Strengthening Community and Ecosystem Resilience against Climate Change Impacts

Developing a Framework for Ecosystem-based Adaptation in the Greater Mekong Sub-Region

Literature Review

October 2013
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I. Preface

1. Ecosystem-based adaptation (EbA) has the potential to be an important part of the adaptation strategy for the Greater Mekong Sub-region (GMS). EbA is still a comparatively new concept and the countries in the GMS show a need for operational guidance that helps to assess, develop and mainstream EbA as a part of their integrated adaptation strategies. To support the adoption of EbA as an integral adaptation strategy, the World Bank and the World Wildlife Fund (WWF) collaborated on the development of a framework for assessing EbA options and subsequently field-testing it in two countries in the GMS; namely Laos and Vietnam.

2. The long-term goal of the project is to contribute to the adoption of EbA as a part of an overall adaptation and development strategy in the GMS. The role of ecosystems in reducing vulnerability to both current and future climate change hazards is increasingly getting recognition in the GMS. However, there are still gaps in the available knowledge and practical application of EbA that are relevant and tailored to the country context. The project has the following specific objectives to fulfill these gaps:

   a. Develop an “operational framework” (herein referred to as the Framework), which enables governments to consider, develop and implement EbA measures as a part of an adaptation response to climate change. Part of the Framework also provides guidance in mainstreaming EbA into policies and planning processes.

   b. Field-test the developed Framework in two critical landscapes in the GMS region—a forest catchment/wetland in Laos and a coastal area in Vietnam—and develop case studies that assess the cost effectiveness of EbA in comparison to other adaptation strategies.

   c. Identify the policy entry points to promote and mainstream EbA into development and adaptation planning processes of Laos and Vietnam.

3. In order to provide additional technical support to the Framework, a literature review on EbA was carried out to review the body of work on EbA and its connections to the broader adaptation discourse. The literature review is a fluid document that can be added to and adjusted as the evidence-base grows.
II. Introduction

Historical overview of climate change adaptation and ecosystem-based adaptation

4. Climate change represents a serious threat to human institutions and the economy as it will weaken natural systems and threaten to slow down, and potentially even reverse, sustainable development. Communities all over the world are already experiencing more erratic, severe, and costly changes in natural patterns that threaten human lives and undermine human development; in particularly impacting the poor whose livelihoods depend highly on subsistence economies (IPCC 2007; UNFCCC 2011). Adaptation to climate change has emerged as a critical component of the development process to help safeguard against future climate changes; central to this issue is how adaptation should be carried out. The GMS is a dynamic, rapidly growing region that relies on natural resources and ecosystems for social, economic, and biophysical wellbeing (MRC 2009; WWF 2009). However, increasing temperatures, changes in rainfall patterns, more severe and frequent floods and droughts, and rising sea levels threaten the lives and livelihoods of millions of people and erode sustainable development gains.

5. Adaptation to climate change refers to adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2001). Decision-makers have a range of adaptation pathways available to them. There are three major categories of adaptation: "hard" (or sometimes referred to as "grey"), "soft," and "green." Hard approaches are characterized as capital-intensive, constructed-engineered solutions; soft approaches are characterized as focused on institutions, behavioral and policy approaches; and green approaches are characterized by an ecosystem-based/environmental management approach (The World Bank 2010b, EEA 2010). In reality, the distinction between these approaches are not always clear—for example, watershed planning can be described as both "soft" and "green," and in addition, these approaches often go hand-in-hand as they can be complementary (The World Bank 2010b).

6. Decades of experience in development and disaster risk reduction (DRR) has shown that large-scale, hard infrastructure interventions are expensive, often only provide part of the solution to meeting people's livelihood needs (ELAN 2012), and may work against the environment by disrupting and limiting ecological processes, which may lead to maladaptation and increased social vulnerability (CBD 2009). This necessitates sufficient consideration of "soft" and "green" measures as a part of the suite of options. Infrastructure-based solutions also often cause offsite problems for "downstream" ecosystems and communities (Hirji and Davis 2009). Problems with "hard" solutions most often occur when they have been poorly planned, sited, designed, constructed, and operated (The World Bank 2010b). However, there has been a historical bias to hard solutions at the national and some regional planning levels, as especially reflected in the water sector (Parry et al. 2009).

7. Therefore, the challenge is to identify the most appropriate and effective combination of approaches for an adaptation strategy. In field sites in Vietnam, re-establishment or migration of mangroves was ranked above spending money on sea walls, given the lower costs of mangrove planting and the potential for this activity to be more beneficial for the poor (The World Bank 2010b).

8. In recent years, "EbA" has emerged as a popular approach to respond to climate change. EbA is defined by the Convention on Biological Diversity (CBD) 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” (2009). The purpose of EbA is to increase the resilience of both human systems and ecosystems through activities such as sustainable management of natural resources, conservation, and integrated watershed management, which restore and maintain the integrity of ecosystems and the services they deliver to people. One of the advantages of EbA is that it may be more cost-effective and accessible by rural or poor communities than measures based on hard infrastructure and engineering. Ecosystem-based approaches to adaptation can be particularly important to poorer people, who are often the most directly dependent on the services that ecosystems provide (UNFCCC 2011).

9. 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). EbA builds upon and utilizes approaches that already exist and are central to natural resource management, community-based conservation, and sustainable development. The accumulated body of work in these areas represents a robust foundation upon which EbA has evolved and can rely upon. In fact, much of the information about EbA is not necessarily labeled as EbA, but rather falls under categories such as ecosystem restoration, soil and water conservation, and disaster risk reduction (Munroe et al. 2011). The implementation of EbA can generate significant social, economic, and cultural co-benefits, and utilize and build on the knowledge and practices of indigenous peoples and local communities (Naumann et al. 2011). Principal co-benefits of EbA include livelihood sustenance and food security, sustainable water management, disaster risk reduction, biodiversity conservation, climate change mitigation, and cost-effectiveness (UNFCCC 2011).

Introduction of the Greater Mekong Sub-Region

10. The Mekong River is one of the greatest river systems on Earth and the largest in Southeast Asia, home to over 65 million people who rely on the river’s rich resources for their livelihoods (WWF 2009). The river descends from the Tibetan plateau and passes through deep gorges in the upper reaches of Yunnan province in China, then moving through or forming the borders of Myanmar, Thailand, and Laos before entering into Cambodia. From there, the Mekong enters a mega delta in Cambodia and southern Vietnam before emptying into the South China Sea. With the river system’s unique flood-pulse hydrology, it is one of the most biologically diverse places on Earth (WWF 2009).

11. Climate change has already begun in the GMS. Average daily temperatures across Southeast Asia have increased 0.5 to 1.5°C between 1951 and 2000 (IPCC 2007). Although more annual runoff is expected from an increase in total precipitation, periods and pockets of water stress are likely by the 2050s (IPCC 2007). The topography of the region makes it especially vulnerable to sea level rise due to the extensive coastlines and major deltas barely above mean sea level. Even small increases in global sea levels can cause large-scale devastation, when monsoon winds combine with high tides creating storm surges (especially during the typhoon season) leading to greater inundation, as experienced with Typhoon Linda and Cyclone Nargis. Heat waves have become more common (IPCC 2007).

