MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT

DEPARTMENT OF DISASTER MANAGEMENT AND CLIMATE CHANGE

GUIDELINES ON

ECOSYSTEM-BASED ADAPTATION PRACTICES IN LAO PDR

2013

FOREWORD TO THE EBA GUIDELINES

Adaptation to climate change is increasingly becoming a key concern in the national development agenda, without which our country will be ill equipped to reach the Millennium Development Goals or the Socio-Economic Development Plan set forth by the Government of Lao PDR. Historically, adaptation planning has placed too great an emphasis on infrastructure-based solutions to climate change without adequately considering the vital importance of the role played by key ecosystem services, not only in directly supporting climate change adaptation but also in providing a host of other benefits for human well-being.

In recognition of this, the Department of Disaster Management and Climate Change, together with its partners and stakeholders, has developed these guidelines on Ecosystem-based Adaptation planning as a tool for adaptation at national and sub-national levels which are presented here by the Department as a key step toward full mainstreaming of the Ecosystem-based Approach across relevant sectors. We still have more to do, working together to take forward this approach through direct implementation in a variety of contexts in order to refine and enhance its effectiveness as a practical tool for adaptation across relevant sectors and geographic contexts.

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We would like to acknowledge the contribution of different national and provincial authorities in Lao PDR to finalize these guidelines. At the national level, guidance was provided by the Climate Change Technical Committee comprising of various line ministries. At the sub-national level, we acknowledge with gratitude inputs from the Champasak Provincial Governor's Office, Provincial Office of Natural Resources and Environment, Phathoumphone District Governor's Office, the District Office of Natural Resources and Environment, Champasak Provincial Agriculture and Forestry Office, Phathoumphone District Agriculture and Forestry Office, and Champasak University.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

This document presents Operational Guidelines for Ecosystem-based Adaptation (EbA) that aim to provide robust and detailed guidance to decision makers involved in sub-national decision making for assessing and implementing EbA measures. The EbA guidelines reflect the systemic complexity of climate change patterns and ecosystems, yet are accessible and systematic enough to be applied by planners and practitioners in Lao PDR—including situations where resources and capacity may be limited.

The development of the guidelines was guided by a need, expressed by relevant government units and the development and donor communities, to provide a template suitable for the analysis of vulnerability and the selection of adaptation options at the sub-national level in Lao PDR. They are divided into two sections:

> **Section I** provides a brief explanation of EbA and the rationale for integrating it as part of adaptation options and strategies in Lao PDR. This section focuses on the need for operational guidelines and their target users in Lao PDR and briefly explains the role of the target users in national and/or sub-national decision-making.
>
> **Section II** describes the design of the guidelines and provides guidance for applying them to achieve better climate change adaptation outcomes. This section includes a conceptual design (ecosystem-development nexus), the use of robust analytical methodologies (scenario-analysis, spatial concepts, cost-effectiveness analysis, and participatory methods) and detailed guidance that is applicable at different scales to make EbA more relevant to development planners and policy makers.

The guidelines consist of 4 steps and provide detailed guidance for each step.

Step 1: **Vulnerability assessment** of Social ecological system
Step 2: Identification and Prioritization of **EbA measures**.
Step 3: **Implementation** of EbA measures
Step 4: **Mainstreaming** EbA

Steps 1 and 2 focus on vulnerability assessment and adaptation options that have been field-tested in two sites, one each in Lao PDR and Vietnam. Steps 3 and 4 provide guidance on longer-term implementation and mainstreaming based on different literature and case studies.

These steps were preceded by preparatory steps that included decision on the boundary of the social ecological system and setting up a multidisciplinary task team.

To assist in applying the steps, users are provided with:

- A checklist that summarizes the key actions needed for each step.
- A snapshot of intermediate steps or sub-steps, objectives, outputs and tools and methods available to complete that step for Steps 1 and 2.
- Discussion on each step in the context of Lao PDR and possible integration with existing planning processes.
- Detailed guidance in the form of processes and/or guiding questions for stakeholders for all steps.
- Links to additional resources that might be useful in accomplishing each step.

These operational guidelines build upon existing experience and processes familiar to the governments in Lao, and is supported by a literature review. Different concepts used in the guidelines such as social-ecological system, vulnerability and resilience, and so forth are briefly explained in this document and discussed in greater length in the Literature Review, which can be used as a reference document if necessary

The operational guidelines are intended as a starting document for EbA assessment. While sufficient guidance on "what is needed to make a decision" and "how to get it" is provided here, it is expected that the users will modify and fine-tune the guidelines based on their particular objectives, context, needs, available time and budget. These guidelines have been field-tested in Champasak Province and a case study based on the field-testing is available as an example of the use of the guidelines and for further reference.

II. BACKGROUND AND RATIONALE FOR THE DEVELOPMENT AND IMPLEMENTATION OF EBA GUIDELINES IN LAO PDR

COUNTRY CONTEXT AND CLIMATE CHANGE IN LAO PDR

Climate change is a major sustainable development barrier threatening to put significant pressure on human wellbeing and the natural systems that sustain it. Communities worldwide already experience erratic, severe and costly changes in natural patterns that undermine human development and push people into, or further into, poverty. In the Southeast Asian region the Intergovernmental Panel on Climate Change (IPCC) forecasts a 2.4-2.7ºC rise in mean annual temperature, a 7 percent increase in wet season rainfall, and longer dry seasons by the end of this century. These changes are expected to result in more frequent extreme and severe weather events, including typhoons, floods, storm surges, and prolonged droughts.

Lao PDR has been recognized as one of the countries that are most vulnerable to climate change impacts due to its particularly high dependence on climate-sensitive natural resources and low adaptive capacity. For example, the whole agriculture sector (farming, animal husbandry, forestry, and fisheries) is directly dependent on land and climatic resources (temperature and rainfall). The industrial sector is also by and large resource-dependent with mining, agricultural processing, hydropower, and wood processing as the main sub-sectors. Energy and Transport are particularly sensitive areas, where Lao PDRs' hydropower potential and strategic territorial position within one of the world's fastest growing regions can contribute to regional sustainable energy solutions. Moreover, the poor strongly depend on biodiversity and natural resources for their livelihoods, such as the provision of fish and aquatic resources, which presently make up about 90 percent of local protein consumption in many areas, and non-timber forest products (NTFPs), which account for an estimated 30 percent of Lao PDR's GDP.

Climate change is likely to pose formidable threats to development, economy and society at large. The Global Facility for Disaster Reduction and Recovery reports that mean annual temperatures in Lao PDR are projected to increase by 1.4 to 4.3ºC by 2100, with similar projected rates of warming for all seasons. Mean annual rainfall is projected to increase, with the most significant increases expected in the wet season and a decrease in the dry season. An increase in floods is expected to have severe implication on agriculture lands. The increase in temperature and decrease in rainfall in the dry season is expected to prolong and exacerbate the severity of droughts making more than 188,000 households food insecure, especially in the rural areas (World Bank 2011). Therefore, adaptation to climate change is a critical development issue in Lao PDR.

ECOSYSTEM-BASED ADAPTATION (EBA) AND ITS RELEVANCE TO LAO PDR

Ecosystem-based adaptation (EbA) is defined by the Convention on Biological Diversity (CBD 2009) as "the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change." As one possible element within a broader portfolio of adaptation measures, EbA uses sustainable management, conservation, and restoration of ecosystems to provide services to facilitate human adaptation to the adverse impacts of multiple pressures, including climate change (Chapin *et al.* 2009; CBD 2009; Piran *et al.* 2009). Ecosystem-based Adaptation builds upon and utilizes approaches that already exist and are central to natural resource management, community-based conservation and sustainable development.

For Lao PDR, EbA can provide adaptation solutions that are consistent with national development and adaptation goals such as food security, conservation of natural resources and sustainable development. The national policies in Lao PDR, especially the National Strategy on Climate Change and the seventh National Economic and Social Development Plan put emphasis on a climate resilient development that promotes sustainable economic development and enhances the quality of the natural environment. People's livelihoods and key economic drivers in Lao PDR—such as industries, hydropower and tourism—are dependent on natural resources including forests, water resources, biodiversity and other ecosystem services. EbA addresses the crucial links between climate change and these resources—considering natural resource management through a lens of enhancing community resilience. EbA also builds on existing capacities and efforts on natural resource management such as sustainable forestry, integrated water resource management, biodiversity conservation etc. Most of the time, EbA also offers solutions that are cost effective and considered "low regret" or "no regret" (i.e. activities that yield benefits even in the absence of climate change; for example, improved forestry/watershed management).

By helping to build human resilience and ensuring sustainability of ecosystem services, EbA measures also reduce the risk of maladaptation. Planners and decision-makers in Lao and elsewhere have a range of adaptation pathways available to them that are generally divided into three categories: *hard*, or sometimes referred to as *grey* adaptation, *soft* adaptation, and *green* or *Ecosystem-based* Adaptation (EbA); although some practitioners group green adaptation measures with soft adaptation measures[1]. Historically, there has been a bias for hard solutions at the national and some regional planning levels, (Parry et al. 2009) however soft and green solutions may offer new pathways that are safer and cost less. Hard solutions have especially been implemented in the water sector where dams, dikes, and wells have been built. However, decades of experience in development and disaster risk reduction (DRR) have shown, that large-scale, hard infrastructure interventions are expensive and often only provide part of the solution to meeting people's livelihood needs (ELAN 2012). Though providing instant localized protection, they may work against the environment by disrupting and limiting ecological processes, thereby possibly leading to maladaptation and increased social vulnerability (CBD 2009). For example, infrastructure-based solutions often cause offsite problems for downstream ecosystems and communities (Hirji and Davis 2009).

Compared to hard adaptation efforts, EbA is generally considered to be more accessible to rural communities, and offers co-benefits such as soil management, water regulation, carbon sequestration, and livelihood diversification opportunities. However, since the EbA concept is relatively new, a strong body of evidence for its overall effectiveness including cost effectiveness has yet to accrue. Ecosystems have limits beyond which they cannot function effectively and these limits are complex and sometimes unpredictable. How climate change may affect them, and if and when their tipping points may be reached are both still largely unanswered questions (ELAN 2012). Hence, there is still a need for research, groundwork and collection of evidence to realize the full potential of EbA.

BACKGROUND ON THE EBA OPERATIONAL GUIDELINES

While EbA builds upon a vast array of other disciplines, such as natural resource management, restoration ecology, sustainable development, and community-based

[1]Hard approaches are characterized as capital-intensive, constructed-engineered solutions; soft approaches are characterized as focused on institutions, behavioral and policy approaches such as regulatory framework; and green approaches are characterized by an ecosystem-based/environmental management approach (The World Bank 2010b, EEA 2010).

conservation, more work is needed to advance the integration of ecosystem based approaches in adaptation and development planning. The UNFCCC notes that a "lack of knowledge tools, including case studies….demonstrating the effectiveness of ecosystem-based approaches, decision-making at the local level, cost–benefit analysis tools to map different costs and benefits associated with ecosystem-based approaches for adaptation and best practice guidelines and guidance documents" are key impediments to mainstreaming ecosystem-based approaches in adaptation policies and planning (UNFCCC 2011). Decision makers must be convinced that green or EbA measures are capable of meeting their adaptation objectives. This will require a systematic consideration of the applicability, limitations and risks of EBA options as compared to traditional, often hard infrastructure alternatives.

The key needs in Lao PDR include increasing awareness and capacity for adaptation including EbA, guidance on considering, assessing and implementing EBA measures, and building an evidence-base of how EbA contributes to reducing vulnerability.[2] The operational guidelines for EbA (also referred to as 'the guidelines' or 'EbA guidelines') proposed here provide technical guidance to Lao PDR to help the government assess and implement EbA measures, and integrate this approach into their planning and policy systems. The guidelines enable the users to consider EbA while formulating and prioritizing adaptations.

The guidelines emphasize the importance of community participation and build on the community based adaptation (CbA) approach, which is especially relevant to district and provincial level actions. However, the guidelines also have scale flexibility, so that they can be used at different levels, including sectoral and national levels.

The guidelines acknowledge that EbA may not always be the most suitable adaptation option in all contexts and that the final decision on adaptation options depends on the context and factors at play.

The objective of the guidelines is to provide a resource that helps users:

1. Understand the interaction within a social-ecological system (a system comprising of both bio-physical elements and socio-economic systems);
2. Assess current and future risks and vulnerability of the SES;
3. Design and prioritize adaptation measures;
4. Design and implement EbA projects; and
5. Mainstream EbA in the national and sub-national policy and planning processes.

