



PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE:

TYPE OF TRUST FUND:

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PART I: PROJECT IDENTIFICATION

Project Title:	Strengthening agro-climatic monitoring and information systems to improve adaptation to climate change and food security in Lao PDR		
Country(ies):	Lao PDR	GEF Project ID:	
GEF Agency(ies):	FAO	GEF Agency Project ID:	620833
Other Executing Partner(s):	Ministry of Natural Resources and Environment (MONRE), Department of Meteorology and Hydrology (DMH), Ministry of Agriculture and Forestry (MAF), Department of Planning and Cooperation (DPC)	Submission Date:	June 17, 2013
GEF Focal Area (s):	LDCF	Project Duration (months):	48 months
Name of parent program (if applicable): <ul style="list-style-type: none"> • For SFM/REDD+ <input type="checkbox"/> • For SGP <input type="checkbox"/> • For PPP <input type="checkbox"/> 		Agency Fee (\$):	520.548

A. FOCAL AREA STRATEGY FRAMEWORK:

Focal Area Objectives	Trust Fund	Indicative Grant Amount (\$)	Indicative Co-Financing (\$)
Objective CCA-1 – Reducing Vulnerability	LDCF	500,000	1,900,000
Objective CCA-2 – Increasing Adaptive Capacity	LDCF	4,979,452	14,855,500
Total project costs		5,479,452	16,755,500

B. PROJECT FRAMEWORK

Project Objective:						
<ol style="list-style-type: none"> 1. To enhance monitoring, analysis, communication and use of agro-meteorological data and information for decision making in relation to agriculture and food security at national and provincial levels 2. To improve monitoring and analysis of agricultural production systems by strengthening Land Resources Information Management System (LRIMS) and Agro-Ecological Zoning (AEZ) to support agriculture policies and adaptation to climate change in agriculture 						
Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount (\$)	Indicative Co-financing (\$)
Component 1: Strengthening agro-climatic monitoring, analysis, communication and use of data and information for decision making in agriculture and	Inv.	Outcome 1.1: Improved agro-meteorological monitoring, communication and analysis facilities established at national and provincial level	1.1.1: Agro-meteorological station networks improved/rehabilitated with both conventional and automatic weather stations to increase coverage in the major agricultural production areas (12 stations in four major plains covering 8 provinces and 5 additional stations covering other production areas).	LDCF	2,000,000	6,152,381

			<p>communication facilities upgraded to enhance connectivity of national Department of Meteorology and Hydrology (DMH) with provincial level sub-units (in close collaboration with Ministry of Tele-Communication)</p> <p>1.1.3: A laboratory for instrument calibration and agro-meteorological analysis upgraded at DMH, Vientiane (includes setting up of necessary instruments and tools).</p> <p>1.1.4: A geospatial analysis facility including a remote sensing and GIS unit is established to receive, process (eg. rainfall estimate) and analyze near real-time climate monitoring, archiving, store, processing and analysis of agro-climatic data and detailed Agro-climate Atlas and Agro excel tables prepared for wider use</p>			
	TA	<p>Outcome 1.2: Institutional and technical capacity strengthened to facilitate data sharing, archiving, analysis and interpretation of agro-meteorological information products to users at all levels</p>	<p>1.2.1: Standard Operating Procedures (SOPs) for climatology and agro-meteorology division of DMH and guidelines for installation of instruments and observation, data coding and maintenance developed and staff trained (at least 65 technical staff trained)</p> <p>1.2.2: Training curricula related to climatology (including seasonal forecast), agro-meteorology, remote sensing, GIS, crop yield forecasting and preparation of improved crop bulletins developed, reviewed and series of training programmes organized towards contribution for development of value added forecast and information products (training needs assessed and at least 100 technical staff from DMH trained)</p> <p>1.2.3: Technical capacity in communication of climate information (50 print and media reporters on products and services) and use of climate information for preparation of strategies and plans (50 staff at national level from various</p>	LDCF	500,000	2,523,810

			<p>technical agencies trained) and for adoption of sustainable farming practices based on climate information at provincial and district levels (at least 200 MAF staff from provinces and districts trained)</p> <p>1.2.4: Field Schools (34 FFS in key agriculture plains) established and facilitators trained on integration of climate data and information into FFS curriculum (The target communities will be identified in close collaboration with LDCF PIF being prepared by FAO on “Climate Adaptation in Wetlands Areas (CAWA) in Lao PDR”</p>			
<p>Component 2: Strengthening institutional and technical capacity for monitoring and analysis of agriculture production systems and development of Land Resources Information Management Systems (LRIMS) and Agro-Ecological Zoning (AEZ)</p>	Inv.	<p>Outcome 2.1: Integrated Land Resources Information Management System (LRIMS) and High resolution Agro-Ecological Zones (AEZ) and agriculture production Systems At Risk (SAR) developed based on agricultural resources (climate, land, soil, water and crops)</p>	<p>2.1.1 Computing facilities (hardware and software) designed, procured and installed at national level for database development and management of Land Resources Information Management System (LRIMS) and customized application designed and developed for assessment of land suitability for agriculture</p> <p>2.1.2 Available data and information on land, soil, water, land utilization types, socio-economic, food security, vulnerability and impacts of climate change on crops synthesized and archived in digital format for the whole country following FAO-AEZ methodology consistent with global standards (data sets already generated by similar projects including LDCF project supported by UNDP)</p> <p>2.1.3 Impact scenarios of water availability, crop yield and socio-economics for all major agro-ecological zones assessed and Agro-Ecological Zoning and Integrated Natural Resources and Food Security Systems at Risk (Naf-SAR) developed for improved policy formulation and adopted for planning (This output will improve mapping of flood/drought prone areas, consider land use planning support in natural hazard prone</p>	LDCF	1,900,000	5,455,714

		Technical capacity developed for sustained operation and use of LRIMS, AEZ and agriculture production Systems at Risk for policy formulation and adaptation planning in agriculture sector	LRIMS, Agro-Ecological Zoning and Naf-SAR developed and training programme conducted for the MAF and MONRE staff to update and retrieve data and use for practical applications (at least 50 core staff trained thrice in 4 years to update and retrieve data for applications) 2.2.2 Adaptation priorities based on revised LRIMS, AEZ and Naf-SAR documented at national level for all production systems and zones (the strategies will focus primarily the agriculture production System At Risk (SAR)) 2.2.3 The location specific adaptation strategies delivered on pilot basis to facilitate implementation of adaptation interventions by other GEF/LDCF projects (e.g. "Climate Adaptation in Wetlands Areas (CAWA) in Lao PDR")			
Component 3: Knowledge management and dissemination of information and lessons learned for planning, monitoring and evaluation	TA	3.1: Knowledge and information sharing for agriculture and food security planning and programming and project outputs/outcomes monitored and evaluated to ensure sustainability	3.1.1: Knowledge and information sharing workshops conducted and best practices, key lessons disseminated via publications, project websites and others to facilitate wider awareness and utilization in other climate sensitive sectors 3.1.2: Customized data and information on climate, land Resources, Agro-Ecological Zones and production Systems At Risk integrated into national agriculture policies, plans and programmes (at least 4 plans, strategies and programmes endorsed by the Government) 3.1.3 Project M&E system established to monitor activities, outputs systematically at all levels (national, provincial and local) and outcomes evaluated	LDCF	268,526	600,000
Sub-Total					5,218,526	15,957,619
Project management Cost (PMC)					260,926	797,881
Total project costs ⁴					5,479,452	16,755,500

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

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount (\$)
GEF Agency	World Bank (WB)	Grant	6,010,000
GEF Agency	Asian Development Bank (ADB)	Grant	3,020,000
GEF Agency	FAO	TCP and Trust Funds	997,000
GEF Agency	FAO	Pipeline projects	1,000,000

National Government	Asian Development Bank	Grant	4,728,500
National Government	DMH, MONRE	In-Kind	500,000
National Government	MAF	In-Kind	500,000
Total Co-financing			16,755,500

D. INDICATIVE TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA(S) AND COUNTRY

NOT APPLICABLE

E. PROJECT PREPARATION GRANT (PPG)

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 (\$)</u>
• No PPG required		
• (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

Type of Trust Funds	GEF Agency	Focal Area	Country Name/ Global	PPG (\$) (a)	Agency Fee (\$) (b)	Total (\$) c=a+b
LDCF	FAO		Lao PDR	150,000	14,250	164,250
Total Grant Resources				150,000	14,250	164,250

PART II: PROJECT JUSTIFICATION

A. PROJECT OVERVIEW

A.1. Project description

1) The problems and root causes:

