



# PROJECT IDENTIFICATION FORM (PIF)

**PROJECT TYPE:** Full-sized Project  
**TYPE OF TRUST FUND:** LDCF

## PART I: PROJECT INFORMATION

Project Title:	Adapting Community Forestry landscapes and associated community livelihoods to a changing climate, in particular an increase in the frequency and intensity of extreme weather events.		
Country(ies):	Myanmar	GEF Project ID:	5567
GEF Agency(ies):	UNEP	GEF Agency Project ID:	01149
Other Executing Partner(s):	Ministry of Environmental Conservation and Forestry (MoECF)/Environment Conservation Department (ECD), and Forest Department (FD), Ministry of Transport (MoT)/Department of Meteorology and Hydrology (DMH)	Submission Date:	May 2013
		Resubmission Date:	16 October 2013
GEF Focal Area (s):	Climate Change	Project Duration(Months)	48
Name of parent programme (if applicable):		Agency Fee (US\$):	473,812

### A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK:

<i>Focal Area Objectives</i>	<i>Trust Fund</i>	<i>Indicative Grant Financing (\$)</i>	<i>Indicative Co-financing (\$)</i>
CCA-1	LDCF	1,562,500	5,991,600
CCA-2	LDCF	1,075,000	4,236,100
CCA-3	LDCF	2,350,000	8,983,300
Total project costs		4,987,500	19,211,000

### B. INDICATIVE PROJECT FRAMEWORK

<b>Project Objective:</b> To increase the resilience of Community Forestry and associated local community livelihoods to climate change-induced risks in the Central Dry Zone, Rakhine Coastal State and Ayeyarwaddy Region.						
Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount (\$)	Indicative Co-financing (\$)
1. Conducting science and assessment for appropriate climate-resilient and multi-benefit Community Forestry.	TA	1.1. Strengthened scientific and traditional knowledge base for designing climate-resilient and multi-benefit Community Forestry.	1.1.1. A climate change and forestry research network established including a steering committee and an online communication and dissemination platform/web-portal. 1.1.2. Information and data (including spatial) generated and consolidated for designing climate-resilient and multi-benefit Community Forestry.	LDCF	500,000	1,122,200
2. Establishing climate-resilient and multi-benefit community forests with core,	Inv	2.1. Vulnerability of communities living in and adjacent to community forests	2.1.1. Appropriate climate-resilient and multi-benefit forestry species and approaches implemented under the Community Forestry Instruction (1995) at three pilot townships	LDCF	1,950,000	8,472,200

multi-use and agro/aqua-forestry zones.		reduced through diversified livelihood options, climate-resilient forests and protective forest shelter zones.	identified as most vulnerable to climate change-induced risks: i) Chauk Township, Central Dry Zone; ii) Myebon Township; Rakhine Coastal State; and iii) Hinthada Township, Ayeyarwaddy Region.  2.1.2. Climate-resilient and multi-benefit Community Forestry systems planned, implemented and maintained by Forest User Groups and Management Committees using climate-resilient and multi-benefit forestry species and approaches.			
3. Establishing end-to-end early warning systems for protecting communities and safeguarding livelihoods	Inv	3.1. Community Forestry landscapes and associated local community livelihoods protected from extreme weather events (drought, intense rain, flood, cyclone and storm surge) through effective preparedness, early warning and response.	3.1.1. Extreme weather risks in the Central Dry Zone, Rakhine Coastal State and Ayeyarwaddy Region are effectively predicted, monitored and tracked to provide early warning with adequate lead times prior to extreme weather events.  3.1.2. Early warnings effectively packaged and disseminated to communities at the three pilot Community Forestry townships vulnerable to extreme weather events including drought, cyclone, storm surge, sea-level rise and/or flood.  3.1.3. Local communities at Community Forestry pilot sites are adequately prepared for and respond in an appropriate manner to early warnings received e.g. risk reduction/disaster management methods as well as evacuation/escape plans.	LDCF	1,950,000	7,250,000
4. Mainstreaming climate change adaptation, including extreme weather preparedness, into the Community Forestry Instruction and relevant policies and plans.	TA	4.1. Strengthened Community Forestry systems in Myanmar through the integration of climate-resilient/multi-benefit forestry approaches into relevant forestry policies and plans.	4.1.1. Climate-resilient and multi-benefit (core, multi-use and agro/aqua-forestry) Community Forestry established – as an integral part of Myanmar's strategy to address climate change and sustainable forestry – through drafting and proposing revisions to the current Myanmar Forest Policy (1995), Community Forestry Instruction (1995) and Forestry Master Plan (2001-02 to 2030-31).  4.1.2. A new Community Forestry Law drafted and proposed to consolidate and strengthen the Community Forestry Instruction (1995) – including climate change adaptation and livelihood diversification measures e.g. climate-resilient and multi-benefit (core,	LDCF	350,000	1,366,600

		multi-use and agro/aqua-forestry) forestry systems.			
		4.1.3. A supplement to the Forest Law (1992) is drafted and proposed to ensure a legal basis for Community Forestry – including measures for reducing climate change vulnerability of local communities living in and adjacent to community forests.			
Sub-Total				4,750,000	18,211,000
Project management cost (PMC)			LDCF	237,500	1,000,000
Total project costs				4,987,500	19,211,000

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

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount (\$)
National Budget	Through the Forest Department (FD), Ministry of Environmental Conservation and Forestry (MoECF).	Grant	10,211,000
National Budget	Through Department of Meteorology and Hydrology (DMH), Ministry of Transport (MoT).	Grant	8,000,000
Implementing Agency	United Nations Environment Programme (UNEP) as the co- Implementing Agency of the Global Climate Change Alliance for Myanmar	Grant (parallel)	1,000,000
<b>Total Co-financing</b>			19,211,000

### D. INDICATIVE TRUST FUND RESOURCES (\$) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY<sup>1</sup>

GEF Agency	Type of Trust Fund	Focal area	Country Name/Global	Grant amount (\$) (a)	Agency Fee (\$) (b)	Total (\$) (a + b)
NA						
<b>Total Grant Resources</b>						

### E. PROJECT PREPARATION GRANT (PPG)

	<u>Amount Requested (\$)</u>	<u>Agency Fee for PPG (\$)</u>
• No PPG required	_____	_____
• (up to) \$50k for projects up to and including \$1 million	_____	_____
• (up to) \$100k for projects up to and including \$3 million	_____	_____
• (up to) \$150k for projects up to and including \$6 million	US\$100,000	US\$9,500
• (up to) \$200k for projects up to and including \$10 million	_____	_____
• (up to) \$300k for projects above \$10 million	_____	_____

### PPG AMOUNT REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES) FOR MFA AND/OR MTF PROJECT ONLY

GEF Agency	Type of Trust Fund	Focal area	Country Name/Global	(in \$)		
				PPG (a)	Agency Fee (b)	Total c = a + b
N/A						
<b>Total PPG Amount</b>						

MFA: Multi-focal area projects; Multi-Trust Fund projects.

## PART II: PROJECT JUSTIFICATION

### **A. PROJECT OVERVIEW**

#### **A.1. Project Description**

##### *A.1.1. The problem that the project seeks to address, root causes and barriers that need to be addressed*

Myanmar is rich in natural forests and approximately half (49% or ~317,730 km<sup>2</sup>) of the total land area is forested. The forests in Myanmar support a range of socio-economic sectors and local community livelihoods, through the provision of multiple forest products and ecosystem services. These include: i) provisioning services such as food, fibre, fuel, medicines, timber and honey; ii) cultural services such as aesthetic, education, ecotourism and scientific; iii) regulating services such as climate regulation, buffering the impacts of extreme weather events, soil retention and water regulation; and iv) support services such as nutrient cycling and carbon storage. Forests provide safety-nets for communities in times of hardship or food insecurity. In addition, the agricultural sector which employs 65% of the labour force and accounts for 25% of the country's gross domestic product is supported by functioning forest ecosystems that maintain soil fertility and regulate water flow.

However, large-scale degradation and unsustainable management practices – including shifting cultivation, charcoal production, over-harvesting of timber and fuelwood, agricultural and aquaculture expansion, overgrazing by livestock and development – as a result of increasing human populations have greatly reduced the extent of natural forest ecosystems including mangrove ecosystems in Myanmar, particularly in the most populated areas of the Ayeyarwady Delta (mangrove and estuarine forests) and Central Dry Zone (dry thorn and scrubland forest)

These environmental threats are exacerbated by observed climate variability and climate changes that have been observed in recent times and will be magnified in the future. Increases in the frequency and intensity of cyclones, floods and droughts have been observed and are predicted to worsen. These extreme weather events have already substantially impacted local communities in Myanmar. For example: i) the Nargis cyclone in May 2008 led to over 138,000 deaths and damages of up to ~US \$10 billion including extensive damage to mangroves, agricultural land, houses and utility infrastructures; and ii) a severe drought in 2010 diminished village water sources across the country and destroyed agricultural yields of peas, sugar cane, tomato, and rice.

The vulnerability of Myanmar's population to climate change impacts is compounded by a lack of adequate early warning systems for extreme weather events. Communities are unable to plan for and respond appropriately to climate change hazards such as cyclones, floods or drought. Farmers are unable to adapt their practices by adjusting planting time or selecting appropriate climate resilience crop varieties. Furthermore, communities often do not have the capacity to respond appropriately to early warnings for extreme weather in the event that one is received.

Myanmar's National Adaptation Plan of Action prioritises the development of early warning systems, community-based climate-resilient reforestation in the Central Dry Zone – which is susceptible to drought – and climate change adaptation including community-based mangrove restoration in coastal regions including Rakhine State and the Ayeyarwady Region which are susceptible to increased intensity and frequency of heavy rains and floods. The degradation of forests in these regions has reduced the potential of these forests for buffering local communities against risks associated with long-term climatic changes such as flood and drought and providing for their livelihoods. Livelihoods of these local communities include casual labour, farming, small trade, sale of livestock, artisan trade, regular salaries, remittance, bamboo or wood cutting, charcoal production, trade, business and fishing. Crops cultivated for domestic use by local communities include onions, potatoes, garlic, cassava, sweet potatoes, groundnut, sesame, sunflower, black gram, chickpea, soybean and pigeon pea. Livestock reared includes cattle, sheep, goats and ducks and aquaculture species include mudcrab, clam, shrimp and tilapia. Functioning forest ecosystems support many of these livelihoods and have the potential to support further livelihood options that are not yet utilised.

The impacts of climate change on multiple sectors will limit Myanmar's ability to achieve economic growth and poverty reduction goals. Climate change is expected to reduce productivity of staple agricultural crops such as rice, wheat, maize, soybean and groundnut through: i) coastal flooding and salt water intrusion of low-lying agricultural

lands and water sources; ii) increased heat and water stress as a result of drought and increased temperatures; and iii) reduced soil fertility as a result of erosion by flooding. Climate change will also impact other important socio-economic sectors. The availability and quality of fresh water resources will be negatively impacted by factors such as: i) increased salinity of ground and surface waters as a result of coastal flooding; ii) reduced surface water availability as a result of increased sedimentation and higher evaporation rate; and iii) increased pollution as a consequence of run-off from floods or heavy rainfall events. The health sector is also likely to be impacted by increased incidence of disease outbreaks as a result of pollution and deteriorating quality of water resources.

The problem that this project seeks to address is that forest landscapes and local community livelihoods are particularly vulnerable to a changing climate and in particular an increase in frequency and intensity of extreme weather events. Current reforestation and afforestation activities in Myanmar do not consider climate change impacts in the design or implementation and existing climate monitoring and early warning systems (EWS) in the country are unable to provide timely early warnings. The institutional and technical capacity to address climate change risk at national and local level is very limited. .

The preferred solution to the problem the proposed project seeks to address is to build the climate resilience of forests and associated local community livelihoods by catalysing large-scale integration of an Ecosystem-based adaptation (EbA) approach and related alternative livelihoods into current forestry management and restoration programmes as well as strengthening Myanmar's capacity to better manage extreme weather events at a national and local level. This includes building capacity for research, developing early warning systems, implementing EbA approaches and mainstreaming EbA approaches into community forestry strategies and plans. The restoration of forests that are climate-resilient and effectively generate ecosystem services will reduce the vulnerability of local communities to climate change. EbA provides a low-cost and effective approach for maintaining and/or enhancing the flow of ecosystem goods and services in forests. Restoring forests with climate-resilient species that provide ecosystem services such as increased water flow and maintained soil accretion benefits both the environment and community livelihoods including agriculture thereby supporting long-term community adaptation and resilience for a relatively small investment. The establishment of climate-resilient community forests is a means to provide relative protection for livelihood infrastructural/agriculture assets against extreme weather events. It cannot be treated as an alternative to effective climate change monitoring and early warning systems that are necessary for saving lives and warning communities to undertake necessary precautionary measures for protecting livelihoods/assets. Changes in Myanmar's climate system will result in more frequent and intense extreme weather events. The importance of early warning systems to advise local communities of such extreme weather events is therefore increasingly urgent. Therefore the LDCF project will increase the climate change resilience of local communities through the development of effective early warning systems to provide user-agencies and end-users with sufficient lead-time to minimise risk to life, evacuate vulnerable groups and move assets to safer locations. Early warning systems also enable farmers to plan their agricultural activities.