Target Audiences for EbA and EbA guidelines in Lao PDR

The EbA guidelines are targeted to policymakers, planners and practitioners involved and/or interested in decision making for climate change adaptation at the sub-national level. These include:

[2] Identified through stakeholder consultation.

i. Ministries: Prime Minister's Office, Ministry of Natural Resources and Environment, Ministry of Agriculture and Forestry, Ministry of Planning and Investment, Ministry of Industry and Commerce and the National Agriculture and Forestry Research Institute.

ii. Provincial Level: Provincial Governor's Office, Provincial Office of Natural Resources and Environment, Provincial Agriculture and Forestry Office, Provincial Office of Planning and Investment, Provincial Office of Industry and Commerce.

iii. District Level: District Governor's Office, District Office of Natural Resources and Environment, District Agriculture and Forestry Office, District Planning and Investment Office, District Industry and Commerce Office.

iv. Village level: Village cluster/Kum Ban Leaders, Village Management Authority.

v. Other practitioners: Related NGOs and NPAs, Development Partners, Companies

Roles of these various organizations in facilitating EbA initiatives, policies and planning processes are expanded below:

TABLE 1: ROLES AND RESPONSIBILITIES OF RELEVANT AGENCIES

Organization	Roles
Ministry Level	
Prime Minister's Office	1. Decision making for development project design: 2. Approving decision for large concession projects; 3. Report on natural resource and environment management
Ministry of Natural Resource and Environment/MoNRE	1. Developing national strategies, Laws, Decrees, Policies, Guidelines; 2. Project development, planning, management, and monitoring; 3. Preparing and reporting on NRM.
Ministry of Agriculture and Forestry/MAF	1. Developing national strategies, Laws, Decrees, Policies, Guidelines; 2. Project development, planning, management, and monitoring; 3. Preparing and reporting on Forest, Agriculture, Livestock, and irrigation management; 4. Approving forest and agriculture land concessions.
Ministry of Planning and Investment/MoPI	1. Leading on national SEDP; 2. Approval-granting agency for development and concession projects; 3. Coordination on collaboration.
Ministry of Industry and Commerce/MoIC	1. Developing national strategies, Laws, Decrees, Policies, Guidelines; 2. Project development, planning, management, and monitoring; 3. Prepare and reporting on trade; 4. Approval-granting agency for commercial concession projects; 5. Approval-granting agency for export of NRM and Agriculture products.
NAFRI	1. Developing the new adapted species of agriculture and NTFPs; 2. Recommendation and planning for Agriculture and timber species planted; 3. Center of Agriculture and Forestry technical skill.
University	1. Teaching; training.
Province Level	
Provincial Governor Office	1. Managing Provincial-SEDP implementation; 2. M&E on Forest and NRM; 3. Approval-granting agency for development projects; 4. Approval-granting agency for concession projects; 5. Decision making on Forestry, NRM, and Agriculture development and management; 6. Reporting on NRM, and SEDP

Provincial Office of Natural Resource and Environment /PONRE	1. Land use planning and land allocation; 2. Implementation of NRM; 3. Raising awareness on the Environment; 4. Disaster management and adaption option development for climate change.
Provincial Agriculture and Forestry Office/PAFO	1. Forestry and Agriculture extension, 2. Agriculture, Livestock, and Fishery technical guidance; 3. Irrigation planning;
Provincial Office of Planning and Investment /POPI	1. Lead on provincial SEDP; 2. Approval-granting agency for concession projects; 3. Coordination on collaboration, 4. Approval-granting agency for development projects; 5. Reporting on NRM, and SEDP.
Provincial Office Industry and Commerce /POIC	1. Trading development; 2. High value added market extension; 3. Price information support; 4. Supporting SME's.
District Level	
District Governor's Office	1. Managing District-SEDP implementation; 2. M&E on Forest, NRM, and Agriculture extension; 3. Reporting on NRM, and SEDP.
District Office of Natural Resource and Environment /DONRE	1. Leading on implementing land use planning, Environmental management, Forestry and Natural Resource Management; 2. Reporting.
District Agriculture and Forestry Office/DAFO	1. Leading on implementing forest management; 2. Implementing Agriculture extension; 2. Reporting.
District Office of Planning and Investment /DOPI	1. Leading on district SEDP; 2. Coordination; collaboration, 3. Monitoring of development projects; 4. Reporting on NRM, and SEDP.
District Office of Industry and Commerce /DOIC	1. Implementing trade development; 2. Implementing market extension; 3. Reporting.
Village Level	
Village cluster/Kum Ban	1. Lead on implementing land use planning, Environmental management, Forestry and Natural Resource Management; 2. Primary Implementation of forest management; 3. Implementation of agriculture extension; 4. Reporting.
Village Management Authority	1. Joint implementation for Land use planning, Environment management, Forestry and Natural Resource Management; 2. Main Implementing agency for forest management; 3. Recipient agency of agriculture extension.
Outside support	
Related NGO's and NPA	1. Supporting all related technical skills on livelihood development, forest management, and NRM.
Extension companies	1. Supporting investment and extension projects.

Process for customizing the EBA guidelines

This document was prepared following the guidance of a draft "Generic EbA Operational Framework which in turn was produced based on existing literature and expert consultation on methods for assessing EbA options. A literature review exists as a companion piece for the generic framework and provides conceptual clarity for all the concepts discussed within this guidance. The generic framework was finalized in part based on the experience of producing and piloting this customized framework in Lao PDR.

The customization was facilitated by the following:

i. *Consultations with stakeholders and analysis of policy and planning processes:* Multiple discussions with the national and provincial governments of Lao PDR, in both one-on-one meetings and group discussions added significant value to this document. The Department of Disaster Mitigation and Climate Change (DDMCC) under the Ministries of Natural Resources and Environment was the primary government counterpart for developing these guidelines.

An analysis of policy and planning processes was done to ensure that these guidelines can be institutionalized in relevant policies and planning processes in Lao PDR. A stakeholder working group was established for Lao PDR comprising key government and non-governmental agencies including academic institutions, which provided guidance in drafting the guidelines and maintaining its relevance to key policies and planning processes.

The customization process included:

- Discussion of the relevance of the identified steps to Lao PDR and how they could be implemented;
- Identification of agencies and planning processes that particular steps could be useful for, where relevant; and
- Identifying policy entry points for EbA in the mainstreaming process.

Details of the customization of each step of the guidelines are included in the corresponding steps.

ii. *Field-testing:* This document has been field-tested for its effectiveness and relevance in the catchment of the Beung Kiat Ngong wetland complex in Phathoumpone District, Champasak Province in Southern Lao PDR; an area which supports a human population of 11,500 people from eight core and five surrounding villages. The field-testing in Champasak--together with the discussion with the stakeholders in Lao PDR--has provided ground-truthing and allowed for valuable insights specific to Lao PDR to be incorporated in these guidelines. A summary of these discussions is provided in Annex 1.

III. EBA GUIDELINES

A set of guiding principles--based on the literature and on experiences of different organizations--was used to design the guidelines (Box 1). These provide the socio-economic development context and highlight uncertainties surrounding the understanding of climate change impacts. These principles should be considered when modifying and/or applying the guidelines in a particular context.

Box 1: Guiding Principles

- Climate change adaptation must be integrated into a broader sustainable climate-resilient development agenda.
- The assessment of vulnerability and adaptation options should adopt a system perspective recognizing the connectivity between vulnerability of ecosystems and vulnerability of communities.
- Adaptation strategies must be custom-made and recognize the value of ecosystems services in building human resilience.
- Action must take place at the lowest appropriate level, with pilots at the local level that involve multi-stakeholder participation at all levels. Scale-appropriate integrated methodologies must be considered, with specific attention to integrating community based adaptation (CbA) and EbA at the local level.
- A two-way flow of knowledge transfer is necessary in identifying risks and designing adaptation responses that includes recognition and transfer of local knowledge from communities and scientific data and tools for adaptation from practitioners, including climate change forecasts/projections/analyses, alternative future scenarios, long-term planning, and spatial analysis.
- Despite various information gaps and much uncertainty about the possible effects of climate change on local weather patterns, meaningful scenarios can be developed on which to base decision-making and identify "no regret" actions.
- Early climate change adaptation action is a part of a responsible precautionary approach to sustainable development.
- An adaptive management approach should be used where there is a willingness to change focus and pathways mid-stream if needed (Andrade et al. 2011). Actions should be flexible and allow for application of several strategies aimed at achieving the same goal..

The basic conceptual architecture of the guidelines is presented in Figure 1. It consists of:

1. the context of different components of the social-ecological system (SES), i.e. broader human (communities) and biophysical (ecosystem) conditions, including processes within social and biophysical systems;
2. existing and future key drivers of change such as development activities and climate change; and
3. current and future vulnerability depending on exposure, sensitivity and adaptive capacity of the social ecological system.

Based on these, adaptation actions--including those relevant to EbA--are identified, prioritized and implemented.

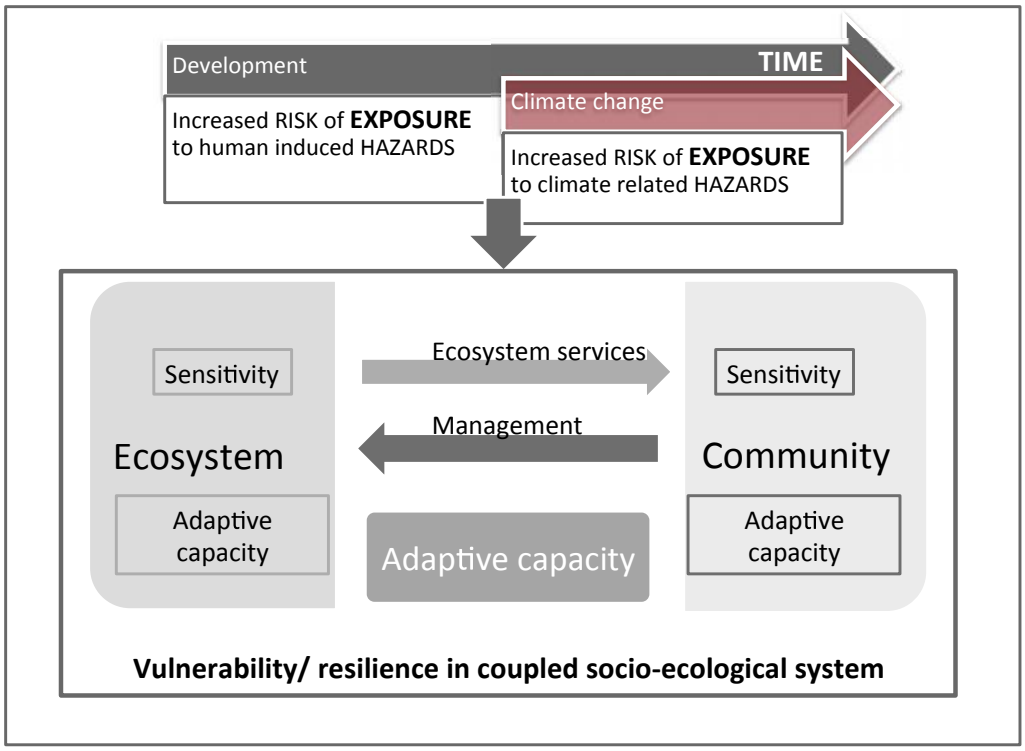

FIGURE 1. CONCEPTUAL ARCHITECTURE OF THE EBA GUIDELINES ADOPTED FROM UNFCCC, 2012 AND LOCATELLI, 2008

While conceptual aspects are discussed in detail in the literature review, these guidelines focus on the operational aspects of implementing EbA in Lao PDR. These guidelines build on other vulnerability assessment guidelines and apply an ecosystem and ecosystem services lens. As such, the guidelines are structured to provide step-wise guidance to integrate ecosystem services considerations in each step of an assessment leading up to the design and implementation of adaptation options, including EbA activities and their subsequent integration in different planning processes. Detailed procedures are provided for the 4 distinct steps that make up the guidelines. Steps 1 and 2 have been field tested in Lao PDR; steps 3 and 4 are generic guidance based on different literatures and case studies.

Step 1: **Vulnerability assessment** of SES
Step 2: **Identification and Prioritization** of EbA measures.
Step 3: **Implementation** of EbA measures
Step 4: **Mainstreaming** EbA in planning processes

Monitoring and Evaluation (M&E) is also considered an important element of the guidelines and essentially crosscuts all the steps. Table 2 provides a snapshot of the first two steps and sub-steps of the guidelines.

TABLE 2. STEPS AND SUB-STEPS OF THE EBA GUIDELINE

Step 1: Vulnerability assessment	Step 2: Adaptation Measures
1.1 Understanding the current context of SES communities (Current community SES profile—socio-economic profile and ecosystem linkages)	2.1. Identifying adaptation strategies including EbA
1.2 Understanding ES in the area	2.2. Prioritizing EbA measures using Multiple Criteria Analysis including a cost-effectiveness analysis
1.3 Understanding threats from current climate change impacts to the communities	
1.4 Understanding threats and opportunities from socio-economic dynamics to the communities	
1.5 Understanding threats from current climate and non-climate risks to the ES	
1.6 Creating Future Scenarios to identify future vulnerabilities to climate and non-climate change.	
1.7 Calculating and ranking exposure, sensitivity and adaptive capacity for hazards	
1.8 Summary and a vulnerability matrix	

Table 2 is expanded upon below in tables detailing each step of the. Since many of the steps are common to other guidelines, this explanation is provided especially to help practitioners understand why a particular step is important to EbA. The tables also indicate the desired outputs of each step and offer some examples of tools and methods that practitioners can use to achieve the indicated outputs and objectives.

STEP 1 . VULNERABILITY ASSESSMENT OF COMMUNITIES AND ECOSYSTEMS:

Box 2: Checklist for Step 1

- ✓ Identify the boundary of the relevant social-ecological system in consultation with the government.
- ✓ Identify vulnerable groups (or sectors) and areas.
- ✓ Identify relevant stakeholder groups—being careful to include lower income groups, ethnic minorities, women's groups, and other actual or potentially marginalized groups.
- ✓ Identify local resource persons and/or local champions.
- ✓ Consult relevant stakeholder and focus groups.
- ✓ Identify key linkages between the socio-economic sectors (e.g., livelihood of the communities) and ecosystem services.
- ✓ Identify and map major ecosystem services and ecosystem areas.
- ✓ Assess issues arising from climate change and non-climate change for each vulnerable group.
- ✓ Document spatially and temporally relevant information such as what time of year certain patterns occur.
- ✓ Assess past and current climate and non-climate risks to ecosystems.
- ✓ Asses future risks from climate hazards based on climate change projections.
- ✓ Assess future risks from non-climate pressures based on development plans and other factors.
- ✓ Assess the level of vulnerability for each vulnerable group/sector or area.
- ✓ Share and validate vulnerability assessment findings.

In the vulnerability assessment it is necessary to set the context of adaptation including who and what components of coupled socio-ecological systems are vulnerable and what are the risks or threats. The guidelines use an ecosystem (holistic) lens to facilitate an integrated understanding of vulnerability drivers as well as identify who (or what groups) is vulnerable to specific climate hazards.

