



PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Full-sized Project

TYPE OF TRUST FUND: LDCF

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PART I: PROJECT INFORMATION

Project Title:	Strengthening climate information and early warning systems in Cambodia to support climate resilient development and adaptation to climate change		
Country(ies):	Cambodia	GEF Project ID: ¹	5318
GEF Agency(ies):	UNDP	GEF Agency Project ID:	5235
Other Executing Partner(s):	Ministry of Water Resources and Meteorology (MoWRAM)	Submission Date:	February 19, 2013
GEF Focal Area (s):	Climate Change	Project Duration (Months)	36
Name of parent programme (if applicable): <ul style="list-style-type: none"> • For SFM/REDD+ <input type="checkbox"/> • For SGP <input type="checkbox"/> 	n/a	Agency Fee (\$):	466,477

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK²:

Focal Area Objectives	Trust Fund	Indicative Grant Amount (\$)	Indicative Co-financing (\$)
CCM-2	LDCF	1,069,762	5,077,803
CCM-3	LDCF	3,840,523	11,595,128
Total Project Cost		4,910,285	16,672,931

¹ Project ID number will be assigned by GEFSEC.

² Refer to the reference attached on the [Focal Area Results Framework](#) when completing Table A.

B. INDICATIVE PROJECT FRAMEWORK

Project Objective: To strengthen climate observing infrastructure and increase capacity to utilise climate and environmental information for responding to climate hazards and planning adaptation to climate change						
Project Component	Grant Type³	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount (\$)	Indicative Co-financing (\$)
1. Transfer of technologies for climate and environmental monitoring infrastructure	Inv	1.1. Improved hardware and software capacity to monitor extreme weather, climate change and forecast capacity	1.1.1. Procurement and installation of 24 meteorological stations across the country 1.1.2. Procurement and installation of 2 upper air monitoring stations 1.1.3. Rehabilitate 37 hydrological monitoring stations installed across the country including Mekong river tributaries 1.1.4. Establish the required hardware and software tools in Cambodia for risk mapping and forecasting (3-24 hours for risk of flooding, short-term of 5 days for harvesting and sowing, and seasonal forecasting of weather, climate, drought etc. for national planning purposes) using climate models and information received from monitoring stations 1.1.5. Enhanced capacity of relevant existing institutions to calibrate sensors and measurement equipment	LDCF	3,292,842	8,975,455
	TA	1.2. Increased institutional capacity to maintain EWS related infrastructure	1.2.1. Train 5 key staff each from DOM and DHRW in the selection (identify cost effective technologies), installation and maintenance of equipment to established standards and services 1.2.2. Develop and implement plan for the operation and maintenance of the installed EWS with matching skills and institutional capacities	LDCF	570,500	2,544,452
2. Capacity to synthesize/model	Inv	2.1. Increased national capacity	2.1.1. Develop climate/weather forecast	LDCF	282,350	1,752,308

³ TA includes capacity building, and research and development.

the climate and environmental data ⁴		to assimilate and forecast climate and environmental information	products utilizing monitored data			
	TA		2.1.2. Train 6 forecasters, 3 each from DOM and DHRW and use information from monitoring stations in modelling, data quality control and forecasting climate information (on daily to seasonal, as well as medium-to long-term timescales)	LDCF	120,000	384,068
3. Information dissemination to different sectors of an economy and purposes (such as risk of flooding, harvesting and sowing, and seasonal forecasting of weather, climate, drought etc. for national planning.)	TA	3.1. Customised climate and weather information available for national planning and other purposes 3.2. Increased communication between countries in the context of trans-boundary issues	3.1.1. Generate tailored climate and weather information (for different sectors of an economy and purposes such as risk of flooding, harvesting and sowing, and seasonal forecasting of weather, climate, drought etc. for national planning), technically robust and tailored warning messages to meet the short-term and long-term needs of key stakeholders 3.1.2. Establish Standard Operating Procedures (SOP) for issuing and disseminating warnings through communication channels 3.2.1. Conduct knowledge (lessons, and best practices) sharing workshop through regional institutions involving other countries	LDCF	410,770	2,222,699
Sub-Total					4,676,462	15,878,982
Project Management Cost ⁵				LDCF	233,823	793,949
Total Project Costs					4,910,285	16,672,931

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

Sources of Cofinancing	Name of Cofinancier	Type of Cofinancing	Amount (\$)
Bilateral Aid Agency(ies)	Japan International Cooperation Agency (JICA)	Grant	7,980,890
Others	ADB	Grant	4,942,000
National Government	Government of Cambodia	Grant	2,643,033
Others	Mekong River Commission (MRC)	Grant	150,000

⁴ for forecasting (3-24 hours for risk of flooding, short-term of 5 days for harvesting and sowing, and seasonal forecasting of weather, climate, drought etc. for national planning purposes) and issuance of early warning

⁵ Same as footnote #3. This includes Direct Project Services (services such as procurement, human resources management, organization of training activities, conferences, and workshops etc.) which UNDP provides at the request of government and itemize against a schedule of costs set out in UNDP's Universal Price List (UPL) or local price list. An initial analysis indicates that these costs will not exceed US\$ 75,000 over the three years of project duration.

Others	Plan International	Grant	707,008
GEF Agency	UNDP	Grant	250,000
Total Cofinancing			16,672, 931

D. INDICATIVE TRUST FUND RESOURCES (\$) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY:
NA

E. PROJECT PREPARATION GRANT (PPG)⁶

Please check on the appropriate box for PPG as needed for the project according to the GEF Project Grant:

	<u>Amount Requested (\$)</u>	<u>Agency Fee for PPG (\$)⁷</u>
• No PPG required.	-- 0--	--0--
• (upto) \$50k for projects up to & including \$1 million	_____	_____
• (upto)\$100k for projects up to & including \$3 million	_____	_____
• (upto)\$150k for projects up to & including \$6 million	150,000	14,250
• (upto)\$200k for projects up to & including \$10 million	_____	_____
• (upto)\$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

Trust Fund	GEF Agency	Focal Area	Country Name/ Global	(in \$)		
				PPG (a)	Agency Fee (b)	Total c = a + b
LDCF	UNDP	CLIMATE CHANGE	Cambodia	150,000	14,250	164,250
Total PPG Amount				150,000	14,250	164,250

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

PART II: PROJECT JUSTIFICATION⁸

A. Project Overview

A.1. Project Description. Briefly describe the project, including ; 1) the global environmental problems, root causes and barriers that need to be addressed; 2) the baseline scenario and any associated baseline projects, 3) the proposed alternative scenario, with a brief description of expected outcomes and components of the project, 4) incremental cost reasoning and expected contributions from the baseline, the GEFTF, LDCF/SCCF and co-financing; 5) global environmental benefits (GEFTF, NPIF) and adaptation benefits (LDCF/SCCF); 6) innovativeness, sustainability and potential for scaling up

The fundamental problem that this LDCF initiative seeks to address:

The fundamental problem that the proposed project will address is, sectoral planning and decision making processes, include climate change considerations in short and long term planning processes where the data are generated through hardware installed in the country along with risk mapping and forecasted data are made available under the proposed project. Such decision making, risk reduction and management activities especially will benefit agriculture and water management sectors in their planning process. This will be achieved through establishing a functional system in the country that generates knowledge of the risks

⁶ On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

⁷ PPG fee percentage follows the percentage of the GEF Project Grant amount requested.

⁸ Part II should not be longer than 5 pages.

(vulnerability & hazard), has the capacity to monitor, analyze and forecast hazards, provide communication and dissemination of alerts and warnings as some of these elements of EWS either does not exist or does not functional in Cambodia.

The vulnerability of many communities in terms of climate and weather hazards have increased in Asia due to their close proximity to rivers and heavy dependence on monsoons. This has raised the risk level associated with these hazards in terms of droughts, storms, floods, inundation, landslides, debris flow, and soil erosion. Furthermore the frequency of extreme weather events is influenced by El Niño and other regional climate drivers. The recovery and response of these communities to extreme weather events is often very poor, mainly due to their low income level and Human Development Index (HDI), among a host of other reasons. It is evident that a lack of climate change and environmental data, seasonal and climate forecasts, as well as the dissemination of integrated climate and environmental information for decision making,⁹ reduces the ability to respond to risks (based on hazard, exposure and vulnerability). Therefore, it is necessary to map climate hazard risks in order to identify the vulnerable communities supported by increased capacity to monitor climate and environmental information.

Climate change induced events such as floods, cyclones/typhoons and droughts have significantly impacted the region and caused the death of millions of people, infrastructure damage, direct economic losses and health impacts. The damage that was caused by Typhoon Ketsana in 2009 resulted in a loss of US\$130 m in Cambodia¹⁰. The flood in 2011 affected 683,498 ha of agricultural land, causing estimated US\$451 m damage and US\$174 m in losses thus affecting the Cambodian economy more susceptible to floods and drought. Therefore, it is important to factor in required response measures and cost considerations in long-term planning, and sector decision making processes. The expectation is that if such events are monitored and predicted early, anticipated impacts could be minimized (or opportunities maximised) significantly.