A number of significant adaptation barriers exist in the country to achieving climate change adaptation in Myanmar were identified during the NAPA process. These include: i) limited technology and capacity for remotely and automatically forecasting extreme weather events; ii) limited coordination and linkages between the national climate monitoring systems and local communities most at risk; iii) insufficient evidence and demonstration of adaptation benefits in the country to influence policy- and decision-making; iv) limited community awareness and understanding of EbA as a result of limited on-the-ground examples; v) limited access to replicable EbA demonstrations, resulting in government decision-makers and resource-users not having the tools and knowledge necessary to catalyse large-scale EbA implementation; and vi) limited financial resources as a result of poor budget provisions for adaptation driven by barriers to incorporate EbA into natural resource programmes and to strengthen early warning systems in the country for addressing future climate change risks.

The proposed project will contribute to overcoming the above adaptation barriers by: i) integrating climate-resilient forestry and alternative livelihood options into community forests in three townships; and ii) enhancing the current early warning systems in the country. This will be achieved through i) strengthening existing scientific and traditional knowledge; ii) undertaking on-the-ground climate-resilient and multi-benefit community forestry pre-investment interventions; iii) establishing end-to-end early warning systems; and iv) mainstreaming EbA and extreme weather preparedness into relevant policies and plans. Multi-benefit forests provide useful benefits to

communities including food, timber and firewood. In addition, they provide services such as stabilising soil and increasing water infiltration thereby increasing soil accretion, maintaining soil fertility and increasing water flow in rivers consequently. Such regulating and supporting services provided by forests benefit agriculture and therefore local communities. Further, the forestry and early warning pre-investment interventions of the proposed project will be implemented as an integrated climate change adaptation measure and will increase resilience to extreme weather events while serving as demonstrations for potential replication at other sites/townships. Importantly, there will be linkages made between the early warning systems, forestry activities and other livelihood practices ensuring a holistic approach to adapting Myanmar to climate change.

### *A.1.2. The **baseline** scenario and associated baseline projects*

#### ***Baseline forestry scenario and associated baseline project***

In 1995, the MoECF issued the Community Forestry Instruction (CFI) to support the transfer of national forests to community management, with the aim of addressing deforestation in the country as well as the limited success of governmental reforestation programmes. Under the CFI, **the Community Forestry (CF) programme** was launched across the country for all government forestry activities including commercial, village supply and watershed afforestation/reforestation. Without the LDCF project: i) community forestry, including reforestation will continue without the consideration of climate change and additional benefits to local communities and the national and local capacity to address climate change risk will remain weak; and ii) early warning systems will be insufficient to prevent loss of crops, property and life.

The **main objective** of the CF programme is to plant trees on barren lands and to reforest degraded areas with active participation of local communities. It aims to: i) contribute to national economy; ii) regain environmental stability; and iii) satisfy the basic needs and improve the living conditions of local communities<sup>1</sup>. In working towards the CF programme's objectives, the FD has established/restored ~43,872 ha of community forests covering all states/regions (~2580 ha/annum). This includes 575 Forest Users Groups (FUGs) comprising 40,624 local community members participating in CF across the country. According to the National Forest Master Plan (2001/02-2030/31), the FD aims to i) further establish/devolve an additional ~874,764 ha of community forests; and ii) contribute 4.13 million m<sup>3</sup> of wood to local communities to support their fuel requirements by the end of 2030/31 (i.e. ~25% of the country's total wood fuel requirements [16.53million m<sup>3</sup>] by 2030)<sup>2,3</sup>. This programme is implemented by the Myanmar Forest Department (FD) under the MoECF and **is supported by a budget of ~US\$ 17 million/annum**. Community forestry activities in Myanmar are funded by various donors such as DFID, UNDP and JICA as well as state budget which are channelled through the state budget. The programme is considered as baseline project for this LDCF project out of which budget 10 MUSD are being sought as financing

Forestry User Groups have been established in the Central Dry Zone, Rakhine Coastal State and Ayeyarwaddy Region in Myanmar<sup>4</sup>. The LDCF project will support communities at these sites to apply to the FD for the formation of community forests (see Section A.1.4 for process). During the PPG phase communities will be identified that are willing to go through this process.

Climate change hazards including cyclones, heavy rain, flooding, storm surges and drought are expected to significantly affect the baseline project activities. Increased incidence of intense rainfall events are likely to occur in Hinthada township in the Ayeyarwaddy region and in Myebon township in Rhakine Coastal State. This could lead to seedlings being washed away, soil erosion and damage to equipment and irrigation infrastructure. Increased drought periods in Chauk township in the Central Dry Zone will lead to temperature and water stress on trees and failure of

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<sup>1</sup> Dr. Thaug Naing Oo. 2011. Assessment on community forestry management and its development with special reference to three critical areas of Myanmar. ITTO Fellowship Program Technical Report for Fellowship (Ref. 009/10S).

<sup>2</sup> Tint et al. 2011. Community Forestry in Myanmar: Progress and Potentials. Ecosystem Conservation and Community Development Initiative, Yangon.

<sup>3</sup> Baginski et al. 2011. Is Community Forestry in Myanmar fulfilling its potential? International Development University of East Anglia. Policy Briefing Paper.

<sup>4</sup> Tint, K., Springate-Baginski, O. & Gyi, M.K.K. 2011. Community Forestry in Myanmar: progress & potentials. Ecosystem Conservation and Community Development Initiative, Yangon, Myanmar and School of International Development, University of East Anglia.

seedlings. Climate change is also likely to further compromise community livelihoods e.g. crop production of local communities and lead to more pressure being placed on natural resources such as forests leading to overharvesting. A summary of the impacts of climate change to baseline projects and the adaptation measures proposed by the project is presented in Annex 4.

### ***Baseline climate monitoring and early warning system scenario and associated baseline project***

At present, the Department of Meteorology and Hydrology (DMH), under the Ministry of Transport, is the main authority responsible for climate monitoring, forecasting and early warning preparation and dissemination. This includes meteorological, hydrological and seismological related data collection, analysis and archiving. The DMH issues warnings for cyclones/ strong winds, flood/storm surge and intense rains based on empirical analysis of data from 157 manual meteorological and/or hydrological observation stations across the country. To a certain extent, satellite estimates and forecast information from Global Producing Centres as well as neighbouring NMHSs are also used to inform warnings, particularly for cyclones.

The River Forecasting Section (RFS) under the DMH is responsible for preparing and issuing flood forecasts and warnings based on 30 manual observation stations situated along 8 major rivers. The RFS estimates peak flood levels using empirical models, including single and multiple regression analyses. At present, there is no systematic drought monitoring system in the country. The DMH, however, has recently started to invest in drought monitoring by setting up an Agro-meteorological Division and Drought Monitoring Centre (DMC). **Approximately US\$ 2 million/annum** of the national budget is used by **DMH** to maintain the climate monitoring, forecasting and early warning systems in the country<sup>5</sup>. This investment is used as baseline project for this LDCF project.

The increased incidence of climate change hazards including cyclones, heavy rain, flooding, storm surges and drought are expected to place more pressure on existing EWS. The existing processes can already not cope with levels of extreme weather events to provide timely warnings to safeguard lives and livelihood assets. A summary of the impacts of climate change to baseline projects and the adaptation measures proposed by the project is presented in Annex 4.

#### ***A.1.3. The proposed **alternative scenario**, with a brief description of expected outcomes and components of the project.***

The proposed project aims to minimise the effects of climate change including an increase in frequency and intensity of extreme weather events on CF landscapes and local community livelihoods. To achieve this, it will implement climate proofing pre-investment interventions to community forests and associated local community livelihoods in three townships identified by the NAPA as most vulnerable to climate change-induced risks from extreme weather events during stakeholder consultations: i) Myebon in Rakhine Coastal State; ii) Hinthada in the Ayeyarwaddy Region; and iii) Chauk in the Central Dry Zone. This will include establishing climate-resilient/multi-benefit inland watershed and coastal community forests with core, multi-use and agro/aqua forestry zones including mixed farming areas (crops, livestock, fish, and fruit trees), shelter/green belts, fuel wood lots and plantation forests. The establishment of multi-benefit forests includes the planting of beneficial trees such as trees that provide fruits e.g. Toddy palm, *Borassus flabellifer*, provide firewood, stabilise soils, are drought tolerant and increase water infiltration. These forests benefit livelihoods through providing direct services such as food and firewood and improve soil accretion, soil fertility and water availability in rivers thereby benefiting livestock and crop production. To ensure that interventions are best suited to specific sites, research will be conducted to establish best-practice approaches and to enable up-scaling of project climate change adaptation approaches. These include climate-resilient reforestation and EWS which will be integrated into relevant national policies and plans.

To further protect CF landscapes and local community livelihoods from extreme weather events, the proposed project will build weather preparedness at a national and local level i.e. the capacity to monitor, track and respond to extreme weather events. This will be achieved by ensuring end-to-end early warning systems, at the three-targeted townships, to complement climate-resilient/multi-benefit forests established. Approximately 16 automated sensors will be estab-

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<sup>5</sup> This national budget includes foreign aid contributions of approximately US\$ 1,000,000 per annum.

lished across the Central Dry Zone, Rakhine Coastal State and Ayeyarwaddy Region for providing real-time weather observations to monitoring teams at the DMH. Furthermore, the technical capacity of the DMH will be built to: i) predict extreme weather events; ii) package warnings into a format that can be understood by the various user agencies; and iii) disseminate warnings through the effective channels. Community-based early warning systems will be established at the three townships. A summary of the impacts of climate change to baseline projects and the adaptation measures proposed by the project is presented in Annex 4.

The above will be achieved by delivering four integrated and complementary components.

***Component 1: Conducting science and assessment for appropriate climate-resilient and multi-benefit Community Forestry.***

This component corresponds to the results framework objective CCA-3, and will strengthen the scientific and traditional knowledge base to enable the FD to adequately assist communities to design and implement climate-resilient and multi-benefit community forests. The knowledge base developed under Component 1 of the proposed project will be applied to concrete field experience. More specifically it will be used for designing community forests implemented under Component 2 so as to help communities cope with a changing climate in the three project targeted townships. Research findings and associated training will enable the FD to assist communities design management plans for establishing climate-resilient/multi-benefit community forests across the country. It will also be disseminated within the region through the Asia Pacific Network. A description of the adaptation scenario funded by LDCF resources is presented in Section A.1.4 with indicative activities presented in Annex 2.

***Component 2: Establishing climate-resilient and multi-benefit community forests with core, multi-use and agro/aqua forestry zones.***

This component corresponds to the results framework objective CCA-2 and CCA-3, and will reduce the vulnerability of communities living in and adjacent to community forests through diversified livelihood options, climate-resilient forests and protective forest shelter zones. CF design will be undertaken by local communities with extensive input from the FD. Furthermore, CF design and implementation will be informed by the traditional and scientific information and data generated and consolidated in Component 1. A description of the adaptation scenario funded by LDCF resources is presented in Section A.1.4 with indicative activities presented in Annex 2.

***Component 3: Establishing end-to-end early warning systems for protecting communities and safeguarding livelihoods.***

This component corresponds to the results framework objective CCA-1 and CCA-3, and will ensure that CF landscapes and associated local community livelihoods are protected from extreme weather events (drought, intense rain, flood, cyclone and storm surge) through effective preparedness, early warning and response. Effective early warning systems benefit agriculture by enabling farmers to plan for extreme weather events and adjust planting times and crop varieties used. The health sector can also benefit e.g. by planning to better cope with water-borne diseases as a result of floods. Extreme Weather Management Committees (EWMC) will manage and develop community-based early warning systems<sup>6</sup>. A description of the adaptation scenario funded by LDCF resources is presented in Section A.1.4 with indicative activities presented in Annex 2.

***Component 4: Mainstreaming climate change adaptation, including extreme weather preparedness into the Community Forestry Instruction and relevant policies and plans.***

This component corresponds to the results framework objective CCA-1 and will strengthen CF systems in Myanmar through the integration of climate-resilient/multi-benefit forestry approaches into relevant forestry policies and plans. A description of the adaptation scenario funded by LDCF resources is presented in Section A.1.4 with indicative activities presented in Annex 2.

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<sup>6</sup> Including relaying warnings received from the DMH and local authorities to grass-root communities and assisting communities undertake the necessary risk reduction measures e.g. evacuating areas, moving assets, and implementing extreme weather mitigation measures e.g. sandbags to prevent inundation of property and land.