A thorough vulnerability assessment is one of the most important aspects of applying the guidelines as it builds understanding of key dimensions of the climate change adaptation challenge. Since subsequent analyses and decisions will be based on the vulnerability assessment, it is important to allocate enough time for this process. Depending on the scope and scale of the assessment, one to three (or more) months may be required.

While there are many existing methodologies for conducting a vulnerability assessment for communities, the methods for assessing risks to ecosystem services are fewer. The steps outlined here have been developed based on the adaptation literature and on lessons from vulnerability assessments conducted by WWF, MRC, ADB, USAID and others in the Greater Mekong region. These lessons include:

i. the perceptions and past experiences from the vulnerable communities (often gathered using participatory rural assessment tools;
ii. Climate hazards and impacts identified by scientists including downscaled models;
iii. The results of spatially explicit analyses and processes including scenario development.

The processes and products outlined below represent one way of assessing vulnerability related to ecosystems and ecosystem services. It focuses on one particular analytical tool, InVEST, and draws on other assessment tools to a lesser degree. Users of these guidelines are encouraged to review all relevant data and context and should modify the steps and guiding questions provided below accordingly. It is important to remember that:

- vulnerability assessment is an iterative process; and
- there is no single, most appropriate methodology, approach, or set of tools for assessing vulnerability.

Before starting the vulnerability assessment, it may be important to:

- Identify the site and decide on the boundary (if has not already been done). In doing this, consider the following:
  - Identify key stakeholders that are either interested in or involved in similar adaptation initiatives. Examples of these stakeholders include: government agencies, especially the Ministry and Department for Disaster Management and Climate Change (DDMCC), Natural Resource and Environmental Management Planning, Kum Ban leaders, international NGOs and local civil society organizations. Meet with these stakeholders to better understand their perceptions priority risks and vulnerabilities, and to identify any ongoing or potential activity that can be linked to. Early communication with these key stakeholders will contribute to making the objectives and scope more realistic and can also help in identifying the sites.
  - Consider defining the area of analysis in terms of administrative boundaries.
  - Discuss and agree on the membership of, and terms of Reference for, a Steering Group to be Chaired by the District Governor's Office, and to include, DoNRE, PoNRE, PAFO, DAFO, Planning & Investment, and Kum Ban (Village Cluster) leaders, amongst others, to oversee the planning process.

Identify skill sets needed and establish a team.

- Depending on the objective, decide on the ideal skill sets needed and assemble a multidisciplinary team covering as many of these as is possible. Key capacities might include, for instance: integrated planning, group process facilitation, research and data analysis skills, knowledge of climate change and its likely impacts, knowledge of ecosystems and livelihoods, knowledge of relevant sectors such as agriculture, skills for policy and institutional analysis, skills for qualitative interviewing and rural appraisal, knowledge of GIS, and knowledge of environmental economics. Engagement of experts for specific processes (e.g. cost effectiveness analysis, spatial analysis, etc.) should also be considered.

- Discussions should be held with other projects to see whether a collaborative team can be assembled.

- Identify and engage local resource persons who are well respected in the study area, know the area well and can convene a group of people. Local governments can also act as local resource persons and/or help identify the resource persons.

- As it may not always be possible to assemble experts in all of the areas, or teams experienced in the data collection, the identified skills should be used to prepare an audit of the skills of the team against the ideal skill set, and if required, briefings and preparatory training arranged.

TABLE 3. SNAPSHOT OF STEP 1 – CARRYING OUT VULNERABILITY ASSESSMENT

Stages	Objective	Outputs	Tools
1. Assessing vulnerability of SES	EbA lens: Current and future risk and vulnerability of the social-ecological system		
1.1. Understanding the context of SES (communities, their demographic, socio-economic conditions, key sources of livelihood and how they are supported by the ecosystem services).	To understand different groups within the communities and their current dependency on ecosystem services for their livelihood and other purposes.	i) A community profile of the study area. ii) List with ecosystem services ranked in accordance with their level of importance in the communities. iii) Groupings of key beneficiaries from the ecosystem services.	Tool 1: Secondary research and data collection. Tool 3: PRA Tool 3.1: Focus group discussion (FGD) Tool 3.2: Seasonal calendar Tool 3.3 Community mapping
1.2. Understanding and mapping ecosystems and ecosystem services in the study area.	To identify major ecosystem services provided (including key species if relevant) to the communities and other socio-economic sectors in the study area.	i) A map of the community identifying ecosystems and ecosystem services. ii) Digital Map of the study area showing key ecosystem services and their current distribution and amount.	Tool 5: Expert judgment Tool 3: PRA Tool3.1: FGD Tool 3.3: Community mapping
1.3. Understanding current threats or risks from climate change to the	To understand climate characteristics in the study sites.	i) Hazard map and hazard ranking.	Tool 3: PRA Tool 3.1: FGD

communities.	To understand key concerns of the communities with regard to climate change and analyze the risks and impacts on different stakeholders/groups within the communities.	ii) Seasonal calendar with climate risks. iii) Past trend identifying climate hazards. iv) List of coping strategies.	Tool 3.3: Community mapping Tool 2.2: Historical timeline
1.4. Understanding threats and pressures from non-climate risks and different socio-economic dynamics including potential development plans on the communities.	To understand whether the existing socio-economic dynamics can increase or decrease the resilience of communities to cope with climate change. To understand how such change in socio-economic dynamics over time may push the community to be more (or less) resilient.	i) A list of socio-economic factors that make the community vulnerable. ii) Potential development plans and its projected impacts.	Tool 1: Secondary research and data collection (Policy review) Tool 3: FGD/ Key informant interviews
1.5. Understanding the threats from current climate and non-climate risks to the ecosystems and ecosystem services.	To assess the impacts of climate change and socio-economic dynamics to the ecosystem, in particular key ecosystem services and species. To assess how long ecosystems take to recover.	Current climate and non-climate risks and impacts identified.	Tool 1: Secondary research Tool 3: FGD Tool 5: Expert judgment
1.6. Creating future scenarios to identify future vulnerabilities to climate and non-climate change.	To identify potential risks and impacts from climate change and socio-economic dynamics in future based on climate change Projections. To identify how land-use will change under different scenarios in future (spatial analysis).	Future risks and impacts from climate change and development pressures identified; different scenarios for the future developed.	Tool 5: Experts judgment Tool 4: Scenario analysis Tool 4.1: Modeling and simulation
1.7 Assessing exposure, sensitivity and adaptive capacity.	To assess and rank how vulnerable each sub-component/sector is.	Risk and Vulnerability Ranking	Tool 3: FGD Tool 5: Expert judgment
1.8 Summarizing the information and creating vulnerability matrix.	To summarize and analyze the information collected	Vulnerability matrix	Tool 3: FGD Tool 5: Expert judgment

1.1. Understanding the context of SES

Notes on customization:

- Secondary data collection can be a significant challenge as many relevant projects and processes have poor collation and information sharing systems. Support may be needed to improve information management in these cases.
- Although some government staff have experience in assessing the use of direct goods from ecosystems, the wider concept of ecosystem services is new to most people.
- Teams have considerable experience in direct collection of information from communities, but have less experience in facilitating discussion with communities to explore issues. Similarly there is less capacity in spatial, or "systems" approaches to analysis of data.
- Vulnerability assessment has a requirement for social science skills, which need to be combined with the technical skills in the teams.
- In order for EbA to be mainstreamed into both adaptation planning and development planning, the initial field data collection could be combined, rather than leaving integration until the planning stage. This would not only allow true integration but would reduce the costs and the burden on communities whose livelihood activities can be disrupted by planning activities.

Products, recommended process, and methods/tools for carrying out Stage 1.1.

Products:

(i) A community profile of the study area; (ii) List ranking ecosystem services that are important to the communities; (iii) Groupings of key beneficiaries from the ecosystem services

Process:

- Identify and obtain the existing socio-economic data on communities (e.g. governance, age, gender, education/skill level etc.) and their livelihoods (e.g. types/sources of production of food and materials, sources of cash income, time input to each, benefits from each, marketing, sustainability, how livelihood patterns are changing and why, supply, location, quality and reliability of water, human and domestic waste management, incidence and types of disease, location and type of health facilities, transportation links, communication links, education facilities, investment, credit/micro-finance availability, village rules and regulations, recent and current assistance projects, etc.). District and provincial departments may already hold this information if socio-economic surveys have been conducted recently.
- Since much of this information is needed for a range of planning processes it is important to check who else has an interest in such information to discuss whether they have already collected this information, and if so how recently, and to ascertain similarities of their methodology, and if the data collected could be combined. A clear example of shared interest, even where there is not a "technical assistance project" would be with the development of the Kum Ban and District Socio-economic Development Plans.
- The Training Needs Analysis carried out once the team has been selected should identify what training is required for the team prior to the field data collection.
- Identify the major "sectors/stakeholders" or "livelihood groups", within the study area and their relationship with ecosystems and ecosystem services.
- Develop an understanding of how different communities interact with ecosystems and ecosystem services- for subsistence, livelihood, commercial benefit, etc.
- Prepare a seasonal event calendar for each livelihood group.
- Identify the socio-economic value of ecosystem goods and services; i.e. what percentage of household income comes directly from surrounding ecosystems? Are ecosystem services related

strictly to subsistence or do they also support production and trade beyond subsistence?

- Rank different community groups based on how dependent they are on the ecosystem goods and services and identify the key beneficiaries.
- Qualitatively rank the ecosystem services in order of how important they are (economically, socially and/or culturally) to the communities.
- Develop a community profile and a list of ecosystem goods and services that are important to the community

Methods / Tools: secondary data collection, planning, and training of filed data collection team, focus group discussions, household survey; participatory resource mapping

Example of Seasonal Calendar for agricultural activities in the study site in Lao PDR

Livelihoods Activities	Month of the Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Agriculture												
Paddy rice						←	- -	- -	→			
Sweden garden			←	- -	- -	- -	→					
Vitamin Ashes	←	→									←	→
Vegetable	←	- -	- -	- -	- -	- -	→					
Coffee	←	→									←	→
Cassava		←	- -	- -	→							
Mushroom	←	- -	- -	- -	- -	- -	→					
Agar wood				←	- -	→						
Eucalyptus					←	- -	→					
Rubber Wood			←	- -	- -	→						
Mulberry heuong	←	→									←	→

1.2. Understanding and mapping ecosystem and ecosystem services in the study area.

Notes on customization:

- GIS based tools, such as InVEST, are powerful tools that may eventually add benefit to adaptation planning in Lao PDR; however, at present there is little in-country capacity for use of such tools at the sub-national level so further training and capacity building may be needed before they can be effectively deployed at this level.
- Mapping can sometimes be conducted using large-scale aerial photos and topographic maps. However, using hand-drawn paper maps and/or other low-tech approaches may be sufficient and more appropriate for local communities.
- Priority ecosystems and ecosystem services should be identified for consideration during planning, but it is unlikely that there will be resources for further detailed study in the absence of external funding. When resources for more elaborate assessment are not available, general indications of ecosystem services and the areas which contribute these services can be approximated by local resource users using participatory mapping approaches.

Products, recommended process, and methods/tools for carrying out Stage 1.2.

Products:

(i) A community-developed map of ecosystem and ecosystem services; (ii) Map of the study area showing key ecosystem services and their current distribution and amount

Process:

- Identify the major ecosystems and possible ecosystem services in the area through community discussions, transect walks, and experts' judgment. While communities focus on the ecosystem services that are directly important to the communities, it is important to understand the full range of ecosystem services in the study area, such as climate regulating services.
- The briefing document on Ecosystem Services should be considered for possible use as part of the team briefing and preparation.
- Assess the availability of map and/or aerial photo resources and associated information.
  Appropriate options for discussing, visualizing, and recording spatially explicit information might include one or more of the following (all of which may be in use or have previously been used for such purposes as resource mapping or disaster planning):
  - GIS platform(s);
  - printed map(s) from such a GIS;
  - topographic map(s),
  - large scale aerial photo(s) of the area
  - hand-drawn map(s)
- Identify and obtain the best source of existing data on historic and current vegetation/land cover and land-use classes to make a map. If resources allow, this can be prepared as a digital map.
- Any other available contextual data, such as tenure, roads, settlements, rivers, terrain, or catchment boundaries should also be compiled at this stage.
- Facilitate mapping of additional relevant key biotic and geophysical features of the study area on these maps.
- Identify and map key ecosystem products and services, the location of livelihood assets, and so forth on the map (See figure 2).
- In consultation with stakeholders, identify and indicate areas that will need to be either maintained or managed in a specific way to ensure provision of priority ecosystem services.
- If time, resources, and expertise allow, conduct more spatially explicit and quantitative assessment of relevant ecosystem services using InVEST or another appropriate software or analytical approach. There is a growing level of such relevant expertise in the region. If these more detailed assessments are not possible, then information can be held on aerial photos and topographic maps. If these are used at the same scale it makes it easier to conduct a spatial analysis, e.g., how different areas, and their ecosystem services, might be affected by extreme weather, such as flooding to different depths.

Methods / Tools: expert judgment, consultation with stakeholders, community resource mapping, and spatial analysis including the use of programs such as InVEST if this can be arranged.