The underlying reasons for this problem

The following are the underlying reasons for the problem of not considering risk mapping and climate forecast in the short and long-term sectoral planning process, decision making and risk reduction and management activities.

- Insufficient number and unreliable meteorological and hydrological monitoring stations to collect climate and environmental information through an integrated network. The reason for this is importance and the purposes of climate and environmental data was never realised in planning process.
- Unreliable and insufficient data for combining with available global datasets in order to forecast 3-24 hours for risk of flooding, short-term of 5 days for harvesting and sowing, and seasonal forecasting of weather, climate, drought etc. for national planning purposes. As a result, it makes impossible to forecast weather and associated hazards.
- There is insufficient number of trained personnel to effectively run and maintain these monitoring stations.
- There is limited understanding of risk mapping. The reason for this is, in part, understanding of likely risk levels was not assessed due to the data unavailability.
- Furthermore, there is insufficient number of trained personnel to model data, no capacity to package warning messages to various sectors, and use appropriate forecast tools, which was compounded by unavailability of required hardware in the country as mentioned earlier.
- There are no set standard operating procedures to pass the processed information back to different sectors.

⁹ G. Srinivasan, K.M. Rafisura, A. R. Subbiah (2011). Climate information requirements for community-level risk management and adaptation. *Climate Research*, Vol. 47: 5–12, Published 31 March 2011; doi: 10.3354/cr00962

¹⁰ Most of this information is synthesized from “Climate Risk Information - A Regional Dialogue on Supply and Demand”, 01-03 December 2010, Bangkok, Thailand.

- End users are not aware of warning messages as there is no information dissemination at the community level and are not sensitised of response to the messages in case if there is a system of communicating early warning messages in few communes.

This region in general has not effectively benefitted from the existing knowledge and systems that are developed globally to monitor climate and environmental data on a real-time basis, detect adverse trends and make reliable prediction of possible impacts while reducing the impact on people, infrastructure, economic and health impacts. For example, DOM in Cambodia has a Doppler radar installed, but this infrastructure is being used ineffectively due to insufficient number of trained personnel to effectively run and maintain the system within the department.

The long-term preferred solution

In the context of the above problem and underlying causes, the preferred solution is to build the required EWS related infrastructure, ensure the technology is transferred and information is shared with other countries in the region through regional institutions under this proposed LDCF project. Without investments in required hardware and the capacity to monitor and maintain infrastructure, forecast of climate-related hazards and information dissemination will not be realized. The aim of this project is to strengthen the EWS of Cambodia, largely through improving national capacities to generate and use climate information in the planning processes and management of climate-induced hazards. It will be achieved through implementing the transfer of appropriate technology, infrastructure and skills.

Therefore, the proposed LDCF project focuses on introducing the climate considerations in the planning processes and early warning infrastructure respond to climate change conditions. This is achieved through improving the hardware and software capacity to monitor extreme weather and climate, forecast and customise the information as needed for national planning processes and alert climate induced risk such as flooding as prioritized by MoWRAM, DOM and the Department of Hydrology and River Works (DHRW) in Cambodia.

Most economies in Asia are agriculture dependent and flooding and drought are two hazards being felt in the region not differently in Cambodia as well. However, there is a significant inequality in the existing infrastructure, and development related to EWS between various countries in Asia as well as capacity to cope up with the latest developments. Cambodia is considered to have inadequate capacity for weather and climate observation, forecasting and issuance of early warning. In issuing early warnings of potential extreme events, the crucial first step is to have reliable information (weather, climate and hydrology). Institutionalizing the entire process of monitoring weather and climate data until community level response is important to risk reduction, management and effective adaptation as different institutions are responsible for generating and delivering weather and climate information. The proposed LDCF project will address some of these barriers through establishing standard operating procedures and institutionalising the information dissemination to communities and end users.

However, there are significant barriers (institutional, financial, technical and informational barriers) that prevent the desired solution from taking effect.

The barriers to the solution taking effect are as follows:

- Unreliable data from meteorological and hydrological monitoring stations due to manual data collection. Inaccurate data, and false monitored data will lead to a mismatch between the temporal and spatial scale of the forecasts and the scales required for decision making. For instance, in Cambodia, only information on seasonal rainfall totals is available but for most farming systems, the distribution pattern of rainfall within a season, as well as probabilities of a dry or wet spell within a season are

more critical¹¹.

- There is insufficient funds allocation through the national budget, and personnel capacities to maintaining the existing infrastructure in Cambodia.
- There are no trained personnel to model data in the country to downscale and forecast. Currently, Regional Integrated Multi-Hazard Early Warning System (RIMES) (not only for Cambodia, but for most countries in the region) is providing short range and long range forecasts. Often these turned out to be unreliable due to very few number of or no measured data points in the country.
- There are no set standard operating procedures to pass the information to different sectors, which is further plagued by lack of infrastructure for real-time data transmission and communication channels in the country.

It is a general notion that environmental disasters, which are mostly short term (impacts such as floods, cyclones and geologic hazards) are difficult to predict in order to achieve efficient response implementation. But this information is very much needed by those who may be directly affected. Long-range seasonal forecasting of weather, climate, drought etc. in some cases can provide useful information for long-term planning. This forecast is greatly needed for national and sectoral planning purposes. To put this in perspective, farmers may need 3-5 days short-term weather forecast for harvesting the crop or sowing the seeds. Whereas those at risk to flooding will need 3-24 hours lead time to minimize the impact and prevent loss of life and economic (infrastructure) damage.

Baseline Project(s) that this LDCF initiative will build on in Cambodia include the following:

Lead Institution: Japan International Cooperation Agency (JICA)

Project Title: The Project for Meteorology and Hydrology System Improvement

Funding: around US\$7,980,890

JICA submitted a proposal in mid-2012 to enable Cambodia to receive grant aid from Japan which will be focusing on the capacity building related efforts for staff who are working in Hydrological and Meteorology departments. The proposal is currently under consideration at JICA HQ in Tokyo. This grant aid is aimed at (a) disseminating data and early warning information in order to mitigate risk from natural disasters on rural infrastructure and agricultural land, (b) improve water resources management and development and implementation of irrigation for increasing agricultural productivity, by using weather information, and (c) improve weather observation and real time data collection in order to carry out accurate weather forecast and flood forecast, especially long range or seasonal forecast by increasing the number of monitoring stations. JICA is interested to focus on information dissemination and building related infrastructure at the community level. Despite having monitoring stations infrastructure, improved weather observations and forecast, often, communities' response to early warning messages simply does not exist. Even if the proposed LDCF project emphasizes mostly the required hardware and related capacity building, JICA is interested to fill this gap of providing required infrastructure such as community warning facilities through telemetric instrument, loud speaker system, communication devices etc. at the community and sub-national level. Since the proposed project under JICA is expected to be implemented by DOM and DHRW with the support of MoWRAM, close coordination will be established between these two initiatives. Also this will showcase an approach of combine and sequence of different funding sources when it comes to information dissemination and enabling communities to respond to the warnings as the funds allocated under the proposed LDCF project alone will not be sufficient address this aspect fully. Since JICA is very much interested to fill this gap, it is proposed to be a rational approach. During the PPG phase, this will be further detailed with the support of JICA.

¹¹ G. Srinivasan, K.M. Rafisura, A. R. Subbiah (2011). Climate information requirements for community-level risk management and adaptation. *Climate Research*, Vol. 47: 5–12, Published 31 March 2011; doi: 10.3354/cr00962

Lead Institution: UNDP

Project Title: Strengthening Early Warning Systems for Extreme Weather Events to Advance Climate Risk Management in the South East Asian Region

(wherein Cambodia is one of the countries covered under this project)

Funding: US\$381,066 from ESCAP Tsunami Trust Fund; US\$40,000 from Partner Institutions contribution, US\$5,000 from third party co-financing.

This project is being implemented in both Cambodia and Timor-Leste, and seeks to provide better EWS and risk management in Southeast Asia through partnering with RIMES. It supports a number of regional and national activities, providing “reliable and timely climate risk information” to strengthen national and local preparedness. In the case of meteorological data, no information from Cambodia is made available to RIMES. Therefore, RIMES generates information based on the data availed from the nearest weather stations, which is often turned out to be unreliable due to the challenges involved in the data correlation. Relevant components of this project in the context of the proposed LDCF project are “Monitoring and Warning Service” which will “promote national support for real-time, timely, free and open access to data, analysis, and other information products for (tsunami) warning purposes”. Another relevant component is “Communication and Dissemination of Warnings”, which will support the development of Standard Operating Procedures (SOPs) at all levels¹². The proposed LDCF project will consider baseline activities such as strengthening national capacity to analyse data, forecast, communicate and disseminate warnings, and expand their scope to strengthen national institutional capacity to monitor and forecast climate and environmental information. Since there is an ongoing effort to establish SOPs, its scope will be expanded to cover other climate hazards and decide of an approach to inform national planning processes.