#### *A.1.4. Additional cost reasoning and expected contributions from the baseline, the LDCF and co-financing*

If implemented appropriately, CF can build the climate resilience of local communities by improving their access to additional sources of income, food supplies, and other natural resources. Furthermore, climate-resilient CF can increase the adaptive capacity of local communities by providing environmental services such as protecting watersheds and providing a buffer against extreme weather events. Although, CF is an inherently adaptive and participatory concept, at present CF landscapes and associated community livelihoods are vulnerable to climate change impacts.

Baseline CF in Myanmar is an investment in local communities. UNEP has secured baseline co-financing commitments of US\$ 19,211,000. This includes co-financing of US\$ 10,211,000 from the MoECF through the FD's national forestry budget and US\$ 8,000,000 from the MoT through the DMH's national climate monitoring, forecasting and early warning system budget. The proposed project will ensure that this investment is resilient under future climate change conditions. Please see the **additional cost reasoning** for each component below as well as a description of the climate change vulnerabilities of the baseline projects versus the adaptation alternative in Annex 4.

#### ***Component 1: Conducting science and assessment for appropriate climate-resilient and multi-benefit Community Forestry***

At present, there is insufficient knowledge and capacity in Myanmar to develop viable community forestry projects that incorporate climate change as well as non-climate change issues (e.g. policy, institutional, economic, social and administrative). As a result, climate change adaptation approaches/technologies are not included in current reforestation programmes; and communities living in and around community forests are not provided with information regarding the benefits of adequately managing and protecting community forests, particularly under a changing climate. If community forests are not viewed as important assets for sustaining community livelihoods, they will continue to be degraded and over-utilised and therefore not provide adaptation benefits to communities in the long-term.

The FD undertakes forestry research on a yearly basis on growth performance, productivity of commercial species and assessments of current reforestation/afforestation efforts and CF projects. In terms of climate change, recent investments in research tend to focus on climate change mitigation strategies as opposed to adaptation<sup>7</sup>. As a result, low awareness levels of the role that reforestation/afforestation plays in climate change adaptation is limiting the potential of the FD's current reforestation efforts in increasing the adaptive capacity of local communities and forest areas.

The **baseline cost (US\$ 1,122,000)** under this component includes funds allocated by the FD for forestry research of relevance to CF during the implementation phase of the proposed project.

**With LDCF funding**, current forestry research undertaken in the country will be enhanced to include climate change impacts and adaptation options for addressing these impacts. This will be achieved by consolidating and/or generating scientific and traditional research/data (including spatial data) on: i) climate change impacts (economic/ecological), ii) extreme weather hazard maps/assessments, iii) CF practices, iv) reforestation techniques, v) climate-resilient/multi-benefit species/varieties, vi) alternative livelihood options to increase the climate change resilience of communities; and v) the benefits (economic and ecological) of climate-resilient CF/reforestation activities. Spatial data on afforested/reforested areas across the country will be generated and/or consolidated, as appropriate, to inform effective positioning of future reforestation activities based on: i) spatial extent of predicted climate change

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<sup>7</sup> Myanmar has made recent investments to link reforestation/afforestation efforts, including CF, to climate change mitigation strategies such as REDD+. Four National Workshops have been held to identify the potential for REDD+ to be incorporated into Myanmar's forestry activities. These workshops have built capacity and improved awareness levels of the FD staff regarding the importance of reforestation in climate change mitigation and thus REDD+. A number of in-country studies have been undertaken by individuals in the FD and related institutions (e.g. Thaug Naing Oo, 2009) to quantify the carbon sequestration potential of commercial tree species. The Ecosystem Conservation and Community Develop Initiative (ECCDI)<sup>7</sup> and the International Tropical Timber Organisation (ITTO)<sup>7</sup> funded two studies on the progress and further potential of CF in Myanmar. These studies, however, failed to consider/integrate climate change adaptation. The ITTO study, although recognising the importance of integrating climate change mitigation into CF, failed to highlight the importance of climate change adaptation.

impacts; and ii) increasing the connectivity between forested areas. This exercise will be conducted at two scales – i) at a national scale spatial data on afforested/reforested areas across the country will be **consolidated** using **existing** maps and spatial data already generated by the Ministry of Environmental Conservation and Forestry (MoECF), and ii) at a local level (within the pilot sites) community maps delineating afforested and forested regions at a finer scale will be generated and digitalized in order to identify effective positioning of future reforestation activities.

LDCF resources will be used to identify: i) appropriate site-specific tree and other plant species/varieties (including climate-resilient/multi-benefit species) for inclusion in community forests; ii) alternative livelihoods for increasing the number of options for local communities to generate income when faced with uncertain weather patterns; iii) broad-scale geographic areas to concentrate reforestation/afforestation efforts based on spatial data depicting climate change impacts and forest connectivity; iv) techniques for maximising production and improving soil conditions under a changing climate; and v) support measures necessary for assisting communities during extreme weather events (e.g. ponds, reservoirs, tube-wells, freshwater tanks, drainage canals, dykes, Yaing Khway/"small wells" and natural buffers) to complement community forests and local livelihood options. Research conducted will focus on generating information/knowledge to assist with increasing the adaptive capacity of local communities including quantifying the benefits (i.e. financial yields/savings, both short- and long-term) of climate-resilient/multi-benefit species as well as climate-resilient/multi-benefit community forests in general. Furthermore, research will be conducted to investigate innovative financing mechanisms (e.g. carbon credit trading, mitigation markets) to provide renewable/sustainable finance for CF activities.

The **additional cost** of strengthening the baseline scientific and traditional knowledge base for designing climate-resilient and multi-benefit Community Forestry is **US\$ 500,000**. This knowledge base will be used to design community forests for implementation in the proposed project at the three targeted townships.

***Component 2: Establishing climate-resilient and multi-benefit community forests with core, multi-use and agro/aqua forestry zones.***

Although the CF programme aims to provide for the basic needs of local communities through planting trees and reforestation, it does not consider alternative livelihood options and in particular, short-term income generating strategies, that could complement reforestation activities. As a result, the time delay between planting trees and obtaining the benefits is a major constraint on the sustainability of these baseline community forests under a changing climate. This is because there are no incentives in the short-term to ensure local communities protect and sustainably manage community forests for long-term benefits. As result, community forests are degraded and have reduced potential to provide a range of adaptation benefits including buffering communities from extreme weather events, reducing erosion and trapping sediment, increasing the land available for diversified local livelihoods, providing economic services such as food and fibre, and providing habitats for local animals/plants which offer safety nets for communities during times of hardship.

However, the current the CF programme is vulnerable to the effects of climate change because of the continued use of a few single species/varieties in reforestation efforts that are not resilient to a wide-range of climate extremes. These species are usually introduced for fuelwood supply e.g. fast growing, coppicing species such as *Eucalyptus* sp., *Leucena leucocephala* and *Acacia* sp. in watershed areas and *Rhizophora mucronata* in coastal mangrove areas (occasionally *Rhizophora apiculata* is also used). The resulting mangrove or watershed monocultures have limited structural and taxonomic diversity and zonation. This renders them vulnerable to environmental shocks and disease. For example, *Leucena leucocephala* is extremely susceptible to insect infestations and furthermore has a tendency to be uprooted during strong winds and intense rain. Moreover, most community forests are established in severely degraded areas and therefore have poor species diversity, genetic variability as well as limited ecological structure. While the species chosen in baseline reforestation scenarios are generally fast growing and therefore appropriate for fuel wood supply and sediment trapping, single species plantations are not resilient to climate change impacts.

The **baseline cost (US\$ 8,472,200)** under this component comprises CF programme resources for business-as-usual CF establishment during the implementation phase of the proposed project. This includes the costs of: i) seeds and seedlings of certain species for inclusion in community forest restoration; ii) community forest planting; iii) basic

technical support for communities; iv) FUG and MC establishment; v) community forest approval and certification; and vi) initial and follow up (after first rotation) training.

**With LDCF funding** the ecological and productive resilience of CF landscapes and local community livelihoods will be enhanced. Climate-resilient and multi-benefit community forests<sup>8</sup> will be established in: i) Myebon (Rakhine Coastal State); ii) Hinthada (Ayeyarwaddy Region); and iii) Chauk (Central Dry Zone). This will include the introduction of a new method for mapping/zoning of community forests into core, multi-use and agro/aqua forestry zones. The latter two zones will include *inter alia* mixed farming areas (crops, livestock, fish, fruit trees), fuel wood lots and plantation forests. Community forests established with LDCF investment will be resilient to climate change impacts through increased species diversity, genetic variability, climate-resilient species, appropriate structural design and enhanced protection and management by local communities. Furthermore, local communities will have increased resilience to extreme weather events as a result of diversified livelihood options introduced using LDCF funding, including a diversity of integrated production systems as well as short-term/intermediate income generating activities (e.g. beekeeping, sericulture, bamboo/mushroom production).

The CF landscapes established within these townships will be beyond business-as-usual activities and be more resilient to climate change impacts as a result of: i) increased protection/ownership by local communities; ii) the presence of appropriate species diversity/genetic variability (i.e. a number of climate-resilient and multi-benefit species/varieties); and iii) appropriate forest structure e.g. height, density and width. Specific measures will be incorporated into the design of the interventions to ensure that the climate-resilience of the forests, and the adaptive capacity communities who depend on the forests, is enhanced. These measures include tailoring community forest establishment to include core, multi-use and agro/aquaforestry zones using: i) climate-resilient and multi-use species/varieties that provide multiple provisioning (food, medicines, fiber, non-timber forest products), supporting (soil formation and retention) and regulating (water flow regulation, flood control) ecosystem services; ii) innovative forest structure; and iii) additional support measures to enable local communities to adapt to the effects of climate change. Innovative measures include drainage canals, rainwater tanks, tube-wells and Yaing Khway/"small wells" for further protecting community forests and local communities from extreme weather events. The proposed project, by ensuring the diversification of activities, will complement and sustain the CF programme's business-as-usual reforestation efforts over the longer-term and under a changing climate. This is because alternative livelihood options that provide intermediate/short-term benefits<sup>9</sup> and income will motivate communities to protect CF landscapes and this will build climate change resilience of these landscapes. Furthermore, integrating diversified livelihood options such as mixed farming and agro/aqua forestry into CF systems will provide communities with a greater number of options when faced with increased climate variability and climate change-induced risks such as extreme weather events. For example, integrated farming systems increase stability and resilience of production. This is because if one crop fails, another may survive, or if all crops fail, livestock and aquaculture resources will compensate. Local communities will have consistent long-term adaptation benefits including increased buffering for extreme weather events, reduced erosion and sedimentation, increased water and food supplies, increased livelihood options, and increased social and human adaptive capacity. This will assist local communities to recover quickly after extreme weather events as well as adapt to future climate changes.

The **additional cost** of integrating climate-resilient and multi-benefit species and approaches into CF at three pilot townships<sup>10</sup> identified as most vulnerable to climate change-induced risks from extreme weather events is **US\$ 1,950,000**. This will be used to ensure that: i) alternative livelihood options and short-term income generating strate-

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<sup>8</sup> Including diversified and site-specific selection of 10-20 inland watershed forest species/varieties into community forests established at two of the targeted townships (Chauk in the Central Dry Zone and Hinthada in the Ayeyarwaddy Region) as well as 5-10 coastal forest (including mangrove) species/varieties into community forests at one township (Myebon in the Rakhine Coastal State). Species/varieties will be chosen for supplying multiple benefits to communities including forest products, such as timber and NTFPs, as well as ecosystem services such as erosion control, water flow regulation and protection from extreme weather events e.g. species suitable for greenbelts/shelterbelts. Furthermore, community forest zones will be implemented using appropriate structural dimensions e.g. width, height and density for specific climate change threats. For example, studies have shown that for mangrove/coastal forests to effectively buffer communities against storm surge, flooding and tsunamis, the greenbelt/buffer zone should be at least 100 m wide (towards offshore) or have a density of 400 trees/100 m<sup>2</sup> along the shoreline.

<sup>9</sup> such as beekeeping, sericulture, bamboo growing and mushroom growing.

<sup>10</sup> i) Chauk Township, Central Dry Zone; ii) Myebon Township; Rakhine Coastal State; and iii) Hinthada Township, Ayeyarwaddy Region.

gies are integrated into community forest systems; and ii) a range of climate-resilient and multi-benefit forest and crop species are used in reforestation efforts.

***Component 3: Establishing end-to-end early warning systems for protecting communities and safeguarding livelihoods.***

At present, there is no connection between CF projects or other afforestation/reforestation efforts and disaster risk reduction measures/early warning services. As a result, community forests established by the FD, as well as related local community livelihoods such as fishing and agriculture, are vulnerable to climate change impacts, in particular an increase in frequency and intensity of extreme weather events. Furthermore, the DMH has limited technology and capacity for remotely and automatically forecasting extreme weather events. DMH has a network of 157 manual meteorological and/or hydrological observation stations across the country, and the RFS collects data from 30 manual observation stations situated along 8 major rivers. However, the observation stations, and particularly those in high-risk areas such as the Central Dry Zone, coastal areas and flood-risk areas, need to be upgraded (as they are manual) in order to provide real-time data for informing early warnings.