12. The economy of the region is inextricably tied up with the Mekong ecological system and critical sectors, such as rice and agricultural production and fisheries are vulnerable to both climate and non-climate pressures. People’s productivity and quality of life will also suffer as more become sick with diseases associated with floods, such as malaria, dengue fever, and diarrheal-related
inflictions. Given the strong economic and social connections that exist between people and the environment in the GMS region, EbA has the potential to play a particularly strong role in the region’s adaptation strategy. Adaptation approaches should focus on maintaining or restoring the diverse ecosystems of the Greater Mekong (WWF 2009).

III. Key EbA concepts

13. This section seeks to elaborate on and provide a theoretical underpinning for the central concepts of EbA. The discussion provides support for the approach used in the EbA Framework, and can serve as an additional reference for those seeking more conceptual clarity on how the central tenets of EbA work.

Social-Ecological System

14. Given the immense complexity of the major challenges confronting populations today, and the cross-disciplinary needs required to address these challenges, practitioners and researchers are increasingly recognizing the importance of a social-ecological system (SES) as a mechanism for conceptualizing human-environment systems and how these systems can be managed to be sustainable and resilient (Berkes et al. 2003; Folke 2006; Peterson 2010; Stokols et al. 2013). In short, a social-ecological system can be defined as a coherent system of biophysical and social factors that regularly interact in a resilient, sustained way (Redman at al. 2004). It is described as dynamic, complex, and with continuous adaptation, and the SES approach also asserts that social and ecological systems are linked through feedback mechanisms (Machlis et al. 1997; Gunderson and Holling 2002; Berkes et al. 2003).

15. One of the assertions of the SES perspective is that the distinction between human and ecological systems is arbitrary, and rather they are integral and interlinked to each other (Berkes and Folkes 2003). One way of describing SES is as “interacting stores of natural, social and other types of capital” (Stokols et al. 2013), described in Table 1 below. As Stokols et al. (2013) states, “human–environment systems are characterized by mutually overlapping transactions wherein humans adjust to environmental influences on the achievement of social goals, and in turn, attempt to modify the environment in furtherance of these same goals.” This paradigm notes that, as part of the focus on transaction, the dynamic exchanges among people and environments occur across varying times and scales, and as such, it is important to consider the temporal and spatial scale of the system under study.

<table>
<thead>
<tr>
<th>Table 1 Forms of Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material Resources</strong></td>
</tr>
<tr>
<td>Economic/financial capital:</td>
</tr>
<tr>
<td>Natural capital:</td>
</tr>
<tr>
<td>Human-made environmental capital:</td>
</tr>
<tr>
<td>Technological capital:</td>
</tr>
<tr>
<td><strong>Human Resources</strong></td>
</tr>
<tr>
<td>Social capital:</td>
</tr>
<tr>
<td>Human capital:</td>
</tr>
<tr>
<td>Moral capital:</td>
</tr>
</tbody>
</table>

*Source: Adopted from Stokols et al. 2013*
16. The SES lens to problem-solving requires trans-disciplinary action and research, whereby a diverse array of both fields (for example academic-disciplinary, professional-practitioner, and lay citizen perspectives) and cultures work together in order to better understand and improve the sustainability and resilience of human–environment systems (Brown 2010; Stokols 2006).

17. The SES approach is central to EbA, as there is the explicit consideration of both socioeconomic and ecological systems and the linkages of their dynamic, complex interactions over time and space. If ecosystem services are relevant for a given sector or community, the adaptation strategies need to address the vulnerabilities of both natural and human systems at the same time and consider the links between them (Locatelli, 2008). Figure 1 illustrates the interactions and feedback loops that a SES attempts to capture (Resilience Alliance 2008).

Figure 1 Illustration of interactions in an SES

Source: Resilience Assessment 2008

Vulnerability of social-ecological systems

18. Adger (2006) defines vulnerability as “the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt”. Focusing on only certain types of vulnerability, such as just the social or the physical does not capture the interlinked issues that result in the vulnerability of a place or group to multiple stressors (Adger 2006). Table 2 shows how the scholarship on vulnerability has evolved to the vulnerability of SES.

19. Vulnerability, in terms of climate change specifically, is defined by the Intergovernmental Panel on Climate Change (IPCC 2007) as, “the degree to which an entity is susceptible to, or unable to cope with, the adverse effects of climate change, - including climate variability and extremes.” It is generally described as being a function of three characteristics: exposure, sensitivity, and adaptive capacity (IPCC 2007; Gitay et al. 2002 in Bezuijen et al. 2011).

20. From a climate change perspective, exposure is the important climate events and patterns that affect the system, but includes other changes in linked systems that might be induced by climate effects (IPCC 2007). In a practical sense, exposure is the extent to which a region, resource, or community experiences changes in climate, characterized by the magnitude, frequency, duration
and/or spatial extent of a weather event or pattern (IPCC 2007). For example, coastal communities are more exposed to sea level rise and cyclones, and semi-arid and arid areas are more exposed to drought (Care International 2009).

| Table 2 Review of traditions in vulnerability research (Adger 2006) |
|---|---|---|
| **Antecedent and successor in vulnerability research** | **Vulnerability approach** | **Objectives** |
| **Antecedent** | Vulnerability to famine and food insecurity | Development to explain vulnerability to famine in the absence of shortages of food or production failures. Described vulnerability as a failure of entitlements and shortages of capabilities. | Sen (1981); Swift (1989); Watts and Bohle (1993) |
| | Vulnerability to hazards | Identification and prediction of vulnerable groups, critical regions through likelihood and consequence of hazard. Application in climate change impacts. | Burton et al. (1978, 1993); Smith (1996); Anderson and Woodrow (1998); Parry and Carter (1994) |
| | Human ecology | Structural analysis of underlying causes of vulnerability to natural hazards. | Hewitt (1983); O’Keefe et al. (1976); Mustafa (1998) |
| | Pressure and Release | Further developed human ecology model to link discrete risks with political economy of resources and normative disaster management and intervention. | Blaikie et al. (1994); Winchester (1992); Pelling (2003) |
| **Successors** | Vulnerability to climate change and variability | Explaining present social, physical or ecological system vulnerability to (primarily) future risks, using wide range of methods and research traditions. | Klein and Nicholls (1999); Smit and Pilifosova (2001); Smith et al. (2001); Ford and Smit (2004); O’Brien et al. (2004). |
| | Sustainable livelihoods and vulnerability to poverty | Explains why populations become or stay poor based on analysis of economic factors and social relations. | Dercon (2004); Ligon and Schechter (2003); Dercon and Krishnan (2000) |
| | Vulnerability of social-ecological systems | Explaining the vulnerability of coupled human-environment systems. | Turner et al. (2003a, b); Luers et al. (2003); Luers (2005); O’Brien et al. (2004) |

21. From a climate change perspective, *sensitivity* is the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise (IPCC 2007). For example, a community dependent on rain-fed agriculture is much more sensitive to changing rainfall patterns than one where mining is the dominant livelihood. Likewise, a fragile, arid or semi-arid ecosystem will be more sensitive than a tropical one to a decrease in rainfall, due to the subsequent impact on water flows (Care International 2009).