Lead Institution: Plan International

Project Title: Strengthening national and Sub-national Capacity to implement disaster management towards increased community resilience

Funding: Around US\$707,008

This project is being implemented since 1st June 2012 and the project duration is for 18 months. This project is now extended till 2013. The EU funding was routed through Disaster Preparedness European Community Humanitarian Office (DIPECHO) dedicated to disaster preparedness. The project is developing the provincial contingency plans (including simulation exercise) in 5 provinces (KCham, Siem Reap, K Thom, K Chhanag, Kandal), District contingency plans in 9 districts and 20 communes. It is aimed to train subnational committee for disaster management as well as broadcast information on disaster through provincial radio. The proposed LDCF project will expand the scope of sub-national capacity building related activities and built on the experiences of simulation exercise, broadcast of disaster and early warning related information. After all the effort of processing climate and environmental data, it is important to use this information for planning and early warning related purposes.

Lead Institution: UNDP

Project Title: Flood Early Recover Assistant Project

Funding: Around US\$100,000

This project is being implemented since 2011 until 2013. This project was to support the flood recovery operations of 2011 floods. This is also focusing on early recovery needs assessments related to livelihoods and develop an early recovery framework and programme. This analysis is considered to be important for risk mapping. In the flood early recover assistant project, UNDP has already established a coordination mechanism with other UN agencies and development partners such as ADB, JICA and with NCDM. Therefore, it could assure that duplication of efforts can be avoided and ensure activities are complemented specifically update of risk maps and increase its scope to cover other risk hazards.

¹² http://www.tl.undp.org/undp/recovery_ongoingproject.htm

The 12 automated real-time hydrological stations installed by Mekong River Commission (MRC) on the mainstream of the Mekong River in Cambodia will be operated and maintained by the Government of Cambodia starting next year. The annual budget allocated from MRC towards this activity is US\$50,000/year. By considering a project implementation period of three years for the proposed LDCF project, US\$150,000 can be considered as available co-financing.

The national budget available through MoWRAM for the operation and maintenance of meteorological and hydrological stations in Cambodia is US\$50,000/year. Considering the EWS project implementation period of three years, the allocated national budget towards the operation and maintenance of these stations can be considered as available co-financing of US\$150,000.

Incremental /Additional cost reasoning:

The proposed project will address the inclusion of climate change considerations in short and long term planning to sectoral planning and decision making processes, through hardware installed in the country along with risk mapping and forecasted data.

Component: 1

Outcome 1.1: Improved hardware and software capacity to monitor extreme weather, climate change and forecast capacity

Baseline scenario: The Ministry of Water Resources and Meteorology (MoWRAM) has overall responsibility for observing and managing the country's hydrological and meteorological information systems. MoWRAM's DOM and DHRW are functioning arms for meteorological and hydrological related information respectively. At the moment, Cambodia largely depends on the weather forecast from the RIMES as there are no trained personnel to model data in the country to downscale and forecast. The baseline projects that are relevant to this Outcome are "Meteorology and Hydrology System Improvement" project of JICA and "Strengthening Early Warning Systems for Extreme Weather Events to Advance Climate Risk Management in the South East Asian Region" project of UNDP.

Status of hydrological stations: For hydrology related information, MoWRAM has to manage the data collection, monitoring station operation and send data to Mekong River Commission (MRC) as MRC has installed 12 automated real-time hydrological stations on the mainstream of Mekong River in Cambodia. Four of these were installed in 2001 and eight in 2009. Only since 2010 these stations are functioning properly. The Regional Flood Management and Mitigation Programme (2011-15) of MRC has a total budget of US\$ 17 million. This includes the costs involved in the operation and maintenance of the monitoring stations as well as to cater to the needs of member countries. MRC has an agreement with the Government of Cambodia to maintain these 12 hydrological stations installed by MRC on the mainstream of Mekong River. Since the country has weak capacities to maintain and repair these hydrological stations, MRC is currently providing expert and spares for maintenance as per agreement. From next year, these installed 12 automated hydrological stations will be transferred to the Cambodian Government with an annual budget of US\$ 50,000 towards the operation and maintenance of these stations.

Apart from this, Cambodia has 89 hydrological stations installed across the country including Mekong River tributaries. Of these, 62 are operating (9 of these are automated, but not real-time) and 37 stations require rehabilitation. The data are being collected centrally every 1 to 3 months. DHRW uses this data to produce forecasts and early warnings for floods and droughts, as well as a short-term flood forecast at the start of the rainy season in collaboration with MRC. Flood maps are also produced and available online, but along the mainstream of Mekong. For short term flood forecast, such data is not useful, rather hourly data is needed. It is possible only when there is reliable and accurate data available. With the support of SPCR through an ADB loan, efforts are underway to establish a National Flood Forecast Centre at a cost of US\$ 2.58 million.

Status of meteorological stations: Currently, there are 24 meteorological stations across the country, located in 24 provinces, which are manual. Most of these stations are malfunctioning as equipment calibration was never performed as per standards and there is no operation and maintenance being performed as recommended. The data are being collected manually every day, and the manually recorded data will be sent to DOM once in a month or three. In addition, there are eight automated weather stations in Cambodia, established with the support of JICA (<http://weather.irrigateway.net/Cambodia/>). Some of these are functional, but data reliability from these stations is highly questionable. Therefore, for meteorological data, MoWRAM uses global telecommunication system to get the data. Also, there are gaps in the historical record, mainly due to non-collection of data from manual stations and lack of integrated efforts for compiling the data. Though DOM has recorded weather information since 1962, many years are missing from the record. There are no upper air monitoring station in the country and through the discussion with concerned DOM personnel, it was learnt that two stations are needed, one in Phnom Penh and the other at Siem Reap. Both DOM and DHRW departments do not have the capacity to either forecast climate & environmental data or the required infrastructure. UNDP under its ongoing Regional Project on Strengthening Early Warning Systems (RPSEWS) in Southeast Asia provides an intensive training course on numerical weather prediction for DOM forecasters at RIMES. MoWRAM recognizes that it is necessary to fill the existing gap of available historical meteorological data of Cambodia using existing information (which needs to be digitized). There is no existing laboratory in the country towards calibration and maintaining these monitoring stations.

Additionality: Both, DOM and DHRW recognize the need for combining data collection capacity, physical tools and human capacity for analysis and weather forecast. This is considered important as (a) the river hydrological regime, especially tributaries, may change every 3 to 5 years, (b) it is necessary to map drought areas (risk mapping) in order to inform policy and take necessary action, and (c) information is required to promote the optimal use of water to maintain and/or increase agriculture productivity. For short term flood forecast, the existing data collection system is not helpful. The current process of manual data collection system shall be replaced with automated systems. So that the process of data collection can be streamlined. In order to achieve these, it has been requested by the government that the DOM needs 24 automated meteorological stations to be located in each province with related domestic telecommunication systems and Global Telemetry System (GTS). The government also requested two upper air monitoring stations, one in Phnom Penh and the other in Siem Reap to strengthen the reliable data collection, which will be useful for improving regional numerical weather predictions and global climate models run by international forecasting centres. These upper air monitoring stations are important as Siem Reap is a historical and one of the major tourist destinations in Cambodia. All the automated monitoring stations will be fitted with appropriate means for relaying data to central servers (e.g. via GPRS or satellite telemetry). It was identified that thirty seven hydrological stations need to be rehabilitated, which would cost about US\$ 12,000/station including required automation for data collection. LDCF resources will be used for the installation of required hardware (such as OTT CBS bubble sensor for water level measurement, measuring tube with kevlar core 50m, OTT DuoSens Standard with display and Jog-Shuttle with analog input for collecting, processing, recording and transmitting data). This will help DHRW to identify flood prone areas before it occur, issue warnings for downstream and alert communities that are at flood risk. MOWRAM has developed a proposal (for a total grant assistance of US\$ 7,980,890) in partnership with JICA to strengthen the capacity of monitoring hydro-meteorological data and effective information dissemination to various end-use sectors including community warning facilities. The ongoing support of RPSEWS needs to be scaled up and provided with the required hardware in the country to generate country specific forecast. None of the ongoing baseline projects consider these elements as this LDCF project is aiming to address. The proposed project will also establish the required hardware and software tools for forecasting, using numerical weather prediction models which will utilise the data received from both surface and upper air monitoring stations. Since it was identified that equipment calibration and maintenance was an issue in the baseline scenario and none of the baseline projects consider this an important activity, the proposed LDCF project will consider this as important activity and strengthen the capacity of a laboratory of relevant institutions to calibrate sensors and measuring equipment.