Current warnings issued by the DMH provide lead-times of 24-72 hours, which are sufficient for saving lives. However, in most cases, these lead-times are inadequate for protecting livelihoods and/or implementing extreme weather risk reduction measures, such as: i) moving assets (e.g. food, livestock and personal items) to safer locations; ii) using flood control/rerouting structures (e.g. dam management, temporary flood defences) to prevent inundation of property and land; and iii) implementing flood resilience measures (e.g. sandbags). Furthermore, even in cases when warnings have been successfully communicated with adequate lead-time (~72 hours) for people to take action, the appropriate response from those most at risk has been hard to achieve. For example in 2008, although meteorologists accurately predicted the path of Cyclone Nargis (wind speeds of >258km/h) more than 24 hours in advance, ~130,000 lives were lost. This was mainly as a result of problems transmitting information to communities at risk in a timely, understandable and actionable manner as well as subsequent time delays in emergency personnel arriving at the necessary locations. Furthermore, many communities did not believe the warnings received from military personnel or on the television. Therefore they refused to leave their houses or livelihoods. More recently in 2010, similar problems were experienced when Cyclone Giri (wind speeds of 120km/h) claimed 45 lives.

Drought is considered the most severe weather event in the country. This is based on the overall impact of drought events on local communities, including agricultural losses, health impacts, damage to property and assets as well as loss of income and livelihoods. However, at present, there is no systematic monitoring or warning system in place for drought events in the country. The Agro-Meteorological Division and Drought Monitoring Centre under the DMH provide information on water balance, temperature and rainfall (collected from 17 agro-meteorological stations across the country) to relevant departments and technical institutions on a ten-day basis. This forecast information, however, does not reach farmers or local communities.

The **baseline cost (US\$ 7,250,000)** under this component includes funds allocated to business-as-usual activities undertaken by the DMH for climate monitoring, forecasting and warnings preparation and dissemination. Furthermore, the DMH will provide human resources for the proposed project.

**With LDCF funding the proposed project will ensure** that pilot end-to-end early warning systems (i.e. the process from effectively detecting hazards through an **automated** network of observation stations to ensuring the appropriate community response) support communities living in and around the climate-resilient/multi-benefit forests established under Component 2 of the proposed project. This investment will build the DMH's technology and human capacity to generate effective early warnings and link this to community-based early warning systems developed. This will ensure that communities at proposed project target sites will effectively receive early warnings and be adequately prepared, i.e. have enough lead-time, to take the necessary extreme weather mitigation measures for protecting both lives and livelihoods. In addition to these localised benefits, building the technical capacity of the DMH and relevant user-agencies will improve regional warnings disseminated to townships in the Central Dry Zone, Rakhine Coastal State and Ayeyarwaddy Region. Broad scale awareness-raising at local levels (through information dissemination) will improve community responses to early warnings throughout the relevant States/Regions.

Establishing effective early warning systems using LDCF funding to build upon existing national and traditional systems already in place will provide user agencies/communities with sufficient lead-time to plan crop planting and other activities related to crops and livestock, minimise risk to life, evacuate vulnerable groups, move assets to safer locations and effectively use extreme weather risk reduction measures. Furthermore, capacity building of user agencies and community-based early warning systems implemented by the proposed project will ensure communities/user-agencies are adequately prepared for and respond to early warning systems in the appropriate manner. As a result, the resilience of local communities will be built for managing an increase in intensity and frequency of extreme weather events that will be experienced under a changing climate.

The **additional cost** of establishing pilot end-to-end early warning systems at three townships<sup>11</sup> identified as most vulnerable to climate change-induced risks from extreme weather events and building the capacity of DMH at a national level for climate monitoring, forecasting and early warning system preparation and dissemination for protecting communities and safeguarding livelihoods is **US\$ 1,950,000**. The cost of the required hard and software, as well as on-the-ground training for local communities, was estimated through local market research and collaboration with DMH and other stakeholders. The combined cost of establishing drought and cyclone EWSs in Chauk Township and Myebron Township (respectively) is US\$ 438,400. This includes 12 Automatic Weather Observing Systems (AWOS) and associated Communication Facility Radio Transceivers, technical training, hard- and software, technical support to the pilots in the two townships, solar panels and network facilities, training for local communities, and publishing and printing of handbooks, pamphlets and brochures for local communities. See Table 1 in Annex 3 for more details, and Annex 4 for the proposed locations of the AWOS. The cost of establishing a flood EWS in Hinthada Township is estimated to be \$245,050. This includes financing similar components to the drought and cyclone EWSs, as well as additional 3 Automatic Water Level Stations associated with the 3 AWOS. See Table 2 in Annex 3 for more details, and Annex 4 for the proposed locations of the AWOS. The remaining US\$ 1,266,550 will be used for training of DMH staff in forecasting and maintenance of the installed equipment.

***Component 4: Mainstreaming climate change adaptation, including extreme weather preparedness into the Community Forestry Instruction and relevant policies and plans.***

Although the CFI (1995) forms a good basis for CF implementation and despite the strong endorsement of CF in the Master Plan, the policy and legal framework for effective CF implementation under a changing climate requires strengthening. The existing Forest Law does not provide a legal basis for CF and there is no integration of climate change adaptation (including extreme weather preparedness and response) into existing forest policies and plans (including the Forest Law). The existing National Environmental Conservation Committee (NECC) created by law on 2011, which is chaired by the Minister of Environmental Conservation and Forestry does include a few Task Force on land use, industry and urbanization and water. However this committee does not include any task force on climate change issues.

Generally, only “soft rights” are transferred to communities. These are often insufficient incentive for effective community engagement, since the rights and access to benefits that communities receive under such arrangements are frequently not proportional to their management responsibilities. The incentives to over-exploit community forests are therefore greater than the incentives to protect and utilise them sustainably. This results in severe degradation of forests and associated ecosystem services and increases the vulnerability of CF and local community livelihoods to climate change. For CF to deliver beneficial outcomes under a changing climate it needs to be tailored – using climate-resilient and multi-benefit approaches – and sustainably expanded. For this to be realised CF needs be supported by appropriate policy and legal frameworks.

The **baseline costs (US\$ 1,366,600)** under this component includes the business-as-usual legislation and policy activities that will be undertaken to develop a CF Law and to ensure the appropriate CF procedures are included in the design of proposed revisions and supplements developed by the proposed project. In addition, GCCA will provide US\$ 1 million parallel co-financing for this component.

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<sup>11</sup> i) Chauk Township, Central Dry Zone; ii) Myebron Township; Rakhine Coastal State; and iii) Hinthada Township, Ayeyarwaddy Region.

**With LDCF funding** policy revisions will be proposed particularly related to increasing the resilience of community forests and associated local community livelihoods to climate change impacts. FD funds will be used for revisions and supplements needed for strengthening CF programme implementation in the country under future climate conditions, in particular strengthening the legal basis of the CFI.

Proposed revisions will be developed for: i) integrating climate change adaptation, including climate-resilient/multi-benefit forestry approaches, alternative livelihood options and extreme weather warnings/preparedness/response into relevant policies and plans; ii) ensuring CF and other reforestation activities are established as a part of Myanmar's strategy for climate change and sustainable development; and iii) strengthening the quality of the land use and access rights given to communities. To ensure a legal basis for CF in the country, firstly, a supplement to the Forest Law will be drafted and proposed, and secondly, a new CF law will be proposed. Appropriate supplements to the Forest Law, regarding community forest protection from climate change impacts, diversified livelihood options and securing land use rights will assist with gaining the trust of local communities and provide them with a sense of security/ownership over community forests established. This will ensure that climate-resilient/multi-benefit CF is established as an integral part of Myanmar's strategy for addressing climate change and sustainable forestry.

Revisions to the CFI, supplements to the Forest Law and the creation of a CF law will ensure that rights and access given to local communities to community forests are aligned with their management responsibilities. Furthermore, capacity building of the FD will ensure that local communities understand their rights and access to forest resources in community forests. This will incentivise the protection of these resources by local communities under a changing climate. A Task Force on Climate Change including for adaptation will be added to the NECC including the revision of its Terms of Reference to reflect the focus on climate change matters. This task force is expected to provide support to the mainstreaming climate change into national development.

The **additional costs** of creating an enabling policy environment that empowers local communities to adequately manage forests to increase their adaptive capacity including the necessary capacity building of all stakeholders as well as relevant revisions, supplements and policy briefs is **US\$ 350,000**.

#### *A.1.5. Adaptation benefits*

**At the local level**, the following adaptation benefits will be realised by communities living in and around community forests established at the three target townships: i) the reception of timely, understandable and actionable early warning/extreme weather information; ii) strengthened forest and livelihood 'safety nets' for providing natural resources during/after extreme weather events; iii) increased livelihood options (crops, fish, trees, livestock, sericulture, mushroom growing) for facing uncertain weather events; iv) improved natural capital and ecosystem services, including replenishable natural capital (potable water, fertile soils), cultivated/production system natural capital (crops, forest plantations, fish/crustacean aquaculture, livestock rearing facilities/resources) and renewable natural capital (ecosystem services/biodiversity); v) increased physical/natural capital for moderating environmental extremes, minimising natural disasters and stabilising ecosystem components e.g. intact mangrove buffer zones/tree shelter belts and/or dykes, Yaning Khway/"small wells", drainage canals for enhancing *inter alia* flood regulation, erosion control, wave energy dissipation; vi) improved human capital through capacity building/training activities on climate-resilient forestry practices and climate risk management; and vii) strengthened land-use security through proposed revisions/supplements to relevant policies/laws/plans.

Both **men and women** will be engaged in climate-resilient/multi-benefit CF design, establishment and management activities. Socio-economic assessments conducted under Component 1 will focus on identifying local livelihood options and community structures that provide equal adaptation benefits for both men and women. These assessments will be used to inform interventions undertaken under Component 2. As a result, women at targeted townships will gain the skills and exposure needed to increase their representation in community structures such as FUGs, MCs and Extreme Weather Management Committees

Recipient local communities will immediately perceive the **short-term benefits** of climate-resilient/multi-benefit community forests and end-to-end early warning systems established at the proposed project's target townships. These benefits will initially accrue at a local level within the proposed project's targeted townships. However, re-

search/information consolidated and generated under Component 1, and policy/law/plan revisions proposed under Component 4, will ensure that local level interventions are sustainably expanded and replicated across the country. This will enable for the proposed project's climate change adaptation benefits to cover greater geographic scales and persist long after project completion.

Building the technical and human capacity of the DMH and relevant user-agencies will improve **regional warnings** disseminated to townships in the Central Dry Zone, Rakhine Coastal State and Ayeyarwaddy Region as well as other regions of the country. Broad scale awareness raising at grass root levels (through information dissemination) will improve community responses to early warnings throughout states/regions in these areas.

The proposed project although strongly focused on implementing adaptation interventions within the Early Warning Systems and Forestry Sectors/Themes, will include activities that will provide support for agriculture production – a First Level Priority Sector for adaptation in Myanmar – under a changing climate. This is because climate resilient and multi-benefit community forests with core, multi-use and agro/aqua-forestry zones will contribute to building the climate change resilience of food security, poverty alleviation and economic development.

#### *A.1.6. Innovativeness, sustainability and potential for scaling up*

Reforestation/afforestation programmes including CF interventions cannot be implemented successfully under a changing climate without adequate incentives to ensure protection and thus sustainability. If implemented correctly, over time CF can be self-sustaining and support livelihoods under a changing climate. The proposed project will integrate innovative approaches<sup>12</sup> into baseline programmes for increasing benefits provided to local communities and thus ensuring the resilience of community forests to climate change threats. These will be coupled with capacity building and increased engagement with local communities to build overall adaptive capacity that will ensure the protection of newly established community forests.

The proposed project is grounded in the principles of EbA, of which a rapidly growing body of studies suggests that EbA projects deliver favourable cost/benefit ratios when compared hard adaptation strategies. This is because EbA can help support governments to meet not only their adaptation needs but also their mitigation commitments and broader development goals. EbA reduces climate change vulnerability, but it simultaneously provides a range of co-benefits such as carbon storage and sequestration, biodiversity conservation, alternative livelihoods, and poverty reduction opportunities. Furthermore, restoring or protecting the extent of forest ecosystems improves ecosystem resilience, which reduces the risk of ecosystems reaching tipping points and shifting to unmanageable or unrecoverable states as climate change proceeds<sup>13</sup>.