1. The climate of Lao PDR is divided into two distinct seasons: rainy season, or monsoon, from May to mid-October, followed by a dry season from mid-October to April. The average annual rainfall is about 1,300 – 3,000 mm. Lao PDR is divided into three different climatic zones: (i) The northern mountainous areas above 1,000m have a mountain temperate and hilly sub-tropical climate. They are relatively dry, with an average rainfall between 1,500 and 2,000mm; (ii) The central mountainous areas range in altitude from 500 to 1,000 m (with some mountain peaks >2,000 m). They have a tropical monsoonal climate with a higher temperature and higher average rainfall than elsewhere which ranges from 2,500 to 3,500 mm; (iii) The tropical lowland plain and floodplains along the Mekong River and its main tributaries include the plains of Vientiane, Borikhamxay, Khammouane, Savannakhet, Champasack, Saravane, and Attapeu Provinces. More than 50 percent of the population of Lao PDR lives in these areas. They have an average rainfall of 1,500 to 2,000 mm.¹

2. Lao PDR is the most rural country in Southeast Asia, with over three quarters of the total population currently living in rural areas. Approximately 38 percent of these rural dwellers live below the poverty line, and population growth continues to be concentrated in the rural areas (80%). The population density is relatively low (23 people per km²) and the distribution is uneven and the mountainous terrain of much of the country limits the possibility of planting crops and making a living from agriculture. A large majority of people depend on subsistence agriculture. Rural poverty is still high, though the proportion of the rural population that is poor fell from 52 percent to 38% between 1993 and 2003. Two-thirds of households have no

3. In Lao PDR, agriculture is the most important sector in national economy and agricultural population constitutes 76% of the total population. Per capita agriculture GDP is only USD 235. Crop production is mainly based on cultivation of rice under lowland and upland conditions. Rice represents 80% of total land area suitable for cultivation. Food self-sufficiency is highly uncertain and very much depending on extreme climate events such as droughts and floods. Annual production at sub-national level is uneven, resulting in unpredictable food balance². The key vulnerabilities of the agriculture sector in the Lao PDR are mainly caused by floods and drought. There are several other sectors that closely linked to agriculture also contribute to its vulnerabilities such as water resources, transportation network and public health services as these sectors are also frequently affected by extreme climate events.

4. In Lao PDR, in normal years the country is largely self-sufficient³ in rice, the main staple accounting for 80% of the cultivated land. However, regional differentiation in per capita production - the north is below the target self-sufficiency level, the centre is self-sufficient and the south is a surplus producer of rice - coupled with extremely poor road and other transport infrastructure create local availability problems. In addition, there is a problem of seasonality in food availability, especially for the remote areas and a severe problem of instability due to floods that regularly destroy crops in the centre and the south. Droughts in the north and along the Vietnamese border also contribute to the problem.

5. Concerning the **climate change impacts**, Lao PDR, in its initial national communication to the United Nations Framework Convention on Climate Change (UNFCCC) submitted in November 2000, stated that the "Lao PDR is highly dependent on natural resources for its prosperity: agriculture, forest resources, and water resources. The likely transition in climate change will, therefore, not only have physical impact on these resources but also a larger impact on the socio-economic situation of the country. There has been no study on the vulnerability of different sectors to climate change in the country. Such a study is necessary in view of likely impacts, so that appropriate adaptation measures can be designed to minimize any likely future impacts".

6. The National Adaptation Programme of Action (NAPA) - submitted to the UNFCCC in 2009 - identified four sectors as being highly vulnerable to climate change and requiring priority adaptation measures: agriculture, forestry, water resources, and health. The NAPA has confirmed that the primary climate change-related hazards in Lao PDR are floods and droughts and their adverse impacts contribute to the root causes of the problems related to variable agricultural production and food insecurity. Expected changes in climate will have a range of impacts mainly due to increases in annual mean temperatures by around 0.1-0.3°C per decade; a longer annual dry season; more intensive rainfall events; and more frequent and severe drought and flooding events. The 4th Intergovernmental Panel on Climate Change (IPCC) report (2007)⁴ indicates that the Mekong basin is expecting increasing maximum monthly flows of +35-41% and decreasing minimum monthly flows of 17-24% over the course of this century, which will substantially increase flooding risks in the wet season and water scarcity and drought in the dry season.

7. The National Climate Change Strategy (2010) confirms that, at present, there have only been limited assessments, analysis or projections regarding the potential impacts of climate change on the physical and social environment of the Lao PDR, due to the lack of long-term climatic data for reconstructing the past climatic history as a support for the projection of future climatic trends. However, trends show evidence that the dry season is becoming longer, that droughts are more frequent and more severe, and that the incidence of unusual and extreme flood events are escalating. Similar trends have been identified in the South East Asia and at the Mekong Basin area.

8. A study on potential climate changes in the Lower Mekong Basin, under different scenarios of atmospheric CO₂ concentrations was conducted between 2005 and 2006, concludes that: Future temperature change in the Lower Mekong Basin area will vary from baseline condition within the range of 1 °C ~ 2°C. The region will have longer summer with shorter winter time. The trend of increasing precipitation between 10%

² <http://www.fao.org/countries/55528/en/Lao/>

³ Self-sufficiency is defined by the Government as the production of 350 kilograms of paddy per capita per year

⁴ Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds. Cambridge University Press, Cambridge, UK, 976 pp

and 30% is projected throughout the region, with the highest increase to occur in the eastern and southern part of the Lao PDR. Climate variability tends to be more extreme as the range of precipitation, between dry and wet years will be wider in the future, especially in the Lao PDR. The agriculture sector of Lao PDR is likely to be seriously affected by the impact of climate change and particularly the rural populations and their adaptive capacity.

9. In the general strategy of national development, the Government of Lao PDR gives priority to the agriculture sector. The orientation is to promote farmers' economy in order to orient them from a subsistence production towards a market production economy. Among the development objectives, the most important is to attain national food self-sufficiency in paddy production and diversification by increasing production of other crops, animal husbandry and fishery. In this context, the technical support to agricultural production and diversification is essential either for activities during the cropping season (climate information services, crop monitoring, yield forecasting, agro-advisory services to farmers) and for planning activities (climate change impact assessment, land-crop suitability, crop diversification).

10. In the face of such complexity, the Government's ability to deal with food security issues is not adequate on two accounts: in the first place there is not a sufficient understanding of the problem and its root causes, and Government policy simply identified food security with self-sufficiency in rice. Secondly, the system of data collection and analysis at provincial level on all the food security related issues is not adequate. In the Ministry of Agriculture and Forestry (MAF), reporting on crops is based on an expensive crop cutting exercise and data reporting has not a standard format. There is standardized land resources information management system and land suitability details available to better inform the policy makers. In DMH, the collection and analysis of meteorological data is not adequate for deriving crop yield forecasting at provincial level. In the light of the above, there is a need by the Government to address the collection, analysis and dissemination of crop- and climate-related information.

2) Barriers that the project needs to address:

11. Monitoring and analysis of climate variability and climate change impacts in agriculture sector is constrained by: i) insufficient agro-meteorological observing stations to monitor the current state of the climate and hydrology, map risks and detect long-term trends; ii) insufficient use of modern techniques for monitoring climatic conditions and providing climate information to regions not covered by the agro-meteorological stations; iii) limited use of climate forecasts on seasonal timescales in agriculture sector; iv) lack of understanding of the current and potential future distribution of the most vulnerable areas and population to climate change and food insecurity; v) limited packaging of different sources of information to inform risk reduction efforts by the policy makers and farmers; vi) inappropriate communication of agro-meteorological messages to the farmers and vii) lack of trained personnel to effectively run and maintain the Land Resources Information Management Systems (LRIMS).

12. Inadequate number and non-extensive spatial distribution of agro-meteorological monitoring stations in major agricultural areas has meant that many important regions and populations vulnerable to climate hazards are under-served by the existing weather and climate data and information generation and dissemination system. For example, major crop production plains in the central and southern parts of Lao PDR are not adequately monitored in terms of weather and climate risks. Therefore, many potentially threatening hazards are not forewarned because of a lack of or ill-equipped monitoring stations. Equipment failure is also common and regular checks and maintenance often neglected due to insufficient funds, incentives and regulatory policies resulting in poor quality and unreliable data for making management decisions related to climate change induced disaster risks. It is also evident from the available reports that intensive institutional, infrastructure and capacity development measures are required

13. It is now common practice to utilize satellite imagery as a useful tool for monitoring areas where meteorological monitoring stations do not exist and aspects of the environment useful for assessing current risks e.g. vegetation monitoring helps assess crop performance and images of floods help understand which areas are more at risk. However, the meteorological technicians and forecasters and national extension services are ill-equipped (lack of appropriate computer hardware and software) and have little or no capacities and skills to analyze the modern information products to develop agro-met advisories and other products that are useful to farmers. High costs of procurement and operation and maintenance of instruments are barriers to the acquisition of the modern technology. In addition, technical capacity at the country level are limited to make use of the available forecasts and downscale them for location specific needs in agricultural sector. The reliability of these

climate information services in agriculture.

14. Often weather and climate information products are given in the same standard formats for different users in various sectors and this restricts their interpretation and application. For example, agricultural extension officers require information about the start of the rains, the frequency of days with rain and length of dry spells that are relevant to the crop being grown in a particular season, whereas those monitoring floods require information on rainfall intensity. Inadequate technical capacity within the Ministry of Agriculture and Forestry (MAF) is a barrier to translate the generic information into most practical and applicable information. Other barriers include lack of trained personnel who are capable of maintaining an observational network, generating information for specific sectors, as well as interpreting the data in ways that non-technical stakeholders can understand.