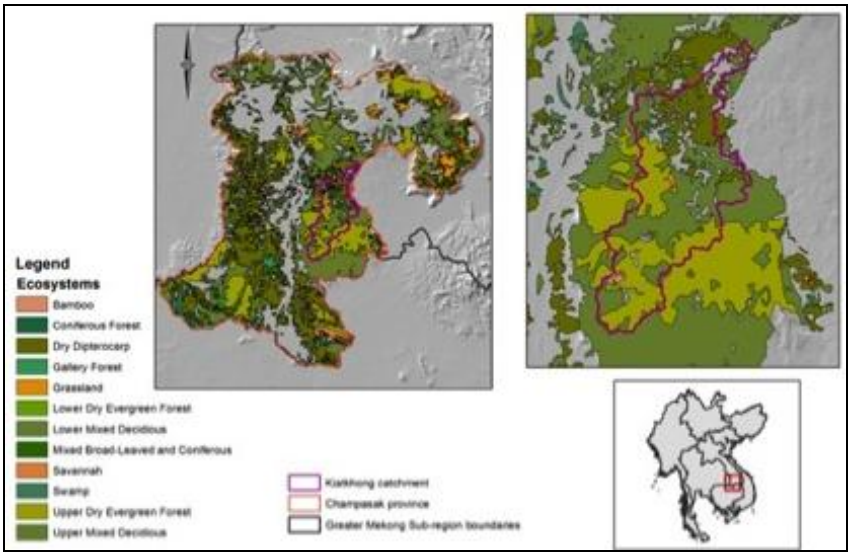

FIGURE 2. KEY ECOSYSTEMS IN CHAMPASAK PROVINCE

Source: WWF, 2013 based on land cover maps of 2002

1.3. Understanding climate change threats or risks to communities

Notes on customization:

- It may currently be unrealistic for DoNRE staff to collect and analyze information on predicted climate change, so it is important that DDMCC gather existing information and prepare briefing papers at the provincial level for province and district staff.
- The current focus of the guidelines is on hazards, which needs to be balanced by inclusion of information on slow-onset changes, which will also require adaptation.
- Clearly much of the data discussed here is also required for the development of Kum Ban and district Socio-economic Development Plans. Therefore even if adaptation planning and SEDP processes are to be kept separate, planning processes data collection for the two should be combined.

Products, recommended process, and methods/tools for carrying out Stage 1.3.

Product:

(i) Hazard map and hazard ranking; (ii) Seasonal calendar with climate risks; (iii) Historical timeline; (iv) List of ways that the community coped with previous hazards.

Process:

- Collect information on available climate change projections at the local level, including from the current DDMCC Provincial Briefing documents, and predicted impacts from secondary data collection or key informants' interviews.
- Using the centrally produced briefing packs, explain the concept of climate hazards to relevant communities and identify the primary climate hazards in the area based on the community's perceptions. Some discussion maybe needed to conclude whether a particular hazard is caused by climate change or other causes.
- Take the map from Step 2 and prepare a hazard map with participation from the communities to identify: (i) the locations that are prone to hazards, (ii) the types of hazards in different locations, and (iii) the communities most at risk from the hazards.
- Identify periods and seasonality of climate hazards and combine this information with the seasonal event calendar to make explicit the effects on livelihoods of different groups.
- Identify past hazards, changes in their intensity, nature, and behavior and create a historical timeline.
- Based on the historical timeline, discuss the potential trend of climate change and likely impacts in the future.
- Conduct a participatory hazard analysis and identify the hazards that are most likely to occur and hazards that are most likely to cause damage.
- Explain the concept of 'risks' and 'impacts' from identified hazards and identify risks (likelihood of hazard happening) and impacts from climate hazards.
- Identify which communities are most vulnerable to these hazards and why.
- Identify anticipated "slow-onset" changes (e.g. reduced crop yields from certain crops or production methods, or changes in suitability of certain plantation crops), sources of additional information on these, and opportunities to adopt more appropriate practices
- Much of the information in this section is directly relevant to the development of the Kum Ban & District Socio-Economic Development Plans, and so could be combined with these planning processes.

Methods / Tools: focus group discussion, participatory hazard mapping, creating historical timeline

1.4. Understanding threats to communities from non-climate risks and various socio-economic dynamics including development plans

Notes on customization:

- There is a clear need in this stage to consider and understand the Socio-economic Development Plan.
- It is important that during socio-economic development planning thought is given to potential reliance on and impacts to ecosystems and ecosystem services when considering each potential develop activity.
- Need to identify both the drivers affecting development as well as the aspirations of the communities – including aspirations for development.
- Natural resource management planning and food production need to be based on a thorough understanding of local knowledge systems.
- A clear understanding of the links between climate change and non-climate change related pressures are necessary.

Products, recommended process, and methods/tools for carrying out Stage 1.4.

Products:

(i) A list of socio socio-economic factors that make the community vulnerable; (ii) Potential development plan and its projected impacts.

Process:

- Identify and develop a list of non-climate pressures (examples: development pressures, land-use conflicts) that have affected the communities in the past.
- Identify the major aspirations of the community; how they feel these might be achieved; and what are major areas of concern. What are the pressures for change (natural and economical) and how these have changed over the past?
- Find out how resources are managed, including both traditional methods, and introduced methods, and whether there have been any conflicts over them.
- Find out how the access to resources differs within the communities.
- Collect information from the potential development plans and discuss with the communities about the positive and negative impacts of the proposed development for the future.
- Consider whether the activities proposed in the S-EDP take full account of their interactions, positive and negative, with natural systems and the potential knock-on effects of these on the natural systems and the ecosystem services they provide.
- Identify the communities that are most vulnerable to the threats from socio-economic dynamics and why.
- Although information can be gathered separately for steps 1.3&1.4 the discussion on their significance should be combined as changes in socio-economic factors will have effects on ecosystems and ecosystem services, and any changes to ecosystems will have an impact on the socio-economic situation, so these need to be considered as a "matrix".

Methods / Tools: Focus group discussion, community resource mapping

1.5 Understanding threats from current climate and non-climate risks to the Ecosystems and Ecosystem services

Notes on customization:

- In order to ensure there is support for the proposed process and its intent, it is important to ensure that the assessment of threats to ecosystems services are framed around priorities for sustainable development, rather than an ecosystem conservation perspective – the links between the two should be made but planned development should be seen as "change", and the full consequences of those explored, rather than labeling them as "hazards".
- Rather than only considering the impacts on the ecosystems directly, it is essential that knock-on effects from impacts on people that will alter their impact on the ecosystem are identified.

Products, recommended process, and methods/tools for carrying out Stage 1.5.

Products:

Explicit list of climate and non-climate risks and impacts.

Process:

- Consider each climate and non-climate pressure hazard identified in Step 4 and identify how it affects the ecosystem or ecosystem products and services that are important to the communities. Spatially note them in the hazard map if they are not already there.
- Identify positive/negative impacts of the potential development plan, or other predicted changes, to the ecosystems.
- Pressures will not only directly affect the ecosystem and its services, but will also change pressures on the communities, which will in turn affect their interactions with the ecosystems. For this reason it might help to use a flipchart or whiteboard while having the discussions; for each "pressure" being considered look at not only the ecosystem and any of its services this will impact on, but also identify the impacts the pressure will have on the community, and how these might bring about changed pressures from the community on the ecosystem. Similarly record how the changes you thought would happen to the ecosystem will affect the communities. By the end you should have a complex matrix which should help you understand the way these all inter-relate, and how pressures on one affect the whole system.
- Identify if there are any rules/limits for collection of ecosystem goods and services.
- Discuss and find out how specific socio-economic dynamics (from the previous step) affect ecosystem management.
- If the communities have identified particular species as important, identify how the past hazards have impacted them.
- Identify the ecosystem goods and services that are most vulnerable to the climate and non-climate risks.
- If ecosystems have been significantly degraded in the past, find out how long it took for the ecosystems to recover.

Methods / Tools: focus group discussions, expert judgment.

1.6. Creating future scenarios to identify future vulnerabilities to climate and non-climate change

- Climate adaptation planning is a complex process as it involves considering how we can influence an uncertain future. One approach that facilitates structured thinking about the future is called "scenario development" or "scenario planning". In scenario planning, stakeholders use assumptions and predictions about how environmental, socio-economic, policy, or other conditions might change to identify one or more future scenarios.
- Often, 2 or 3 contrasting scenarios are developed in order to gain insight about the likely outcomes of different decisions or policies. For example, stakeholders might "work up" the following contrasting scenarios—each defined generally by contrasting assumptions about policy and regulatory conditions:
    - Business as usual (BAU) scenario: Current policies and trends continue.
    - Unregulated Development Scenario: Investment in infrastructure and commerce increases and environmental regulations are relaxed.
    - Regulated Development Scenario: Stricter environmental regulations and oversight are applied to development activities.

- Consideration of these different scenarios can provide valuable insight into what policies and decisions will lead to desired outcomes.
- Scenarios can be developed to accommodate assumptions about how underlying climate change might affect and interact with other assumptions.

Notes on customization:

- A scenario planning process is valuable because if requires stakeholders to think explicitly about what they desire in the future and how today's decisions and policies will either facilitate or conflict with that desired future.
- However, it is not currently a part of the standard district planning process in Lao PDR and therefore will require training and support.

Products, recommended process, and methods/tools for carrying out Stage 1.6.

Products:

(i) Outcomes of contrasting policies and decisions explicitly contrasted; (ii) Maps showing changes in land cover for different scenarios, highlighting the areas within the study sites more vulnerable to development pressure (from the land change modeling analysis); (iii) Maps showing ecosystem services under threat from development activities.

Process:

- Identify one or more policies or decisions for which insight is sought and aspects of life that will be detailed in the scenarios to be developed (e.g. water and air quality, household income, economic opportunity, etc.).
- Compile information relevant to current policies and plans.
- Consult the scientific and academic community to identify future climate change projections relevant to the study areas.
- In consultation with experts where needed, develop two or more alternative visions for the study area and document how selected aspects of life will likely be affected.
- Determine future risks and impacts from climate change and development pressures to communities and ecosystem services.
- Because the ***spatial pattern*** of anticipated changes (rather than simply the "amount" of change (e.g. hectares of forest converted) is important when considering how natural systems will be impacted, it is useful to carry out a spatial analysis of the different scenarios identified.
- If resources allow, the spatial analysis can be carried out by one or more experienced specialists using land change modeling approaches and perhaps other tools.
- Alternatively, a low-tech approach can be applied where anticipated changes can be sketched on topographic maps, aerial photos, or hand-drawn maps. Factors mapped could include changes to transportation infrastructure, water sources, soil condition, etc..

Methods / Tools: expert judgment, scenario modeling, focus group discussion, mapping onto aerial photos, InVEST, land change modeling.

1.7. Calculating and ranking exposure, sensitivity, and adaptive capacity for hazards

This process helps planners understand the different factors that add up to putting communities at risk from climate change. This step is especially important because until it is understood whether the main issue in a particular situation is that the people (or the systems they are dependent on) are highly ***exposed*** to risk, or are particularly ***sensitive*** to that risk, or have little ***capacity to adapt*** to the risk, it is hard to evaluate options for action. In some situations, increasing the capacity of the community or the natural system can help reduce

exposure or sensitivity to climate risks while in other cases, addressing exposure or sensitivity directly may be the preferred approach.

Notes on customization:

- This process may necessitate new concepts or skills training, and support may be required the first time it is carried out.
- It is sensible to use this ranking on analysis.
- However it will require participants to use new skills and will therefore require support and training to be effective.
- It is useful to help prioritize potential impacts and to identify whether the best approach is to reduce exposure or increase adaptive capacity.

Products, recommended process, and methods/tools for carrying out Stage 1.7.

Products:

An explicit ranking of climate change risks and vulnerability

Process:

- Identify sub-units within the socio-ecological system (for example, groups of people with common interests within communities, different parts of a watershed, or different services (such as mangroves, sand dunes, etc.)).
- This process can be done for both ecological systems and community/socio-economic systems. For ecosystems, make note of the severity of impacts during past extreme events to calculate the sensitivity of a particular ecosystem.
- For each threat (or a selection of the most important threats if there are too many threats) evaluate the risk/vulnerability of each threat within each sub-unit. This evaluation is best done by an expert or a panel of experts. Each sub-unit should be given a score between 1 and 5 for exposure (likelihood) and sensitivity (consequence). See the examples below.
- The exposure and sensitivity ratings are then related to each other to determine the risk ranking of that particular threat, to that particular sub-unit. Again, see the example below.
- By plotting the risks from the above matrix against adaptive capacity scores, an overall picture of vulnerability of the communities and/or socio-economic systems will emerge.
- Unless adaptive capacity of the ecosystem can be calculated in a meaningful way, do this step for the socio-economic system only.

Methods / Tools: expert judgment, focus group discussion

TABLE 4. RISK RANKING MATRIX

Exposure (likelihood)						
	High (5)	M	MH	MH	H	H
	Moderate-High (4)	LM	M	MH	MH	H
	Moderate (3)	LM	LM	M	MH	MH
	Low-Moderate (2)	L	LM	LM	M	MH
	Low (1)	L	L	LM	LM	M
		Low (1)	Low-Mod (2)	Moderate (3)	Mod – High (4)	High (5)
Sensitivity (consequence)						

TABLE 5. SOCIO-ECONOMIC VULNERABILITY (RISK RANKING) MATRIX

Exposure and Sensitivity						
	High (5)	M	MH	MH	H	H
	Moderate-High (4)	LM	M	MH	MH	H
	Moderate (3)	LM	LM	M	MH	MH
	Low-Moderate (2)	L	LM	LM	M	MH
	Low (1)	L	L	LM	LM	M
		High (1)	Mod - High (2)	Moderate (3)	Mod – Low (4)	Low (5)
Adaptive Capacity						

1.8. Summarizing the information and creating a vulnerability matrix

The ultimate objective of the vulnerability assessment step is to understand current and future risks and impacts from climate and non-climate risks in order to identify preferred adaptation strategies. Creating a ***vulnerability matrix*** is one way of capturing and presenting the overall results of the vulnerability analysis.

Depending on the specific context, stakeholder preferences, and resources, stakeholders should select one of the following approaches:

i) Assess exposure, sensitivity and adaptive capacity; and rank the vulnerability as a combined function of these from low to high. The indicators to assess exposure sensitivity and adaptive capacity are developed together by focus group discussion and expert judgment; or
ii) From the information collected in the preceding steps, rank points of vulnerability directly.