22. From a climate change perspective, adaptive capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (IPCC 2007). The drivers of adaptive capacity include physical, financial, human, and social capital. Adaptive capacity is unequally distributed, and varies systematically along existing fault lines for inequality, socio-economic status, and social exclusion, such as gender and ethnicity (World Bank 2011). Therefore, the poor are not only the most exposed to the impacts of climate change, they are also the least equipped to adapt to it (World Bank, 2011). The Millennium Ecosystem Assessment notes that many of the means of building adaptive capacity are also linked to ecosystem services regardless of scale.
In other words, healthy, functioning ecosystems contribute positively to adaptive capacity. Investments should be made in the maintenance of ecosystem services as an explicit means for improving food security, clean water, health services, and a clean environment.

23. by Locatelli (2008) below illustrates how the three components of vulnerability relate to each other. As the figure shows, potential impacts to a system equate to exposure plus sensitivity. In addition, another conceptual distinction is that for the IPCC definitions, exposure is external to the system (for example, a climatic event), in contrast, sensitivity and adaptive capacity are both internal (Locatelli 2008).

Figure 2 The components of vulnerability

<table>
<thead>
<tr>
<th>Vulnerability</th>
<th>Exposure E</th>
<th>Sensitivity S</th>
<th>Potential Impacts PI</th>
<th>Adaptive Capacity AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes</td>
<td>The nature and degree to which a system is exposed to significant climatic variations</td>
<td>The degree to which a system is affected, either adversely or beneficially, by climate-related stimuli. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise)</td>
<td>All impacts that may occur given a projected change in climate, without considering adaptation</td>
<td>The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences</td>
</tr>
</tbody>
</table>

Source: Locatelli, 2008.
Note: Definitions are from IPCC: McCarthy et al. 2001). The signs under the arrows mean that high exposure, high sensitivity and low adaptive capacity induce high vulnerability.

Role of ecosystems in reducing vulnerability

24. Human beings and social systems are an inseparable part of their environment through their dependence on ecosystems and the services ecosystems provide. Every human crisis may not be an environment crisis, yet every environmental crisis is a human crisis threatening human wellbeing and livelihoods (Schröter, 2005). Ecosystems offer different services that include provisioning services (e.g., food, fresh water, fuel wood, biochemicals), regulating services (e.g., climate and disease regulation, pollination), cultural services (e.g. spiritual, recreational, and aesthetic value, inspiration) and supporting services (e.g. soil formation, nutrient cycling, primary production). They influence our security, basic material for a good life, health, good social relations,
and ultimately our freedoms and choices; in short our wellbeing (Millennium Ecosystem Assessment 2003). It has been long recognized that the constituents of human wellbeing play an important role in determining the vulnerability of communities, economies, and linked social-ecological systems. The mismanagement of ecosystem services reduces the human wellbeing and increases human vulnerability (Schröter, 2005).

25. The reverse is also true—that is, the proper management of ecosystem services reduces the vulnerability of humans, societies, and economies. Ecosystem services may contribute to reducing exposure, sensitivity, or adaptive capacity of coupled human–environmental systems in various ways. The ecosystems can provide a natural barrier against hazards to reduce exposure of the social systems. Provisioning services (food, water, and chemicals) directly contribute to the adaptive capacities of communities and socioeconomic systems they support by creating a healthy society that is food-secure and has access to clean drinking water. Regulating services (e.g., climate and water regulation) can decrease the sensitivity of a coupled human–environment system, for example, the water regulation services provided by a forest determine the response of a watershed to rainfall events (Locatelli, 2008). Supporting services (e.g., pollination, nutrient cycling etc.) contribute to the adaptive capacity of an ecosystem, because nutrient cycling and primary production are important components of the functioning, resistance, and resilience of the ecosystem (Locatelli, 2008). Supporting services are thus critical to the integrity of the ecosystems on which human and economic wellbeing depends. The figures given below show the linkages between ecosystem services and human-wellbeing (Figure 3) and linkages of ecosystem services and components of vulnerability (Figure 4).

### Figure 3 Relationship between ecosystem and constituents of wellbeing.

<table>
<thead>
<tr>
<th>Ecosystem Services</th>
<th>Constituents of Wellbeing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provisioning services</strong></td>
<td>Security</td>
</tr>
<tr>
<td>- Products obtained from ecosystems</td>
<td>- Personal safety</td>
</tr>
<tr>
<td>- Food</td>
<td>- Secure resource access</td>
</tr>
<tr>
<td>- Fuel wood</td>
<td>- Security from disasters</td>
</tr>
<tr>
<td>- Fibre</td>
<td></td>
</tr>
<tr>
<td>- Biochemicals</td>
<td></td>
</tr>
<tr>
<td>- Genetic resources</td>
<td></td>
</tr>
<tr>
<td><strong>Regulating services</strong></td>
<td>Basic material for life</td>
</tr>
<tr>
<td>- Benefits obtained from regulation</td>
<td>- Adequate livelihoods</td>
</tr>
<tr>
<td>of ecosystem processes</td>
<td>- Sufficient nutritious food</td>
</tr>
<tr>
<td>- Climate regulation</td>
<td>- Shelter</td>
</tr>
<tr>
<td>- Disease regulation</td>
<td>- Access to goods</td>
</tr>
<tr>
<td>- Water regulation</td>
<td></td>
</tr>
<tr>
<td>- Water purification</td>
<td></td>
</tr>
<tr>
<td><strong>Cultural services</strong></td>
<td>Good social relations</td>
</tr>
<tr>
<td>- Nonmaterial benefits obtained</td>
<td>- Social cohesion</td>
</tr>
<tr>
<td>from ecosystems</td>
<td>- Mutual respect</td>
</tr>
<tr>
<td>- Spiritual and religious</td>
<td>- Ability to help others</td>
</tr>
<tr>
<td>- Recreation and ecotourism</td>
<td></td>
</tr>
<tr>
<td>- Aesthetic</td>
<td></td>
</tr>
<tr>
<td>- Inspirational</td>
<td></td>
</tr>
<tr>
<td>- Educational</td>
<td></td>
</tr>
<tr>
<td>- Sense of place</td>
<td></td>
</tr>
<tr>
<td>- Cultural heritage</td>
<td></td>
</tr>
<tr>
<td><strong>Supporting services</strong></td>
<td>Freedom of choice and action</td>
</tr>
<tr>
<td>- Services necessary for the</td>
<td></td>
</tr>
<tr>
<td>production of all other ecosystem</td>
<td></td>
</tr>
<tr>
<td>services</td>
<td></td>
</tr>
<tr>
<td>- Soil formation</td>
<td></td>
</tr>
<tr>
<td>- Nutrient cycling</td>
<td></td>
</tr>
<tr>
<td>- Primary production</td>
<td></td>
</tr>
<tr>
<td>- Provision of habitat</td>
<td></td>
</tr>
</tbody>
</table>