15. Currently, impact assessment and adaptation planning are constrained by non availability of climatic, bio-physical and socio-economic data. Recent assessments conducted for second national communication reiterated the need for having a systematic data base on climate, land, soil and other socio-economic details that can be readily available for assessment of climate change impacts and vulnerabilities. There are several projects and programmes which focus on impact assessment, but they are highly fragmented and are focusing on one or two pilot provinces. Development of country wide Land Resources Information Management Systems (LRIMS) and impact and vulnerability assessment could guide the policy makers to develop climate responsive policies and plans in agriculture and provide most appropriate and location specific adaptation options for farmers.

3) Baseline scenario and associated baseline projects

16. To address the baseline problems, the government is promoting rural and agricultural development policies and related reforms. The public investments have contributed to agricultural sector growth of 4.7 percent annually over the past decade. This growth has been fueled in large part by an expansion of land under cultivation and an increase in agricultural labour force. The recent growth of agriculture, and particularly of cash crop and livestock production, has occurred because of the reduced internal barriers to domestic trade and public investments in irrigation and transports. Improved bilateral relations with neighbors leading to improved cross-border trade and regional integration with the dynamic markets of Vietnam, Thailand and China and increasing levels of foreign direct investment in agricultural production in Lao PDR also contributed to the growth and partly addressed the problems.

17. The agriculture sector remains central to both growth and poverty reduction in Lao PDR. Rural growth will be mainly driven by the continued commercialization of agriculture, and sustained by strengthened management of the natural resource base. However, there are key challenges to maintain high rates of rural growth especially through improving farmer productivity, linking farmers to markets, capturing value added opportunities and strengthening public expenditure. There are number of baseline projects that addresses issues associated with improving agricultural production by improving monitoring of factors of agricultural production and also by strengthening institutional and technical capacities.

18. **Mekong – Integrated Water Resources Management Project (Mekong - IWRMP) – Component 2** for LAO PDR (USD 6.01 million): The World Bank has funded a regional project for Lao PDR, Cambodia, Vietnam, and Mekong River Commission (MRC) to promote Integrated Water Resources Management in the Mekong River. The component 2 of the project focusing on "National Water Resources Management" with an estimated cost of US\$6.01 million aims to support legal, institutional, and human resources strengthening to implement IWRM and better water resources planning in Lao PDR through: (a) development of a new Water Resources Law considering the regional enabling implementation of the IWRM in the Mekong River; and (b) installing essential institutional capacity regarding water quality monitoring, hydro-met modeling, and collection and analysis of the hydro-met networks. Lao PDR accounts for more than one third of the flow of the Mekong River; hence, strong and accountable systems at the national level are key to sound water management. Specific activities such as sharing hydro-met data with neighboring countries and the MRC for integrated regional flood and drought forecasting, support for Water Resources Modeling, including review and selection of appropriate, adapted models, technical assistance and training; support for Hydro meteorological Network Upgrading, and establishment of flood and drought warning systems, through provision of building equipment and training to the DMH within MONRE are the activities closely related to the proposed LDCF project.

19. The meteorology and hydrology data collection and forecast production activities of the DMH are critical to the success of the Mekong-IWRM. The aim of the baseline project is to support the planning and implementation of a responsive hydro-meteorological data collection, management, and forecast system in the context of the national hydro-meteorological framework and plan. The specific objective is to strengthen the hydro-meteorological data collection, management, and forecast system for floods, droughts and extreme weather for DMH at Vientiane Capital and the selected priority river basins through the following actions: i) Enhancing the current early warning system for floods and extreme weather as well as droughts through the strengthening of the hydrological and meteorological monitoring system at the national level as well as in the priority river basins; ii) Strengthening the technical capacity for the forecasting of floods, droughts and extreme weather events as well as for seasonal predictions at the national and priority river basin level; iii) Increasing awareness and responsiveness to floods, drought, and other extreme weather events for the selected provinces, districts, and communities; and, iv) Strengthening support to and communications with the National Disaster Prevention and Control Committee and its related agencies.

21. **Greater Mekong Sub-region: Flood and Drought Management and Mitigation Project – LAO People’s Democratic Republic (April 2013–March 2019) (USD 3.02 million ADB Grant):** The main aim of the project is to reduce the impact and economic losses resulting from floods and droughts in the greater Mekong sub-region. The project involves three countries (Vietnam, Cambodia and Lao PDR). The project has four outputs and the output 1 is relevant to the proposed LDCF project. The output 1 on "Enhanced regional data, information, and knowledge base for the management of floods and droughts" has three major activities: (a) development of design criteria for water control infrastructure such as flood and drought risk mitigation schemes in the Mekong Delta for Viet Nam; (b) assessment of cross border flood management options in Viet Nam and Cambodia; and (c) establishment of the National Early Warning Center in the Lao PDR. Activity (c) is aimed to strengthen national early warning center in Lao PDR and this is one of the priorities identified under the DMHs plan for the next five years. The project target is to implement National Early warning Center (NEWC) with calibrated operational forecasting models by 2016. The estimated budget for this Lao PDR specific activity is USD 3.02 million. The Ministry of Agriculture and Forestry (MAF) is the executing agency and will coordinate the project activities related to early warning systems with the Department of Meteorology and Hydrology (DMH).

22. **Sustainable Natural Resource Management and Productivity Enhancement Project (ADB) (June 2009–December 2015):** The output (i) capacity building for agriculture and natural resource sector management Capacity building initiatives will target (i) land suitability assessment and participatory land use mapping with a budget of USD 4,728,500. This subcomponent 1.1 of the project is related to component 2 specific activity on development of land resources information management systems (LRIMS). Subcomponent 1 (i) will build land suitability assessment, land-use classification and zoning, and digital mapping skills in participating provincial agriculture and forestry offices (PAFOs) (where responsibility for ANR management and technical assessment of proposals for FDI and concessions has been delegated). This will require (i) provision of geographic information system (GIS) equipment (hardware and software); (ii) training PAFO and district staff in land suitability and participatory land-use mapping and social analysis of land rights and GIS and information management techniques; (iii) procurement of digital data sets to facilitate the preparation of land suitability and land-use maps at district level and subsequently at subproject level, i.e., kumbans and villages; and (iv) funds to operate a resource mapping facility including “ground truthing” of interpreted data sets. This will provide the basic information and equipment to enable staff to present technically based recommendations prior to the award of land concessions in the provinces, thereby improving land-use planning and natural resource management. Ministry of Agriculture and Forestry (MAF) is the executing agency of the project.

23. **Pro-Poor Policy Approaches to Address Risk and Vulnerability at the Country Level:** The project implemented by FAO is aimed to enhance the institutional capacity of four Asian countries (including Lao PDR) to develop pro-poor policy solutions for managing the risks and vulnerability faced by small holders. The total budget of the four year (2011 – 2015) project is USD 2,150,000 and the approximate share for Lao PDR is USD 600,000. The specific objectives of the proposed programme are: to identify and analyze current and emerging risks and vulnerability at the national level as a means to help formulate pro-poor policies to inter-alia enable smallholders’ and other rural poor to raise agricultural productivity and to increase incomes; strengthen the capacity of key government agencies and other related stakeholders in pro-poor policy analysis, formulation and implementation; promote greater participation of civil society and private sector in pro-poor policy dialogue and advocacy; promote sharing of experiences and lessons on successful pro-poor policies

24. **Development of the Monitoring System of the Ministry of Agriculture and Forestry (TCP/LAO/3303):** The project is aimed for contribution to more effective achievement of the national development objectives, including improved food security, better rural livelihood and poverty reduction, and improved management of forest and other natural resources. The project with a budget of USD 397,000 focuses national level capacity development. The expected project outcomes will be the improved capacity of MAF in managing its development projects supported by reliable and systematic information on the progress and achievements of projects at various levels, including the ability for synthesis analysis on the contribution of its projects to the key development objectives. This improvement will include its better capacity to collaborate with the DPs on harmonizing their M&E activities into the MAF system.

4) Long-term solutions and alternative scenarios:

25. It is expected that as climate change will alter frequency and intensity of climate related shocks, therefore improving agro-meteorological advisories is one way to increase the adaptive capacity of the country to a changing climate. The agro-meteorological advices also benefit the poorer segments of society, those who do not necessarily benefit from large protective infrastructure projects. To allow Lao PDR to better manage climate risks, food security and agricultural production, scarce and dwindling water resources and make their socioeconomic development process less vulnerable to climate-related risks, it is essential to: enhance the capacity of hydro-meteorological services and networks for predicting climatic events and associated risks; develop a more effective, efficient and targeted delivery of climate information; support improved and timely preparedness and response to forecast climate-related risks and vulnerabilities.