It is good to keep in mind that the "vulnerability of a system" is best understood by looking not only at individual pressures and impacts, but also at the altered interactions within the system—in this case, interactions between ecosystem and communities.

Notes on customization:

- A vulnerability matrix is a useful way of summarizing information on vulnerability that facilitates prioritization of possible actions.
- However, it is complicated and will therefore require substantial capacity and time to compile.
- If compiling a vulnerability matrix is not possible for some reason, information can be taken directly from preceding sections and applied to identify key actions.

Products, recommended process, and methods/tools for carrying out Stage 1.8.

Products:

Vulnerability Matrix

Process:

- For each hazard identified, calculate and rank exposure, sensitivity and adaptive capacity.
- Rank vulnerability of communities and ecosystems based on the climate and non-climate risk, exposure sensitivity and adaptive capacity. A detailed methodology for this is provided below.
- If assessing exposure and/or sensitivity and/or adaptive capacity is not feasible (particularly for ecosystems) analyze the information collected above and rank the vulnerability based on risks and impacts.

Methods / Tools: data analysis, focus group discussion, expert judgment

TABLE 6. EXAMPLE OF A VULNERABILITY MATRIX

	Current Hazards	Future climate and non- climate hazards	Exposure	Sensitivity	Risk Ranking	Adaptive Capacity	Vulnerability
Community group /Sector 1	Description		Low -High	Low -High	Low -High	Low -High	Low -High
Community group 2							
Community group 3							
Ecosystem component/ hotspot 1							
Ecosystem Component							

STEP 2. IDENTIFYING AND PRIORITIZING ADAPTATION OPTIONS

Box 3: Checklist for Step 2:

- ✓ In consultation with stakeholders, identify coping activities of different vulnerable groups and sectors.
- ✓ Consult expert groups to identify potential adaptation strategies for communities and ecosystems.
- ✓ Assess and address specific problems and priorities of vulnerable groups, sectors, and ecosystems.
- ✓ Develop criteria (including cost effectiveness) for prioritizing adaptation strategies.
- ✓ Prioritize and shortlist adaptation strategies.

The purpose of Step 2 is to identify and prioritize a range of potential adaptation measures in consultation with stakeholders and relevant experts. For each hazard, potential measures are identified, including ecosystem-based approaches and other hard/engineering solutions. These approaches are then evaluated based on different criteria to select optimum adaptation strategies. Based on the nature of the adaptation criteria, the guidelines will provide methodology for both cost effectiveness analysis and multi-criteria analysis (MCA).

TABLE 7. SNAPSHOT OF STEP 2

Stages	Objective and EBA lens	Outputs	Tools and Methods
2. Developing adaptation options	EBA lens: Consideration of ecosystem services while designing adaptation options		
2.1. Identify ways of coping and adapting	To develop a long-list of hard and Ecosystem-based Adaptation options to address existing and future vulnerabilities.	A list of coping strategies Long-list of adaptation options	FGD/Key informants' interviews (Tool 3)
2.2. Conduct multi-criteria analysis (including spatially explicit analysis if possible)	To compare how different adaptation strategies perform to achieve the adaptation target/objective.	Criteria for screening adaptation strategies	Participatory Stakeholder Consultations Land change modeler, InVEST, Marxan with Zones
2.3. Conduct cost effectiveness analysis	To compare cost effectiveness of different adaptation strategies.	Cost effectiveness of each adaptation option identified	Research/data analysis Expert Judgment

2.1. Identifying existing ways of coping and adapting.

Notes on customization:

- Planners will need to be sensitive to the language used when reading and communicating this section to others.
- Communities have "coped" with previous climate-related problems, so it is appropriate to discuss with them specifically how they coped—what materials and resources they used, where and how they obtained food, how damaged buildings and other structures were repaired, and how the community worked together on these. Depending on the perspective and experiences of stakeholders, it may or may not be appropriate to use the term *coping strategies.*
- It is then possible in discussion to consider whether the ways that previous problems were coped with would be able to handle future (potentially more frequent or extreme) events, especially if previous coping required ecosystems which are under increasing pressure.
- One possible adaptation option could be to support communities in increasing their ability to cope. Methods for how to achieve this could come from within or outside the community.
- The concept of 'adaptation" will be new to many participants. Significant time may be required to ensure that stakeholders understand and can work with the concept.
- Details of how negative impacts of climate change can be reduced may involve new approaches for both communities and District staff.
- In most cases, identifying a range of potential adaptation options will require input from communities and local government staff. However, if local capacity for a more complex evaluation is low, outside expertise will likely be needed.
- Although multi-criteria analysis, including cost-effectiveness analysis, will be carried out in the next step, implications, other costs, and benefits of the various measures should be noted in this stage.

Products, recommended process, and methods/tools for carrying out Stage 2.1.

Products:

(i) A list of previous ways of coping; (ii) Long-list of adaptation measures/strategies

Process:

- Identify previous ways of coping among vulnerable communities and whether they are likely to be sufficient to deal with future climate-related disasters, if these become more frequent or intensive, and with current rates of habitat degradation.
- Identify further ways of coping beyond past experience.
- If possible, develop 2 or more potential adaptation strategies appropriate for addressing each previously identified risk. Adaptation strategies can be either EbA or hard/engineered solutions. This should be done (i) in consultation with the communities keeping their current coping strategies in mind; and (ii) in consultation with experts to ensure that measures/strategies based on experience from other similar contexts are considered.
- Ensure that all potential strategies/measures are assessed for potential maladaptation consequences.
- For each potential strategy, note in detail how it would mitigate a particular threat; avoid or reduce a risk, and/or build adaptive capacity or resilience.
- Identify who would be the lead agency/people responsible for implementing the strategy, when it would need to be implemented by, and any sequencing requirements.

Methods / Tools: focus group discussions, expert judgment

Guidance for identifying Ecosystem-based Adaptation options:

Awareness of the climate risks and of vulnerable areas/sectors including vulnerable communities is a key factor in identifying adaptation options. Understanding the linkages between wellbeing of people and socio-economic sectors and ecosystem services can help to identify context-appropriate hard and ecosystem based interventions. The users should also be aware that EbA measures might not be the only or the most appropriate options for identified risks and vulnerabilities. Ecosystem perspectives need to be at the heart of the planning process from the beginning, including setting of the adaptation goal and understanding risks and vulnerabilities.

To identify appropriate adaptation options, review of the relevant literature, especially past experiences of stakeholders in similar contexts, may be essential. It may also be essential to consult with the experts. EbA options identified should take into account:

- Which ecosystems are they applicable to?
- Which ecosystem services are at stake?
- What are the likely benefits and whether they contribute to the adaptation objective identified?
- What are the costs associated in terms of financial and human resources?

The examples given below may be of some use in identifying adaptation options. The list can serve as an excellent starting point to identify adaptation options and to start discussions with a range of stakeholders and experts.

Examples of EbA strategies for forested catchments and communities dependent on agriculture and fisheries:

- Conservation and restoration of forests and natural vegetation to stabilize hillside/mountainside slopes and regulate water flows, preventing flash flooding and

landslides as rainfall levels and intensity increases (Munro et al. 2011).

- Introduction of community fisheries to help preserve fish stocks and the establishment of community forests to ensure sustainable supplies of timber, non-timber forest products, and forests foods. This example addresses provisional ecosystems services such as food, building supplies, fuelwood, etc.
- Establishment of healthy and diverse agroforestry systems (the integration of food production into forests) to cope with changing climatic conditions (Munro et al. 2011)
- Conservation of agro-biodiversity to provide specific gene pools for crop and livestock adaptation to climate change (UNFCCC 2011).
- Managing the spread of invasive alien species that are linked to land degradation and that threaten food security and water supplies (UNFCCC 2011).
- Integrated nutrient management to integrate natural and man-made soil nutrients to increase crop productivity and sustain soil fertility.

To ensure successful impacts from the EbA options, it may be necessary to couple EbA approaches with other soft measures including targeted education, awareness raising, and capacity building. It is also important to ensure that EbA options do not negatively impact social cohesion among individuals and communities.

2.2. Multi-Criteria Analysis

The short-list of adaptation strategies identified will be compared using a multi-criteria analysis, ideally with explicit spatial considerations. Both socio-economic development and adaptation planning are complex. Different stakeholders may have different opinions about what the adaptation objective should be, as well as the criteria to prioritize options. If the adaptation objectives are not commonly agreed earlier in the process, they should be further discussed at this point to achieve clarity and agreement.

Notes on customization:

- Clear and transparent selection of objectives is a fundamental component of most planning processes and needs to be strengthened in Lao PDR.
- However, for complex planning challenges such as those involving socio-economic development or adaptation options, it is likely that diverse stakeholders will have similarly diverse objectives and interests. It is therefore important that the first stage of any such planning process should be a multi-stakeholder exercise to identify and rank objectives. This will facilitate an appropriate weighting structure in a multi-criteria analysis.
- Stakeholders can use the same process to identify, and rank, other criteria they feel it should be used in the analysis.
- Once there is agreement on the options to be evaluated, a number of additional considerations can enhance the evaluation.
- More complex and computer-based analyses may not be appropriate at this stage.
- Although spatial analysis should be encouraged, it may need to be done through use of maps and aerial photographs—rather than via GIS methods and tools. An overly technical approach could dissuade stakeholders from carrying out or buying into such an analysis

Products, recommended process, and methods/tools for carrying out Stage 2.2.

Products:

(i) A list of jointly developed criteria and adaptation targets; (ii) Prioritized adaptation options

Process:

- Carry out a participatory process to agree the relative importance of different possible objectives. An easy way to do this is to collectively develop a list of possible objectives, and then have different stakeholders or representatives of stakeholder groups 'score' them; e.g. by being given a set number of points to allocate according to how they rate these different objectives. The scoring from this exercise can in turn be used to filter objectives to form a more manageable list and to assign weights for subsequent analysis and prioritization.
- Collectively agree on the main categories of effects of the adaptation strategies to be considered (e.g. environmental, social, economic, etc.).
- Although how well different adaptation options will achieve the identified objectives is likely to be one of the main criteria used to evaluate the different options, stakeholders should also be asked to identify and score other relevant criteria to be used to fully evaluate the options (such as financial cost
- Once the objectives and other criteria, as well as their relative importance (weighting), have been agreed the process of multi-criteria analysis should be carried out through a consultative process.
- The minimum process for conducting the MCA will be through an "Expert Workshop," where each of the options will be discussed and subjectively scored (e.g. on a 5-point scale), against each of the criteria; the scoring is then adjusted according to the weighting, and the weighted scores used to rank the adaptation options.
- When considering the likely effects of different adaptation options, full consideration should be given to the context of the intervention. One component of this is to consider spatial aspects of the likely climate change impact and the intervention; this can be done using topographical maps, aerial photos, or computer programs.
- Based on the collectively agreed criteria, rank the identified adaptation options.

Methods / Tools: discussion with stakeholders, expert judgment.

The MCA can also be done without explicit spatial analysis by agreeing on a set of evaluation criteria, assigning weights to these, scoring strategies/measures against these criteria, and using weights and scores to calculate a ranking metric. However conducted, any MCA should be informed by consultations with local experts as well as published performance of these measures against current climate hazards. The table below provides an example of evaluating a particular option against a set of criteria.

TABLE 8. EXAMPLE OF RANKED ADAPTATION OBJECTIVES IN LAO PDR (THE TOP SCORES ONLY)

Adaptation objective	Total score	Weighting
Minimize impact on Livelihood of Villagers from climate related events	66	0.24
Minimize impact on achievement of Provincial socio economic development plans	43	0.16
Minimizing impacts on stability, security & social order from CREs	29	0.11
Ensure maintenance of food supply	28	0.10
Minimize impact on achieving the millennium Development Goals from CREs	27	0.10
Ensure maintenance of access to clean water	22	0.08
Enhance Resilience (Reduce Vulnerability) of Ecosystems	19	0.07
Poverty Reduction amongst most vulnerable groups	19	0.07
Minimize loss of life from Climate Related Events	18	0.07
Total	271	1.00

Source: Discussion with technical expert group

Example of Multi-Criteria Analysis In Lao PDR

A simple multi-criteria analysis (MCA) process was used to score each adaptation options against the following criteria:

i. **Effectiveness**: Will it achieve each adaptation objective?
ii. **Cost**: How cost effective will it be?
iii. **Feasibility**: How realistic will it be to carry out?
iv. **Attractiveness:** How attractive is it for public and private funding?
v. **Capacity:** How well does it fit with current capacity?

Scoring and weighting: As there was no technical analysis for these criteria, scoring was carried out by "expert judgment." First these criteria were assigned different weights of either 1 or 2. A criterion of "effectiveness in achieving the set objective" was assigned a weight of 2; all other criteria were assigned an equal weight of 1. Experts were then asked to assign a score for each criterion on a scale of 1 to 5. Weighted scores were then summed accross the 5 criteria for each adaptation option.

Scoring resulted in the following preferred list of adaptation options:

i. Improved Wetland Management (26.32)
ii. Improved Forest Management (25.42)
iii. Raising Awareness of CC impacts (24.86) (could be done via 4)
iv. Enhanced Agricultural Extension (24.74)
v. Improved Integrated Socio-economic Development Planning (24.46)
vi. Improved NTFP Management (23.54)
vii. Forest Restoration (23.42) (could be integrated with 1)
viii. Targeted support to Poorest members of Villages(23.36)

2.3. Cost effectiveness analysis

Cost effectiveness analysis (CEA) is a useful evaluation approach that can provide insight about alternatives that might not be apparent via other methods. It compares two or more options for achieving the same (or similar) outcome and is capable of providing meaningful results even when benefits cannot be expressed in monetary terms.