*Source: MEA, 2005.*
26. Ecosystem based Adaptation can play a role in reducing different aspects of vulnerability to climate change—exposure, sensitivity and adaptive capacity. In Figure 4 Locatelli (2008) examined how ecosystem services relate to components of vulnerability to climate change. For example, climate regulation (a regulating service) links to exposure to climate change. In addition, underlying supporting services connect to an ecosystem’s adaptive capacity (Locatelli, 2008). Other regulating services, such as disease regulation, and water regulation and purification relate to ecological and societal sensitivity in terms of the effects of climate change on flooding and the spread of disease. Finally, provisioning and cultural services contribute to both societal sensitivity and adaptive capacity, or the ability of a society to prevent the damage from flooding and disease.

Benefits of EbA for communities

27. Livelihood sustenance and food security: Ecosystems, whether protected or not, contribute to water, food, energy, and livelihood security; for example, harvested products can be used to generate income. Landscapes with high ecological integrity also help to protect water supplies and maintain and improve water quality, which benefits food production and resource harvesting activities.

28. Sustainable water management: Climate change will increase water scarcity, creating competition among agricultural, industrial, and domestic uses. Resilient ecosystems, especially forests, protect water supplies and water quality. A third of 105 of the world’s largest cities (including Jakarta, New York, Mumbai, Quito, and Melbourne) derive their water from forested protected areas (UNFCCC, 2011).
29. **Disaster risk reduction:** Intact ecosystems are important for providing natural buffers against impacts associated with many extreme weather events, including storms, flooding, droughts, hurricanes, and cyclones (UNFCCC 2011).

30. **Co-benefits for Climate change Mitigation:** EbA actions can contribute to climate change mitigation, by reducing greenhouse gas emissions through the maintenance and enhancement of natural greenhouse gas sinks (i.e. forests, vegetated areas, ocean, etc.). Such win-win outcomes could also help to avoid maladaptation (UNFCCC, 2011).

31. **Cost effective and Pro-poor:** EbA options are often more cost-effective and accessible by rural or poor communities than measures based on hard infrastructure and engineering. EbA can be particularly important to poorer people, who are often the most directly dependent on the services that ecosystems provide (UNFCCC, 2011).

32. **Complementary to other initiatives:** EbA can complement, protect and extend the longevity of investments in hard infrastructure (UNFCCC, 2011). For example, mangroves restoration and/or plantation can increase the longevity of sea-walls for coastal zone protection.

33. **Wide Applicability:** EbA can be applied to a wide range of spatial and temporal scales. This means that there is potential for considering EbA under many circumstances (UNFCCC, 2011).

34. **Multi-sectoral and Multi-scale in nature:** EbA integrates a range of disciplines, actors, and institutions interacting at different governance levels and influencing diverse decision networks (Vignola et al. 2009), potentially acting to facilitate the resolution of other issues simultaneously.

**Vulnerability Assessments as an operational tool**

35. Given the rich array of disciplines that have contributed to the formulation of vulnerability, the vulnerability assessments also have a wide-range of forms, from a structured, analytical assessment of community-based adaptation to climate change to advocacy for marginalized communities (Hinkel 2010). Vulnerability research and assessment supports a deeper understanding of whether adaptation takes place, to what extent and why, and the inter-relationship between the social, economic and environmental factors that lead to vulnerability (Adger 2006; Brooks et al. 2011; UNEP 2011; Villanueva 2011; UNEP 2012). Communities are not homogenous, and it is important to understand the differentiated social impacts of climate change based on gender, age, disability, ethnicity, geographical location, livelihood, and migrant status (Tanner and Mitchell, 2008). In addition, a vulnerability assessment should address both climate and non-climate pressures, as both of these dynamics interact and create risks to the SES (ECAWG 2009).

36. In EbA, ecosystems and ecosystem services are included in the vulnerability assessment in terms of (a) how ecosystems themselves are vulnerable and (b) how they (can) interact with dependent communities. While there are many existing methodologies for vulnerability assessment for communities, the methods for assessing risks to ecosystem services are few. In a large-scale assessment of adaptation options for U.S. federally managed lands, West (2008) emphasizes the importance of clearly identifying how development goals in a landscape or community depend on key attributes and services of the ecosystems of which they are a part. Elucidating this relationship then allows an analysis of how changes in climate and non-climate stressors may impact the key ecosystem attributes and services on which development goals depend. This analysis is necessary so that stakeholders can develop effective adaptation strategies.
37. While limited, there are some resources on how to conduct a vulnerability assessment in the context of EbA. Particularly informative resources include ICEM’s Climate Change Adaptation and Mitigation Methodology (CAM), UNEP’s EbA Guidelines and The World Bank’s/WWF’s Flowing Forward. Each of these have informed and contributed to shaping the emerging draft Framework.

38. The CAM is an integrated tool that was designed and field-tested for the Asia Pacific region. One unique attribute of this approach is that it makes the explicit connection between adaptation and mitigation in terms of their potential synergies and trade-offs (Carew-Reid et al. 2011). In addition, as a part of the identifying adaptation priorities this methodology makes use of the “adaptation deficit” concept. This refers to those things which need to be done to address current development problems, with or without climate change, such as rehabilitation and maintenance of water drainage systems, prevention of unsustainable forest loss and soil erosion, and managing flooding due to poor development control and coastal protection. Many actions that address current development problems will build resilience, even if they do not specifically target “climate change.” Those actions that are a part of the “adaptation deficit” should be prioritized early on in a climate change adaptation strategy, as depicted in Figure 5 (Carew-Reid et al. 2011).

Figure 5 The CAM Adaptation Pathway

Adaptation Pathway - addressing the adaptation deficit

Response to CLIMATE CHANGE
- addressing additional threat

Response to CLIMATE VARIABILITY
- addressing extreme weather events

Response to REGULAR CLIMATE
- addressing existing development challenges

ADAPTATION PATHWAY
1. Addressing the adaptation deficit
2. Reinforcing successful coping mechanisms
3. Taking new high priority adaptation action

Action at any level will build resilience to climate change

Source: ICEM 2011

39. The CAM model has two major steps in the vulnerability assessment. One is the potential impact, determined by first an impact assessment, looking at exposure and sensitivity), and second, determining final vulnerability by looking at the adaptive capacity of the system to the impact (Carew-Reid et al. 2011). In order to do this, the methodology relies on a series of matrices—one focused on climate change impacts and the other on adaptive capacity. Both matrices utilize a ranking system, with scores ranging from “very high” to “very low” (Carew-Reid et al., 2011).