27. Improve agro-climatic monitoring, communication and analysis infrastructure: In Lao PDR, there has been a steady decline in infrastructure dedicated to monitoring the climate for the last 20-30 years. Whilst this situation has been ameliorated by specifically targeted project interventions, this has only benefited a particular aspect of the early warning system. Recently the need for a systematic improvement of the observing network is recognized by the Global Climate Observing System (GCOS) which in its reports notes that “Developing Countries have made only limited progress in filling gaps in their in situ observing networks, with some evidence of decline in some regions, and capacity building support remains small in relation to needs”. This proposed GEF LDCF project focuses only on the agrometeorological component, which is consistent with the Long-Term Strategic Plan (2011-2015) of DMH that highlights the need to establish observation systems for climate parameters, agro-met parameters and application of climate prediction models as well as agro-met analysis and crop yield forecasting.

28. Improve institutional and technical capacity to monitor, analyze and use agro-meteorological data and information to support decision making in agriculture: There needs to be an official process for generating agro-meteorological information that includes communication between sectoral ministries such as Ministry of Agriculture and Forestry (MAF) and the communities. Representatives from different technical departments need to convene, assess the situation and warning messages and prepare impact outlooks for easy understanding by the user communities. Technical capacity strengthening is required to translate information for agricultural applications. The intermediary support services in the MAF should develop expertise to translate climate information into specific threats and responses in agriculture. This information should then be combined with known vulnerabilities to identify areas and communities at risk. This is currently not part of the process and will form part of the long-term solution and expected alternate scenario of the project.

29. Development of nationwide information systems and comprehensive data base on impacts and vulnerability: A dedicated information portal is needed to provide data and information on impact of climate change on crops, land suitability and Land Resources Information Management Systems (LRIMS). Improvement of socio-environmental databases for assessing the risks posed by climate variability and change is being highlighted in many Government documents when referring to climate variability and change. Calculating risks for known socio-environmental vulnerabilities requires a comprehensive archive of information related to vulnerable communities, infrastructure, roads, shipping, access to markets, flood prone areas, cropping patterns etc. This information are held in disconnected databases or computers spread across different government departments and ministries. All the information required to assess vulnerability and calculate risks needs to be accessible, either through a central database/repository, or through distributed networks.

30. Strengthening institutional and technical capacity on information and decision support systems: The scientific and technical capabilities required to effectively downscale climate scenarios and forecast their

potential impacts on agricultural systems and vulnerable communities are often weak. This may be due to a lack of infrastructure (computational equipment), software (model code and associated routines) or technical capacity/skills to programme and run the models. Systematic analysis of impacts of climate change requires capacity development and establishment of necessary database and computing facilities to match the requirements at the country level and also technical and institutional capacity to sustain such investments.

31. Overall, the long-term solutions and alternative scenario of the project is tuned to focus future investments in agriculture that considers expected climatic conditions and aim to provide better information at all levels to improve agriculture policies and programmes and ultimately farmer productivity. Provision of needs-based climate information services for agriculture is important both in lowland, predominantly rice production areas, and in uplands. The evolution of diverse land use and upland systems needs to be better understood as the basis for better orientation of Government policies on agriculture transformation so as to promote sustainable intensification under increasing climate variability and climate change. The agriculture productivity improvement is also linked with sustainable land management and use. This needs a robust analysis of land use and crop suitability to match with changing climatic conditions. A comprehensive analysis of resource suitability and impact of climate change on crops to better inform institutional and policy frameworks are receiving urgent attention and forms alternative scenario expected from the project.

5) Description of components, expected outcomes and incremental cost reasoning of the project

Component 1: Strengthening agro-climatic monitoring, analysis, communication and use of data and information for decision making in agriculture and food security

32. **Baseline:** Weather and climate information services generated for agricultural decision making in Lao PDR depends on information generated from 17 main synoptic stations and 32 secondary climatic stations. Many of these stations are very old and key instruments are not working properly. There is no laboratory for calibration of instruments at the central level to ensure proper maintenance and sustainability of climate monitoring infrastructure. The stations covering the main agricultural production areas are inadequate to generate reliable information to influence decision making at different levels (national, provincial, district and local). Data coding and communication facilities are weak and thus connectivity of national Department of Meteorology and Hydrology (DMH) with provincial level sub-units is not always reliable. Because of the problems with the connectivity, the information collected from these stations is not readily available for preparation of Agro-advisories by the DMH. On the other hand, the mechanisms for data sharing are not well established within the DMH and other user agencies including the Ministry of Agriculture and Forestry (MAF).

33. There are number of global and regional centres that provide updated climate information products on regular basis and in addition, near real time monitoring is also possible with limited investment for processing of available data from these centers. However, the national center is not equipped with the facility to access and analyse the information products at the national level. Non-availability of quality controlled agro-meteorological data base also limit the analysis and preparation of reliable and location specific agro-meteorological information products. Besides limited station networks, the available data is only in paper form and has not been systematically digitized with adequate quality control procedures.

34. The DMH is constrained by an inadequate institutional mechanism and technical capacity to monitor agro-meteorological parameters and analyse the available data for agricultural applications. There are efforts to strengthen monitoring and analysis capability focusing on water resources management and improvement of early warning system for floods and drought (e.g. establishment and strengthening of the National Early Warning Center through ADB support and enhancement of early warning systems for floods and drought through World Bank's Mekong-IWRMP). These ongoing efforts need to be complemented with specific technical assistance that focuses on agro-meteorological monitoring and analysis. Development of customized information products for agriculture sector is still not in operation despite great significance of agriculture sector in national economy. Collaboration between DMH and MAF is pre-requisite to strengthen provision of value added agriculturally relevant climate information products.

35. The needs of users in agriculture sector are unclear and not properly considered in developing agro-meteorological information products and services. This situation is due to limited dialogue between information users and providers but also to lack of a concrete collaboration which would translate the

appropriate national mechanisms to collect, store, and distribute data and information, range users in agriculture sector. Furthermore, the DMH and MAF must ensure that these data and information are accurate and readily available and that these data and information satisfy the information needs of the decision makers. In summary, the current baseline situation is not providing any of the value added services to the agriculture sector. The situation is expected to be improved through technical assistance component of this LDCF project.

36. **Additional activities and cost reasoning:** The baseline projects mainly focuses on climate and hydrological monitoring network focusing on the Mekong river; the major agricultural plains and necessary agro-meteorological monitoring networks are not considered. The additional financing from LDCF will be used to upgrade agro-meteorological station networks by replacing with new ones or by re-habilitation of existing ones with both conventional and automatic weather stations to increase coverage in the major agricultural production areas. The initial discussion with DMH proposed the need to establish 12 stations in four major agriculturally important plains covering 8 provinces and additional 5 stations covering other production zones. Improved data coding and communication facilities need to be established to enhance connectivity of national DMH with provincial level sub-units. This should be undertaken in close collaboration with Ministry of Tele-Communication through proposed new initiatives connecting provinces with national center through fiber optics. The LDCF resources will be used to strengthen a laboratory for instrument calibration and agro-meteorological analysis at DMH, Vientiane.

37. Similarly, investments are also required to enhance facilities to access and analyse agro-meteorological information at national levels. A geo-spatial analysis facility including a remote sensing and GIS unit in Vientiane will be established to receive, process and analyze near real-time climate monitoring. Hardware and specialized software for collecting, archiving, processing and analysis of data will be installed and tested. Agro-climatological database in digital format will be developed and a detailed national Climate Atlas will be prepared for wider use. Though the investment in the monitoring and communication infrastructure targets climatology and agro-meteorology division, overall requirement for strengthening early warning and climate information services will be considered explicitly in close collaboration with other projects targeting other technical divisions of DMH (e.g. forecasting, hydrology, meteorology and hydrology network maintenance).

38. The TA activity aims to strengthen institutional and technical capacity to facilitate data sharing, archiving, analysis to provide improved agro-meteorological information products. The LDCF will support to prepare and operationalize the Standard Operating Procedures (SOPs) for climatology and agro-meteorology division of DMH. This will also outline institutional coordination mechanisms between the 4 technical divisions with DMH and with the Department of Agriculture, Department of Statistics and Department of Irrigation to facilitate sharing and communication of agro-meteorological data and information. Guidelines for installation of instruments and observation, data coding of field observatories and maintenance will be developed and staff trained. This activity will consider other sensitive sectors to enhance the synergies with other programmes and projects.

39. To sustain the technical assistance, training curricula in climatology (including seasonal forecast), agro-meteorology, remote sensing, GIS, crop yield forecasting, preparation of improved crop bulletins and information communications will be developed and integrated into DMH's regular activities. The LDCF project will strengthen to make crop monitoring and yield forecasting operational building on FAO's previous interventions. A series of training programmes to improve technical capacity of the climatology and agro-meteorological division at DMH and provincial centers organized for development of value added forecast and information products and services (4 training programmes on key technical areas organized based on training needs assessment). Technical capacity of DMH will be improved to develop seasonal climate forecasts in collaboration with international and regional institutions for climate prediction. At the local level the customized climate information products will be delivered through Farmer Field schools (34 FFS in key agricultural plains).

