxic materials), UNDP will ensure that appropriate guidelines and standards are followed, in particular those of the World Commission on Dams report "Dams and Development: A New Framework for Decision-Making," and the World Bank (Operational Policy 4. 37 Safety of Dams).

By following these guidelines UNDP will also ensure that projects avoid the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from project activities, taking into consideration differentiated exposure to and higher sensitivity of marginalized groups, including communities living in voluntary isolation.

The mini dams will be constructed under the supervision of a company or institution with reputable expertise and experience in international standards. As stipulated in the budget and budget notes, the company will be supervised by the project chief technical advisor, who will also be recruited internationally. Construction will also be closely co-supervised by the District Engineers, and requirement impact assessments will be undertaken, where needed, and provisions stipulated adhered to. The company will also develop a monitoring and maintenance schedules, manuals for training, and train relevant staff to ensure follow up maintenance. To prolong the life of dams, proper watershed management in each catchment will be practiced (described in outcome 5).

2.5 Will the proposed project involve the application of pesticides that have a known negative effect on the environment or human health? The baseline program (the agriculture input subsidy includes application of fertilizers and pesticides. The component aimed at reducing post harvest losses will also involve some level of using chemicals to treat, for example grain, before storage. The chemicals could have a negative effect on the environment or human health through harmful toxins that affect human health and damage to non-target species caused by indiscriminate application. However, the program will be supported by the empowered extension service, and involves training of farmers. In addition, selection of pesticides will be informed by best practices world-wide and negative impacts would occur only where the science

relating to the dangers of the chemical use is incomplete.
4.2 Is the project likely to significantly impact gender equality and women's empowerment?: Yes, the Project will impact gender equality and women's empowerment positively. The project uses community based adaptation planning, learning, reflection and monitoring. CBA addresses social drivers of vulnerability including gender inequality and other factors related to social exclusion. CBA also constitutes an effective vehicle for building resilience of vulnerable individuals, households and communities from the ground up, while addressing the objectives of wealth creation and poverty reduction. Apart from these interventions, there will be many project activities involving stakeholder participation, including at a management level and equal representation of each gender in these activities will be strongly encouraged especially women's representation.
4.4 Will the proposed project have variable impacts on women and men, different ethnic groups, social classes? Yes, the Project will have variable impacts on women and men, different ethnic groups and social classes. This is because men and women are often involved in different activities, ordinarily. For example the PPG assessments reported that more women (60%) are involved in fishing than men, certain types of irrigation are dominated by one gender and not the other. Through the CBA approach, these differences will become clear and the project will strive to target the relevant social or gender group to ensure effectiveness of the project, while at the same time aware of the need for equitable access to benefits of the project. This will in particular be important with the financial tools (mini credit, cash/grants), and the establishment of the income generating activities. No society is homogeneous, and while it is important to spread project benefits equitably, considerations for sustainability requires that capacity and interest be matched carefully with engagement with financial tools, in particular introduction of IGAs. It would be pointless to give loans for IGAs to people who have no interest or inclination to business. However, the project has a huge array of benefits, and the important point will be to develop and apply criteria for matching benefits to social and gender groups, and that the process be done transparently and involve high levels of consultation.
8.2 Is the proposed project likely to significantly affect land tenure arrangements and/or traditional cultural ownership patterns? Yes, the proposed project is likely to significantly improve land tenure arrangements, and traditional cultural ownership patterns. The registration of the Village Forest Areas will improve tenure of community forest resources with the attendant benefits
C. Next Steps (for projects requiring further environmental and social review and management): In this section, you should summarise actions that will be taken to deal with the above-listed issues. If your project has Category 2 or 3 components, then appropriate next steps will likely involve further environmental and social review and management, and the outcomes of this work should also be summarised here. Relevant guidance should be obtained from Section 7 for Category 2 and Section 8 for Category 3.

ACTIONS

288. **1.3 Risk of introducing invasive alien species:** Selection of the agroforestry species will be informed by science and best practices worldwide. The project will invest significantly in preventative and mitigation measures, including adequate assessments for the selection of indigenous tree species for agroforestry and woodlots, and strict monitoring of forestry and agroforestry activities to ensure minimisation of the introduction of exotic and indigenous species that could become invasive.