To ensure that the proposed project's concepts, directions and interventions are sustainably expanded and replicated throughout the ~874,764 ha of community forests planned for implementation under the CF programme (over the next 18 years), the proposed project will: i) build a robust knowledge base for designing appropriate community forests in the face of climate change; ii) mainstream climate change adaptation (including extreme weather preparedness) into the CFI and relevant policies and plans; iii) create an enabling policy environment to empower local communities to exercise real authority over the management of forests in their area, and thereby to obtain economic and other benefits; and iv) undertake capacity building of all stakeholders (from government to community-level) to enhance climate-resilient community forest development and support decentralization/devolution. This will reduce the vulnerability of CF landscapes and associated local community livelihoods established to climate change impacts.

Participation/community engagement will be an important factor during all phases of this project and will form the basis of long-term consensus building. A participatory and livelihoods approach involving the community will create awareness and knowledge sharing. The proposed project will focus on increasing the involvement of the FD with

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<sup>12</sup> Such as: i) alternative livelihood options (including integrated/mixed farming systems, agro/aqua forestry) to provide intermediate income as well as longer-term economic incentives; ii) support measures for protecting livelihoods from extreme weather events (buffer zones, drainage canals, ponds); and iii) climate-resilient and multi-benefit tree species.

<sup>13</sup> Jones et al 2012. Harnessing nature to help people adapt to climate change. Nature. Published online: 26 June 2012 | doi: 10.1038/nclimate1463.

local communities, including supporting the FD to work with local communities in mapping and zoning forests, designing planting protocols, identifying appropriate alternative livelihood options and developing respective management plans. This will build confidence and trust between local communities and the FD as well as empower communities to adequately participate in all steps of community forest establishment and to thoroughly understand the respective adaptation benefits. This will guarantee that communities protect climate-resilient/ multi-benefit community forests established under the proposed project, particularly in core forest areas.

## A.2. Stakeholder engagement

The project will use a thorough participatory approach with stakeholder participation and validation for all major activities. This participatory approach has been initiated in the PIF phase, which included a mission to Myanmar from 19 March – 6 April 2012 where a wide range of stakeholders were consulted to inform the design of the proposed LDCF project. In the PPG phase, stakeholder consultations around proposed activities will mobilise local communities, initiate discussions and promote buy-in from local communities. Consultations at a national level will include ministries, NGOs, international partners and the private sector. At the local level local government departments, community user groups, community members and relevant organisations will be included. Key stakeholders of the proposed project include local communities, regional and district administrations, government agencies and parliamentarians. The Executing Agencies of the proposed project are the Myanmar FD, under the MoECF, and the DMH under the Ministry of Transport. Whereas, the FD will play the lead role for implementing Component 1, 2 and 4 of the proposed project, the DMH will mainly be responsible for Component 3. The two Project Management Teams, however, will work closely together throughout project implementation. The National Environmental Conservation Committee (NECC, located within the MoECF) will act as the national coordinating body.

Other government ministries involved in the proposed project will include the Ministry of Social Welfare, Relief and Resettlement (MoSRR), Ministry of Agriculture and Irrigation (MoAI) and the Ministry of Livestock and Fisheries (MoLF). Research groups/task teams will be set up at research institutions, including the University of Yangon, Yezin Agricultural University, University of Forestry (Yezin), Forest Research Institute, and University of Mawlamyine (aquaculture research centre). These research institutions will provide the scientific basis for designing climate-resilient and multi-benefit community forests. Both local and international experts will be important stakeholders for guiding the proposed project's activities under all project Components. Furthermore, the proposed project will actively engage with NGOs<sup>14</sup> and FUGs/Community Based Organisations as partners for on-the-ground implementation.

The **main stakeholders** of the proposed project are the local communities living in and adjacent to community forests established at the three-targeted townships. Local communities will be actively engaged throughout project design and implementation. Furthermore, local communities will provide the traditional/indigenous knowledge basis for the proposed project's Components. The proposed project will consider gender equality during all stages of design and implementation. Gaining an understanding of gender-specific needs in the targeted townships will enable the proposed project to provide adaptation benefits to both men and women<sup>15</sup>.

At the start of the PPG implementation phase, the main stakeholders will be brought together at an inception workshop. A project steering committee will be created at this workshop, drawing from the stakeholders. During the next stage of the PPG implementation phase, the potential adaptation interventions for the project will be established. Selection criteria for choosing the most suitable adaptation interventions and selecting project pilot sites for demonstration of these interventions will then be identified at mapping workshops. In these workshops, relevant experts in appropriate fields (e.g. socio-economic development experts; coastal, ecosystem and biodiversity managers, hydrologists, forest managers and civil engineers, etc.) will assess the potential adaptation interventions, and establish a processing for identifying selection criteria and appropriate demonstration sites. The inception and

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<sup>14</sup> Local NGOs already involved in CF implementation in the country include: i) Forest Resource Environment Development and Conservation Association (FREDA); ii) Biodiversity And Nature Conservation Association (BANCA); and iii) Ecosystem Conservation and Community Development Initiative (ECCDI).

<sup>15</sup> Women in Myanmar are particularly vulnerable to climate change induced economic damages and suffering as they are more susceptible loss of assets, abuse, violence, malnutrition and exploitation after extreme weather events (DMH. 2011. Myanmar Participatory Rural Appraisal).



mapping workshops will also enable the: i) collection of baseline information; ii) documentation of ongoing initiatives and potential areas of collaboration; and iii) the initiation of discussions with potential implementing and co-financing partners. During the PPG the means of engaging with baseline project stakeholders will be explored so as to make sure the project will have an impact towards building the resilience of these project.

### A.3. Risks and mitigation measures

Please see Table 2 below for a summary of the description of the risks that might prevent the proposed project's objective from being achieved.

**Table 1.** A summary of the proposed project's risks, risk ratings and mitigation measures.

Identified Risks	Rating	Mitigation Measures
Staff turnover in responsible government departments (in particular FD and the DMH)	High	<ul style="list-style-type: none"> <li>Establish supporting relationships during the initial stages of project design with appropriate individuals in the respective Ministries/Departments.</li> </ul>
Resistance of stakeholders to accept change i.e. the adaptation alternative over the business-as-usual. This has a potential to affect the scaling up of project activities.	High	<ul style="list-style-type: none"> <li>The proposed project will be institutionalised within the FD under the MoECF and DMH to ensure sustainable delivery into the future.</li> <li>Awareness raising will be conducted at all levels using appropriate IEC (Information, education and communication) means/materials.</li> <li>Capacity building and training of important stakeholders will be conducted to increase their understanding/awareness of the benefits of the project's activities.</li> </ul>
Unfavourable climate conditions including current climate and seasonal variability and/or extreme weather events.	High	<ul style="list-style-type: none"> <li>Ensure that current climatic variability is taken into account in project design.</li> <li>Focus on climate-resilient species, and techniques to assist plant growth particularly in the seedling/sapling phases.</li> <li>Strengthen early warning systems to reduce the exposure of livelihood options to extreme weather events implemented under the proposed project.</li> <li>Integrate support measures (ponds, reservoirs, tube-wells, freshwater tanks, drainage canals, dykes, Yaing Khway/"small wells" and natural buffers) for reducing exposure of project activities to unfavourable conditions.</li> </ul>
Resistance of communities at target sites to adopt climate-resilient/multi-benefit species/approaches during and/or after project implementation.	High	<ul style="list-style-type: none"> <li>Climate-resilient/multi-benefit forests will be designed and implemented based on site-specific socio-economic and ecological assessments. This will ensure that communities support the approaches used.</li> <li>The CF policy and legal framework will be explained to communities so that they understand their rights and access to community forests.</li> <li>The relationship and engagement between the FD and local communities will be built.</li> </ul>
Capacity constraints of local institutions may limit the ability to undertake the required research/assessments and project interventions.	Medium	<ul style="list-style-type: none"> <li>Initiate collaboration and exchange between local institutions and international research institutes.</li> <li>Develop human resource capacity as required.</li> <li>An international and local expert will work closely with the proposed project managers, researchers and other relevant stakeholders.</li> </ul>
Increasing Overseas Development Assistance (ODA) increases demands on government staff time/capacity.	Medium	<ul style="list-style-type: none"> <li>Collaborate closely with other related overseas development projects/programmes/activities/initiatives to ensure government staff time is managed and capacity built according to the required in-country needs.</li> </ul>
Priority interventions implemented are not found to be cost-effective.	Low	<ul style="list-style-type: none"> <li>Cost-effectiveness will be a core principle in the implementation of climate-resilient/multi-benefit adaptation measures. Detailed information will be recorded regarding cost effectiveness.</li> </ul>

### A.4. Coordination with other relevant GEF financed and other initiatives

At this stage, it is envisaged that the proposed project will coordinate closely with public, private and local community stakeholders that are involved in the design and implementation of the following initiatives:

- On-going establishment of aqua-forestry and community plantations with mangrove/watershed tree species in the Ayeyarwady Delta by FRED A (Forest Resource Environment Development and Conservation Association). FRED A is an NGO that promotes sustainable forest management and has about 140 members including foresters, botanists, agronomists, zoologists, veterinary scientists, engineers, timber businessmen, journalists and artists. Activities conducted by FRED A include socio-economic surveys for rural community development, community planning for reforestation and forest conservation and restoration of degraded

mangrove ecosystem in the delta of Myanmar. Organisations such as DFID, JICA and UNDP have provided FREDAs with funding.

- On-going community forestry research and activities undertaken by ECCDI (Ecosystem Conservation and Community Development Initiative). ECCDI is an NGO that promotes sustainability of natural ecosystems to enhance socio-economic development through environmental restoration and poverty alleviation. Organisations such as DFID, JICA and UNDP have provided FREDAs with funding.
- On-going mangrove/watershed restoration activities and biodiversity conservation work undertaken by BANCA (Biodiversity and Nature Conservation Association). BANCA is an NGO focusing on conservation and sustainability. Organisations such as DFID, JICA and UNDP have provided FREDAs with funding.
- Investment activities of the Regional Integrated Multi-Hazard Early Warning System (RIMES) and World Meteorological Organisation (WMO) in the country through the project “Reducing risks of tsunami, storm surges, large waves and other natural hazards in low elevation coastal zones” (2011-2013) which focuses on developing end-to-end early warning systems linked to two townships in the Yangon Region (Kungangone) and Ayeyarwady Region (Pyinsalu).
- Japan International Cooperation Agency (JICA)-led, Integrated mangrove rehabilitation and management through community participation in the Ayeyarwady Delta project (2007-2013).
- UNDP-led: i) Adaptation Fund project, “Addressing Climate Change risks on water resources and food security in the Dry Zone of Myanmar (2011-2013), Department of Agriculture; ii) Inle Lake Conservation and Rehabilitation Project (2012-2013); and iii) Integrated Community Development Project (ICDP).
- UN-HABITAT-led i) State of the Environment Report (2012-2013); and ii) Long-term Restoration Plan for Inle Lake (2012-2013).
- International Tropical Timber Organisation-led Capacity building for developing REDD+ activities in the context of sustainable forest management (2012-2015), Forest Department.
- Myanmar Climate Change Alliance (MCCA) project which has been developed jointly by UNEP and UN-Habitat with EC under Global Climate Change Alliance (GCCA).
- UNEP-UNDP Poverty Environment Initiative (PEI) that seeks to mainstream poverty-environment linkages into national development planning.
- In addition to the above the project will coordinate with other Agencies of the GEF and donors who are in the process of formulating other adaptation projects including the UNDP LDCF regional project on EWS.

## **B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:**

### **B.1. National strategies and plans or reports and assessments under relevant conventions**

The proposed project has been designed to address Myanmar NAPA Priority Adaptation Projects for **First Level Priority Sectors:** Agriculture, Early Warning Systems and Forestry. In alignment with **Priority Adaptation Projects** identified by the Myanmar NAPA for these Sectors/Themes, the proposed project will enhance the current climate monitoring, forecasting and early warning systems in the country and integrate climate-resilient forestry approaches, alternative livelihood options (including agriculture-based options) and community-based early warning systems into the CF baseline project.

The Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) (2009-2015) which aims to improve disaster management in Myanmar e.g. protect lives, livelihoods, and secure development. The proposed project is consistent with the MAPDRR’s seven components, which are aligned to the Hyogo Framework for Action: i) policy, institutional arrangements and further institutional development; ii) hazard, vulnerability and risk assessment; iii) multi-hazard early warning systems; iv) preparedness and response programs at national, State/Region, district and township levels; v) mainstreaming of disaster risk reduction into development; vi) community-based disaster preparedness and risk reduction; and vii) public awareness, education and training.

The proposed project has been developed based on in-country guidance from the National Environmental Conservation Committee (NECC), located under the MoECF. Furthermore, the NECC has approved the proposed project’s

aim and interventions. As a result, it is consistent with the climate change adaptation strategies identified for the country<sup>16</sup>.