Outcome 1.2: Increased institutional capacity to maintain EWS related infrastructure

Baseline scenario: UNDP under its ongoing Regional Project on “Strengthening Early Warning Systems for Extreme Weather Events to Advance Climate Risk Management in the Southeast Asia Region” is providing intensive training course on numerical weather prediction for DOM forecasters at RIMES. But this ongoing support need to be scaled up under the proposed LDCF project by providing required hardware in the country to generate country specific forecast using the monitored data. There are a total of about 50 staff at the DOM in Phnom Penh and a total of about 75 personnel (3 to 4 staff at their provincial department in each of 24 provinces). DHRW has total staff strength of 60. This staffs are able to do simple work and are not trained to maintain the hardware infrastructure. The Technical Service Centre (TSC) conducts regular trainings for staff from the DOM, DHRW, Department of Irrigation, Department of Clean Water and Sanitation in Cambodia. Though the national government has allocated a budget of US\$ 50,000/year for rehabilitation, operation and maintenance of hydro-met stations, there is no available data on the number of stations rehabilitated each year as well as maintenance of equipment (calibration of sensors etc.) used at these monitoring stations. It can be stated that this budget is certainly insufficient to cover the rehabilitation, operation and maintenance of existing monitoring stations. The baseline projects that are relevant to this Outcome are “Meteorology and Hydrology System Improvement” project of JICA and “Strengthening Early Warning Systems for Extreme Weather Events to Advance Climate Risk Management in the South East Asian Region” project of UNDP.

Additionality: Using the LDCF resources proposed in this project, five key staff each from DOM and DHRW will be trained in the installation and maintenance of new equipment (as well as operation and maintenance of existing equipment) as per established international standards, and services suited to the country’s context. It is essential to strengthen the capacity of rest of the staff in the operation and maintenance of these monitoring stations through matching skills and institutional capacities. The proposed LDCF project will do so through training of trainers’ methodology which is considered to be a sustained approach of strengthening the skills for rest of the staff. This will be achieved through partnering with an academic institution. The respective departments are further equipped with the required vehicles for maintenance of monitoring stations as needed, machine tools and accessories, and spare parts. One vehicle is proposed for this purpose by the proposed project, but required details will be further verified during PPG phase. Considering the EWS project implementation period of three years, the allocated national budget towards the operation and maintenance of these stations can be considered as available co-financing of US\$ 150,000. As mentioned earlier, the annual budget allocated from MRC towards operation and maintenance of its hydrological stations is US\$ 50,000/year. By considering the proposed EWS LDCF project implementation period of three years, US\$ 150,000 can be considered as available co-financing.

Component: 2

Outcome 2.1: Increased national capacity to assimilate and forecast climate and environmental information

Baseline scenario: In the past, projects such as Global Facility for Disaster Reduction and Recovery (GFDRR) had assisted DOM and DHRW in compiling a detailed assessment of existing hydro-meteorological equipment, its needs, assessment of institutional capacity, and then a strategy for designing an “official” programme of flood and drought monitoring to benefit a variety of end users, including communities¹³. Agro-meteorological data and forecasting is undertaken by the Ministry of Agriculture, Forestry and Fisheries (MAFF), but current efforts lack the necessary information. In the past, some projects have attempted to build capacity in this arena but designated staff still lacks the necessary background or have become unavailable. Lack of information for crop forecast models (including data on wind speed and direction, solar radiation, humidity and evaporation) has made it necessary to estimate some important parameters¹⁴. With regard to EWS, RIMES has implemented its multi-hazard EWS at the regional scale. Though Cambodia is receiving this

¹³ http://www.gfdrr.org/gfdrr/ca_projects/detail/3123

¹⁴ http://www.foodsecuritylink.net/cambodia/index.php?option=com_content&view=article&id=76

information from RIMES, this data needs to be tailored to the country context and package the information needed for specific sectors of the economy. It is essential that “Strengthening Early Warning Systems for Extreme Weather Events to Advance Climate Risk Management in the South East Asian Region” project initiatives be scaled up to generate country specific forecast. The country still lacks hazard, vulnerability and risk maps, due to the unavailability of reliable data. The baseline projects that are relevant to this Outcome are “Flood Early Recover Assistant Project” and “Strengthening Early Warning Systems for Extreme Weather Events to Advance Climate Risk Management in the South East Asian Region” projects of UNDP, “Strengthening national and Sub-national Capacity to implement disaster management towards increased community resilience” project of Plan International and “Meteorology and Hydrology System Improvement” project of JICA.

Additionality: Through the use of LDCF resources, the proposed EWS project will enhance national capacity by making available climate and environmental data processing software, visualization software, radar ingesting software, and forecasting support tools. Details of these tools and products will be explained further during PPG phase. The EWS project will also train three forecasters each from DOM and DHRW in modeling, data quality control and forecasting climate information (on daily to seasonal, as well as medium- to long-term timescales) and generate risk maps based on hazard and vulnerability. This activity of risk maps update and increase its scope to cover other risk hazards is additional to what was done under “Flood Early Recover Assistant Project”. JICA is interested to improve weather observation and real time data collection through emphasizing the thorough implementation of operation and maintenance plan for monitoring systems. Also information dissemination through providing required infrastructure such as community warning facilities based on telemetric instrument, loud speaker system, communication devices etc. at the community and sub-national level. For these activities, real time data collected from monitoring stations will be used for processing information. It is important to build the capacities of DOM and DHRW staff in terms of analysis, data quality assurance, quality control of data, prediction, and forecasting of extreme weather events and seasonal variability. Developing these capacities will directly contribute to country’s commitments under Hyogo Framework of Action (HFA). As an alternative back up, information sourced through GTS can also be used for analysis and processing information. Most of these Outputs will be achieved in close collaboration and involvement of other key ministries including Ministry of Agriculture, Forestry and Fisheries (MAFF) and Ministry of Environment (MOE). Where needed, other institutions such as National Committee for Disaster Management (NCDM), Ministry of Interior (MOI), Ministry of Planning (MOP), Cambodian Red Cross (CRC) etc. are involved. The proposed LDCF project will follow the training of trainers’ approach to train sufficient number of qualified personnel and where needed academic institutions will be involved. “Strengthening Early Warning Systems for Extreme Weather Events to Advance Climate Risk Management in the South East Asian Region” project of UNDP reviewed existing institutional capacities for receiving, processing and disseminating early warning and weather forecasting capacities in Cambodia. The proposed LDCF project will build on these experiences.

Component: 3

This component will strengthen information dissemination to the local level and enable the sharing of best practice examples between the countries. This will also address the issue of limited capacity in the country to streamline the procurement of effective technologies and equipment required.

Outcome 3.1: Customised climate and weather information available for national planning and other purposes

Baseline scenario: At the moment, MoWRAM is playing a key role in compiling information from DOM and DHRW and providing information to national and sub-national government agencies, MOP, local authorities, and the public through television, national radio, and local newspapers. When it comes to information dissemination, forecast information from MoWRAM will be passed on to the NCDM and other stakeholders such as the National Committee for Sub-national Democratic Development (NCDD), MAFF, and CRC. Each

of these institutions will alert their respective constituencies to send early warning messages. For disaster preparedness and response interventions in Cambodia, NCDM is the responsible institution. However, NCDM lacks both the technical skills and the budget for disaster preparedness and response interventions. Effective information flow is also limited due to the lack of Standard Operating Procedures (SOPs), defined roles of various stakeholders which need to be further strengthened. A disaster management law for Cambodia has been drafted, but it has not yet been put into operation. This law partly addresses mechanisms for national and local authorities, division of responsibilities, and the role of private companies and international organizations while responding to disaster risk reduction and recovery.

The Regional Flood Management and Mitigation Centre (RFMMC) is based in Phnom Penh and supports Cambodia, Lao PDR, Thailand and Viet Nam by managing flooding through timely flood-forecasting and issuing warnings as demanded. The data are sourced from 138 hydro-meteorological stations and forecast water levels at 23 points on the Mekong River mainstream. RFMMC also forecasts expected water levels which is communicated through various channels (fax, e-mail, website), to national focal points in each country, NGOs, the media, and most importantly, the public.

The capacity to deal with disasters and emergency response measures by various institutions (disaster management committees, from national to commune level as well as line ministries) is largely insufficient. So far emergency responses are undertaken by humanitarian organizations including national and international NGOs and CRC.

The expected JICA contribution is towards the establishment of and strengthening community warning facilities including communication instrumentation, public announcement loud speaker system, RF communication devices especially in the communities close to river banks. Such community warning facilities will be equipped with a loud audio announcement system or siren to issue a warning for local residents in the case of emergency evacuations against hazards such as flood, heavy storm or cyclone, etc. The baseline projects that are relevant to this Outcome are “Meteorology and Hydrology System Improvement” project of JICA and “Strengthening national and Sub-national Capacity to implement disaster management towards increased community resilience” project by Plan International. Some of the proposed JICA grant (US\$ 7,980,890) can be used as co-financing or parallel financing to establish these community warning facilities.

Additionality: The proposed EWS project uses the LDCF project resources for the generation of tailored climate and weather information service (both short- and long-term) for improved sectoral planning especially disaster management, agriculture, water, finance and planning, etc. The proposed LDCF project will be built on the experiences of “Strengthening Early Warning Systems for Extreme Weather Events to Advance Climate Risk Management in the South East Asian Region” project of UNDP where decision making is based on the uncertainties associated with location and past history of extreme weather events experienced. Staff will be trained in implementing their roles within the Standard Operating Procedures (SOPs) and updating them as and when needed. Since there is a lack of clarity on the role of different institutions while responding to early warning messages, there is a need to establish and strengthen SOPs for issuing and disseminating warnings (based on the weather forecast by MoWRAM). Since these activities are not part of the baseline project, these are considered additional and it is important to build the capacities in terms of warning related information dissemination to various sectors of an economy and informed planning processes.