289. **1.6. Mini dams and impacts on surface or ground water:** Ensure that the mini dams are constructed with the appropriate guidelines, either following the FAO's "Manual on Small Earth Dams," at http://www.fao.org/docrep/012/i1531e/i1531e00.pdf. In the event that any of these dams turn out to be complex dams (dams of heights between 10 and 15 meters that present special design complexities, including an unusually large flood-handling requirement, location in a zone of high seismicity, foundations that are complex and difficult to prepare, or retention of toxic materials), UNDP will ensure that appropriate guidelines and standards are followed, in particular those of the World Commission on Dams report "Dams and Development: A New Framework for Decision-Making," and the World Bank (Operational Policy 4. 37 Safety of Dams).

290. By following these guidelines UNDP will also ensure that projects avoid the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases

that could result from project activities, taking into consideration differentiated exposure to and higher sensitivity of marginalized groups, including communities living in voluntary isolation.

291. **2.5 Application of pesticides and chemicals that have a known negative effect on the environment or human health:** Selection of the pesticides and other chemicals will be informed by science and best practices worldwide. The project will invest significantly in mitigation measures, including minimising pesticide use and investment in pesticides that have minimal impacts as well as encouraging holistic rangeland management and organic pesticides where possible.

7.8 Sample ToRs for key positions

TECHNICAL ADVISOR (Natural Resources/Environmental Science)

Duties and Responsibilities

292. The Technical Advisor (NRM) will be a practising scientist with over ten years experience in ensuring that natural resources/ agriculture based development in rural areas is based on, and contributes to sound science. S/he will supervise a team of experts in various disciplines and closely work with local communities, line departments, NGOs and the private sector to deliver the results expected from the investment in a timely manner with the greatest impacts. Under the direction of both the National Project Director (NPD) and UNDP-GEF, the CTA will perform the following duties:

Technical:

- Take overall responsibility for the technical quality of implementation and results delivered by the project. In this regard, the CTA will work with the rest of the project staff, communities and the District Teams to ensure that any project activities are based on an analysis of best practices and informed by lessons generated, locally, in the country and abroad. S/he will also make sure that the project results are consistently captured, recorded and shared widely with appropriate audiences, and, as much as possible, as technical publications meeting internationally accepted standards. A list of potential technical publications will be generated early on, and pursued systematically.
- Provide direct technical support for the following outputs:
  Output 1.1: Information provided on how the state of use and management options of critical resources/ecosystems/landscapes influence effectiveness of baseline programs
  Output 3.1: Construction of mini dams[44], water ponds, retention ridges, and water diversion structures
  Output 3.2 Construction of physical structures to support infrastructure and expansion of water harvesting from dwellings:
  Output 4.1: Degraded watersheds (forest ecosystems) rehabilitated, river Banks and Lake shores protected from direct siltation
- This support may be either direct or in the hiring of contractors and supervising their work, in line with the stipulations of the budget notes.
- Contribute in achieving the Government's commitments to international forums and conventions in the context of poverty-environment nexus.

Management and Coordination

- Lead and co-ordinate the activities of the UNDP/GEF Specialists and ensure their effective deployment for dispensing the inputs and collection of results.
- Regularly organize the PSC and other coordination meetings.
- Facilitate the mobilization of resources and prepare / regularly update the work plan for the Program.
- Interact with other donors and stakeholders in the program districts and develop joint work plans and mobilize resources for the project.

[44] A UNDP funded project in Pakistan was instrumental in the construction of some 170 mini dams in a rainfed district [Lachi Tehsil, District Kohat] which has changed the life of people.

- Assist the NPD in operation, running and recording the deliberations of the PSC and implementing its decisions.
- Develop competence in the counterpart Government staff and others in producing the Program outputs through a participatory process.
- Identify, together with the specialists the need for additional short-term consultancies or sub-contract inputs, prepare TORs and initiate their process.
- Prepare and timely submit all the reports required by UNDP/GEF and the Government (particularly the PIR).
- Contribute to the procurement of equipment and ensure its full operation and maintenance;
- Liaise with UNDP, other UN agencies, multi-lateral and bi-lateral funding agencies, GOM and NGOs operating in the program area for possible coordination in program implementation and mobilize resources for scaling up the program activities, consistent with the program's objectives.
- Carry out any other relevant duties identified from time to time by the NPD and/or UNDP to further develop the Program.