## **B.2. GEF Focal area and/or fund(s) strategies, eligibility criteria and priorities**

The proposed project has been developed using the Updated Results-Based Management Framework for the Least Developed Countries Fund (LDCF), Adaptation Monitoring and Assessment Tool (GEF/LDCF.SCCF.9/Inf.4 October 20, 2010) (see Part I.A of this PIF) and the “Operational Guidelines on Ecosystem-based approaches to Adaptation (GEF/LDCF.SCCF.13/Inf.06 October 16, 2012). In line with the LDCF eligibility criteria and priorities, the proposed project has been designed specifically to meet the urgent and immediate adaptation needs of Myanmar’s most vulnerable local communities as **identified in Myanmar’s NAPA** (Decision 7/CP.7). It blends activities and elements from the top four Priority Adaptation Projects identified in the NAPA for the First Priority Level Sectors/Themes: i) Agriculture; ii) Early Warning Systems; and iii) Forestry. The proposed project will use LDCF resources to finance the additional costs needed for: i) increasing the climate change resilience of a government-funded baseline programme, the Community Forestry Programme<sup>17</sup>; and ii) building the DMH’s existing climate monitoring, forecasting and early warning systems to safeguard lives and livelihoods from climate change-induced risks. Furthermore, it has been developed using the following approaches: i) participatory (communities and relevant stakeholders); ii) learning-by-doing; iii) multi-disciplinary; iv) complementary; and v) gender sensitive.

## **B.3. The GEF Agency’s comparative advantage for implementing this project**

UNEP’s considerable experience in implementing ~80 adaptation-related projects including SCCF, LDCF and AF projects throughout Africa and Asia-Pacific provide experience upon which the agency will draw during the implementation of the proposed project. Furthermore, UNEP has a proven international and national record for its strong technical and scientific background in the field of climate change, and as such is an appropriate agency for providing EbA capacity building and implementation support for enhancing adaptive capacity within Myanmar. UNEP’s experience in community-based projects, natural resource management and support for the development of national environmental policy is well recognised in Asia.

UNEP’s Flagship Programme: Ecosystem-based Adaptation represents a ground-breaking shift in focus in the realm of climate change adaptation, which has been commended by the Conference of the Parties to the UNFCCC (CoP). The EbA approach is multidisciplinary in nature, and involves managing ecosystems to build their resilience, and use ecosystem services to promote climate change adaptation and disaster risk management. This approach has been endorsed by IUCN and the EC, and provides a platform for engaging a broad range of stakeholders and sectors in the adaptation process. This approach, furthermore, has recently been endorsed by GEF through the Operational Guidelines on “Ecosystem-Based Approaches to Adaptation” GEF/LDCF.SCCF.13/Inf.06 October 16, 2012.

UNEP has a flexible mandate in Myanmar and over recent years has been working with the Myanmar government on national policies and strategies. The long-term relationship formed between UNEP and Myanmar’s national government is a significant comparative advantage over other agencies which have had restricted mandates in Myanmar. The “Thematic Analysis 2011: Achieving the Millennium Development Goals in Myanmar” served as the basis for identifying the Strategic Priorities in the United Nations Strategic Framework for Myanmar. UNEP drafted chapter 7, in this Thematic Analysis, “Ensuring Environmental Sustainability”, which specifically formed the basis of Strategic Priority 3 and contributed (with other MDGs) to the formulation of Strategic Priority 1 and 4. Although the proposed

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<sup>16</sup> i) Create adaptive capacities for responding to climate change impacts focussed on preparedness, monitoring, pilot projects and restoration of natural capital; ii) support the country’s aim to reduce greenhouse gas emissions through increasing carbon sinks and utilising sustainable development practices e.g. sustainable agriculture and forestry that reduces emissions and increases absorption; iii) integrate climate change management i.e. knowledge management, database and tools, management preparedness and multilateral participation into national, regional and local level policies and plans; iv) increase climate change research including assessing future climate risks and current vulnerability; and v) mainstream climate change adaptation into policy, planning and relevant projects to ensure scaling up of climate change adaptation across the country at national, regional and local levels.

<sup>17</sup> Decision 3/CP.11, GEF/C.28/18.

project aligns with all four<sup>18</sup> Strategic Priorities identified in Myanmar’s United Nations Strategic Framework (2012-2015), it specifically focuses on Strategic Priority 3“Reduce vulnerability to natural disasters and climate change (contributing to MDG 7)”.UNEP has also jointly developed the Myanmar Climate Change Alliance (MCCA) project with UN-Habitat under the Global Climate Change Alliance (GCCA). The objectives of this initiative are to: i) raise awareness, ii) build technical and institutional capacity of government to implement and develop climate change policy, and c) demonstrate resilience building measures in the field. The LDCF will build on this partnership. US\$ 1,000,000 is sought as parallel co-financing from this initiative (see Table C).


UNEP’s expertise and support are important to making the environment an integral part of the work of UN country teams. At the regional level, UNEP is a member of the UN Development Group for Asia and Pacific that coordinates regional support to UN Country Teams. Furthermore, UNEP also participates in the regional Peer Support Group that provides hands-on support to UN Country Teams. In terms of capacity to implement the proposed project in Myanmar, the FD and DMH have appropriate systems, including a country-wide institutional network and necessary staff and infrastructure. Through its regional office and capacity to work directly with governments, UNEP will be able to mobilise staff time and resources to supervise the project. Close proximity to UNEP’s Bangkok regional office and regular communication with the national implementing partners will provide the means for successful project delivery.

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

**A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):** (Please attach the [Operational Focal Point endorsement letter\(s\)](#) with this template. For SGP, use this [OFP endorsement letter](#)).

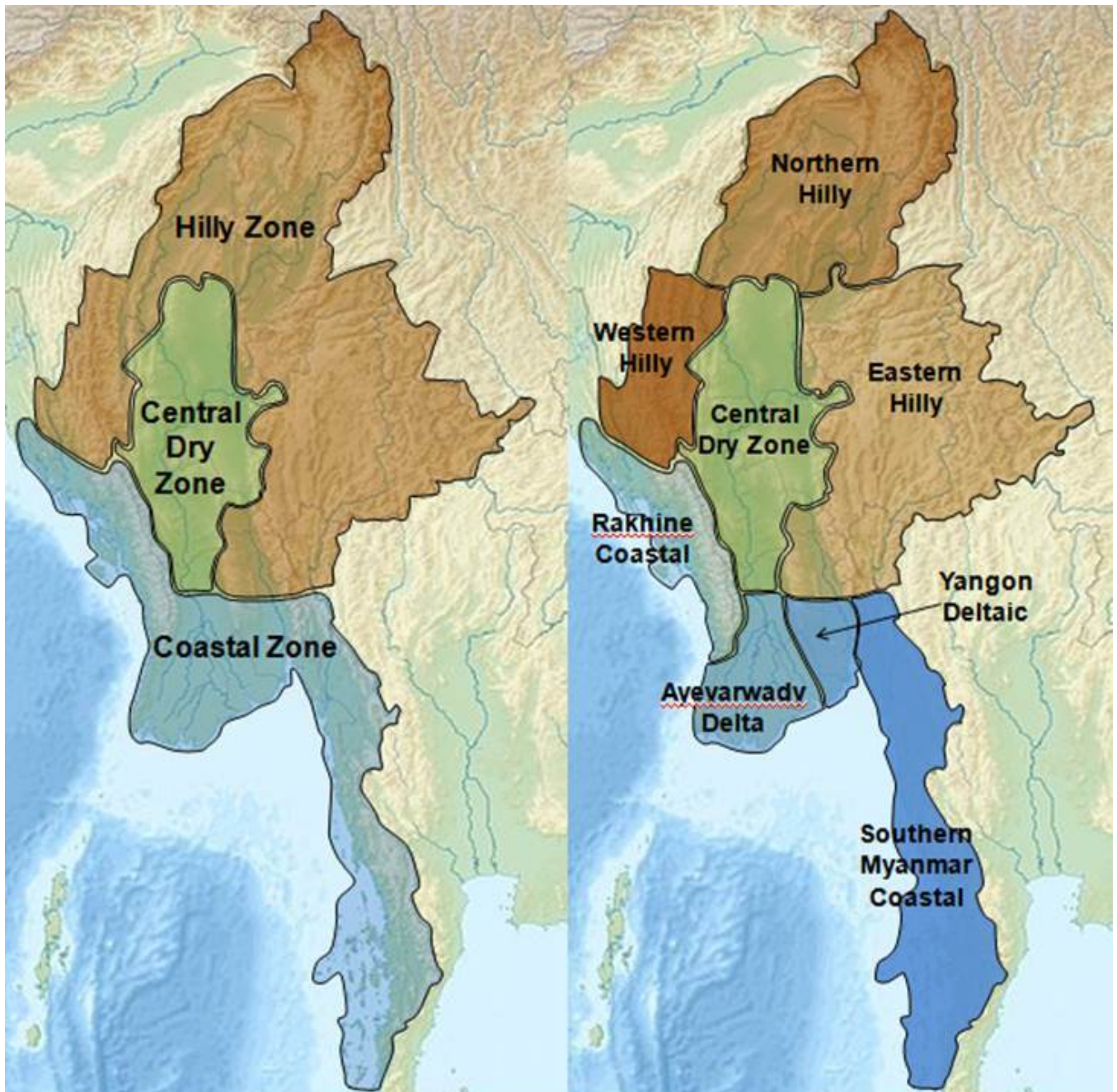
NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Mr. Hla Maung Thein	Deputy Director General	MINISTRY OF ENVIRONMENTAL CONSERVATION AND FORESTRY	MAY 2013

**B. GEF AGENCY(IES) CERTIFICATION**

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for project identification and preparation.					
Agency Coordinator, Agency name	Signature	DATE (MM/dd/yyyy)	Project Contact Person	Telephone	Email Address
Maryam Niamir-Fuller, Director, GEF Coordination Office, UNEP.		10/16/2013	Ermira Fida Head, GEF Adaptation Unit, DEPI, UNEP	+ 254 714636329	<a href="mailto:ermira.fida@unep.org">ermira.fida@unep.org</a>

<sup>18</sup> Strategic Priority 1: “Encourage inclusive growth (both rural and urban), including agricultural development and enhancement of employment opportunities (contributing to MDG 1, and with repercussions on MDGs 2, 3, 4, 5, 6 and 7)”; Strategic Priority 2: “Increase equitable access to quality social services (contributing to MDGs 2, 3, 4, 5, and 6, with repercussions on MDG 1)”; Strategic Priority 3: “Reduce vulnerability to natural disasters and climate change (contributing to MDG 7)”; and Strategic Priority 4: “Promote good governance and strengthen democratic institutions and human rights (foundation for progress on all MDGs, including MDG 8)”.

ANNEX 1: Myanmar's (a) three agro-ecological zones; and (b) eight physiogeographic regions





## ANNEX 2. Indicative activities for each project component

### *Component 1: Conducting science and assessment for appropriate climate-resilient and multi-benefit Community Forestry*

Measures financed by LDCF resources will include:

- establishing a climate change adaptation network<sup>19</sup> made up of experts and practitioners to identify priority research needs;
- consolidating international/national best practices and latest research in CF practices, predicting climate change impacts and reforestation adaptation techniques;
- strengthening research undertaken by the FD and other related institutions to include climate change adaptation and climate-resilient approaches to reforestation, including building human and technical capacity for climate change adaptation planning, including purchasing and installing new software packages<sup>20</sup> and providing the necessary training to use these tools;
- conducting region-specific studies<sup>21</sup> to inform the design of climate-resilient/multi-benefit community forests planned for establishment under Component 2 in the Myebon, Hinthada and Chauk townships;
- strengthening spatial data on afforested/reforested areas across the country to inform effective positioning of future reforestation activities based on both climate change impacts and increasing connectivity between forested areas; and
- establishing a communication and dissemination web-platform, including information relevant for designing climate-resilient/multi-benefit CF and reforestation programmes and linking this to the Myanmar Information Management Unit (MIMU) (<http://themimu.info/>) online information portal.

### *Component 2: Establishing climate-resilient and multi-benefit community forests with core, multi-use and agro/aqua forestry zones.*

Measures to be financed under this component include:

- introducing a new method for **mapping/zoning community forests** into core, multi-use and agro/aqua forestry zones including *inter alia* mixed farming zones (crops, livestock, fish, fruit trees), buffer/shelter belts, fuel wood lots and plantation forests;
- zoning forests in the Myebon, Hinthada and Chauk townships into core, multi-use and agro/aqua forestry zones (mentioned above);
- introducing **alternative livelihood options** for appropriate forest zones including mixed farming systems (crops, livestock, fish, fruit trees), aquaculture systems (mud crab, clam, shrimp and tilapia), and other **short-term/intermediate income generating strategies** e.g. beekeeping, sericulture, bamboo growing<sup>22</sup> and mushroom growing;
- **strengthening incentives** for communities to look after community forests through greater community involvement and engagement (through alternative livelihoods introduced above), as well as increasing communities understanding of community forestry rights, regulations and legislation;

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<sup>19</sup> This network be facilitated by a project steering committee.