Outcome 3.2: Increased communication between countries in the context of trans-boundary issues

Baseline scenario: Climate Change and Adaptation Initiative (CCAI) is a collaborative effort among its member countries Cambodia, Lao PDR, Thailand and Viet Nam. This initiative will demonstrate and share adaptation strategies, emphasize a basin-wide approach and ensure that climate change adaptation is harmonized with effective strategies and plans at various levels¹⁵. This also provides on-the-job advice and

¹⁵ For more information refer to <http://www.mrcmekong.org/about-the-mrc/programmes/climate-change-and-adaptation-initiative>.

mentoring and learning-exchange visits for government staff with other countries and other sites. The Agriculture and Irrigation Programme (AIP) is another regional programme that focuses on water management in agriculture since agriculture is the single most important economic activity in the Lower Mekong Basin (LMB). The Programme also works towards improved irrigation to ensure that the sector's water management is more sustainable in the future. The baseline projects that are relevant to this Outcome are "Meteorology and Hydrology System Improvement" project of JICA, and "Strengthening national and Sub-national Capacity to implement disaster management towards increased community resilience" project by Plan International.

Additionality: The LDCF resources will be used to train key staff in DOM and DHRW to identify cost effective technologies and streamline procurement of climate monitoring equipment. LDCF resources will be used for training two key staff each from DOM and DHRW in selecting and identifying cost effective technologies and streamlining procurement including climate monitoring equipment. This is needed to ensure that standard and certified instrumentation is in place and producing reliable data as required. Technical guidance will also be provided on the appropriate use of available data, how to use it to generate meaningful information which can either be used to generate a warning or combined with other sources of data to generate warnings. It must be ensured that these technologies are appropriate for the intended purpose, and are a cost effective solution. This knowledge will then be transferred to the other qualified staff in both the departments. MRC and RIMES are two regional institutions that also support Cambodia on early warning related activities. The proposed LDCF project will establish close coordination with MRC as far as flood forecasting and trans-boundary issues are concerned. The ongoing collaboration and cooperation with RIMES will be maintained to strengthen national and local preparedness for DRR and DRM. The experiences and lessons learnt under the proposed LDCF project will be shared with other countries through RIMES. The proposed EWS project will conduct knowledge exchange and promote sharing of lessons and best practices between countries through MRC and RIMES to enhance region-wide capabilities, for example, through participation in regional meetings, joint missions, teleconferences, etc. The proposed LDCF project will closely coordinate with Asian Disaster Preparedness Center (ADPC) which is considered as a regional resource center for DRR and one of the longest serving regional DRR resource centers in the world.

Other benefits, such as socioeconomic benefits, anticipated to be delivered by the Project at the national and local levels:

As mentioned earlier, the damage caused by Typhoon Ketsana in 2009 resulted in a loss of US\$130,000,000 in Cambodia. The flood in 2011 affected 683,498 ha of agricultural land, causing an estimated US\$451,000,000 damage and US\$174,000,000 in loss in Cambodia. The proposed LDCF project is expected to deliver both national and local benefits. It is generally agreed that investments in disaster risk reduction are more cost-effective than investments in disaster response and recovery. Studies conducted by the World Bank and International Federation of Red Cross and Red Crescent Societies (IFRC) estimate that for every dollar invested in disaster risk reduction, two to ten dollars are avoided or reduced in disaster response and recovery costs.

In addition, this project will benefit national institutions in strengthening their capacities to better gear to face natural disasters and hazards through reducing exposure, increasing resilience (through better planning) and reducing vulnerability. Since this project will help to strengthen and inform decisions and policy making, respective departments and ministries may deliver improved products and services to the populations they serve. This can be quantified through reduced crop losses, reduced damage to infrastructure (roads and bridges), increased productivity, and reduced disruption to people's livelihoods. More detailed assessments will be conducted during the PPG phase of methods and approaches for such an analysis and quantification.

The improved communication and exchange of early warning related information between various ministries can benefit the private sector, especially the industrial sector. If more reliable information is backed by the right kind of policies, it will contribute to the economic growth of the country. Perhaps the largest economic benefits are associated with improved transport planning, especially shipping which will take advantage of

improved forecasts of winds and waves, and aviation which can take advantage of improved local forecasts.

Disaster risk reduction needs to integrate a gender perspective through the collection of gender specific data along with noting specific concerns pertaining to women in terms of preparedness and adaptation requirements while reducing exposure to hazards. It is also imperative that an enabling environment be created for women to be equal partners in the implementation of climate risk management measures. Likewise while gearing for disaster risk reduction, constraints of marginalized and vulnerable groups will be factored into project ownership and benefits. It then becomes useful to make specific provisions for the inclusion of such groups at all stages of project planning and implementation. It is important that community profiles make note of the presence of marginalized and vulnerable groups that could include children, elderly, the disabled, and the socially or economically weaker sections, and facilitate their participation to ensure the inclusiveness of measures being planned and implemented. The monitoring and evaluation framework will require data reporting on these groups and include vulnerable group sensitive benchmarks and targets.

A.2. Stakeholders. Identify key stakeholders (including civil society organizations, indigenous people, gender groups, and others as relevant) and describe how they will be engaged in project preparation:

Stakeholder	Relevant roles
Ministry of Water Resources and Meteorology (MoWRAM)	MoWRAM will be the Executing Partner/Implementing Partner of the proposed LDCF project. MoWRAM will be responsible for establishing required coordination with other line ministries. Also, it will work closely with DOM and DHRW in obtaining the core data for packaging the early warning information needed for specific sectors.
Department of Meteorology (DOM)	Responsible Party for maintaining meteorological stations, data collection, its analysis and forecasting
Department of Hydrology and River Works (DHRW)	Responsible Party for maintaining hydrological stations, data collection, its analysis and forecasting
Cambodian Red Cross (CRC)	When it comes to early warning information, CRC's mandate is to disseminate information (only to their constituencies unless it is critical) and take appropriate response measures. Currently, the funds are being used for disaster relief operations but not for preparedness. The CRC's community based disaster risk management (CBDRM) has the widest coverage in the country, spanning 9 provinces, 23 districts, 94 communes and 317 villages. As part of IFRC's global agenda, the CRC finalized its community based disaster risk reduction (CBDRR) strategy.
National Committee for Disaster Management (NCDM)	In Cambodia, NCDM is responsible for disaster preparedness and response interventions. In the proposed project, NCDM is responsible for increased effectiveness and efficiency of information dissemination. However, NCDM lacks both the technical skills and the budget to do so, but these capacities will be strengthened further under the proposed LDCF project.
Mekong River Commission (MRC)	MRC, as part of its two key strategies, (a) the Integrated Water and Related Resources Management (IWRM)-based Basin Development Strategy, and (b) the 2011-2015 Strategic Plan, provides regional and trans-boundary perspectives for basin development planning, opportunities and risks associated with development. MRC will play a key role to cater common countries' needs and increased communication between countries in the context of trans-boundary issues.
Ministry of Planning (MOP)	The early warning related information communicated from MoWRAM will be informed to MOP. This will help the MOP to strengthen the informed decision and policy making process. This will benefit national institutions in strengthening their capacities to better gear to face natural disasters and hazards through

	reducing the exposure, increasing resilience (through better planning) and reducing vulnerability.
Ministry of Interior (MOI)	NCDD is under the Ministry of Interior (MOI). This is the line ministry through which MoWRAM will coordinate while passing on the early warning related information.
NCDD	The National Committee for Sub-national Democratic Development (NCDD) is the inter-ministerial mechanism for promoting democratic development through decentralization and deconcentration reforms throughout Cambodia. This is under the MOI. The strategic framework document outlines: (a) the objectives and priorities of the decentralization and deconcentration (D&D) strategy; (b) the scope of needed reforms to achieve the D&D objectives and priorities; and (c) the structural changes in the existing governance system required to achieve the D&D objectives and priorities. At every level there exists a committee (Provincial Committee for Disaster Management, District Committee for Disaster Management, Commune Committee for Disaster Management), to take appropriate action and disaster risk management. This existing governance structure can be used for information dissemination to the community level and respond to the early warning information.
Ministry of Environment (MOE)	MOE is one of the main stakeholders of the proposed LDCF project. It is also responsible for guiding the discussions and provides advisory services when the project is under implementation. This ministry also hosts the role of GEF operational focal point for Cambodia.
Ministry of Agriculture, Forestry and Fisheries (MAFF)	One of the stakeholders of the proposed LDCF project and a prime beneficiary as agriculture is one of the main targeted sectors for information dissemination and strengthening commune level capacities to respond to the early warning messages.