A classic cost-effectiveness analysis includes 1) establishing an explicit goal (such as reducing the incidence of a disease in a town by 50 percent in four years), 2) compiling information on the expected cost of two or more methods of achieving the goal, and 3) selecting the least-cost alternative (World Bank 2010).

An important aspect of CEA is that the benefits of alternatives need not be expressed in monetary terms and can instead be based on such metrics as number of lives saved or years without major flooding. By comparing the ratio of costs to the measure of effectiveness,

options for interventions can be ranked. This flexibility makes the approach particularly suitable to assessing alternatives in the context of EbA.

In some situations, cost effectiveness may be the singular criteria for evaluating options. It can certainly be used to make any "cost effectiveness" scoring within an MCA more explicit and defensible.

The CEA process outlined in the box below has been tested for evaluating adaptation options in the Mekong.

Notes on customization:

- Cost-effectiveness analysis (CEA) is becoming an increasingly common way of analyzing options to assist with policy making and likely should play a more central role in climate change adaptation planning and policy development in Lao PDR. It may be less appropriate for village or district level socio-economic or adaptation planning.
- As the pilot project in Lao PDR (that informed these guidelines) focused on Community Driven local Adaptation Planning, the process did not allow for collection of sufficient data to support a full CEA analysis. However, "best available estimates" were used to demonstrate the process and build capacity for its subsequent use.
- It is recommended that follow-up projects aim to use formal CEA to evaluate EbA vs. "hard/engineering" approaches. This will help inform policy dialogue and decision-making in the context of EbA and general climate change adaptation.
- CEA seems most effective when choosing between a number of different options for achieving a well-established and explicit objective; in situations where stakeholder perspectives on objectives differ, it may be significantly less useful.
- Although one of the advantages of CEA is that it requires less hard data than some other types of economic analyses. However, in the context of assessing EbA options, the key metric of "increased value of ecosystem services" is often not available.

Products, recommended process, and methods/tools for carrying out Stage 2.3.

Inputs: 2 or 3 adaptation intervention to be compared

Expected output: Cost effectiveness of each option identified to assist in decision-making

Process:

- *Identification of adaptation options for analysis*
  - Based on a discussion with stakeholders and after a preliminary multi-criteria analysis, identify key priority adaptation strategies for the cost effectiveness analysis.

- *Selection and definition of the measure of effectiveness*
  - The choice of the effectiveness criteria to be used depends on the main objective of the intervention. If the objective is broadly defined, then detailed discussion of climate change adaptation objectives is likely needed. This will be an important consideration for the comparative analysis of adaptation options since the objective of EbA is not always cost related. While it would be extremely difficult to quantify the value of ecosystem services in building resilience, to the extent possible, the value of a particular contributing ecosystem service should be included as a part of effectiveness to ensure that the comparative analysis takes environmental value into account.

  - Some example of effectiveness metrics:

- Increase in food security
- Reduction in property damages
- Reduction in coastal wave height
- Level of diversification of livelihood skills

- *Choosing a discount rate*

  Discounting is an important part of any economic analysis. Discounting acknowledges the opportunity cost of spending money on one activity instead of another. Furthermore, people usually have a time preference for money; i.e. we prefer to have money now rather than wait until sometimes in the future to receive it. Similarly, most people would prefer to incur costs in the future instead of today. Serious consideration should be given to the discount rate and some lenders and development organizations may have established protocols which analysts may be required to follow. Such protocols may call for using the government's long-term bond rate, local lending rates or a "social discount rate". Some experts argue that discount rates in developing countries should be higher due to stronger time preference for money.

  Detailed discussion of discounting is beyond the scope of this guidance–but in line with standard recommendations, we suggest that analysts use a range of discount rates to reflect a range of assumptions about the ROI of the intervention over time, perhaps even including a declining discount rate to environmental benefits that will continue far into the future.

  As a general rule, the discount rate will typically have a bigger impact when the timing of costs and benefits is not synchronous. Use of a 0 or low discount rate implies that future benefits are valued as if they were received today. The use of higher discount rates (anything above 5 percent) suggests that the future benefits are less valuable than if they were received today – but that doesn't mean to say that high discount rates are not to be used. The danger is if 0 discount rates were used for social projects, society may end up allocating too many resources to achieving just these objectives and not enough to other valuable objectives.

- *Assessing costs*
  In calculating cost in the framework of a CEA, the following cost factors should be considered:

  1. Categories of direct costs: i.e. maintenance and operating costs in the future may be significant and should be considered by decision makers.
  2. Categories of indirect costs, i.e. insurance.
  3. Categories of other costs, i.e. opportunity costs.
  4. Magnitude of direct costs.
  5. Timing of costs, i.e. in what time period will they be incurred.
  6. Who incurs them?

- *Establishing a cost-effectiveness ratio and interpreting results*

  - Define cost-effectiveness ratio.
  - Give a template summary table for how interventions can be compared easily.
  - Templates used for field-testing the cost effectiveness analysis and an actual example of CEA from field-testing is provided in the annex.

Example of cost effectiveness analysis (CEA) in Lao PDR:

1. Identification of adaptation options for analysis: Based on MCA, a CEA was carried based on the options that received the highest ranking through the MCA, i.e. increased agricultural extension, improved forest management, and improved wetland management.
2. Effectiveness measure: Number of years in 10 in which food supply is not disrupted for more than 5 days in any village due to Climate related events.
3. Discount rate: 4 percent

Assumptions made in the CEA analysis for assessing costs

Costs: The costs of wetland management were estimates from an IUCN report on Beung Kiat Ngong (IUCN 2011); forest management costs from Protection Forest estimates (SUFFORD 2011); and costs of enhanced agricultural extension were estimated by the project technical team.

Service values: Forest and wetland regulatory service values and forest provisioning were taken from a WWF analysis (Campbell 2010). Wetland provisioning service values were taken from IUCN (2011).

Changes in service values. Although there is a growing pool of information on the value of ecosystem services in the region there is little information on how values for different ecosystems change depending on the condition of natural capital (this information is needed to evaluate the cost effectiveness of either prevented degradation or restoration. Where information was available it was normally on valuations of the same type of ecosystem, in different condition, but also in a different location. For example healthy Mekong mixed forest regulatory services had been assessed as providing $650 of services/ha/year, but degraded forest only $ 250. In the CEA used for the case study it was assumed that the forests were partly degraded and could be improved, so were started at $ 450 hectare/ha/per year, with the assumption that restoration would increase this to $550 over 10 years. It is hoped that this is a realistic, but conservative, estimate. As no information was available for the reduction of value in degraded wetlands the same percentages were used as for forests.

The results of the analysis (see Table 9) show that investing in improved ecosystem management is extremely cost effective. Not only does it achieve the desired objectives, but, as the negative sign shows, it also provides additional benefits such as increases in environmental service values that are worth considerably more than the costs.

TABLE 9. COST EFFECTIVENESS RATIOS

	Effectiveness measure	Financial costs	Financial cost effectiveness ratio	Other economic net benefits /costs	Total costs	Total economic cost effectiveness ratio
Unit		$ Present value	$ Effectiveness measure	$ Present value	$ Present value	$ Effectiveness measure
Increased Agricultural Extension	8					
Local		$14	1.8	21.8	-$8	-1.0
National		$-	0.0	0.0	$-	0.0
Global		$-	0.0	0.0	$-	0.0
Total		$-	0.0	0.0	$-	0.0
Improved Forest Management	7					
Local		$27	3.9	808.8	-$782	-111.7
National		$-	0.0	0.0	$-	0.0
Global		$-	0.0	0.0	$-	0.0
Total		$-	0.0	4148.3	-$4,148	**-592.6**
Improved Wetland Management	7					
Local		$27	3.9	2594.0	-$2,567	-366.7
National		$-	0.0	0.0	$-	0.0
Global		$-	0.0	0.0	$-	0.0
Total		$-	0.0	10682.3	-$10,682	**-1526.0**

Source: Cost effectiveness analysis

STEP 3. GUIDELINE ON IMPLEMENTATION OF ECOSYSTEM-BASED ADAPTATION PROJECTS

Box 4: Checklist for implementation of EbA initiatives

- ✓ Stakeholders engaged in the EbA assessment process and specific attitudes and priorities of key stakeholders were taken into account.
- ✓ The initiative involves multi-stakeholder consultation and coordination including with the government and civil society at different levels.
- ✓ The initiative identifies ways to maintain or improve the delivery of ecosystem services that can contribute to the adaptive capacity of communities.
- ✓ EbA measures/strategies are designed with explicit recognition of available local resources.
- ✓ Indicators, risks, and assumptions for each outcome/ output are identified.
- ✓ Strategies to mitigate identified risks developed.
- ✓ Cost of selected outcomes and outputs identified.
- ✓ Funding plan and corresponding budget established.
- ✓ Linkages established between 1) recommended strategies/measures and 2) national, sub-national, and/or local development plans, strategies, and policies.
- ✓ Sustainability and replicability of outcomes and outputs assessed.
- ✓ Potential benefits detailed.

Monitoring and Evaluation (M&E)

- ✓ M&E requirements budgeted.
- ✓ Indicators and baselines clearly identified.
- ✓ Indicators are S.M.A.R.T. (Simple, Measurable, Achievable, Realistic, Time bound) and consider i) system-wide vulnerabilities, ii) costs and benefits, and iii) avoidance of maladaptation.
- ✓ Targets, milestones, sources of data, frequency, and responsibility clearly identified.
- ✓ Reporting line for M&E established and appropriate agency/people to authorize changes to the initiative identified.
- ✓ Guideline for learning and knowledge sharing established.

Once adaptation options have been identified and shortlisted and a particular strategy is selected, the next step is implementation. Implementation consists of several steps including design, deployment of the strategy, and M&E. The iterative feedback process is of particular importance so that actions can be adjusted as new information is obtained. The guidance provided below is based in literature from UNEP, UNDP, WWF, and other sources.

Notes on customization:

If it is intended that support for the selected adaptation options will be through the SEDPs, or sectoral plans, then standard government of Lao PDR planning, monitoring, and reporting systems will need to be followed. However, the guidelines below are provided in order to encourage more systematic and rigorous planning, implementation, and monitoring.

3.1. Design an outcome-based or results-based set of project management guidelines

This is a crucial step in project design (UNEP, 2012), the purpose of which is to clearly specify the activities required to achieve the intended adaptation objective and outcomes, identified in Step 1. Resources that can help in developing systematic or results-based guidelines are provided in the annex. Major steps are as follows:

3.1.1. Formulate a list of activities required to achieve the expected outcomes

Based on adaptation strategies to be implemented, it is important that the expected outcomes are clearly articulated and relevant and appropriate indicators specified. Key considerations include:

i. Based on the findings from vulnerability analysis, adjustments to the adaptation outcome/s identified in Step 1 should be made if needed.

ii. Anticipated "impacts" from the outcomes should be identified and specified. The overarching impacts from the outcomes may be much broader, longer-term, and in line with the national and sub-national priorities to which the action may contribute. The outcomes must be within the scope of strategies implemented.

iii. For EBA actions, the principal outcome should be reduced vulnerability of the targeted community (or other socioeconomic system) and interim or related outcomes should include maintenance or improved condition of key ecosystem service(s) that contribute to the adaptive capacity of communities.

3.1.2. Create logical linkages between different activities, outputs and outcomes

There are many ways of creating a logical/results-based framework (log frame, results-based matrix, results chain, theory of change, etc.). They all require a clear articulation of how different activities contribute to different outputs, outcome and possible long-term impacts. It is important to consider that this is true for not only the EbA options, but also other projects. EbA options may consists of a number of adaptive actions, form direct active management measures (such as planting mangroves in a coastal area, diversifying community livelihoods based on different ecosystems) to capacity building actions (for example, training on climate-resilient policy formulation). It is imperative to establish clarity on which activities contribute to which output/s and intended outcome.

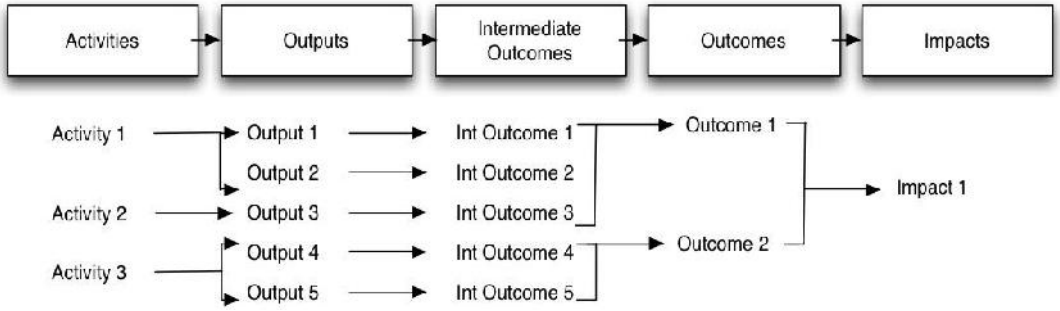

FIGURE 3. RESULTS CHAIN SHOWING CONTRIBUTIONS OF EBA ACTIVITIES TO THE OUTCOME

Source: UNEP 2012

3.1.3. Specify assumptions made in the logical chain and identify barriers or risks to implementation.

Specify the key assumptions made in relation to the implementation of EbA options and the intended results. Assumptions may be process related or related to human behaviors. If there is an assumption that climate change will impact socio-economic systems and ecosystems in certain ways, these need to be clearly articulated.