Component 2: Strengthening institutional and technical capacity for monitoring and analysis of agriculture production Systems and development of Land Resources Information Management System (LRIMS) and Agro-Ecological Zoning (AEZ)

40. **Baseline:** Climate change adaptation in Lao PDR is constrained by non-availability of quality and high resolution data on climate change impact scenarios on agriculture resources (climate, land, soil, water,

and crops). Analysis of impacts of climate change on the agriculture sector can help policy and farm level decisions to reduce the potential impacts. Lao PDR continues to seek innovative ways of assessing and communicating climate risk information to policy makers and vulnerable communities in order to meet increasing complexities of the climate system. There are no systematic assessment and deliverable methods and tools employed to conduct a comprehensive climate change impacts scenarios at the moment. Current vulnerability and risk information are still too vague or specific to pilot provinces/districts and are not available in a useful format and content to meet the needs for natural resources management and promoting improved adaptation technologies in agriculture. For example, downscaling of climate scenarios and its impacts on livelihoods and natural resources especially land, water and agriculture are rarely linked to direct response mechanism.

41. The knowledge and experience on how to translate climate predictions to specific adaptation actions is missing. There are specific initiatives through a GEF-LDCF project on “Improving Resilience of the Agriculture Sector in Lao PDR to Climate Change Impacts” that focus primarily on increased knowledge on climate variability and climate induced threats on agricultural production, food security and vulnerability targeting only major hazards (floods and droughts) and focuses on land use planning for the selected provinces. These initiatives require additional strengthening by establishing hardware and software and customized information management systems. The lessons learned through these pilot interventions need to be up-scaled at the national level with sufficient infrastructure.

42. Lack of crucial information to support decision-making processes in all sectors, in particular in agriculture reduces the adaptive capacity of institutions and communities. Lack of targeted capacity building programmes and inadequate efforts to sustain the technical assistance provided through various projects focusing on impact assessment and adaptation planning and non-availability of national skilled staff are the major barriers to advance adaptation planning in agriculture sector targeting the whole country. Past experiences have shown that there is a scarcity of staff able to produce crop- and climate-related information and there is a need to have a long-term plan of action in this regard. Thus, the project should provide equal emphasis on technical assistance and capacity development together with investments for development of information systems, impact assessments and decision support tools.

43. **Additional activities and cost reasoning:** The LDCF will support a number of investment activities to promote continuous assessment and provision of impact scenarios on agricultural resources (land, soil, water and crops) at the national level. Establishment of information portals on Land Resources Information Management Systems (LRIMS) at national level is one of the major outputs of this component. This will be achieved by maintaining a close collaboration with other initiatives (e.g. GEF/LDCF initiative by UNDP focusing on national long-term information system for flooding and drought related hazards and land use planning in drought and flood prone areas). Computing facilities (hardware and software) will be installed at national level for database management (within the department of agriculture land management) and data analysis. Land Resources Information Management System (LRIMS) and Agro-Ecological Zones (AEZ) database will be developed and customized application is to be designed for assessment of the climate change impacts and decision support products for the development of the adaptation strategies using the meta-framework of Natural Resources and Food Security – Systems at Risk (Naf-SAR) which provides a workflow to coordinate these activities. Under Naf-SAR, LRIMS prototype will be tested and training programme conducted for the MONRE and MAF staff to update and retrieve data and use for practical applications.

44. The LDCF funds will be used to assess climate change impacts on water availability, crop yields and agriculture economy at national level and to assess current and future potential food insecurity risk. The suite of available crop models of FAO-AEZ portal will be calibrated and validated for Lao PDR. Assessments will also focus on impact scenarios of water availability for all major agro-ecological zones, and Naf-SAR framework for analysis of vulnerabilities, impacts and responses implemented for Lao PDR. Establishment of LRIMS and up-scaling of impact assessment work will draw lessons from the ongoing GEF/LDCF project (Improving Resilience of the Agriculture Sector in Lao PDR to Climate Change Impacts) and suitable national stakeholder will be identified on consensus basis. This will consider recent institutional re-arrangement, technical and operational capacity (based on past performance) and detailed consultation during the PPG stage.

45. The LDCF will support the development of high resolution climate change scenarios and archive data of available climate, land, soil, water, land utilization types, socio-economic, climate change vulnerability and

country and also for an major crop production zones across the country. A number of agencies showed interest to make use of data and information for adaptation planning during the consultation meetings (MONRE - DMH, DNDMCC, MAF – Centre for Statistics and Information, NAFRI, DALD etc.). However, appropriate exact focal agency will be decided after further consultations during PPG stage.

46. To sustain these efforts, customized training programmes are necessary for selected staff from MONRE and MAF especially on database management, downscaling of high resolution climate change scenarios, impact assessment, AEZ and Naf-SAR methodology to ensure sustainable use of introduced tools and methods (50 participants trained 3 times in 4 years). Similarly, training resources on Land Resources Information Systems (LRIMS) to be developed under component 2 will be institutionalized as a continuous activity within MAF and MONRE (Training packages, source books on LRIMS will also be developed). The project will assist to integrate data and information on impacts of climate variability and climate change into national agriculture policies, plans and programmes (consultation workshops at national and provincial and local levels organized and at least 4 policies/plans/strategies endorsed by the Government in Agriculture sector). The project will facilitate use of improved data and adaptation practices at local level through similar LDCF projects.

Component 3: Knowledge management, dissemination of information and lessons learned for planning; and monitoring and evaluation

47. The baseline projects have activities related to monitoring, evaluation and sharing of lessons and experiences, but have not explicitly considered a systematic knowledge management and dissemination strategy to institutionalize the interventions to ensure sustainability. The LDCF project will include **additional activities** that will apply a comprehensive framework for knowledge sharing and packaging of lessons learned and experiences. The impact of the investments and technical assistance will be assessed through participatory evaluation. The improvements for agro-climatic monitoring and information systems to promote adaptation will be disseminated for wider use at all levels. The LDCF funds will be used to carry out a final evaluation, and to disseminate good practices and lessons-learned through publications.

48. The LDCF will support to development of adaptation strategies and mainstreaming of data and information into policies, plans and strategies. The adaptation strategies and practices developed based on the advanced agro-climatic monitoring and information systems will be delivered on pilot basis for implementation at field level through other GEF/LDCF projects and is expected to strengthen implementation of activities in support of the 7th National Social and Economic Development Plan (2012 – 2016).

6) Adaptation benefits and innovativeness

49. The adaptation benefits and innovativeness of the project is related to capability of the project in providing a socio-environmental context for the potential impacts of climate variability and climate change which can feed into the development of scenarios, plans and policies relating to agriculture, food security and natural resource management in Lao PDR. The project will provide substantive insight into the distribution of agricultural populations that are vulnerable to climatic variability and change with reference to age and gender as well as access to livelihood resources. The outputs from this approach will support the 7th National Social and Economic Development Plan (2012 – 2016).

50. At the national level, the strengthening of agro-climatic monitoring and information systems will provide input to the development of long term national planning of food security. Customized data and information on climate, land resources, Agro-Ecological Zones and production systems at risk is expected to enhance better integration of climate change concerns into national agriculture policies, plans and programmes. As such a key ministry that will benefit from this endeavour will be MAF through strengthening of their knowledge base, understanding of the socio-economic context of climatic change, access to information and ability to communicate to the users at different levels. Improved coordination between DMH and MAF for sharing of information can lead to improved products and services at a national planning level and provincial support services level. It is then possible that these institutions can start using information and products for proactive and better informed decision making.

51. At the local level, agro-climatic information, disseminated correctly and acted on appropriately, can provide economic benefits through reducing losses of agricultural produce, infrastructure and disruption to people livelihoods. This has further effects on people's health and wellbeing and thus affects communities and

social structures. Communities will immediately benefit through warnings related to agriculture, water and flood management etc. Many of the beneficiaries will be women, especially within the agriculture sector where they often make up the majority of smallholder farmers, yet are most vulnerable to food insecurity. There may also be other benefits to developing the communication systems associated with climate information services. The agriculture sector likely represents some of the largest clients for agro-meteorological advisories and tailored forecasts. Together with the Land Resources Information management Systems (LRIMS) and climate change impact assessments and climate and socio-economic data base, multiple environmental benefits are also expected.

7) Sustainability and potential for scaling-up

52. The sustainability of the expected project outcomes is built into the project approach. The factors that contribute to the sustainability are considered. The sustainability of monitoring networks would depend on effective coordination and monitoring of instruments by the DMH, on development of skills and capacities in instrument maintenance, and on the ability to generate the needed information products for the users. To ensure sustainability of the component 1, the investment and technical assistance activities are aligned to the DHM's five year strategic plan (2011 – 2015). Similarly, the investments on development of the Land Resources Information Management System (LRIMS) and climate change impact assessment tools and methods will be integrated with the ongoing Government priorities and programmes to ensure sustainable operation and maintenance. As the priorities are already part of the Governments strategies, there is an ongoing commitment to sustain the efforts.