A.3 Risk. Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design (table format acceptable):

The following table summarizes the anticipated risks that might prevent the successful implementation of the project and achieving the project objectives, including the proposed mitigation measures:

Risk	Level	Mitigation
Coordination challenges across departments and ministries lead to inefficient and/or ineffective project execution	M	MoWRAM has shown great interest in the implementation of the proposed project which is a much needed project for Cambodia. The major departments that produce meteorological and hydrological information are DOM and DHRW respectively, which operate under MoWRAM. However, when it comes to coordination with external agencies, MoWRAM takes the overall responsibility. At the ministerial level, coordination will be established with other line ministries, so that coordination challenges can be minimized. When it comes to taking action on the ground based on the early warning messages, the institutional structure in the country needs to be strengthened further through Standard Operating Procedures (SOPs), which will be introduced during project implementation.

Lack of effective disaster risk management at the commune level	M	The implementing partner of the proposed LDCF project is MoWRAM. NCDM is the responsible institution for disaster preparedness and response interventions in Cambodia. However, the NCDM has limited capacity in terms of disaster risk management. After all the effort of having required infrastructure in place, if the communities are not better prepared for risk mitigation through avoided exposure to hazards, having such EWS infrastructure in the first place is not a cost effective solution. SOPs will be put in place for effective information flow. It was identified that there are many institutions that are supporting NCDM to build its capacity. Apart from this, the National Committee for Sub-national Democratic Development (NCDD) has disaster management committees at every level (Provincial Committee for Disaster Management, District Committee for Disaster Management and Commune Committee for Disaster Management). This institutional structure will also be strengthened during project implementation for information dissemination and disaster risk reduction through avoided exposure.
Information technology and telecommunications infrastructure including mobile telecommunications networks	M	The telecommunication and information technology network is much needed for the interconnection of the hydro-meteorological stations that will be established across Cambodia so that data collection can be automated and centralized to forecast climate and environmental information. In Cambodia, the use of internet (about a million people as on date and is expected to be over 4 million in the next 2 to 3 years) and mobile phones are increasing and there is a possibility to use these existing channels. At the moment MoWRAM uses this existing infrastructure to communicate flood forecast and cyclone related information.
Delay in the procurement and delivery of required hardware might lead to delays in project implementation	M	Since this equipment may need to be procured and installed as per international standards, availability of such expertise in the country may be non-existent. Also, most of the required hardware needs to be procured outside of Cambodia. MoWRAM has received such support earlier from other bilateral donors and is now well accustomed to the procurement process from overseas vendors. In case such support service is needed, the UNDP country office is well positioned to provide the required backstopping. In order to mitigate this risk, as soon as the project implementation begins, the procurement process will commence to minimize the impact of potential delays on the overall progress of the project.
Lack of communities involvement and response to the community warning setup	L	During the project implementation, lack of involvement of communities in the community warning setup might lead to a lack of response to the warning messages and thus appropriate actions may not be taken as required. Therefore, from the early stages itself, communities shall be involved in the project. This activity shall be closely coordinated with JICA since this activity will be supported through JICA co-financing. Also, more awareness raising activities will be conducted at the community level until the community owns the operation and maintenance of the community warning facilities.
Climate shock occurring during the design and implementation phase of the project	L to M	Climate shocks may occur during the design and implementation phase of the proposed LDCF project. In such instances, most of the project key stakeholders need to attend to the emerging needs that may arise from climate shocks. There may be some delay due to the urgency of priorities, but this is unlikely to derail the project.

A.4. Coordination. Outline the coordination with other relevant GEF financed and other initiatives:

The proposed LDCF project will establish close coordination with the following ongoing initiatives in Cambodia.

Lead Institution: Asian Development Bank (ADB)

Project Title: Pilot Programme For Climate Resilience (PPCR)/Strategic Programme for Climate Resilience (SPCR)

Funding: around US\$86,000,000

Pilot Programme for Climate Resilience (PPCR) has an initial budget of US\$1,300,000 and the initial phase of this programme is expected to be completed by mid-2013. In phase 2 of PPCR, called SPCR, US\$105,000,000 was proposed (US\$50,000,000 in grant funding and US\$55,000,000 in other concessional resource). However, US\$86,000,000 was confirmed (grant - US\$50,000,000 and concessional loan - US\$36,000,000) to finance investment projects to address climate change adaptation needs that include several pilot projects covering various topics of adaptation. The Cambodia PPCR strategic programme notes that weather data from the DOM stations is not easily accessible and the number and type of hydrological monitoring sites are insufficient for effective early warning¹⁶. One of the key challenges the SPCR specifically addresses is “limited institutional and technical capacity for mainstreaming, and inadequate access to reliable early warning data” in Cambodia. This project has several pilot project interventions including “Flood and Drought Management in Pursat and Kratie Provinces” and “Climate Risk Management and Rehabilitation of Small- and Medium-scale Irrigation Schemes in the Tonle Sap Basin” which are relevant to the proposed LDCF project. In some of the pilot interventions, funds are designated specifically for community-based early warning systems, with special attention to the importance of women, indigenous communities and youth in these efforts¹⁷. Efforts are underway to establish a National Flood Forecast Centre at DHRW with the support of ADB loan (US\$2,580,000). “Water Resource Management Sectoral Development” project received a grant of US\$2,362,000 for capacity building and training of staff working in water resource management department. These two interventions are already considered as parallel co-financing. The component 1 of SPCR focuses of promoting climate-resilient water resources and related infrastructure through “Climate Risk Management and Rehabilitation of Small- and Medium-scale Irrigation Schemes in the Tonle Sap Basin”, and “Enhancement of Flood and Drought Management in Pursat and Kratie Provinces” with a proposed investment of US\$33,000,000. The hardware interventions include rehabilitation of irrigation structures; installation of hydro-meteorological monitoring facilities; retrofitting reservoirs; and construction and upgrading of flood protection systems and early warning systems where the allocated PPCR amount for equipment is US\$400,000 of the total US\$14,000,000 allocation. The proposed LDCF project will closely coordinate with these initiatives under SPCR.

Project Title: “Promoting Climate-Resilient Water Management and Agricultural Practices”

Funding: UNDP Contribution: US\$1,240,000; LDCF: US\$1,850,000

This project seeks to enhance food security and production in the face of changed climate conditions. This project has a key output pertaining to the development of a community-based early warning system. The main purpose is to communicate the early warning messages at the community level so that the forecasts and alerts issued can be used by the community to plan farming activities and take disaster management measures against floods or dry spells. However, the sustenance of EWS largely depends on the financial

¹⁶ Cambodia PPCR Strategic Programme document, p. 11. Accessible at:

<http://www.climateinvestmentfunds.org/cifnet/?q=country-program-info/cambodias-ppcr-programming>

¹⁷

<http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR%204%20SPCR%20Cambodia.pdf>

support from the Government, and the project is trying to lobby with provincial administrations for financial support put in place by the end of the project. In this regard, the proposed LDCF project will coordinate with this ongoing project, draw on its lessons and experiences when it comes to community-based early warning system.

Project Title: Cambodia Climate Change Alliance (CCCA)

Funding: UNDP- US\$3,000,000, SIDA - US\$2,130,000, DANIDA- US\$550,000, and EU-US\$3,200,000

This project includes a trust fund and capacity-building components. This project (2010-2012), which is being implemented in conjunction with the Ministry of Environment, aims to (i) support capacity development and institutional strengthening to prepare for and mitigate climate change risks; and (ii) directly help vulnerable communities by enhancing their resilience to climate change and other natural hazards¹⁸. It is likely that CCCA is going to be extended to its phase II implementation beyond 2012. In case if there are any pilot projects proposed under CCCA for disaster risk reduction and disaster risk mitigation, the proposed LDCF project will closely coordinate with such projects. The lessons learnt under the proposed LDCF project will be shared with such project initiatives, especially the practice of alerting communities of early warning message and enabling communities to respond to the warning messages.

Institution: UNEP

Project Title: Vulnerability Assessment and Adaptation Programme for Climate Change in the Coastal Zone of Cambodia Considering Livelihood Improvement and Ecosystems

Funding: US\$1,600,000 (LDCF); US\$4,200,000 (co-financing)

The UNEP-led project on coastal zones (mentioned previously) seeks to address the lack of human and skills capacity, reasoning that any upgrade in technological resources will need to be appropriately met with suitable worker capacities¹⁹. This project works with national, regional, and community stakeholders to reduce the vulnerability of Cambodia's coastal communities to climate change impacts by strengthening policy and science, and demonstrating targeted local interventions to increase ecosystem resilience. Among UNEP's multiple partners working on the Government's Disaster Risk Management priorities, including NCDM, MoWRAM, and MAFF. The project includes an output specifically related to EWS, namely the assessment of options for early warning systems within the coastal zone, which are to be presented to decision- and policy-makers in the appropriate ministries (as per Output 2.1.3). This is expected to coincide with the MoWRAM's ongoing efforts at flood and drought management, as well as previous and ongoing work on EWS by the Danish and Swedish International Development Agencies²⁰. During the PPG phase, the proposed LDCF project design team will consult with respective stakeholders to identify the baseline and incremental activities.