Once the outcomes have been identified, it is also important to identify critical barriers and work to mitigate these. A comprehensive analysis of barriers helps to determine: (i) the feasibility of what EbA initiative specifically seeks to achieve, (ii) how is it dependent on or linked to other ongoing strategies and interventions and their successes and failures (UNDP 2010), and (iii) what barriers and challenges still remain. A single initiative will likely be able

to resolve some, but not all, barriers. Key barriers must be identified through focus group discussions with relevant stakeholders, and a thorough analysis of the context including policies, institutions, and capacities. Interviews with key informants, such as national and sub-national governments, may be beneficial. Barriers can be a combination of information constraints, institutional failures, capacity constraints, economic constraints, and political factors (UNDP 2011). They are specific to the national, sub-national, and local level conditions.

3.1.4. Collectively identify key indicators and establish baselines and targets to monitor each outcome and output:

This step is one of the most challenging parts of implementation. The ability to deal with uncertainty and the dynamics of the changing environment is a key component of the M&E process for strategies focused on reducing long-term climate risks. The idea of monitoring and evaluating adaptation using indicators and baselines is complicated due to several factors:

- Uncertainty: Most effects of the EbA option may only be measurable once climate changes have occurred. For example, the positive effects of planting mangroves might only be fully realized once a climate change-related change in the environment occurs such as a rise in sea level.

- Time Frame: Climate change impacts happen over relatively long periods so the impact of applying an EbA measure or strategy will likely not be subject to measurement within the duration of project implementation. As a result, a final evaluation of the effectiveness of measures applied may not be possible until years after project implementation.

- Moving Baselines: EbA will take place in the context of changing climate hazards, changing status of ecosystems (not necessarily climate-related), and dynamic socio-economic systems. These considerations must be included when developing baseline information and ongoing monitoring procedures.

- Attribution: Closely related to the time frame and the moving baselines may the challenges in attributing success to the actual EbA measures. For example, if the EbA method chosen is planting mangroves, over time certain fish populations may increase in the vicinity of the mangroves. This could be attributed to the implementation of the mangroves, or potentially new legislation on agricultural pollution, which results in less run-offs creating more suitable condition for fish as well.

As a result of these challenges, EbA M&E systems must be developed taking into consideration changing climate and socio-economic profiles, and indicators and targets should be set within a framework that considers change over time (UNEP 2012). Indicators are defined as “qualitative and quantitative statements or major parameters that can be used to describe existing situations and measure changes or trends over time.” (Spearman and McGray 2011).

Setting Indicators and establishing baselines:

Indicators, baselines and targets should be selected in consultation with a range of stakeholders including ecosystem management experts such as local community members, local, sectorial, and national government units, and/or others depending on the context. Preliminary research, data collection and analysis may also be required to establish

baselines.[3] The information collected by participatory methods throughout steps 1-3 can generate good indicators to create a baseline and can be used later for performance evaluation; for example, the current climate risks and perceived impacts, coping strategies, and so forth can be used as a baseline.

Choosing appropriate indicators for adaptation requires linking the goal of an adaptation intervention to its appropriate scale, climate change, and development context. It should also be recognized that adaptation might not be a final outcome, but "a diverse suite of ongoing processes (including social, institutional, technical and environmental processes) that enable the achievement of the development objectives" (UNDP 2007). For EbA, indicators can be process-based (e.g. measuring progress in developing and implementing adaptation measures) or outcome based (e.g measuring the effectiveness of adaptation measures) (UNFCCC 2011). Flexibility to systematically record unintended and unexpected outcomes should also be part of an effective M & E system.

In addition to indicators, it is also necessary to establish baselines, or the current situation of natural and socio-economic systems.

For baselines, it is necessary to:

i. Review and synthesize existing information on current vulnerability, climate risk, and current adaptation measures based on primary date, previous studies, expert opinion, and policy context. (These should be available from Steps 1 to 3)

ii. Describe EbA-related policies and measures in place that influence the ability to successfully cope with climate variability.

iii. Develop baseline indicators of vulnerability and adaptive capacity that take into account the underlying historical trend in the indicator value over time. Note whether there is a trend upward or downward over the last 5 or 10 years that can be drawn from existing records or statistics.

Baselines may be established using existing secondary data sources or may require a primary data collection effort. The following information collected in Steps 1-3 can serve as baseline:

- ***Historical/baseline data***: current vulnerabilities (historical trend, ecosystem mapping, vulnerability profile) and current adaptation measures (consultations, field interviews, literature review).
- ***Scenarios***: future impacts and vulnerabilities adaptation to future impacts (using such approaches as multi-criteria analysis, cost–benefit analysis, and consultations).

3.1.5. Prepare a work plan including a plan for participatory M&E

The M&E system should include a time-bound work-plan that clearly identifies the timeframe and key milestones for the initiative, who is responsible for the activities and how frequently EbA actions will be monitored.

Project interventions, in general, are often short term and M&E within a project intervention cannot possibly ascertain EbA success within that timeframe. The impacts of EbA strategies are only apparent in the long-term. As a result, it is necessary to develop M&E systems that can outlive project timeframes and include indicators that can be measured by communities

[3] For detailed guidance on creating baseline and step-wise guidance to create monitoring framework please refer to Spearman and McGray 2011. Available online at http://pdf.wri.org/making_adaptation_count.pdf.

and/or local institutions rather than project staff. The M&E plan should also include criteria for assessing sustainability against climate change, replicability, and cost effectiveness in addition to measuring progress against the established baselines and targets. Identify who will be implementing the actions, who will be involved in participatory monitoring and evaluation, and how often will the data need to be collected for monitoring and evaluation. If any adaptive change is recommended within the project cycle, identify who should be consulted to implement the change and how can the transparency be ensured in the process.

Questions to consider for the work plan:

- How will the EbA initiative fit into existing activities, plans, and policies?
- Who is responsible for what aspects of the plan?
- What resources are available?
- What is the timeframe for implementation?
- Which partners need to be involved?

Questions to consider for the monitoring plan:

- What questions do you want to answer to get an accurate idea of the progress?
- What data will be used to answer those questions?
- Who will collect the data and when?
- Who will analyze the data and report the results?

3.2. Adaptive Implementation and Monitoring

3.2.1. Allocate the resources and assemble a team for implementation.

Ensure that there are sufficient financial and human resources for the outlined activities including M&E and for supporting learning by doing.

3.2.2. Implement the EbA activities and continuously monitor the progress

Ensure that the actions identified are implemented on time and within the budget. Monitoring will also require additional collection of data, that will then be compared with the baseline to check whether the individual EbA activities are contributing to the intended results and whether the assumptions made in the beginning are correct or not. For qualitative indicators, it is a good idea to have a discussion with the same set of focus groups/individuals that helped to establish any guidelines.

3.2.3. Reflect and Adapt

Review and reflect on the outputs of M&E and assess whether the initiative is progressing as intended. If the progress is as desired, review whether any adjustments can further help in increasing effectiveness and efficiency; if the progress is not as intended, identify what changes can be made at what level. Relevant questions might include: would changing individual EbA actions yield different results? or will some adjustment in outputs and outcome be necessary? Identify what are the barriers to progress and how they can be removed. Identify which assumptions need to be adjusted. These reflections should be done in a participatory manner in discussion with the relevant stakeholders and experts. Once the changes have been identified, alter the program inputs and adjust the work-plan accordingly.

Questions to consider:

- What has been done without delay?
- What were the challenges?
- What worked? How and why did it work?
- What did not work and why?
- What would you do differently if you had the chance to do it again?

3.2.4. Documentation and collecting evidence

The outcomes of M&E can often provide valuable lessons not only for your initiative but for other ongoing and future initiatives as well. In addition, they can also help in demonstrating the effectiveness and collecting useful evidence to be presented to decision makers for further investments in M&E. Hence, carefully document what worked, what didn't and what evidence of effectiveness exist.

STEP 4. MAINSTREAMING OF EBA STRATEGIES IN POLICY AND PLANNING PROCESSES

Mainstreaming (or integrating) EbA into policies and planning processes is an important step for governments to achieve sustainable and climate resilient development. Mainstreaming is also important for all other EbA practitioners and individual projects/initiatives in a country, or even within a region, as their long-term aim is to ensure that countries follow the path for sustainable and climate resilient development.

As most governments are still in the process of mainstreaming climate change in national and sectorial plans as well as developing overall climate change and green growth plans and strategies, this is as an optimal time to include EbA considerations in these processes. Many countries in the GMS are currently in the process of discussing various related concepts such green growth/green development strategies and ecosystem based approaches or climate resilient development. These approaches provide entry points for integrating EbA as green approaches for adaptation.

Mainstreaming climate change raises several questions among scientists, policy makers, and stakeholders. One overarching question is: *How can climate protection be integrated in a cross-sectorial policy approach* (UNDP-UNEP 2010; Kampheng 2012)? Since EbA tackles adaptation from an ecosystem perspective, and sometimes also addresses mitigation, EbA has the potential to contribute substantially to climate mainstreaming and, at the same time, protect or enhance biodiversity (Kampheng 2012). From an economic standpoint, integrating EbA and other adaptation strategies into socio-economic development planning increases the effectiveness and efficiency of investments, as the co-benefits from enhancing the flow of ecological services from relevant natural capital support multiple agendas (Vignola et al. 2009; TEEB 2009). This process can also help address issues of leakage and additionality (TEEB 2009).

Increasingly, countries are realizing that, in the long-term, climate change adaptation needs to be supported by an integrated, crosscutting policy approach—in other words, mainstreamed into national development planning (UNDP-UNEP 2010). At present, there are numerous initiatives and different financing mechanisms aimed at assisting countries with climate change adaptation. Efforts concentrate on developing specific adaptation measures, with a focus on those that correspond to countries' "most urgent and immediate needs," as detailed in NAPAs. As part of mainstreaming climate change adaptation into development planning, steps taken in mainstreaming ecosystem services—considering the value they provide in economies (green economy)—also provide encouraging entry points for mainstreaming EbA.

Mainstreaming EbA is a multi-level process that requires vertical and horizontal coordination among different agencies including cross-sectorial engagement. Planning at the national level provides the overall guideline within which sectorial and other sub-national levels operate. The national level is where the policy goals from long-term visions and national development strategies are translated into action plans and budgets. Key planning interventions—including integrating EbA in sectorial plans and initiating new programs to enable adaptation which may, for example, reallocate funds to more vulnerable sectors or regions—requires engagement at both national and sub-national levels (Lebel et al. 2012).

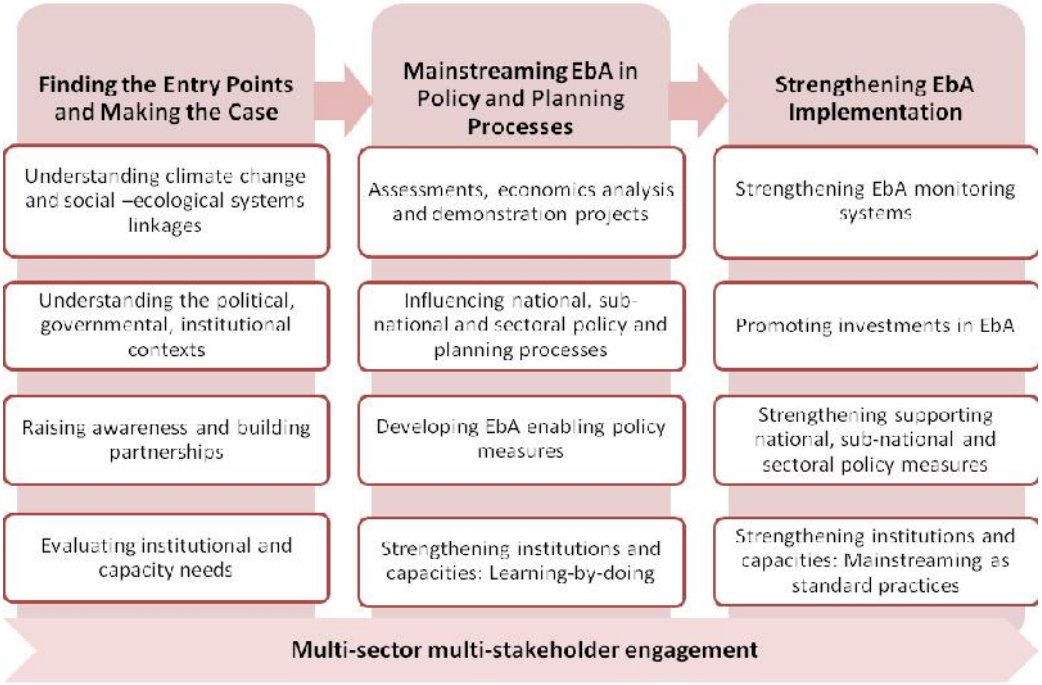

Figure 4: Guidelines for mainstreaming EbA into development planning
Source: Adopted from UNDP-UNEP guidelines for mainstreaming adaptation into development planning

Basic principles and conceptual guidelines for mainstreaming EbA initiatives do not differ significantly from the available guidelines for mainstreaming climate change adaptation in general.[4] However, it is important to recognize that EbA is one subset of an adaptation process and needs mainstreaming in both "adaptation plans" as well as development plans. As most of the governments are still in the process of mainstreaming "climate change" in national and sectorial plans, there may be opportunities to integrate ecosystem-based adaptation. It is important to remember, however, that in most of the countries, ecosystem-based approaches--such as sustainable management of forests, water, coastal areas, and other ecosystems--are already a part of development plans and planning processes. Mainstreaming EbA will add a climate change lens to these considerations.

[4]There is not much literature on mainstreaming EbA; there is, however, available literature on mainstreaming either climate change (both mitigation and adaptation) and climate change adaptation into development planning and processes such as UNDP-UNEP's Guide for practitioners for "Mainstreaming climate change adaptation into development Planning" or the Organization of Economic Cooperation and Development (OECD)'s "integrating climate change into development planning etc."

4.1. Examples of some policy entry points for EbA in Lao PDR

4.1.1. Strategy on Climate Change of Lao PDR

The objective of this strategy is to secure a future where the Lao PDR is capable of mitigating and adapting to changing climatic conditions in a way that promotes sustainable economic development, reduces poverty, protects public health and safety, enhances the quality of natural environment, and advances the quality of life for all Lao people.