Qualifications and Experience

- A minimum of an MSc in Natural resources management or Environment Management or Agriculture or Economics with post degree training on climate change and/or rural development.
- At least ten years experience working with development projects, preferably in southern Africa;
- Excellent interpersonal skills and cultural sensitivity.

Project Coordinators (Field PCs)

293. The Field Project Coordinators (FPCs) will be responsible for ensuring the overall coordination and smooth implementation of the project. The PM will work in close collaboration with the Implementing Partner and UNDP to ensure efficient and effective day-to-day management and monitoring of the project as well as its integration in the national planning and development processes.

Managerial and financial responsibilities:

- Ensure full stakeholder consensus on the implementation of Project outcomes through structured workshops and meetings
- Work closely with relevant Government agencies and partner NGOs to ensure that project implementation contributes synergistically to the relevant projects in the Shire Basin and the country;
- Prepare annual work plans and budgets for the Project;
- Prepare quarterly, annual, mid-term and terminal project progress reports including technical, financial and policy matters, for the consideration of the national PSC, UNDP-GEF, UNDP CO
- Represent the Project in meetings and conferences to which the Project is invited to attend
- Ensure proper management of the properties of the project
- Provide overall professional guidance to partner institutions
- Ensure and maintain linkages between the district authorities and partner institutions through regular district meetings
- Ensure and maintain linkages between the implementation management structures
- Facilitate the contracting of service providers and the implementation of the activities or inputs of short/ long-term consultants and ensure proper delivery of all outputs under implementation
- Secure provision of guidance to the project's M&E procedure and making recommendations to national authorities and donors

Technical

- Take a proactive role in policy advocacy for advancing sustainable development, disaster risk reduction and management and climate smart agriculture in the program districts.
- Take the lead role in the implementation of the following outputs:
    - Output 2.2: Local and national development policies influenced by the project supported pilots to strengthen policies and policy enforcement for climate consideration

- Output 2.3: Lessons generated at the project/district level fed into the national climate programme, SLM platform and other national planning debates, to lobby and influence the adoption of climate risk considerations as minimum criteria for accessing agricultural input subsidy benefits;
- Output 4.2: provision of improved and sustainable supplies of energy, including adoption of sustainable charcoal
- Output 5.3: establish two community-based Climate Smart Agriculture Centres

- This responsibility includes both direct support to district teams and communities as well as the contracting and supervising service providers as stipulated in the budget notes.
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Leadership Skills:

1. The PM will be a leader who will bring to the position status and credibility that is recognized by partner institutions/ implementers. S/ he will have the ability to think strategically and laterally and maintain a broad perspective. The PM will have the ability to work effectively under pressure and manage work and resources within tight deadlines; possess excellent communication skills including the ability to write lucidly and succinctly; and, the ability to work with and command respect of an international staff.

Qualifications and Experience:

- A minimum of 10 years of managerial experience dealing with applied natural resources management issues in southern Africa;
- Must have at minimum a MSC degree in Business Management or Project Management with additional training and/or exposure to climate change or natural resources/environemtn or rural development.
- Proven ability to lead and motivate a multi-disciplinary team to produce the required outputs in a timely manner
- Familiarity with institutional, planning and regulatory structures, and rural livelihoods in Malawi
- Knowledgeable about GEF and UNDP procedures

TECHNICAL SPECIALIST (SOCIAL ECONOMICS)

Duties and Responsibilities

294. The Technical Specialist will be a practising social-scientist with over seven years experience in ensuring that natural resources/ agriculture based development in rural areas is based on, and contributes to sound science. S/he will work with a team of experts in various disciplines, collectively working closely with local communities, line departments, NGOs and the private sector to deliver the results expected from the investment in a timely manner with the greatest impacts. Under the direction of both the TA, the specialist will perform the following duties:

Technical:

- Take overall responsibility for the technical quality of the social sciences requirements of the project. In this regard, the specialist will assist the TA to ensure that any project activities are based on best practices and informed by lessons generated, locally, in the country and abroad. S/he will also assist the TA to make sure that the project results are consistently captured, recorded and shared widely with appropriate audiences, and, as much as possible, as technical publications meeting internationally accepted standards. A list of potential technical publications will be generated early on, and pursued systematically.
- Provide direct technical support for the following outputs:
  - Output 1.3: Participatory Monitoring, Evaluation, Reflection and Learning (PMERL) formulated and information gathered used in adaptive management and shared widely Output 1.2: Comprehensive landscape adaptation plans formulated using the information generated under output 1.1, complemented by community based resilience assessments
  - Output 2.1: Operational capacity of the extension service boosted to enable communities to mainstream climate risk considerations in the implementation of baseline programs

    - Output 4.3: Diversification of household food basket and incomes via expansion of aquaculture and NTFP reduce pressure on the forests, river and lake fisheries
- This support may be either direct or in the hiring of contractors and supervising their work, in line with the stipulations of the budget notes.
- Contribute in achieving the Government's commitments to international forums and conventions in the context of poverty-environment nexus.

Management and Coordination

- Facilitate the mobilization of resources and prepare / regularly update the work plan for the Program.
- Interact with other donors and stakeholders in the program districts and develop joint work plans and mobilize resources for the project.
- Develop competence in the counterpart Government staff and others in producing the Program outputs through a participatory process.
- Identify, together with the specialists the need for additional short-term consultancies or sub-contract inputs, prepare TORs and initiate their process.
- Prepare and timely submit all the reports required by UNDP/GEF and the Government (particularly the PIR).
- Contribute to the procurement of equipment and ensure its full operation and maintenance;
- Liaise with UNDP, other UN agencies, multi-lateral and bi-lateral funding agencies, GOM and NGOs operating in the program area for possible coordination in program implementation and mobilize resources for scaling up the program activities, consistent with the program's objectives.
- Carry out any other relevant duties identified from time to time by the NPD and/or UNDP to further develop the Program.

Qualifications and Experience

- A minimum of an MSc in Agriculture or Agriculture or Economics with post degree training on climate change and/or rural development.
- At least ten years experience working with development projects, preferably in southern Africa;
- Excellent interpersonal skills and cultural sensitivity.

UNDP Project Assurance

- Ensure that funds are made available to the project;
- Ensure the project is making progress towards intended outputs;
- Perform regular monitoring activities, such as periodic monitoring visits and "spot checks";
- Ensure that resources entrusted to UNDP are utilized appropriately;
- Ensure that critical project information is monitored and updated in Atlas;
- Ensure that financial reports are submitted to UNDP on time, and that combined delivery reports are prepared and submitted to the Project Board;
- Ensure that risks are properly managed, and that the risk log in Atlas is regularly updated.

Project Support

- Set up and maintain project files;
- Collect project related information/ data;
- Assist the project manager in updating project plans;
- Administer Project Board meetings;
- Administer project revision control;
- Establish document control procedures;
- Compile, copy and distribute all project reports;
- Assist in the financial management tasks under the responsibility of the project manager;
- Provide support in the use of Atlas for monitoring and reporting;
- Review technical reports;
- Monitor technical activities carried out by responsible parties.

UNDP Programme Manager (UNDP Resident Representative or delegated authority)

- Ensure that resources entrusted to UNDP are utilized appropriately;
- Ensure that the project is making progress towards intended outputs;

- Ensure national ownership, ongoing stakeholder engagement and sustainability;
- Ensure that the project's outputs contribute to intended country programme outcomes;
- Ensure that key results and issues pertaining to project performance are fed into the outcome and programme level monitoring;
- Approve budget for the first year in Atlas;
- Approve and sign the annual work plan for the following year.

Implementing Partner (authorized personnel with delegated authority):

- Approve and sign the annual work plan for the following year;
- Approve and sign the Combined Delivery Report (CDR) at the end of the year;
- Sign the Financial Report or the Funding Authorization and Certificate of Expenditures (FACE).