Institution: FAO

Project Title: Strengthening the adaptive capacity and resilience of rural communities using micro-watershed approaches to climate change and variability to attain sustainable food security

Funding: US\$5,000,000 (LDCF) and US\$18,800,000 co-financing from Government (US\$1,000,000) and bi- and multi-lateral agencies through the FAO – EU: US\$11,100,000; Spain: US\$3,350,000; Italy: US\$462,000, and UN-REDD: US\$1,300,000

This project works at the national and community levels to integrate climate change adaptation into agriculture sector activities. This is accomplished through mainstreaming of adaptation and relevant

¹⁸ http://www.un.org/kh/undp/what-we-do/projects/cambodia-climate-change-alliance?app_id=17

¹⁹ UNEP project ProDoc, p. 25

²⁰ http://www.thegef.org/gef/project_detail?projID=3890

climate information into food-related policies, as well as small-scale water resource infrastructure projects and climate-resilient agriculture demonstration projects. Of particular relevance to this proposed LDCF project is the FAO project's use of a mobile-phone based climate information dissemination pilot programme in 10 micro-watershed communities, which is being implemented with private sector support (Output 3)²¹. Since this LDCF project is still in the design phase, it is too early to identify any best practices and lessons learnt. During the PPG phase, the proposed LDCF project design team will consult with respective stakeholders to identify the baseline and incremental activities.

Institution: The World Bank

Project Title: Mekong Integrated Water Resources Management

Funding: US\$26,590,000

This regional project, which is currently under implementation, aims to establish key examples of Integrated Water Resources Management (IWRM) practices in the LMB (which includes Cambodia), thus contributing to more sustainable river basin development. The project features significant support for disaster risk assessment and management efforts. Its component 2 is to strengthen national water resources management, and the project will evaluate and help to update the country's hydro-meteorological network including, "installing essential institutional capacity regarding water quality monitoring, hydro-meteorological modeling, and collection and analysis of the hydro-meteorological information"²². The project is financed by the IDA, but it is unclear what proportion of the fund is specified for activities in Cambodia. This project will also establish an approach for environment impact risk and disaster risk assessment in the LMB countries. As this is a regional project assisting LMB, and Cambodia is one of the participating countries, the proposed EWS LDCF project will closely coordinate with IWRM project during PPG phase to identify the activities that are complementary. The total cost of IWRM project is US\$26,590,000.

B. Description of the consistency of the project with:

B.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSAs, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.:

Based on the information in Cambodia's NAPA, the necessity for Early Warning Systems (EWSs) are embedded as priority activities under NAPA projects on agriculture/food security, health, disaster preparedness and response capacity and water resources. EWS are often not associated with any one particular sector and are expected to be relevant to multiple sectors, including the food/agriculture, water management, coastal management, health and energy sectors. Cambodia's NAPA (2006) recognizes the extreme vulnerability of rural livelihoods to adverse climate events (particularly flood and drought), and expresses the Government's intention to further develop emergency services, hydro-meteorological networks, and natural disaster prevention and preparedness²³. The NAPA further recognizes the crucial role that accurate information on natural disasters and regular weather forecasts play in disaster preparedness as well as agricultural production. It highlights that national agencies, local authorities, and communities would benefit from weather forecasts - especially under climate change²⁴.

²¹ http://www.thegef.org/gef/project_detail?projID=4434

²² <http://www.worldbank.org/projects/P104806/mekong-integrated-water-resources-management?lang=en>

²³ NAPA, p.3

²⁴ NAPA, p.95

Table 1: NAPA identified priority sectors

#	Priority areas mentioned in NAPA	Cambodia
1	Coastal zone management	Yes
2	Cross-sectoral	No
3	disaster preparedness and response capacity	Yes
4	Education/ capacity building	No
5	Energy	No
6	Food security/agriculture	No
7	Forestry	Yes
8	Health	Yes
9	Infrastructure	Yes
10	Insurance	No
11	Terrestrial Ecosystems	Yes
12	Water resources	Yes

The proposed project is aligned with the **framework of Poverty Reduction Strategy Papers (PRSP) Cambodia**. The central goal of the PRSP is to revitalize the main economic sectors in the country, notably agriculture, fisheries and primary industries, in order to contribute to inclusive and sustainable economic development and growth, and to provide food security and nutrition, as well as employment. Cambodia's PRSP pillars are: (a) *Enhancing the Agricultural Sector*, which includes a focus on protecting rural communities from natural calamities through disaster preparedness and risk reduction, and (b) *Private Sector Development and Employment Generation*, which includes the provision of social services for the poor, especially those vulnerable to natural disasters. The proposed project will contribute to the goal of PRSP by systematically obtaining the climate and environmental data and generate tailored climate and weather forecast information. This information is useful for different sectors of an economy for planning purposes and informed decision making, especially in agriculture sector by sufficiently alerting risk of flooding, crop planting, harvesting, seasonal migration, moving livestock to other locations, etc.

Cambodia's National Strategic Development Plan (NSDP update: 2009 – 2013) provides an effective basis for mainstreaming climate change adaptation into development planning. The NSDP provides the roadmap for implementation of "Phase II Rectangular Strategy for Growth, Employment, Equity and Efficiency". As part of the country's economic development objectives, in July 2004, the Government of Cambodia adopted a "rectangular strategy for growth, employment, equity and efficiency", which stresses the need to improve agricultural productivity through the expansion of irrigation and the management of water resources to reduce vulnerability to natural disasters²⁵. The Rectangular Strategy-Phase II was launched in the first Cabinet Meeting of the Fourth Legislature of the National Assembly held in September 2008. Each strategic growth rectangle has four sides such as (i) Rectangle 1: Enhancement of the Agriculture Sector, (ii) Rectangle 2: Further Rehabilitation and Construction of the Physical Infrastructure, (iii) Rectangle 3: Private Sector Development and Employment and (iv) Rectangle 4: Capacity Building and Human Resource Development. The proposed project will contribute to informed decision making in different sectors of an economy and strengthen the planning processes.

²⁵ NAPA, p.3

The project is aligned with several other NAPA priorities, specifically second medium priority project and third high priority project proposed in NAPA.

- (a) Second medium NAPA priority project entitled “Enhancement of the National Weather Forecast Centre” seeks to build capacity of the Department of Meteorology (DOM) to provide weather forecasts and natural disaster warnings to ensure better preparedness and management. The project will produce regular and timely forecasts, as well as disseminate those to relevant stakeholders. To accomplish this, the NAPA project will upgrade existing hydro- and meteorological stations, as well as procure/install necessary equipment (including rainfall stations) and train technical staff. The estimated project proposed budget in NAPA is \$30 million.
- (b) Third high NAPA priority project entitled “Disaster Preparedness and Response Capacity” will equip communities with the knowledge and tools needed to prepare for and cope with climate hazards. This includes the development of hazard and response maps for floods and storms, and the provision of communications equipment. The estimated project proposed budget in NAPA is US\$5,000,000.

The proposed project will contribute partly to the goals of both these projects proposed in NAPA through improving the hardware and software capacity to monitor extreme weather and climate, forecast and customise the information as needed for national planning processes. The project will also establish Standard Operating Procedures (SOP) to cope with climate hazards.

In March 2009, the Government launched the **Strategic National Action Plan (SNAP)** for disaster risk reduction (DRR), 2008-2013, which covers many themes of climate change adaptation (CCA) and disaster risk reduction, including the development of improved flood forecasting and early warning capabilities. The total budget allocated for this project is US\$1,900,000. This is considered as co-financing and it is expected that the proposed EWS LDCF project will built on the ongoing flood forecasting efforts through strengthening the hardware and software capacities, and disaster risk reduction through establishing SOP to cope with climate hazards. In addition, the implementing partner of SNAP will be invited to participate in the project board meetings, contribute and share the lessons learned under the SNAP project.

The **National Committee for Sub-national Democratic Development (NCDD)** is the inter-ministerial mechanism for promoting democratic development through decentralization and deconcentration reforms throughout Cambodia. This mechanism falls under the Ministry of Interior (MOI), which has developed a strategy called the strategic vision of Decentralization and Deconcentration (D&D). At every level, there exists a committee (Provincial Committee for Disaster Management, District Committee for Disaster Management, Commune Committee for Disaster Management), to take appropriate action to manage disaster risks. This existing governance structure can be used for information dissemination while communicating the information to intended community level civil society (women and youth associations, NGOs, media, farmers’ associations) and the private sector (relevant small-medium enterprises and households as end users) to respond to the early warning messages than to come up with a new institutional structure in the proposed LDCF project. From the cost effectiveness considerations, it is considered as cost effective approach for information dissemination.