53. The LDCF project focuses all provinces to strengthen the agro-meteorological monitoring networks and improving forecast products for agricultural applications. However, there are activities such as conduct of field schools (at least 34 FFS in key agriculture plains) and training of facilitators on integration of climate data and information into FFS curriculum and selected adaptation interventions in major crop production zones/AEZs prioritized by the Ministry of Agriculture and Forestry (MAF) has the potential to up-scale to other similar areas. This is inline with Government's strategy to increase crop production, especially rice. The component 2 of this LDCF project will be built on ongoing LDCF project on "Improving the Resilience of the Agriculture Section in Lao PDR to Climate Change Impacts" implemented by UNDP and NAFRI ensuring that already established methods and tools from selected pilot locations are effectively integrated into a broader framework at national for up-scaling.

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

54. There are number of stakeholders identified during the PIF preparation phase through national level consultations. The expected specific roles and responsibilities of the stakeholders were agreed in principle and detailed discussion will be conducted during the PPG stage to elaborate the technical and in-kind contributions. It is also expected that the there is a scope for additional organizations and agencies to participate in the project preparation and implementation.

Key stakeholders	Role and responsibilities
Ministry of Natural Resources and Environment (MONRE)	Lead national executing Ministry. The MONRE will be the chair of the Project Steering Committee (PSC) and draw members from its departments and other ministries. It was agreed with the World Bank that the Steering Committee will have relevant members of the Mekong Integrated Water Resources Management Project.
Department of Meteorology and Hydrology (DMH)	Lead Executing Department and National Project Coordination Office (Secretariat). The DMH is the main project executing department and is the Secretariat of the project. The Department will coordinate implementation of some of the project components with the Ministry of Agriculture and Forestry (MAF).
Environment Quality and Promotion Department	Member of the Project Steering Committee. National Focal point for GEF.
Department of National Disaster Management and Climate Change, Ministry of Natural Resources and Environment (MONRE)	Steering Committee Member. Focal point for UNFCCC and preparation of NAPA and Second National Communication to the UNFCCC. Participating capacity development programmes related to impact assessment and climate information system.
Environment Management Support	Coordination and collaboration to harmonize spatial information products

Key stakeholders	Role and responsibilities
Resources and Environment (MONRE)	
Land Planning and Development Department, Ministry of Natural Resources and Environment (MONRE)	Coordination and collaboration in development of Land Resource Information Management System (LRIMS) linking to ongoing work on Land Use Master Plans at the national and local level land use plans. The staffs of the department are expected to participate in the capacity development activities of the proposed project.
Ministry of Agriculture and Forestry (MAF); Department of Planning and Cooperation	Sub-Component Coordination Office for activities to be implemented by the Ministry of Agriculture and Forestry (MAF). National executing partner for component 2 of the project.
Center for Statistics and Information, Ministry of Agriculture and Forestry (MAF)	Project Implementing Partner. Collaboration with DMH on Crop monitoring and yield forecasting. Improvement of crop monitoring products and services.
Department of Agriculture Land Development, Ministry of Agriculture and Forestry (MAF)	Project Implementing Partner for development of Land Resources Information Management System (LRIMS) and for preparation of Land Suitability Maps.
National Agriculture and Forestry Research Institute (NAFRI), Research Management Division	Cooperation and collaboration with the ongoing project on "Improving Resilience of the Agriculture Sector to Lao PDR to Climate Change Impacts" led by the Research Management Division of NAFRI.
Department of Forestry, Ministry of Agriculture and Forestry	Cooperation and collaboration in activities related to development of spatial information products and climate change related interventions.
National Geographic, Ministry of Home Affairs	Use of topo maps for preparation of spatial information products related to climate change impacts and also for development of Land Resources Information Management Systems.
Mekong River Commission (MRC)	MRC is involved in Mekong Integrated Water Resources Management Project especially on improving hydrological measurements. Collaboration are foreseen especially on meteorological instrumentation and also awareness raising related to climate change impacts on water resources. MRC's expertise can be drawn for the proposed activity on development of impact scenarios on water availability as part of this LDCF.
Local communities	The local communities, especially farmers will indirectly benefit from the value added and timely weather and climate information for pro-active decision making thereby they can reduce the risks in bad seasons and enhance opportunities in good seasons.

A.3 Risks. Indicate risks, including climate change risks, 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).

Risk	Level	Mitigation
Unavailability of data for development of information products and impact assessment	Medium	Availability of data is the major weakness that the project is aiming to address. However, there are activities embedded into the project framework to compile and quality check all available data for use as part of the project especially for impact assessment and adaptation planning. Additional data sets will be accessed from International specialized institutions and also from FAO databases (eg. GAEZ).
Weak technical expertise at the national level	Medium	The issue of unavailability of requisite human resources will be mitigated by recruitment of international consultants who will work closely with in-country counterparts and by targeted capacity building activities. Training activities of local personnel will also be part of all aspects of the work and the relevant institutions will be encouraged to expand the staff base if it is weak in particular areas.
Weak Information Technology and telecommunications infrastructure at the national level to ensure linkages	Medium	Cost-effective solutions for each particular situation will be used e.g. satellite based measurements. Where feasible automatic weather stations reporting over the mobile telecoms network will be preferred. The proposed restructuring of communication systems by the Ministry of Posts and Telecommunication through e-governance Phase I and Phase II projects.
Insufficient institutional support and political commitments	Medium	The proposed project is strongly supported by Ministry of Environment and Natural Resources (MONRE) and Ministry of Agriculture and Forestry (MAF). The project will therefore take advantage of this opportunity to seek substantial support from the Governments and forge strong partnership with other

Risk	Level	Mitigation
		development partners.
Recent changes in institutional structures and duplication of efforts by various national departments	High	There is a major rearrangement of Ministries and Departments are currently taking place. Detailed consultations have been already conducted with both MONRE and MAF and agreed with the stakeholder analysis and roles and responsibilities were agreed. However, additional consultations will be undertaken during the PPG stage.

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

55. The World Bank is supporting Lao PDR through Mekong Integrated Water Resources Management Project (Mekong-IWRMP). The project aims to strengthen the hydro-meteorological data collection, management, and forecast system for floods, droughts and extreme weather for DMH at Vientiane Capital and the selected priority river basins. Initial discussions were conducted with the World Bank focal point for the possibility of co-financing through this project. In addition, the national steering committee already established for the IWRMP project will be considered for the LDCF project implementation arrangement. This LDCF project will seek specific collaboration with initiatives of the World Bank through Global Facility for Disaster Risk Reduction (GFDRR) especially related to development of strategy for early warning and standard operating procedures for DMH.

56. Asian Development Bank (ADB) is supporting the Government of Lao PDR by funding two projects **Greater Mekong Sub-region: Flood and Drought Management and Mitigation Project – LAO People’s Democratic Republic** (April 2013 – March 2019). One of the main activities of the first project is related to establishment and strengthening of the National Early Warning Center in the Lao PDR in line with the priority identified under the DMHs plan for next five years. Initial contacts were made to request this project as a co-financing project. Detailed further discussion and agreement is expected during the PPG stage. In addition, In addition, cooperation is also expected with the activities of the **Sustainable Natural Resource Management and Productivity Enhancement Project** (June 2009–December 2015). Close collaboration will be established with these project activities to ensure complementarily with the first two components of the proposed LDCF project, which focuses on strengthening agro-meteorological monitoring infrastructure and technical capacity building and institutional strengthening.

57. The ADB support for **Sustainable Natural Resource Management and Productivity Enhancement Project** (June 2009–December 2015) has a component on capacity building for land suitability assessment and participatory land use mapping. This activity is related to component 2 of the LDCF project especially development of land resources information management systems (LRIMS). The subcomponent 1(i) of the ADB support is expected to build land suitability assessment, land-use classification and zoning, and digital mapping skills in participating provincial agriculture and forestry offices (PAFOs). This will require provision of geographic information system (GIS) equipment (hardware and software), training PAFO and district staff in land suitability and participatory land-use mapping and social analysis of land rights and GIS and information management techniques, procurement of digital data sets to facilitate the preparation of land suitability and land-use maps at district level and sustainable operation of resource mapping facility. The component 2 of the proposed LDCF project has activities related to capacity building for climate change impact assessment and land suitability assessment and thus strong coordination will be established to increase synergies and complementarities.

58. National Agricultural and Forestry Research Institute (NAFRI) is involved in a research project on **“Developing Multi-Scale climate change adaptation strategies for framing communities in Cambodia, Lao PDR, Bangladesh and India”**. This ongoing project is funded by Australian Centre for International Agricultural Research (ACIAR). This project aims to assess the impacts of climate change on selected crops. Coordination and collaboration is expected to evolve to harmonize the climate change impact assessment work by transferring FAO GAEZ methodology for climate change impact assessment.

59. UNDP and NAFRI are implementing a GEF LDCF project on **“Improving the Resilience of the Agriculture Section in Lao PDR to Climate Change Impacts”**. The project is being implemented in selected 2 provinces and four districts on pilot basis and has four components: knowledge sharing, capacity

climate change impact assessment and land suitability assessment. It was good during the assessment stage that the lessons learned will be taken into consideration while conducting nation wide analysis as part of the proposed LDCF project.