40. The Flowing Forward model’s approach to a vulnerability assessment utilizes both top-down and bottom-up tools (Quesne et al. 2010). In addition, this model prescribes the examination
of both climate and development impacts. A description of this vulnerability assessment approach is described below in Figure 6.

Figure 6 The Flowing Forward Model

The World Bank’s approach is built on three stages: (1) objective definition, (2) risk assessment, and (3) options identification and evaluation.

Stage 1: Identify problem, objectives, performance criteria, and rules for decision making.
1. Define problem and objectives — identify system of interest and establish overall objectives;
2. Establish “success” or “performance” criteria and associated thresholds of tolerable risk; and
3. Identify rules for decision making that will be applied to evaluate options.

Stage 2: Assess risks.
1. Identify the climate and non-climate variables that could influence potential outcomes, i.e., that the exposure unit is potentially sensitive/vulnerable to; and
2. Identify the alternative future states or circumstances that may occur (both climate and non-climate) and the impact of these on the exposure unit and performance criteria (including the relative importance of climate and non-climate drivers).

Stage 3: Identify and evaluate options to manage risk.
1. Identify potential adaptation options to meet success criteria; and
2. Evaluate adaptation options according to degree of uncertainty and established rules of decision making. In all circumstances, look for no regrets, low or limited regrets, and win-win, and particularly so when there is high uncertainty. The options of “do nothing” or “delay decision” are possible. Avoid climate decision errors (over-adaptation, under-adaptation, and associated mal-adaptation).

Source: Quesne et al. 2010

41. UNEP is also in the process of finalizing guidance on EbA through a tool focused on moving from principles to practice. This working document provides simple step-by-step guidance for those interested in launching an EbA initiative, as well as including an extensive list of resources for various phases of project design and implementation. Their “principles of good practice” provide valuable guidance, and are the following, with more details in the actual guidance (UNEP 2012):

- Adopt a systems approach (SES)
- Include perceptions at the core of the evaluation framework
- Adopt a flexible and adaptive approach to evaluation
- Establish clear program goals and objectives
- Monitor against moving baselines
- Focus beyond outputs to outcomes
- Adopt a participatory approach

42. They note that these principles are similar to other adaptation projects; however, the adoption of a systems (SES) approach and integration of long-term evaluation is particularly unique to EbA (UNEP 2012).
43. WWF’s early experience in the GMS region emphasized a holistic, multi-stakeholder consultation process at landscape scale. WWF first piloted this approach in coastal vulnerability assessments in Ca Mau, Vietnam and Krabi, Thailand. Its success led to a larger scale vulnerability assessment focused on six key landscapes in Cambodia, Lao PDR, Thailand, and Vietnam.¹

Resilience and linkages with social-ecological systems

44. Ecologist C. S. Holling, with his pivotal work on resilience and stability in ecological systems presented resilience as, “determining the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables, and parameters, and still persist” (Holling, 1973). According to Walker et al. (2004), resilience is currently defined in the literature as the “capacity of a system to absorb disturbance and re-organize while undergoing change so as to still retain essentially the same function, structure, identity and feedbacks.” Table 3 describes how the concept of resilience has evolved over time, expanding into the social-ecological domain (Folkes 2006). Research on resilience in terms of the social-ecological is in the early stages (Folkes 2006). The concept of robustness should also be mentioned, complementary and similar to resilience, but with roots based in the field of engineering, and characterized as, “the maintenance of some desired system characteristics, despite fluctuations in behavior of component parts or its environment” (Anderies et al. 2004).

<table>
<thead>
<tr>
<th>Resilience concepts</th>
<th>Characteristics</th>
<th>Focus on</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering resilience</td>
<td>Return time, efficiency</td>
<td>Recovery, constancy</td>
<td>Vicinity of a stable equilibrium</td>
</tr>
<tr>
<td>Ecological/ecosystem resilience</td>
<td>Buffer capacity, withstand shock, maintain function</td>
<td>Persistence, robustness</td>
<td>Multiple equilibria, stability landscapes</td>
</tr>
<tr>
<td>Social-ecological resilience</td>
<td>Interplay disturbance and reorganization and developing</td>
<td>Adaptive capacity transformability, learning, innovation</td>
<td>Integrated system feedback, cross-scale dynamic interactions</td>
</tr>
</tbody>
</table>

45. It is often assumed that the current domain is the good one and that “flipping” to another would cause breakdown; however, this is not always the case, as described by the “lock-in trap” where the current system is not a good place, but quite resilient - as some political regimes can be described (Allison et al. 2007; Gallopin 2006). As such, a change in a system can provide opportunities for renewal and the development of new structures, processes, and pathways (Folkes 2006).

46. The concepts of adaptation, vulnerability, exposure, sensitivity, adaptive capacity and resilience are inter-related, have significant overlap, and wide application to global (and local) change science (Smit and Wandel 2006; Janssen 2007). There is often confusion in the application and use of these terms, in particular, vulnerability, resilience and adaptive capacity. Adaptation and resilience come largely from the natural sciences and expands from there, and in contrast, ¹Http://wwf.panda.org/what_we_do/where_we_work/greatermekong/challenges_in_the_greatermekong/climate_change_in_the_greatermekong/
vulnerability branches off from a diverse array of fields simultaneously (disaster risk, livelihoods and poverty and food security) (Miller et al. 2010). A fundamental difference between resilience and vulnerability is that resilience applies to the “preservation of the behavior of a system as expressed by its state remaining within the considered domain of attraction”; and in contrast, vulnerability refers to “transformations that may go beyond a single domain” (Gallopin 2006). In other words, resilience is not simply the flip or inverse of resilience—while resilience is an important component of vulnerability, changes can take place (good or bad) that go beyond the “current domain.” Each concept has evolved in different ways, from different disciplines, and with an increasing need for integrated science the concepts have converged in important, interrelated ways.

47. In addition, it has been asserted that resilience is not synonymous with adaptive capacity—but is rather a subset—with adaptive capacity considered broader, especially in social settings with regard to how impacts are coped with and opportunities taken advantage of (Gallopin 2006). A recent CSIRO report observes some of the circuitry of these terms ultimately suggesting that enhancing the ability to recover (resilience) and facilitating the transformation of institutions (adaptive capacity) both promise a reduction in vulnerability (Preston and Stafford-Smith 2009). In addition, this CSIRO report stresses that these terms should not be viewed so rigidly as it can cloud their fundamental intent and derail productive gains, but noting on the other hand that this reflects the growing integration of disciplines (Janssen 2006 in Preston and Stafford-Smith 2009).

IV. Examples and Case Studies

48. Although much of the evidence to date has been qualitative and anecdotal, EbA is gaining increasing attention as a potential mechanism for tackling climate change with the added advantage of biodiversity and poverty co-benefits. The EbA approach has now been widely endorsed by multinational environmental, conservation and development organizations, including the United Nations agencies, such as United Nations Environmental Programme (UNEP) and the United Nations Development Programme (UNDP). However, establishing these dynamics in more concrete terms is an area that needs further research and development in order to better mainstream EbA (Doswald et al. 2011; MRC 2009).