IRRIGATION support institution

Duties and Responsibilities

295. Under the overall guidance of the NPD and direct supervision of the NPM, the Irrigation Engineer will perform the following tasks:

- Survey the program districts, and identify sites for the construction small- and medium-dams, water ponds, water channels, culverts, bridges for sustainable flow of water and its use for drinking and irrigation purposes.
- Assist the local communities and the concerned line departments to prepare feasibilities and cost-estimates of the afore-mentioned water harvesting and conservation structures.
- Supervise implementation of the afore-mentioned irrigation schemes so that these are cost-effective and provide water on sustainable basis.
- Prepare working papers for policy makers, local communities and media to demonstrate the economic and ecological viability of the high-efficiency irrigation techniques.
- Develop and implement an action plan in collaboration with the line departments, taking into account the use of incentives and dis-incentives and policy measures to spread high-efficiency irrigation techniques on tens and thousands of acres in the program districts.
- Liaise with the private sector to invest in manufacturing of high-efficiency irrigation equipment in program districts and provision of services for the repair and maintenance of irrigation equipment with a view to create alternative job opportunities for the local communities.
- Initiate programs to train local communities in the repair and maintenance of irrigation equipment.
- Train counterpart staff and others interested in high-efficiency irrigation techniques.
- Disseminate better on-farm surface irrigation practices to economize on water use.
- Assist in the rehabilitation of existing water channels and structures, with community's participation to increase flow of water for irrigation.
- Document outcome/impact of program interventions.

Qualifications and Experience

296. The infrastructure and irrigation support contractor will have experience in the surveying and construction of small dams, water channels, extension services and up-scaling of high-efficiency irrigation techniques within community and government context. The contractor will closely work with local communities, line departments and NGOs and will spend some 50% of his/her time in the field. The contractor should have:

- A team leader with PhD/MSc degree in agricultural irrigation with sufficient experience in high-efficiency irrigation techniques.
- 10-12 years of practical experience in up-scaling of high-efficiency irrigation techniques.

- Strong linkages with the private sector manufacturers of irrigation equipment.
- Proven ability to attract investments from private sector, banks and local communities for up-scaling innovative technologies.
- Commitment for mobilizing funds from private sector for up-scaling water catchment infrastructure and high-efficiency irrigation systems will be an added qualification.
- Excellent skills in written / spoken English.
- Cross-cultural sensitivity, inter-personal skills, art of giving effective presentations, and personal knowledge of local languages will be an added qualification.

NTFPs/AGRICULTURAL BUSINESS DEVELOPMENT CONTRACTOR

Duties and Responsibilities

297. Under the overall guidance of the NPD and Direct supervision of the Technical Advisor, the NTFP/Agricultural Business Development contractor will perform the following tasks:

- Assess the current level of business, entrepreneurship based on NTFPs and/or other income generating activities and identify strengths, challenges, weaknesses and opportunities, and draw lessons for future development of NTFPs/agriculture based income generating activities;
- Identify potential income generating activities;
- Design a program for the implementation of income generating activities (explaining how to move from the current situation to a more successful, widespread adoption of high value NTFP trading/ other income generating activities – this includes identifying markets, market requirements, identifying people with high inclination for entrepreneurship, ensuring to target both man and women, the youth and people with disabilities, designing a criteria for deciding whether to use grant or credit route, designing a system of issuing credits or grants, designing a program of mentoring new business ventures to reduce chances of failure, designing a monitoring system for the programs, etc.
- Provide technical guidance to the Community Development Specialist and Social Mobilizers in the identification and establishment of businesses in program districts.
- Occasionally monitor the businesses established and provide comprehensive reports to the NPM and prepare scaling up programs.

Qualifications and Experience

298. The NTFP/Agricultural Business Development contractor will be an organization or individual with capacity, experience and expertise in entrepreneurship /agro-business development and management experience. The contractor will work with local communities, line departments, private sector and NGOs and will spend 50% of time in the field. Special requirements of the position are as follows:

- M.Sc. degree in natural resource management, agriculture, marketing and management (if an individual).
- 10 years of practical experience in agro-business development.
- At least 5 years of work experience with any international agency or project of national significance.