B.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities:

The proposed project responds to priorities and actions identified in the NAPA of Cambodia which mentioned the need for securing, transferring and installing critical technologies, as well as developing the necessary systems for climate change-related information to permeate into decision-making processes. The project is designed to accommodate the additional adaptation costs of priority actions identified in the NAPA and build on several other baseline projects and programmes. The technologies required to achieve these aims will increase the capacity of the national early warning network to forewarn and rapidly respond to extreme climate events. The project will also contribute towards planning and management of climate change risks across several sectors. The project builds on a range of on-going baseline initiatives and consequently, leverages more than three times the grant contribution (US\$5,541,012) in the form of co-financing (US\$16,672,931).

The proposed project is in line with the following LDCF/SCCF objectives:

- Focal area objective - 2 “Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level”, specifically to Outcome 2.2 “Strengthened adaptive capacity to reduce risks to climate-induced economic losses”, and
- Focal area objective - 3 “Promote transfer and adoption of adaptation technology”, specifically to Outcome 3.1 “Successful demonstration, deployment, and transfer of relevant adaptation technology in targeted areas” and Outcome 3.2 “Enhanced enabling environment to support adaptation-related technology transfer”.

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

Country ownership: The Government of Cambodia has ratified the UNFCCC and is classified among the non-Annex 1 parties to the convention. Cambodia has developed and submitted its National Adaptation Programme of Action (NAPA) and is eligible to benefit from the LDC Fund for the implementation of priority projects/measures identified in its NAPA. In implementing priority interventions identified in the NAPA, the project is consistent with the criteria outlined in UNFCCC Decision 7/CP.7 and GEF/C.28/18.

The proposed project focus is aligned with the scope of expected interventions as outlined in the LDCF programming paper and decision 5/CP.9. Also in line with the decision 11/CP.17, where COP 17 requested the GEF to continue to provide financial resources to developing countries for strengthening existing and, where needed, establishing national and regional systematic observation and monitoring networks.

In addition, the Hyogo Framework for Action (HFA) (2005-2015) has prioritized enhancement of early warning systems noting that investments on early warning systems are far more cost-effective than post-disaster response and recovery, which includes improvement of scientific and technical capacities for hazard monitoring and early warning, observations, and weather and climate modelling and forecasting. The national progress report on the implementation of the HFA for Cambodia indicates that early warning systems need to be improved with appropriate national capacities to make them efficient. At the same time the capacities of Provincial Committees for Disaster management (PCDMs) and District Committee for Disaster Management (DCDM) and Commune Committee for Disaster Management (CCDM) are focused on primarily post-disaster response and not on disaster risk reduction. There are five priority actions listed. Although there has been some progress, some of the achievements are neither comprehensive nor substantial due to a lack of systematic policy and/or institutional commitment. Human resources, mechanisms and systems to collect regularly, maintain, as well as utilize data and information on hazards, exposure and vulnerabilities are very limited.

Compliance with programme and LDC Fund policies: The project complies with the NAPA-identified urgent needs, all of which are relevant for supporting national development goals and for achieving MDGs specifically 1, 3, and 7. The proposed project will contribute to goal 1 of eradicate extreme poverty and hunger

through reducing the crop loss by sufficiently providing information on seasonal forecast, and reduce loss to human, livestock and damage to infrastructure through reduced exposure by providing early warning of climate hazards; goal 3 of promote gender equality and empower women by eliminate gender disparity through addressing specific concerns pertaining to women in terms of preparedness and adaptation requirements while reducing exposure to hazards; and goal 7 ensure environmental sustainability and integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources through improved evidence-based decision-making for early warning and national planning processes.

Institutional Synergy and Coordination:

The proposed project outcomes are closely aligned and coordinated with the efforts that are already underway within Cambodia to promote development that is resilient to climate change at the national and local levels. The project is focused on strengthening the capacity of responsible institutions in Cambodia to monitor extreme weather, climate change, capacity to forecast climate and environmental data, capacity to maintain early warning system (EWS) related infrastructure and increased effectiveness and efficiency of information dissemination. The project will also support and generate reliable hydro-meteorological information (including forecasts). This information will be used in combination with other socio-economic data to improve evidence-based decision-making for early warning and planning adaptation measures for various sectors in Cambodia, which forms part of the NAPA priority project's output. Short-term and long-term seasonal forecasting, and early warning related information will be used for climate sensitive decisions associated with risk of flooding, livelihood actions like crop planting, harvesting, seasonal migration, moving livestock to other locations, etc. apart from benefiting different sectors of an economy and national planning processes.

The proposed project will be implemented by the Ministry of Water Resources and Meteorology (MoWRAM) at the country level in full collaboration with other relevant line Ministries who rely on the information for planning purposes (Disaster Management, Agriculture, Finance and Planning etc.). The project document will be prepared involving key and important stakeholders in the project design, which would include GEF ODP, UNFCCC FP, key senior Government officials, sub national authorities (Provincial and/or District officers, Municipalities), civil society (women and youth associations, NGOs, media, farmers' associations) and the private sector (relevant small-medium enterprises and households as end users). Details of the institutional coordination mechanism and project management will be detailed in the project document which will be prepared during the PPG phase.

The project outcomes will be primarily implemented through national implementation. The PIF therefore outlines project management costs that will be incurred by implementing partners at the national level (specified at below 5% as per GEF policy). The procurement of technologies and technical support will be done according to UNDP policy on National Implementation (NIM). The exact modalities including cost implications will be explored during the PPG phase, including capacity assessment of the national implementing partners, and details will be spelt out in the project document at the time of CEO endorsement.

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

B.3 The GEF Agency's comparative advantage for implementing this project:

UNDP's comparative advantage in implementing this project is supported by the UNDP Country Programme Document (CPD) as well as its energy and environment programme strategy which aims to mainstream environment and disaster prevention measures into national and local development policies, strategies and plans and our overarching role of capacity development. The current cycle of CPD for Cambodia is from 2011 to 2015, which responds to national priorities of the Government of Cambodia as spelled out in the National

Strategic Development Plan (NSDP) 2006-2013. Key result area 4.3 “Promoting climate change adaptation” and the related Outcome of “National and local authorities, communities and private sector are better able to sustainably manage ecosystems goods and services and respond to climate change” emphasizes that National Climate Change Committee, key line Ministries and subnational authorities are enabled to integrate adaptation into development. The resources allocated for Outcome 2 are US\$7,700,000 from its core resources.

UNDP will continue to develop national and local capacities to plan, integrate, coordinate and implement policies and plans with climate change adaptation strategies through leading the implementation of a programme based approach. In addition, UNDP will support public-private sector partnerships that promote low carbon and climate resilient development. UNDP also has a demonstrated track record in assisting ministries, national agencies, and related departments. UNDP works closely with NCDM and relevant ministries in Cambodia to build their capacities in the Disaster Risk Reduction (DRR) through its regional project on strengthening early warning systems.

The total parallel grant co-financing that UNDP will provide to the proposed project through Crisis Prevention and Recovery (CPR), Disaster Risk Reduction (DRR) and RPSEWS activities is US\$250,000. This will be detailed further during the PPG stage.

The CPD is indeed derived from the United Nations Development Assistance Framework (UNDAF) for Cambodia (2011-2015). Results achieved through this project are consistent with the UNDAF Outcome 5, and expected Output “increased national and sub-national capacity for emergency preparedness and response to reduce and mitigate vulnerabilities to disasters, both environmental and health, of the poorest and most marginalized, especially women, children, elderly, youth and people living with HIV”. As some of the project activities and related Outputs proposed in this LDCF project, such as risk mapping of climate hazard risks (in order to identify the vulnerable communities), tailored climate and weather information and warning messages, increased response measures etc. will contribute to this Output of UNDAF.


The UNDP Country Office in Cambodia is sufficiently well resourced to provide the necessary oversight to support the Government of Cambodia in implementing this proposed EWS LDCF project. UNDP’s assistance in disaster risk management and climate change falls under the responsibility of the Environment and Energy Unit (EEU). A professional staff from the country office will be responsible for oversight, project assurance and will represent UNDP in the project board meetings. Nevertheless, this project implementation will also engage Programme Officers from different practice areas within the EEU to ensure highest level of cross-practice collaboration in the project implementation. There are other LDCF, SCCF and Adaptation Fund financed projects across the globe with similar objectives (especially in Africa) currently supported by UNDP. This means that there is substantial in-house technical expertise within UNDP that can be deployed as required to support the Government. This is backed up also with the technical expertise of the Regional Technical Adviser available in the UNDP Asia-Pacific Regional Centre (APRC) based in Bangkok, Thailand. Also, UNDP’s network of global Senior and Principal Technical Advisors provide additional technical oversight and leadership helping to ensure that programmes on the ground achieve maximum policy impact.

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)
Dr. Lonh Heal	GEF Operational Focal Point and Deputy Director General	Ministry of Environment, Government of Cambodia	Feb 18, 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/yy yy)	Project Contact Person	Telephone	Email Address
Adriana Dinu, Officer-in-Charge UNDP/GEF		March 14, 2013	Butchaiah Gadde, UNDP APRC, Bangkok	(+66) 2 304 9100 Ext. 5048	butchaiah.gadde@undp.org