<sup>20</sup> ArcMap GIS and other relevant climate change adaptation planning tools/software (e.g. NOAA CSC Coastal Inundation toolkit, Climate Wizard, Ecosystem-Based Management tools Network, CRiSTAL, CommunityViz) to assist with designing climate-resilient/multi-benefit community forests.

<sup>21</sup> Bio-physical, socio-economic and ecological assessments will be undertaken to identify: i) appropriate climate-resilient/multi-benefit site specific tree and crop species/varieties; ii) innovative/renewable financing mechanisms (e.g. carbon credit trading) for supporting CF activities; iii) short- and long- term economic benefits of climate-resilient/multi-benefit species as well as CF landscapes; iv) support measures necessary for assisting communities during extreme weather events (e.g. ponds, reservoirs, tube-wells, freshwater tanks, drainage canals, dykes, Yaing Khway/“small wells” and natural buffers) to complement community forests and local livelihoods; v) appropriate core, multi-use and agro/aqua forestry zones including mixed farming areas (crops, livestock, fish, and fruit trees), shelter belts, fuel wood lots and plantation forests; and vi) techniques for maximising production and improving soil conditions under a changing climate.

<sup>22</sup> E.g. *inter alia* *Melocanna bambusoides* in Rakhine State, *Dendrocalamus strictus* in the Central Dry Zone; *Bambusa polymorpha* in the Ayeyarwady Region.

- introducing diversified climate-resilient watershed (10-20 species) and mangrove/coastal (5-10 species) species/varieties into new community forests<sup>23</sup>;
- introducing **innovative forest structure** to community forests e.g. size, density and species composition<sup>24</sup> for enhancing adaptive capacity to climate change-induced risks;
- introducing **additional support measures** in community forests, such as drainage canals, rainwater tanks, tube-wells and Yaing Khway/”small wells” for further protecting community forests and local communities from extreme weather events.

**Component 3: Establishing end-to-end early warning systems for protecting communities and safeguarding livelihoods.**

Measures to be financed under this component include:

- introducing **real-time sensor technology** and increasing the DMH’s **observation network coverage** by installing 15 real-time meteorological/hydrological observation stations (including solar panels, batteries and networking facilities) in the Central Dry Zone, Rakhine Coastal State and Ayeyarwady Region for providing real-time weather observations to monitoring teams at the DMH (see Annex 3, Figure 1 for proposed locations<sup>25</sup>);
- strengthening the capacity of the DMH for: i) analysing real-time, historical and satellite meteorological data, ii) using forecasting modelling tools; iii) using long range/seasonal and inter-annual forecasting; and iv) improving dissemination methodologies – including installing appropriate hardware and software<sup>26</sup>;
- strengthening partnerships with Global Producing Centres and neighbouring NMHSs for reducing the high costs that are associated with drought monitoring and for informing cyclone early warnings;
- strengthening the capacity of national and local user agencies<sup>27</sup> to package and disseminate warnings in a timely, understandable and actionable manner<sup>28</sup>; and
- establishing pilot **community-based early warning systems** at the proposed project’s three targeted townships, including: i) installing ~15 **high-frequency radio transceivers** and/or televisions for communicating warnings; ii) providing **two-way radios and/or if appropriate mobile phones** for communicating warnings to and between communities; iii) conducting a needs assessments to understand the current **traditional methods** for monitoring and responding to climate variability; iv) improving and/or developing **hazard and extreme weather risk assessments and maps**; v) integrating early warning systems and risk assessments into existing disaster and CF management plans; vi) developing **preparation and response plans**<sup>29</sup>; vii) **establishing and training local Extreme Weather Management Committees**<sup>30</sup> on extreme weather risks, interpreting and understanding early warnings received and identifying ways to

<sup>23</sup> These will act as research/trial plantations of species/varieties and will be supported by Component 1 of the proposed project. For example, a mix of indigenous mangrove and other coastal species, such as *Rhizophora mucronata*, *Rhizophora apiculata*, *Bruguiera gymnorhiza*, *Heritiera fomes*, *Sonneratia apetal*, *Aegiceras corniculatum*, *Ceriops decandra*, *Cynometra ramiflora*, *Avicennia officinalis* and *Excoecaria agallocha* will be planted to increase the ability of community forests established in the coastal region to adapt to climate change related pressures such as salinity, inundation, temperature and winds. Species will be chosen to cover a range of inundation classes depending on the specific site details<sup>23</sup>. In the Central Dry Zone, a range of drought tolerant species will be tested and in high risk flooding areas, trees with strong root systems will be focussed on.

<sup>24</sup> All tree species chosen for inclusion in community forests will have beneficial products or services for protecting local communities from extreme weather events and/or providing local communities with food, timber, fuelwood and NTFPs.

<sup>25</sup> End-to-end early warning systems established at the proposed project target sites will include all relevant climate change-induced-risks specific for the area. However, there will be a focus on: i) cyclones and storm surge warning and response in Myebon, Rakhine Coastal State; ii) flood warning and response in Hinthada, Ayeyarwaddy Region; and iii) drought warning and response in Chauk, Central Dry Zone.

<sup>26</sup> For managing real-time forecasting e.g. ESRI ArcMap GIS, MIKE 11 (including Enterprise, Flood Forecasting and FLOOD WATCH) as well as relevant storm tracking and drought monitoring software.

<sup>27</sup> E.g. RRD, Department of Irrigation, Water Research Utilization Department, Department of Agriculture.

<sup>28</sup> I.e. decision support system use, forecast interpretation and translation.

<sup>29</sup> Including evacuation routes, safe zones and suitable risk reduction and extreme weather mitigation measures.

<sup>30</sup> Comprising members of local disaster and CF FUG and MC management teams as well as other relevant individuals with experience on traditional climate monitoring, alert systems and response mechanisms.

respond to early warnings; and viii) **awareness raising** in communities living in and adjacent to community forests<sup>31</sup>.

***Component 4: Mainstreaming climate change adaptation, including extreme weather preparedness into the Community Forestry Instruction and relevant policies and plans.***

This component will include: i) mainstreaming climate change adaptation (including extreme weather preparedness) into the CFI and relevant policies and plans; ii) creating an enabling policy environment to empower local communities to exercise real authority over the management of forests in their area, and thereby to obtain economic and other benefits; iii) undertaking capacity building of all stakeholders (from government- to community-level) to support decentralization/devolution and enhance climate-resilient community forest development; and iv) setting up a task force on climate change including for adaptation under the National Environmental Conservation Committee to provide guidance and support on mainstreaming climate change issues in Myanmar.

Adjustments and revisions will be proposed to the following: i) Forest law (1992) and Rules (1995); ii) Myanmar Forest Policy (1995); iii) Community Forestry Instruction (1995); iv) Criteria and indicators for sustainable forest management (1999); v) National code of forest harvesting practices in Myanmar (2000); and vi) Forestry Master Plan (2001/02-2030/31). LDCF resources will be used to draft a new Community Forestry Law and propose it as means to consolidate and strengthen the Community Forestry Instruction (1995) by including climate change adaptation and livelihood diversification approaches. Policy briefs and capacity building training material related to the proposed revisions/supplements as well as the new CF law will be developed. FD officials will be trained to ensure that they are capable of building the capacity of local communities/FUGs/MCs to: i) effectively manage and protect their community forests; and ii) understand their CF rights and responsibilities.

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<sup>31</sup> Conducted by Extreme Weather Management committees on preparation and response plans, including practising risk reduction measures such as evacuating areas, moving assets and implementing extreme weather mitigation measures e.g. sandbags to prevent inundation of property and land.



**ANNEX 3: Budgets for the Drought/Cycle (Table 1) and Flood (Table 2) EWSs are presented.**

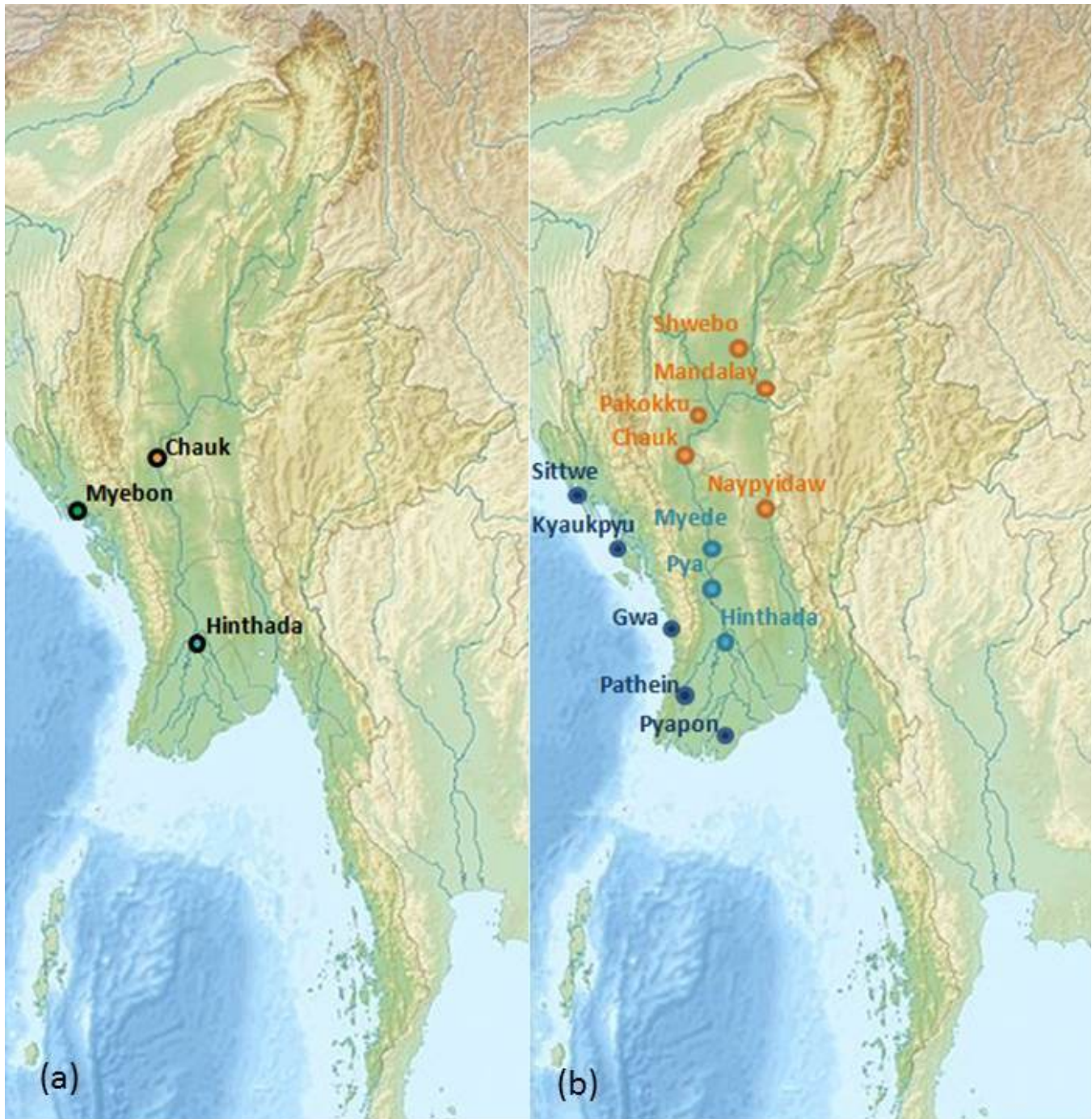
**Table 1: Estimated Costs for combined proposed Drought and Cyclone EWSs in Chauk Township, Central Dry Zone; and Myebon Township; Rakhine Coastal State, respectively.**

SR	Project Components	Function	Advantages	No	Unit Price	Amount (US\$)
1	Automatic weather Observing System	Real time continuous Observations for Meteorological elements	Comprehensive Observation networks	12	12000	144,000
2	Communication Facility Radio Transceiver	Observation and Warning rapid exchange	Support Early Warning	12	3000	36,000
3	Technical Training	Expertise	Capacity building in man power	2	30,000	60,000
4	Computer & Accessories	Infrastructure for analysis	Analysing observations	12	700	8400
5	One Pilot area in Chauk Township In Dry zone	Impacts assessment of Drought Hazards	Support to Operation	1	50,000	50,000
6	One Pilot area in Myebon Township In Coastal zone	Impacts assessment of Cyclone and Storm surge	Support to Operation	1	50,000	50,000
7	Solar Panel and SIM cards and Networking facilities	For real time data receiving	Timely data collection for intensity of wind and rain for early warning	10	3000	30,000
8	Training for Local Communities	To enhance awareness and response	Effective communication to reduce	5	10,000	50,000
9	Publish and Printing Handouts/Pamphlets/Venyl/Brochure	To enhance awareness and response	Effective communication to reduce	1	10,000	10,000
<b>Total USD</b>						<b>438,400</b>