Lao PDR has been recognized as one of the countries that are most vulnerable to climate change impacts due to its particularly high dependence on climate-sensitive natural resources and low adaptive capacity. Moreover, the poor intensely depend on biodiversity and natural resources for livelihoods, such as the provision of fish and aquatic resources that make up to 90 percent of protein consumption in many areas, and the reliance on non-timber forest products (NTFPs), which account for an estimated 30 percent of Lao PDR's GDP. Thus, climate change is likely to pose formidable threats to the economy and the society at large, and EbA must be considered in the strategy.

Responsible Agency: MONRE

4.1.2. Adaptation across sectors

The Government of Lao PDR recognizes that in addition to a strategy on climate change itself, the potential impacts of climate change needs to be considered by all affected sectors, and that these need to include aspects of adaptation. Proposals for possible adaptation measures within sectors are included in the Strategy on Climate Change of the Lao PDR, March 2010.

Within this policy structure there is specific reference to the Agriculture & Food Security, Forestry and Land Use Change, Water Resources, Energy and Transport, Industry, Urban Development and Public Health sectors, all needing to develop EbA strategies.

TABLE 10. ENTRY POINTS FOR MAINSTREAMING EBA IN LAO PDR POLICY AND PLANNING

Relevant Sectors	Relevant Policies	Relevant Agencies
Forestry	Forestry Law	Ministry of Agriculture and Forest (MAF); Department of Forestry (DoF)
Agriculture	Agriculture Law	Ministry of Agriculture (MAF); NAFRI
Fishery	Aquatic and Wildlife Law	Ministry of Agriculture (MAF); NAFRI
Eco-Tourism	Millennium Development Goal; National Social Economic Development Plan	Prime Minister Office (PM); Ministry of Planning and Investment; Lao PDR National Tourism Office
Disaster risk reduction	Action plan on Climate Change 2013-2020	Ministry of Natural Resources and Environment (MONRE)/ Department of Natural Disaster Management and Climate Change (DDMCC)
Water and wetland	Land Law	Ministry of Natural Resource and Environment (MoNRE); Prime Minister Office (PM)
Planning and Investment	National Social Economic Development Plan	Ministry of Planning and Investment (MPI); Prime Minister Office (PM)
National policy of adaptation planning for Climate Change	Action plan on Climate Change 2013-2020	Ministry of Natural Resource and Environment (MoNRE)/ Department of Natural Disaster Management and Climate Change (DDMCC)
Environment Assessment	Agreement on the National Environmental Standards	Ministry of Natural Resource and Environment (MoNRE)/Department of Environment (DoE)
Vulnerability Assessment, and Adaptation identification	Mekong Adaptation and Resilience to Climate Change (Mekong ARCC)	Prime Minister Office (PM); Ministry of Natural Resource and Environment (MoNRE); Department of Natural Disaster Management and Climate Change (DDMCC)
Climate Change Mitigation and Adaptation Planning	National Strategy on Environment to the years 2020 and Action Plan for the years 2006-2010	Ministry of Natural Resource and Environment (MoNRE)/Department of Environment (DoE)
Climate Change Mitigation and Adaptation Awareness	National Strategy on Environmental Education and Awareness to the years 2020 and Action Plan for the years 2006-2010	Ministry of Natural Resource and Environment (MoNRE); Ministry of Education
Development within saved Environment	Seventh National Socio-Economic Development Plan (2011-2015)	All Government Parties
Vulnerability Resilience mapping	The Second National Communication on Climate Change	Ministry of Natural Resource and Environment (MoNRE); Department of Natural Disaster Management and Climate Change (DDMCC)
Climate Change Mitigation and Adaptation planning	Strategy on Climate Change of the Lao PDR	Ministry of Natural Resource and Environment (MoNRE); Department of Natural Disaster Management and Climate Change (DDMCC)

Agriculture Development Strategy: According to the Agriculture Development Strategy for 2020, one of its long-term development goals has focused on gradual introduction and increased application of modernized lowland marketed/oriented agricultural production, adapted to climate change and focused on smallholder farmers**.** The Agriculture Master Plan for 2011-2015 has further addressed climate change in agriculture. There is specific reference

to Conservation Agriculture as a suggested adaptation option that could provide an entry point for broader EbA application.

Ecosystem-based adaptation is also specifically referred for the Forestry Sector in the Climate Change Adaptation strategy.

EbA options are currently not discussed for other sectors, but there is an obvious potential to integrate them in water resource management.

The climate change strategy in Lao PDR provides ample opportunities to integrate EbA strategies as a suite of adaptation options. It is also recommended to include EbA as a tool in socio-economic development planning and, where possible, in the design of development projects.

4.1.3. National Adaptation Plan of Action and National Adaptation Plan

The main goal of NAPA is to formulate urgently needed action plans for adaptation to climate change in Lao PDR. A focus has been placed on four sectors namely agriculture, forestry, water and water resources, and public health.

Lao PDR is in the process of developing national adaptation plans, building upon the experience in preparing and implementing its NAPA. This provides a very good opportunity for EbA integration.

Responsible Agency: MONRE

4.1.4. The Seventh Five-year National Socio-Economic Development Plan (2011-2015)- Environmental Protection, Natural Resources Management and Sustainable Development

NESDP highlights the need for reasonable and efficient use of natural resources to ensure that there is balance maintained between socio-economic developments on the one hand, and environmental protection, on the other. Lao PDR should be a green economy and country development should rely on intellectual development as the first priority. Attention must be paid on economic development to make it possible for people to adjust and protect themselves from the impacts of climate change. Based on the country's condition, it must be ensured that the environment is protected through protecting forest, land, mineral resources, and water resources, and rich species of the nation to be sustainable forever. It also can contribute to the achievement of MDG goal no. 7.

Since mainstreaming of climate change is in initial stages efforts should be made to integrate EbA together with climate change into NESDP.

4.1.5. Land & Forest Law &Tenure:

All land and natural forest in Lao PDR belongs to and is centrally managed by the State. Planted trees can be privately owned, though the land in which they are planted remains state-owned. Rights to use and exploit land and forest can be granted to private entities in a number of ways, with minor differences depending on the category of land. Though there have been significant improvements in recent years, the majority of land used by individuals or communities in Lao PDR has limited tenure security. To date, much land use is informal and registration of land rights remains limited. The Government has recognized the

importance of improving land tenure security, and has highlighted changes in land tenure policy as a crucial part of current efforts to reform land law and policy (Robeck 2012). One aspect of such efforts is the implementation of a Participatory Land Use Planning and Land Allocation Programme that seeks to greatly expand the issuance of titles (MAF and NLMA 2010). This offers an entry point to ensure that ecosystem considerations in climate change are given priority in land use as well as land allocation.

Policy and legal structures to facilitating benefits sharing from ecosystem services are limited in Lao PDR. Legislation for valuing ecosystem services has been identified by the Government as a priority (Agricultural Master Plan 2011-2015), and these issues are among those under consideration as part of the 2013 review of the Forestry Law (MONRE, 2012). While the Government has not signaled how it will regulate, organizations providing input to the Forestry Law reform process have recommended linking benefit sharing to land tenure where the latter is sufficiently secure, such as in the case of registered land use rights. Where tenure remains insecure, it is recommended that legal guidelines be adopted that regulate benefit sharing without allocating, while allowing for such areas to transition to allocation of ecosystem once tenure becomes more secure (MONRE, 2012).

Responsible Agencies: MONRE, MAF

4.1.6. Ramsar Convention on Wetlands of International Importance

Commonly known as the Ramsar Convention, this is an intergovernmental treaty that provides the guidelines for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world." The Ramsar Contracting Parties, or Member States, have committed themselves to implementing the "three pillars" of the Convention: to designate suitable wetlands for the List of Wetlands of International Importance ("Ramsar List") and ensure their effective management; to work towards the wise use of all their wetlands through national land-use planning, appropriate policies and legislation, management actions, and public education; and to cooperate internationally concerning transboundary wetlands, shared wetland systems, shared species, and development projects that may affect wetlands. Wetlands are large natural resources that sustain Lao PDR's economy, and the management of those wetlands needs to integrate EbA.

ANNEX 1:

PROPOSED CHANGES TO THE GENERAL GUIDELINES AS A RESULT OF DISCUSSION AND EVALUATION OF THE GUIDELINES IN A LAO PDR CONTEXT

In general there is currently a relatively low level of understanding of how climate change will affect communities in Lao PDR, and how it should be considered during planning. Therefore, the introductory sections of these guidelines provide useful background and structuring discussion for a full range of stakeholders.

On different steps, based on the discussion outlined in the steps, this section provides the list of modifications made:

STEP 1. VULNERABILITY ASSESSMENT OF COMMUNITIES AND ECOSYSTEMS:

The introduction to this section explains clearly the importance and role of the vulnerability assessment and provides a number of useful tools.

1.1. Understanding the context of SES:

Proposed modifications to the guidelines:

1. Include information on S-EDP plans, policies and responsibilities for adaptation planning and implementation.
2. Include information on predicted climate change and how this will affect achieving the SEDPs.
3. Include of consultation process with communities, and endorsement process.
4. Exclude reference to budgets and timescales.
5. Include section on training required before field work starts.
6. The language of the guidelines should be simplified and linked more closely to current socioeconomic development planning data collection.
7. Include a section on identifying possible "partners" carrying out similar planning processes to ensure efficient collaboration.
8. Although the collection of detailed socio-economic data would be helpful, if it is not possible, then the goods and services should still be ranked according to relative values.
9. Include discussion of combining data collection for adaptation and socioeconomic development planning.

1.2. Understanding and mapping ecosystems.

Proposed modifications to the guidelines:

1. Change the references to InVEST to further emphasize that this tool may not be appropriate in many contexts where technical capacity and computer resources are limited.
2. Strengthen the section on how aerial photos and topographic maps should be used in mapping and facilitating discussion and analysis regarding ecosystems and ecosystem services.
3. Edit the wording on follow-up work on ecosystem services.

1.3. Understanding current climate related threats to communities and ecosystems

Proposed modifications to the guidelines:

1. Change the section on information sources to reflect that DDMCC will centrally gather this information, and prepare Provincial briefing notes.
2. Expand content on slow-onset changes.
3. Change wording from inquiring about historical "coping strategy" to "how did you cope" – when there was not a formal "strategy" as this wording was found to be confusing to users.
4. Include guidance on combining data collection for adaptation planning with data collection for the preparation of socioeconomic development plans.

1.4. Understanding threats from non-climate risks and different socioeconomic dynamics including potential development plans to the communities and ecosystems

Proposed modifications to the guidelines:

1. Include reference to the SEDP.
2. Include reference to identifying, and discussing, the drivers behind the development pressures, and
3. Include reference to identifying, and discussing, the aspirations of the communities, including aspirations for development.
4. Strengthen reference to the use of cultural knowledge.
5. Strengthen the discussion on examination of the links between climate change and non-climate change related pressures.
6. Edit to ensure that the SEDP, in itself, is not seen as "threat" or hazard.

1.5. Understanding threats from current climate and non-climate risks to the ecosystems and ecosystem services (ES)

Proposed modifications to the guidelines:

1. Edit so as to put the focus more on sustainable development than ecosystem conservation
2. Increase coverage of how to facilitate discussion to pull out the linkages between climate change and non-climate change factors, directly, and through changed

1.6. Creating Future Scenarios to identify future vulnerabilities to climate and non-climate change

Proposed modifications to the guidelines:

1. Include more information on the purpose of scenario planning, and on how to conduct it to help understand the community's "vision" of futures they want, or want to avoid.
2. Include discussion of the need for training on how to carry out scenario planning.

1.6.1. Scenario analysis involving modeling tools for spatial assessment of the change in the amount and distribution of ES caused by climate pressure.

Proposed modifications to the guidelines:

1. Include discussion of methodology for carrying out spatial scenario analysis on aerial photos and topographic maps.

1.7. Calculating and ranking exposure, sensitivity and adaptive capacity for hazards

Proposed modifications to the guidelines:

1. Include reference to training and preparation.
2. Include better explanation of the purpose of the exercise, and help it helps both prioritize areas that need attention, and whether these could be tackled through reducing exposure or increasing adaptive capacity.

1.8. Vulnerability matrix

Proposed modifications to the guidelines:

1. Note that this should be included as a ***possible*** tool to help summarize the information, but if that is not possible the information can be taken directly from the previous sections.

STEP 2. IDENTIFYING AND PRIORITIZING DIFFERENT ADAPTATION STRATEGIES

2.1. Identifying existing coping strategies and strategies for adaptation

Proposed modifications to the guidelines:

1. Modify language from "strategies" to "how did you cope?"
2. Include more detailed discussion about the process for identifying and considering the adaptation options.
3. Include sample questions to encourage communities and government officials to also consider how their traditional reliance of ecosystems in times of hazard would be affected if those ecosystems continue to be converted or degraded, and what alternatives there might during times of disaster.

2.2. Multi-Criteria Analysis

Proposed modifications to the guidelines:

1. Include a stakeholder process to rank objectives and agree, and rank, evaluation criteria.
2. Re-arrange of the order of discussion of the methodologies, with greater emphasis on stakeholder and expert scoring against the criteria, and then discussion as to how the process of evaluation can be refined as capacity, information, and resources allow.
3. Include specifics of how to conduct a non-computer based spatial analysis if necessary.

2.3. Cost-effectiveness analysis

Proposed modifications to the guidelines:

1. Include discussion of local-level planning cost-effectiveness as one of the criteria.
2. Explain that if cost-effectiveness is seen as an over-riding criteria then more detailed analysis of this could be carried out, and the methodology with the excel spread sheet to help, will be included as a suggested methodology.

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