49. It is worth noting, as Doswald et al. do (2011), that assessing the effectiveness of EbA is made difficult by two issues:

1. Adaptation is a relatively new concept and therefore, any “adaptation projects” are unlikely to have any results so far; and

2. There is currently much debate on what constitutes successful or effective adaptation. Spearman and McGray (2011), in their review of concepts and options for monitoring and evaluation of climate change adaptation, emphasize the difficulty in defining adaptation effectiveness, and therefore in measuring it.

50. Munroe et al. (2011) conducted a review of 66 case studies on the ability of EbA to help people adapt to climate change impact from peer-reviewed and grey literature. The case studies are from a number of countries, but primarily from developing countries in Africa, Asia, and developed countries in Europe (Figure 7).
51. Based on the case studies, the main ecosystems in which the effectiveness of EbA was found are “artificial terrestrial landscapes” (for example, agricultural landscapes, pastures and urban areas), coastlines, forests and inland wetlands.

52. There are many ways that EbA strategies can help reduce the vulnerability of communities and ecosystems. For example, the establishment of healthy and diverse agroforestry systems helps communities cope with changed climatic conditions (Munroe et al. 2011). The conservation of agrobiodiversity provides specific gene pools for crop and livestock adaptation to climate change (UNFCCC 2011). The conservation and restoration of forests and natural vegetation stabilizes hillside/mountainside slopes and regulate water flows, preventing flash flooding and landslides as rainfall levels and intensity increases. The maintenance and/or restoration of coastal vegetation, such as mangroves, provides coastal defense and reduces coastal erosion (Munroe et al. 2011). The creation of “artificial wetlands” in urban environments generates ecosystem services, which help reduce water consumption and enhance the water quality (City of Melbourne 2009). A brief table of how EbA interventions can help communities build resilience and adapt to climate change is below is Table 4.

<table>
<thead>
<tr>
<th>EbA Interventions</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restoring fragmented or degraded natural areas</td>
<td>Enhances critical ecosystem services, such as provision of water, food, and fisheries</td>
</tr>
<tr>
<td>Protecting groundwater recharging zones and storing floodplains</td>
<td>Secures water resources to assist communities in coping with drought and flooding</td>
</tr>
<tr>
<td>Connecting expanses of forests, grasslands, reefs and other habitats</td>
<td>Enables people, flora, and fauna to mitigate as climate changes</td>
</tr>
<tr>
<td>Protecting and restoring natural infrastructure such as barrier islands, dunes, mangroves, coral reefs, wetlands and forests</td>
<td>Protect communities and infrastructure from sea level rise, natural hazards, erosion, and flooding</td>
</tr>
</tbody>
</table>

53. To ensure successful results in the long-term, EbA interventions should not be implemented in isolation. Rather they should be coupled with other development approaches, such as targeted
education, awareness raising, and capacity building. It is also important to ensure that the EbA options contribute to social cohesion and team building and not create conflicts.

54. In order to see EbA in action, a brief look at two case studies is summarized below. One case study looks at an EbA project being implemented in a coastal area. And the other case study looks at a project for sustainable watershed management that helps in EbA.

**EbA for Coastal Area**

55. The Green Coast Programme is a community-based coastal rehabilitation program that aims to restore, manage and improve resilience of damaged coastal ecosystems in the tsunami-affected area in Indonesia, India, Malaysia, Sri Lanka, and Thailand (Wibison and Sualia 2008). This program focused on restoring coastal areas (mangroves, sand dunes, sea grass beds, and coral reefs), helping communities improve their incomes through sustainable livelihood activities and create an enabling policy environment. While the time-scale is still quite short, results are already impressive. Within three years, the project achieved the following:

- Planted more than three million seedlings, re-establishing over 1,100 hectares of coastal forest and mangroves, helping to protect communities against storm surges, sea level rise, and coastal inundation;
- Communities participated in cleaning up beaches and over 100 hectares of coral reef and sea grass beds. A total length of over 3 km of sand dunes were restored and other key natural habitats, such as lagoons were rehabilitated;
- A total of 91,000 tsunami-affected people in these coastal areas have benefited from rehabilitated coastal ecosystems, with more than 12,000 households directly gaining increased income through livelihood activities (fishing, small scale aquaculture, eco-enterprises, home gardening and animal husbandry).

56. Similarly, in Vietnam, it has been demonstrated that communities at risk can participate in the process of risk reduction. Since 1994, the Vietnamese Red Cross has planted 12,000 hectares of mangroves, at a cost of US$1.1 million. The benefits have been enormous, exceeding the costs. The project has helped reduce the cost of dyke maintenance by over US$7 million per year. In addition, lives, possessions and property have been spared from floods. The livelihoods of an estimated 7,750 families have benefited by selling the crabs, shrimp and mollusks that reside and depend upon mangrove forests (IFRC 2002).

**V. Lessons learned**

57. Different organizations including development organizations, conservation organizations, and multilateral development banks (MDBs), UN organizations and the private sector are increasingly getting involved in EbA initiatives. There are numerous articles and documents available on different aspects of EbA, including the role of ecosystem services in reducing vulnerabilities, principles of EbA, ecosystem management and DRR, and summaries of some case studies and best practices. As such, there is value in taking a step back and learning from existing EbA efforts and initiatives. This will help identify lessons learned, gaps, improve future efforts, and mainstream efforts.

58. A review of previous EbA specific initiatives reveal recurring challenges commonly faced. In summary, there are four common challenges: (1) lack of climate change information; (2) need for
improved assessment methodologies for social-ecological systems; (3) limited evidence-base on the effectiveness of EbA; and (4) lack of practical guidance on how to integrate EbA into broader initiatives. A more detailed analysis of these challenges is described in Table 5.