60. International Centre for Tropical Agriculture (CIAT) has conducted a study on **“Potential Impacts of Climate Change on Land Use in the Lao PDR”** for Lao-German Land Management and Registration Project (LMRP) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The objectives of this study were: (i) to assess the evidence of climate change in the period from 1901 to 2002 and assess the likely changes in the climate to 2050; (ii) to assess the current bioclimatic suitability of Laos for different crops and assess the likely changes in suitability with the predicted changes in climate; (iii) to assess the recent changes in land use and the main drivers of these changes, and (iv) to assess the resilience of the current farming practices and make recommendations that may help prepare for future changes in climate. Consultations were conducted with the CIAT team to identify the possible areas of collaboration during the project preparation and implementation of this LDCF.

61. Coordination and collaboration is expected with a number ongoing and proposed programmes and initiatives by the Government Departments especially land survey, classification and zoning work of Department of Agricultural Land Management of MAF; participatory forestry management, watershed management and remote sensing work being carried out by the Department of Forestry of MAF; Northern upland Development Programme of Department of Planning; preparation of land master plan at national level, village land use planning and sectoral land use planning work undertaken by the Department of Land Use Planning and Land Development within MONRE; and climate change related work coordinated by the Department of National DRM and Climate Change of MONRE.

62. There are number of development partners engaged in initiatives related to various components of the proposed LDCF project. Some of the initiatives are producing topo-maps by National Geographic, Ministry of Home Affairs, Lao Agriculture Land Information System funded by Japan International Cooperation Agency (JICA), Food Security Information Systems by Association of South-East Asian Nations (ASEAN), Agricultural land Management funded by Korea; Forest monitoring and watershed management project supported by Finland; watershed management and capacity development support for strengthening national climate change working group of ADB; Environmental Management Support Programme (EMSP) supported by the Ministry of Foreign Affairs, Finland; proposed programme of UN-HABITAT on strengthening rural infrastructure to enhance resilience to climate risks; and Sustainable Natural Resources Management and Productivity Enhancement Project (SNRMPEP) of IFAD. Initial consultations were conducted with most of the development partners and specific coordination and collaboration will be elaborated during the project preparation phase.

63. FAO is assisting the Lao Government to prepare a GEF LDCF project on **Climate Adaptation in Wetlands Areas (CAWA) in Lao PDR**. Close coordination is expected between the CAWA project and the proposed LDCF project and is expected to be very strong as the lead executing partners for both the projects are from the Ministry of Natural Resources and Environment (MONRE). There are many opportunities for close technical collaboration. As these two projects are expected to be implemented in parallel, the climate change impact modelling work of the proposed LDCF project will provide necessary climate change scenarios, quantitative impact assessment results to prioritize appropriate adaptation practices in Bung Khet Nong (BKN) and Xe Champhone⁵ (XC) wetlands. The investment component of the project on implementation of cost-effective measures to reduce the impact of climate change will also benefit from the quantitative assessment of the impacts and risks through the proposed LDCF project.

64. IFAD grant agreement (2 years project) with Columbia University involving International Research Institute for Climate and Society (IRI) on **“Climate risk management in agriculture with demonstration sites in Laos, Indonesia, and Bangladesh”** employs a collaborative research approach to support capacity development of Lao PDR stakeholders. The project activity for Laos include: preliminary data scoping, climate analysis, modelling and forecasting, preliminary climate risk analysis at the decadal timescale and capacity building events. Close collaboration will be established especially in relation to activities under output 2.1.4 of this project to enhance effectiveness of capacity development efforts. The experiences and

⁵ Update of existing 2012 MRC CC Vulnerability Assessment, Xe Champhone Case study

lessons learned from this demonstration project will be linked to operational institutions (e.g. DMH and MAF) to ensure sustainability.

B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

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

65. The **National Adaptation Programme of Action** to Climate Change (2009) (NAPA) notes that projections of potential climate change and resulting adverse impacts have not yet been developed nationally for Lao PDR, but it is forecast to impact mainly in terms of increased frequency and intensity of droughts and floods. There is a corresponding need to strengthen adaptive capacity to cope with these likely impacts. The main objective of the NAPA is to “develop a country-driven programme to address immediate and urgent needs related to current and projected adverse effects of climate change in key sectors”. These sectors are identified as agriculture, forestry, water resources and public health. NAPA builds on the earlier Disaster Management Strategy and Plan to 2003-2020 and Action Plan to 2010. Natural resource degradation has been identified as a major factor boosting the adverse effects of climate change, and the need to understand the land use, land suitability and agricultural production systems at risk is underscored.

66. The NAPA proposes a number of supplementary activities including provision of computer equipment, and the setting up climate monitoring infrastructure. NAPA recommends that the Government of Lao PDR strengthen the capacity of the National Disaster Management Committee to deal with likely future adverse impacts, strengthen the Climate Change Office, install an early warning system, initiate in-depth studies of the impacts of climate change, formulate a strategy on climate change, and increase reforestation efforts. The proposed LDCF project will contribute to the priority projects in agriculture sector (Land use planning in hazard prone and affected areas and Technical capacities of local agricultural officers in natural hazard prone areas strengthened) and water sector (Water: Mapping of flood-prone areas and Establish an early warning system for flood prone areas, and improve and expand meteorology and hydrology networks and weather monitoring systems). In addition, the agro-meteorological monitoring, analysis and early warning; and information on agricultural production systems at risk will benefit overall adaptation planning and policy advocacy in multiple sectors.

67. Concerning the **National Climate Change Strategy**, this project contributes to the achievement of one important goal that is: “Improve public awareness and understanding of various stakeholders about climate change, vulnerabilities and impacts, GHG emission sources and their relative contributions, and of how climate change will impact the country’s economy, in order to increase stakeholder willingness to take actions”. With reference to the agriculture and food security sector, this project also contributes to the following adaptation option of the National Climate Change Strategy: “Enhancing information dissemination and extension support to LAO farmers in regard to climate change preparedness and responses”.

68. The **Five Year Strategic Plan** (2011-2015) of DMH is evolved to address emerging challenges and responsibilities under MONRE’s Five year Strategic Integrated Capacity Building and Work Programme.

69. To fulfill its mandates, DMH formulated **implementation plan for 2011–2015** on following key tasks: (i) strengthening meteorological stations network including aeronautical and agro-meteorological stations; (ii) improvement of meteorological observation systems in line with WMO’s Information System (WIS) and encoding techniques Table Driven Code Form (TDCF) framework; (iii) mechanism for Data Quality Assurance and Data Quality Control in conforming with the Guides of RA II; (iv) improving climate services by building capacity through WMO’s RA II trainings, workshop as well as collaborating with other agencies, such as Typhoon Committee, ASEAN’s Committees, etc; (v) participation to and get profit of the WMO’s Severe Weather Forecasting Demonstration Project (SWFDP); (vi) install new hydro-met stations with automated digitized system over disaster risk prone River Basins’ areas and design and establish the Early Warning System;; (vii) Strengthen bilateral and regional cooperation, especially active participation to various activities and programmes of WMO RA II (Asia).

70. The project is consistent with the draft **National Early Warning Strategy** paper prepared in 2011 with the aim to operationalize "**Strategic Plan for Disaster Management in Lao PDR**". The National Early Warning Strategy for Lao PDR was prepared under the component 3 on strengthening the Early Warning

Disaster Preparedness Center (DPC). The strategy paper proposes the immediate, medium and long-term requirements. It has emphasized how operationalizing Strategic Plan for Disaster Management (OSPDMD) Activity 3 would fit into this strategy and can be replicated later on a medium and long term basis. The component 1 and 2 of this LDCF project are consistent to this strategy, but are specifically addresses gaps related to agro-meteorological data and information for application in agriculture sector.

71. **The Strategy for Agricultural Development (2011 – 2020)** is the long term framework for the development of the agriculture and forestry sector. Its underlying vision is based on a holistic concept of long-term sustainable development, including economic, social and ecological dimensions. The Strategy sets out two development goals, for the lowland and upland ecosystems respectively. The former is based on modernizing agricultural production adapted to climate change and focused on smallholder farmers, while the latter is centered on conservation of upland ecosystems, food security and livelihoods of rural communities.

72. The Strategy has been more fully fleshed out for the period up to 2015 (which is also the time horizon of the CPF), with an **Agricultural Master Plan (AMP)** and an **Agricultural Investment Plan (AIP)**. Under the Strategy, four goals are specified for the period 2011-15:

- (i) Improvement of livelihoods through agriculture and livestock, with food security as its first priority;
- (ii) Increased and modernized production of agricultural commodities and “pro-poor green value chains” based on smallholders’ organizations and partnering the private sector;
- (iii) Sustainable production patterns, including stabilization of shifting cultivation and climate change adaptation measures adapted to local agro-ecological conditions and ;
- (iv) Sustainable forest management to preserve biodiversity, significantly improve forest cover to benefit local communities, including public and private processing enterprises

73. Under these four goals there are eight programs: The AMP lays out under each of the programs a set of objectives, potential outcomes, targets and key measures for implementation. The AIP complements this by laying out three alternative investment scenarios: 1. “Realistic”, 2. “Conservative” and 3. “Optimistic”, depending upon how much funding is available from (a) the Public Investment Program, (b) Official Development Assistance and (c) Foreign Direct Investment. Category (c) is the most volatile, and (a) the least volatile comparing the three scenarios.