**Table 2: Estimated Costs for proposed for Flood EWS in Hinthada Township, Ayeyarwaddy Region.**

	Activities/ budget details	Cost Estimate (USD)
<b>1. Enhanced observation and monitoring capacities</b>		
	Preparation of tender documents, equipment acquisition	
	- Automatic Weather Station: USD 4,000 x 3 units	12,000
	- Automatic Water Level Station: USD 5,000 x 3 units	15,000
	- Computer : USD 900 x 3 units	2,700
<b>2. Installation of Flood forecast model (MIKE 11)</b>		
	MIKE 11 Real-time (MIKE 11 Enterprise +FF+ FLOOD WATCH Professional)(Software and 1 year maintenance)	8,100
	MIKE 11 FF (Training recommended) ((Software and 1 year maintenance)	6,600
	MIKE 11 GIS (Incl Non-point load est module, ArcGIS 9 Extension, requires ArcView with Spatial Analyst)	2,650
	(Software and 1 year maintenance)	
	Train forecasters on use of models	3,000
<b>3. Capacity building of user agencies</b>		
3.1	Data preparation and database development	17,500
3.2	Hazard map development	27,500
3.3	Exposure/ vulnerability map development	10,000
3.4	Flood risk map development	12,500
3.5	Prepare user manual	5,000
3.6	Training of user agencies at national and local levels	25,000
3.7	Assessment of user needs	12,500
3.8	Evaluate existing flood risk information content	5,000
3.9	Improve flood risk information content, format	5,000
<b>4. Improved community response to warnings at pilot sites</b>		
4.1	Public education and awareness	5,000
4.2	Establish flood markers	2,000
4.3	Establish and train DRM teams at pilot sites	3,000
4.4	Develop, practice flood preparedness and response plans	3,000
4.5	Implement priority flood preparedness, mitigation activities	3,000
4.6	Demonstration of flood risk information application	3,000
<b>5. Project Management</b>		
5.1	Project initiation meeting	5,000
5.2	Semi-annual monitoring & evaluation meeting of the National Working Group	7,000
5.3	Dissemination of experiences, successes, lessons	7,000
5.4	Project close-out workshop	7,000
<b>Total Estimate Cost</b>		<b>245,050</b>

#### ANNEX 4: Targeted townships and sites identified for automatic weather/water level stations



**Fig.1 a)** Target townships for proposed project's climate-resilient/multi-benefit forest reforestation and community-based early warning system pre-investment interventions; and **1b)** sites identified for automatic weather/water level stations for establishment under the proposed project for monitoring and forecasting extreme weather events: cyclones/strong winds; storm surge/flood (dark blue); drought; extreme temperatures (orange); intense rains, and flooding (light blue) (stations at Myede, Pya and Hinthada will include both automatic weather stations and automatic water level stations).

**ANNEX 5: Climate change vulnerabilities of the baselines projects versus the adaptation measures under the LDCF project in Myanmar.**

Baseline projects  •Goals and activities	Climate change hazards affecting the project area	Impacts to the baseline projects and targeted populations as a result of climate change	Ecosystem services targeted by the LDCF project	Adaptation measures supported by the LDCF project	Expected LDCF project benefits
<p><b>Project targeted vulnerable sites and communities:</b>  <b>Local communities</b> - living in and adjacent to community forests at three townships identified as most vulnerable to climate change-induced risks from extreme weather events: i) Chauk Township in the Central Dry Zone; ii) Myebon Township; Rakhine Coastal State; and iii) Hinthada Township, Ayeyarwaddy Region.</p>					
<p><b>Community Forestry (CF) Programme</b></p> <ul style="list-style-type: none"> <li>•Community-based forest management.</li> <li>•Community-based afforestation and reforestation.</li> </ul>	<p>Increased intensity and frequency of flooding as a result of increased heavy rains.</p> <p>More frequent and severe droughts.</p> <p>Increased intensity and frequency of cyclones.</p>	<ul style="list-style-type: none"> <li>•Increased temperature and water stress on trees and death of seedlings.</li> <li>•Increased harvesting pressure when community livelihoods are compromised.</li> <li>•Increased damage to forests from extreme weather events.</li> <li>•Local community<sup>32</sup> livelihoods compromised by water scarcity and flooding.</li> </ul>	<ul style="list-style-type: none"> <li>•Soil accretion.</li> <li>•Water provision through infiltration of water into topsoils<sup>33</sup>.</li> <li>•Non-timber forest products (NTFPs).</li> <li>•Buffering against extreme weather events.</li> <li>•Micro-climate regulation.</li> <li>•Maintained soil fertility.</li> </ul>	<ul style="list-style-type: none"> <li>•Tailoring community forest establishment to include core, multi-use<sup>34,35</sup> and agro/aquaforestry zones<sup>36</sup> using i) climate-resilient and multi-use species/varieties; ii) innovative forest structure<sup>37</sup>; and iii) additional support measures<sup>38</sup> to enable local communities to adapt to the effects of climate change<sup>39</sup>.</li> <li>•Strengthening scientific/ traditional knowledge and building technical capacity to plan and implement climate-resilient forest restoration<sup>40</sup>.</li> <li>•Strengthening</li> </ul>	<ul style="list-style-type: none"> <li>•Best practice information available for implementing reforestation that is climate resilient and ensures continued generation of ecosystem services to benefit local communities.</li> <li>•Climate resilient species used in community forestry programmes.</li> <li>•Early warnings provided to allow planning for extreme weather events.</li> <li>•Climate change adaptation approaches main-</li> </ul>

<sup>32</sup> Living in and adjacent to community forests at three townships identified as most vulnerable to climate change-induced risks from extreme weather events: i) Chauk Township in the Central Dry Zone; ii) Myebon Township; Rakhine Coastal State; and iii) Hinthada Township, Ayeyarwaddy Region.

<sup>33</sup> The infiltration of water into soils also reduces soil erosion resulting in more topsoil available for agriculture and less siltation in rivers.

<sup>34</sup> Multi-use forests include tree species that provide multiple provisioning (food, medicines, fiber, non-timber forest products), supporting (soil formation and retention) and regulating (water flow regulation, flood control) ecosystem services.

<sup>35</sup> Forest ecosystems play an essential role in climate change adaptation by: i) buffering communities from extreme weather events; ii) reducing erosion and trapping sediment; iii) increasing the land available for diversified local livelihoods; iv) providing economic services such as food and fibre; and v) providing habitats for local animals/plants which offer safety nets for communities during times of hardship.

<sup>36</sup> Including inter alia mixed farming zones (crops, livestock, fish, fruit trees), buffer/shelter belts, fuel wood lots and plantation forests.

<sup>37</sup> E.g. size, density and species composition for enhancing adaptive capacity to climate change-induced risks.

<sup>38</sup> Such as drainage canals, rainwater tanks, tube-wells and Yaing Khway/"small wells" for further protecting community forests and local communities from extreme weather events.

<sup>39</sup> Through the conservation of topsoils, increasing fodder available, increased water available for domestic and agricultural use, developing alternative livelihoods based on the benefits of functional core forests (e.g. non-timber forest products) as well as agro/aquaforestry zones.

<sup>40</sup> This capacity will be developed in government departments, academic institutions, NGOs and local user groups under Component 1 and 2.

Baseline projects  •Goals and activities	Climate change hazards affecting the project area	Impacts to the baseline projects and targeted populations as a result of climate change	Ecosystem services targeted by the LDCF project	Adaptation measures supported by the LDCF project	Expected LDCF project benefits
				<p>policies and strategies to integrate EbA into community forest management and reforestation.</p> <p>•Increasing EbA awareness<sup>41</sup>.</p>	<p>streamed into policy to enable climate-resilient forestry that benefits local communities.</p>
<p><b>DoM, climate monitoring and early warning systems.</b></p> <p>•Collecting, analysing and archiving meteorological, hydrological and seismological data</p> <p>•Preparing and disseminating early warnings and bulletins for all climate-hazards.</p>	<p>Increased intensity and frequency of flooding as a result of increased heavy rains.</p> <p>More frequent and severe droughts.</p> <p>Increased intensity and frequency of cyclones.</p>	<p>•Increased pressure on DoM because of an increased incidence of extreme weather events.</p>	<p>• Buffering against extreme weather events.</p>	<p>•Building technical capacity of the DMH to: i) predict extreme weather events; ii) package warnings into a format that can be understood by the various user agencies; and iii) disseminate warnings through the effective channels.</p> <p>•Establishing end-to-end early warning systems<sup>42</sup> to support communities living in and around the climate-resilient/multi-benefit forests established under Component 2 to effectively prepare and respond to an increase in intensity and frequency of extreme weather events<sup>43</sup>.</p>	<p>•Increased reception of timely, understandable and actionable early warning information for protecting lives/livelihoods and implementing extreme weather risk reduction measures<sup>44</sup>.</p> <p>•Improved regional warnings disseminated to townships in the Central Dry Zone, Rakhine Coastal State and Ayeyarwady Region.</p> <p>•Strengthened local capacity to respond to early warnings including following evacuation plans and undertaking risk reduction methods.</p>

<sup>41</sup> Increasing awareness of the adaptation benefits of restoring natural capital among the public, policy makers and decision makers.

<sup>42</sup> I.e. the process from effectively detecting hazards to ensuring the appropriate community response.

<sup>43</sup> Including undertaking risk reduction measures such as evacuating areas, moving assets and implementing extreme weather mitigation measures e.g. sandbags to prevent inundation of property and land.

<sup>44</sup> Such as: i) moving assets (e.g. food, livestock and personal items) to safer locations; ii) using flood control/rerouting structures (e.g. dam management, temporary flood defences) to prevent inundation of property and land; and iii) implementing flood resilience measures (e.g. sandbags).

## **ANNEX 6: Additional baseline project information**

### **The establishment of community forests**

To establish a CF the following steps are undertaken by local communities (CF Model as specified in the CFI<sup>45</sup>): i) a FUG and Management Committee (MC) is established, ii) an area for CF establishment is identified and proposed to the Township/District Forest Office (TFO/DFO) for approval, iii) a draft management plan with assistance from the FD is developed and approval on the management plan obtained by TFO/DFO, iv) a CF Certificate (CFC) is obtained from DFO, v) seeds and seedlings as well as necessary technical support are obtained free of charge from the FD for the first rotation, and vi) the CF is established, managed and sustainably harvested according to the approved management plan. Initially communities are granted a 30-year lease on the land. Depending on the performance and success of the community forest, this can be extended and is inheritable<sup>46</sup>. If a FUG does not follow the MP, the DFO can revoke the CFC.

### **Early warning systems in Myanmar**

Extreme weather early warnings are disseminated by the DMH to the Myanmar Disaster Preparedness Agency (MDPA), Relief and Resettlement Department (RRD) under the Ministry of Social Welfare, Relief and Resettlement (MSWRR), concerned ministries and departments, national government agencies/offices and State/Region government offices. The RRD and the State/Region government offices disseminate warnings to district RRD offices and local/township authorities, who further disseminate warnings to local-levels. The DMH also disseminates warnings using radio, television, newspapers and enterprises/local businesses. In certain instances, the DMH will directly transmit warnings to the local authorities/RRD situated in the geographic location where the extreme weather event is predicted to strike.

The Relief and Resettlement Department (RRD), in collaboration with various UN agencies and international/local NGOs, conducts: i) disaster response and recovery activities; ii) workshops on disaster management at a national level; iii) training programmes with trainers on disaster management at a national level; iv) awareness training on disaster risk reduction at a region/state level; and v) educative talks on disaster awareness programmes at a ward/village level.

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<sup>45</sup> i) A Forest Users Group (FUG) selects a Management Committee (MC); ii) the MC identifies an area for community forest establishment and applies for permission to establish the community forest, through the Township Forest Officer (TFO), to the District Forest Officer (DFO); iii) the TFO assesses the suitability and availability of the area proposed for CF and submits the application to the DFO with a map and relevant recommendations; iv) if permission is granted by the DFO, the FD assists the MC in drafting a Management Plan (MP); v) the MC submits the MP to the DFO; vi) if the MP is approved, the DFO issues a Community Forestry Certificate (CFC), which includes the relevant CF rules, regulations and legislation; vii) the FD provides, free of charge, seeds and seedlings for the first rotation and the necessary technical support for establishing the community forest; viii) the MC establishes and manages the forest according to the MP; and ix) the FUG sustainably utilises the community forest, including harvesting timber, NTFPs and fuelwood according to the MP and selling surplus products at village markets.

<sup>46</sup> Dr. Thaug Naing Oo. 2011. Assessment on community forestry management and its development with special reference to three critical areas of Myanmar. ITTO Fellowship Program Technical Report for Fellowship (Ref. 009/10S).