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Explanation</th>
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<tbody>
<tr>
<td>Lack of knowledge on climate change information</td>
<td>This includes projections, data and gaps and analytical studies on likely impacts at national and subnational scales (AKP 2011; MRC 2009). In Laos, for example, the National Adaptation Programs of Action (NAPA) states that assessments, predictions, and analyses concerning the future impacts have only been done to a limited extent, mainly due to the lack of capacity and resources that the government has not been able to conduct their own climate change research and studies (AKP 2011). The forecasts available are provided by external and regional sources such as global telecommunication systems or data from MRC and SEASTART. More information is available in Vietnam, but there also is a lack of high-resolution data for climate change scenarios (Snidvongs 2010). The policymakers often face the challenge of designing and revising policies without a robust information base.</td>
</tr>
<tr>
<td>Need for improved assessment methodologies of social-ecological systems</td>
<td>There is a need to improve vulnerability assessment models with a social-ecological perspective in order gain understanding of the dynamics between communities and the environment. This is still an area that needs further research and development (Doswald et al. 2011; MRC 2009).</td>
</tr>
<tr>
<td>Limited evidence-base on EbA</td>
<td>Robust scientific studies on EbA effectiveness are few, and only a limited number of case study reviews exist (Reid 2011). Some of the gaps in collecting evidence are: 1. Few studies with comparative analysis of EbA and hard measures, such as a “before and after” situation in the event of a dramatic climate change impact, such as a cyclone (Reid 2011; Doswald et al. 2011). 2. Few case studies closely examine who benefits from EbA among vulnerable communities, groups, and across broader scales. 3. Few case studies provide a quantified economic assessment (the economic valuation with correct attribution of the benefits and beneficiaries of ecosystem services is difficult to evaluate), but it is likely to provide the biggest justification for decision makers when it comes to adopting a new approach (Reid 2011).</td>
</tr>
<tr>
<td>Lack of practical guidance on how to incorporate EbA into adaptation strategies</td>
<td>For maximum and sustained effectiveness, EbA should be implemented in conjunction with other development and adaptation activities. This gap has been described in many sources, including within the DRR community (UNISDR) and featured by the UNFCCC in the UNFCCC SBSTA Information Document Ecosystem-based approaches to adaptation: Compilation of information produced for Durban (FCCC/SBSTA/2011/INF.8).</td>
</tr>
</tbody>
</table>

**Table 5 Common EbA Challenges**

**Lessons learned from broader adaptation initiatives**

59. There is value to be gained from assembling lessons learned from previous adaptation experiences, not limited to EbA and including disaster risk reduction (DRR). Examining and learning from the broader adaptation and disaster risk reduction community will not only help ensure that EbA benefits from this existing body of work, but will also facilitate much needed linkages with these approaches.

60. In general, adaptation efforts suffer from a lack of resources and capacity, and from governance challenges, as do many other sectors of development. Overall, lack of resources and financial capacity is one of the primary reasons that adaptation strategies, even if they are
identified properly and with stakeholder participation, are not taken up by countries at national levels or by affected individuals at a micro-level. In addition, lack of capacity, political will, awareness, and coordination pose a significant challenge in designing and implementing adaptation initiatives, including EbA. There is opportunity for climate funds, development funds and public-private partnerships to help address these challenges.

61. As a source of guidance to other adaptation practitioners and researchers, a review of previous adaptation efforts, not limited to EbA, was conducted. Some of the central lessons learned are discussed below.

62. **Integrate climate change adaptation into broader sustainable development:** First and foremost, any adaptation effort should be a part of a broad sustainable development pathway. Climate change hazards can create significant impediments and jeopardize the sustainable development pathway and place the lives and livelihoods of many at risk. Consequently, it becomes important to integrate adaptation strategies into broader development policies, plans, and targets and select the best strategy to achieve the target (UNFCCC 2011).

63. **Adopt a social-ecological perspective:** From the onset, any adaptation effort should adopt a social-ecological perspective in order to create a framework that best enables capturing the dynamics between the social, economic, and ecological. Taking this view will also enable a better fit into the sustainable development pathway. Ecosystems are complex and they interact with social and environmental systems across a range of scales. Hence the design of adaptation strategies and understanding of vulnerability needs to include the range of drivers that affect the delivery of ecosystem services and cause the communities to be more vulnerable. An effective adaptation strategy is possible only through understanding and reducing not only specific vulnerabilities to climate variability and extreme events, but also other underlying causes of vulnerability (such as poverty, governance, etc.). This will support a deeper understanding of whether adaptation takes place, to what extent and why, and the inter-relationship between the socioeconomic factors that lead to vulnerability (UNEP 2012; Villanueva 2011; Brooks et al. 2011; UNEP 2011).

64. **Pilot at the lowest appropriate level:** Action should take place at the lowest appropriate level, with pilots at the local level. It is necessary to realize that “reducing vulnerabilities and increasing resilience starts with local, community-based adaptation initiatives that engage multiple stakeholders at various levels to design and pilot risk reduction measures” (UNDP 2011). Though the challenge of climate change is global, adaptation is local and it is necessary to think of longer-term solutions that address specific and local problems. Initiatives designed with the local piloting in mind should also include opportunities for replication and scaling up.

65. **Two-way flow of knowledge transfer:** Continuous participation of different stakeholders in identifying the risks and response is crucial for strong ownership and sustained adaptation responses (UNDP 2011). Adaptation strategies that are not congruent with the existing local knowledge and resources have little chance of succeeding. Similarly, it is also important to create a meaningful dialogue, increase capacity, and raise awareness of communities. This can be done through multiple, coupled methodologies, including climate change forecasts/projections/analyses, alternative future scenarios, long-term planning, and spatial analysis. This will help facilitate the difference in climate risks even for the areas that geographically appear to be close (Andrade et al. (eds) 2010). Linked with the principle of community participatory approaches, EbA initiatives should be designed with an inherent understanding of local perceptions on capabilities and risk related to a changing climate (Villanueva 2011 cited in UNEP 2012). Core to the design and
monitoring and evaluation of the initiative should be people’s perceptions of ecosystem contribution to livelihoods, risk, and capacity.

66. Take “No Regret” action despite uncertainty: Studies indicate that despite much uncertainty about the possible effects of global warming on local weather patterns and information gaps, society knows enough to build plausible scenarios on which to base decision making. This is true even in developing countries, where historical longitudinal climate data may be limited. Using such scenarios helps decision-makers identify “no regret” beneficial adaptation measures that would be useful against a range of climate change outcomes (Climate work foundation 2009; UNDP 2011).

67. Adaptive management approach: Project design and implementation should reflect a flexible and adaptive management approach. EbA and other adaptation activities should adopt approaches that can be tailored to changing circumstances. This can only be achieved if the design allows for a diversity of answers to a single question, consideration of several adaptation strategies for the same goal, and a willingness to change focus and pathways mid-stream if needed (Andrade et al. 2011).

Relationship between Disaster Risk Reduction and Ecosystem based Adaptation

68. Soft approaches, including ecosystem-based approaches, are gaining importance in the DRR discourse, policies, and practices; and Environmental Management responses form an important part of the Hyogo Framework for Action 2005-15 (UNISDR 2005), the first global agreement in disaster reduction, with the UN International Strategy for Disaster Risk Reduction (ISDR) as the implementing body. Furthermore, both the 2009 and 2011 Global Assessment Report on Disaster Reduction calls for greater protection and enhancement of ecosystem.

69. The definition of DRR is as follows, “The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events” (UNISDR website). There are many differences and similarities between climate change adaptation, DRR and EbA, including history, institutions, approach, and even terminology. For clarity, some key terms to consider in DRR are described in Table 6 (UNISDR).

70. Experiences in DRR and EbA suggest the importance of integrating ecological, economic and social considerations in reducing risk, and taking into account the role of ecosystems in supporting social and economic development (ProAct Network 2008). In addition, each discipline can learn from the experiences of each other, in particularly in terms of thinking about how to address underlying risk drivers, such as livelihoods, governance, disaster risk, ecosystem decline, and climate change within a larger framework (Global Assessment Report on DRR 2009).