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

74. The Lao PDR ratified the United Nations Framework Convention on Climate Change in 1995 and ratified the Kyoto Protocol in 2003. As a commitment to the Convention, the country submitted the First National Communication to the UNFCCC in year 2000. After submitting its Initial National Communication, several activities were carried out such as Enabling Activities II, National Capacity Self Assessment (NCSA) and National Adaptation Program of Action (NAPA). Lao PDR developed its National Adaptation Programme for Action (NAPA) in 2009.

75. Lao PDR is a Least Developed Country (LDC) making it eligible for funding from the Least Developed Countries Fund (LDCF). The proposed project is consistent with the LDCF results framework, objectives, expected outcomes, core outputs and relevant indicators. The adaptation benefits and additional cost for which the LDCF resources are requested and specific activities will increase the adaptive capacity.

76. The project proposal targets the priority project of NAPA related to strengthening of early warning systems and improves and expands methodology and hydrological networks and weather monitoring systems, land use planning in natural hazard prone and affected areas and strengthening of technical capacities of local agricultural officers. This LDCF proposal focuses only the agro-meteorological component of the climate monitoring and early warning through further prioritization with the Department of Meteorology and Hydrology (DMH), Ministry of Environment and Natural Resources (MONRE) and Ministry of Agriculture and Forestry (MAF).

77. This project will focus on key elements of GEF LDCF objective CCA-1 on reducing vulnerability to adverse impacts of climate change and objective CCA-2 on increasing adaptive capacity to respond to the impacts of climate change. The overall goal is to enhance the capacity for monitoring and analysis of impacts of climate variability and climate change on the agriculture sector to improve food security in LAO PDR. The

project will work in line with GEF strategy to promote sustainable development by supporting climate change adaptation as well as enhancing productivity in agriculture sector.

78. The project framework outlines three components and is aligned with the LCDF objectives and outcomes. Component 1: Strengthening agro-climatic monitoring, analysis, communication and use of data and information for decision making in agriculture and food security Component 2: Strengthening institutional and technical capacity for monitoring and analysis of agriculture production Systems based on development of Land Resources Information Management Systems (LRIMS) and Agro-Ecological Zoning (AEZ) and Component 3: Knowledge management and dissemination of information and lessons learned for planning, monitoring and evaluation All three components contribute to the objective CCA-2, while a part of the component 2 contributes to CCA-1.

79. The strategy of the project is to strengthen the monitoring and analytical capability of the national and provincial institutions to better inform the farmers, institutions and policy makers to reduce risks to economic losses in agriculture sector. The monitoring and analysis tools and methods are aimed to continuously measure and update risks of climate variability and change and vulnerabilities in a cost-efficient way to deliver adaptation benefits. The project will follow the results based management and programmatic approach of GEF/LDCF in enhancing the knowledge and understanding of climate variability and climate change related threats at the country level and in targeted vulnerable areas. All major ongoing and pipeline initiatives of the Government and development partners are taken into consideration to enhance synergies and to avoid potential duplications.

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

80. FAO is the early and leading partner of the Global Framework for Climate Services (GFCS) of WMO and is providing technical support to the member countries for strengthening weather and climate information services for food and agriculture sector. FAO's comparative advantage include: strengthening of agro-meteorological monitoring and observation networks, development of agriculturally relevant weather and climate information services, tools and methods for assessment of climate variability and change in agriculture, and crop monitoring and yield forecasting. FAO provides methodologies, tools for a better understanding and analysis of the effect of the variability of weather and climate on agriculture as well as data and maps and is a prime source of data and information on food, agriculture, land, water, fisheries and forest resources and is at the forefront of gathering and analysing data and dissemination of information.

FAO has developed the Agro-Ecological Zones (AEZ) methodology over the past 30 years for assessing agricultural resources and potential. This amounts to data covering five thematic areas: Land and water resources, agro-climatic resources, suitability, potential and actual yields, production, and production gaps. The GAEZ database provides the agronomic backbone for various applications including the quantification of land productivity. The GAEZ Data Portal⁶, an interactive data access facility, which provides free access to data and information and allows visualization of data, offers the user with various analysis outputs and download options. The GAZ methodology can be readily implemented at the national level.

In the area of food and nutritional security, FAO played a key role in developing the National Nutrition Policy in 2008, and the National Nutrition Strategy and a National Plan of Action for Nutrition in 2009. Under the FAO Multi-Partner Programme Support Mechanism (FMM), FAO facilitated the integration of food security and nutrition into the 7th National Socio-Economic Development Plan and supported the government-led process of establishing a multi-sector coordination mechanism on food security and nutrition under the auspices of the Prime Minister's Office.

81. Under the EU-FAO regional project "Linking Information and Decision-Making to Improve Food Security", FAO contributed to improved food security policies and programmes toward achieving MDG 1. This just completed project aimed at greater availability and access to quantity, quality and timely food security information to support planning, policy and programme decision-making. The key project outputs were: (1) governments and regional organizations awareness and engagement in food security increased; (2) national and regional capacities to collect, analyze and manage food security data increased; and

(3) cooperation between government agencies and civil society organizations. Project activities are organized around four main components: (i) market information, intelligence and analysis; (ii) climate information and analysis for seasonal and long-term timeframes; (iii) chronic food insecurity, livelihood and vulnerability analysis; and (iv) food security related capacity, coordination, dialogue and planning.

82. FAO has been implementing several projects in Lao PDR in the field of agriculture, food security, climate risk management, disaster preparedness and emergency response. FAO's comparative advantage for the proposed project lies in its long-standing experiences working with Government agencies and more specifically with the Ministry of Natural Resources and Environment (MONRE) and Ministry of Agricultural and Forestry (MAF) on issues related to agro-meteorology and climate variability; and agriculture and food security, respectively. Some of the FAO's programmes are complementary to the proposed project and will build on already established institutional systems.

83.

84. The project is directly related to FAO's **Result Based Management Framework** and the new **Strategic Objectives (SOs)** particularly SO2: Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner; and SO5: Increase the resilience of livelihoods to threats and crises. The specific activities relate to assisting member countries in climate change adaptation and delivery of tools and methods.

85. The project fits into the first priority theme of **FAO-Adapt** (Data and knowledge for impact and vulnerability assessment and adaptation), an organization-wide framework programme launched in 2011. It provides general guidance and introduces principles as well as priority themes, actions and implementation support to FAO's multi-disciplinary activities for climate change adaptation. FAO-Adapt provides an umbrella to FAO's adaptation activities, including short-term and long-term adaptation measures. FAO-Adapt aims to enhance coordination, efficiency and visibility of FAO's adaptation work. Technical units in FAO Headquarters and decentralized offices lead the delivery of outputs and actions consolidated under the priority themes defined in the FAO-Adapt Framework Programme.

86. The **Country Programming Framework (CPF)** (2012-2015) prepared for FAO's assistance to the Government of Lao PDR identified "Risk and vulnerability to natural and other disasters, including those induced or intensified by climate change, are reduced by linking prevention, preparedness, response and resilience" as one of the priority outcomes. Within the United Nations Development Assistance Framework (by 2015), the LDCF will contribute to the outcome 8 "the government and communities better adapt to and mitigate climate change and reduce natural disaster vulnerabilities in priority sectors" The outcome outlines the need to support the government of Lao PDR to address institutional and capacity needs.

87. FAO possesses demonstrated experience and capability to provide technical assistance to the Government of Lao PDR especially in agriculture sector focusing on enhancing capacity for monitoring and analysis of impacts of climate variability and climate change on the agriculture sector to improve food security. The FAO Lao PDR Office is staffed with adequate technical staff working on various programmes linked to the proposed project. An inter-disciplinary Project Task Force will be established in FAO to support the project. The FAO Regional Office for Asia and the Pacific (FAORAP) in Bangkok and from the Climate, Energy and Tenure Division (NRC) and Land and Water Division (NRL) in FAO headquarters will technically support the project.

The country office can mobilize complementary national and international technical expertise within FAO (Regional Office in Bangkok and FAO Headquarters in Rome) and provide in-country support for the execution/supervision of the proposed LDCF project.

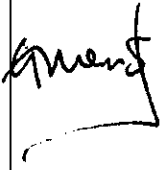
PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

- A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):** (Please attach the Operational Focal Points endorsement letter(s) with this template. For SGP, use this OFF endorsement letter).

NAME	POSITION	MINISTRY	DATE (MM/DD/YYYY)
Khampadith KHAMMOUNHEUANG	Director General	Environment Quality Promotion Department, Ministry of Natural Resources and Environment, P.O.Box 7864, Vientiane, Lao PDR	APRIL 24, 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/Y YYY)	Project Contact Person	Telephone	Email Address
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