71. As risks grow, they cannot simply be managed by building bigger and more concrete engineered structures (ProAct Network 2008). Inversely, not every challenge can be addressed through ecosystem management. Sometimes something completely different is needed, for example, the best approach to adaptation could in many instances be strengthening of local institutions or decision-making processes, government policies relating to land tenure, empowerment of women, local access to credit facilities and so forth, none of which are ecosystem related or engineered; rather they could be considered soft adaptation measures. In fact, a combined balance between the two approaches is needed, with the balance evolving to more soft-
engineered options as such approaches become better understood, monitored, replicated, and valued.

<table>
<thead>
<tr>
<th>Table 6 Key DRR Terms</th>
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<tbody>
<tr>
<td><strong>Term</strong></td>
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<tr>
<td>Hazard</td>
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<td></td>
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<tr>
<td>Risk Assessment</td>
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<td>Risk</td>
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<td></td>
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<tr>
<td>Resilience</td>
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<tr>
<td>Vulnerability</td>
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<tr>
<td>Preparedness</td>
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</table>

72. However, despite the growing recognition of EbA in the DRR community, in practice EbA or an environmental management approach rarely fits into a DRR strategy in a substantive way (ProAct Network Policy Brief 2010). Healthy ecosystems provide important services for DRR; for example, by serving as protective barriers against disasters and building local resilience by sustaining livelihoods and improving capacity to adapt to climate change. This represents an operational gap in the DRR community, as the risk of disasters increase as ecosystem function declines, creating a vicious cycle.

73. A platform for actively creating convergence between EbA and DRR is through the approach referred to as Ecosystem-based DRR, which is described as, “decision-making activities that take into consideration current and future human livelihood needs and biophysical requirements of ecosystems, and recognize the role of ecosystems in supporting communities to prepare for and cope with disaster situations” (IUCN Environmental Guidance Note 2009). This platform is complementary to both EbA and DRR as it serves as a way to bridge two approaches that have more in common than different.
74. Indeed it is pointed out that while DRR, ecosystem management, climate change adaptation, and development planning each have their institutions, goals, activities and stakeholders—many of these relate to each other in important ways, as described by Figure 8 (IUCN Environmental Guidance Note 2009). As such improved dialogue and coordinating mechanisms are critically needed between these sectors for sustained convergence (ibid).

![Figure 8 Areas of convergence between DRR, development and ecosystem management](source: IUCN Environmental Guidance Note, 2009)

75. The development and implementation of ecosystem-based strategies that combine EbA, DRR, and vulnerability reduction in planning and policy processes has great promise for creating a beneficial self-reinforcing feedback cycle (ibid). It is advised that in order to help the DRR and the broader policy and planning community better understand the potential contribution of EbA and an ecosystem-based management approach, more quantitative evidence is needed and awareness needs to be raised of policy-makers, planners, and practitioners of the benefits of this approach (ibid). Figure 9 describes some of the relationships between climate change, disaster risk, ecosystem degradation and vulnerable communities (UNEP 2009).

76. The key is to break the vicious cycle that too often exists between increased environmental degradation, climate change and increased disaster risk. Environmental management, and EbA specifically, is a way of breaking this cycle.
VI. Review of existing frameworks

77. There are numerous resources available on vulnerability analysis (principles, guidelines, and frameworks), as well as significant guidance in mainstreaming adaptation in development planning and processes at various levels. However, detailed operational guidance or operational frameworks for planning and implementing EbA options specifically are still very few. In part, this is because EbA is new to the adaptation discourse, and although EbA is based on a rich foundation, a targeted body of work and evidence base is still being accumulated. To avoid unnecessary duplication, the EbA have referred to and built on the existing array of resources where appropriate. In preparation of the draft framework some of the existing methodologies and frameworks were analyzed.

Overview of the existing frameworks

78. Guidelines and toolkits available for assessing vulnerability and designing adaptation initiatives (not EbA specific), such as ADAPT, Adaptation Wizard, and UNDP’s toolkit for designing climate change initiatives, provide good resources for screening climate change risks. For example, both ADAPT and the Adaptation Wizard offer a five-step process to analyze risk and assess vulnerability that can be built upon to include ecosystem services at the planning and design stage. In addition, UNDP’s toolkit provides detailed methodologies with guiding questions for designing an adaptation project that can assist in designing any adaptation initiative, including EbA practices. However, these frameworks lack a social-ecological perspective that looks at both communities and ecosystems, and their linkages. Ecosystem services are not taken into account, or do these toolkits provide guidelines for spatial or scenario based analysis.

79. Some of the operational guidance available on EbA specifically that has been informative in shaping this Framework include: UNEP’s EbA guidance; IUCN and SEASTART’s Community and Ecosystem-based Adaptation Framework; Ecosystem and Livelihoods Adaptation Network’s (ELAN) Integrated Approach and Framework on Assessing Effectiveness of EbA; and The World
Bank/WWF’s Flowing Forward. These resources, particularly SEASTART/IUCN and ELAN, place particular importance on the integration of different ecosystems and community-based adaptation (CbA). This Framework emphasizes the importance of community participation and builds on the CbA approach, especially at the district and provincial level where it will be field-tested. We also built within the draft Framework the element of scale flexibility, so that it can be used at different levels, including the sectoral and national levels. The final Framework will also provide some guidance at the national level. Below is a description of the primary works of EbA guidance that helped shape the draft Framework.

80. UNEP’s “Ecosystem-based adaptation Guidance: Moving from principles to practice” is a working document produced to assist adaptation practitioners in the selection, design, and implementation of adaptation activities that consider EbA approaches. It takes different contexts into account and suggests an aggregated list of resources to help in every step of EbA assessment. It also gives a list of resources for spatial analysis, scenario analysis and cost effectiveness analysis. However, the list of methodologies and field guidance on “how to” is not extensively documented in the report itself, making it necessary for the user to reference different resources.

81. The Community and Ecosystem based Adaptation Framework developed by SEASTART/IUCN provides a comprehensive conceptual framework for vulnerability analysis of the communities, and all ecosystem services are taken into account. A detailed guidance based on the framework is planned, but not available yet. However, the framework does not provide guidance for designing and evaluating various adaptation options, including comparing and contrasting cost effectiveness.

82. The publication(s) from ELAN on effectiveness of EbA options help establish good principles for EbA initiatives. The “Draft Principles and Guidelines for Integrating Ecosystem-Based Approaches to Adaptation in Project and Policy Design” document provides operational guidelines on designing and implementing EbA options; however, this needs to be developed further and in more detail. It should also be noted that costing and cost effectiveness analyses are not included.

83. The World Bank’s/WWF’s “Flowing Forward” framework provides detailed policy and operational guidance for factoring the ecosystem implications of climate adaptation into integrated water resources planning, design, and operational decisions, as well as biodiversity conservation programs. It focuses on a specific type of ecosystem, but the overall framework has the potential to be useful for and broadened to include other ecosystems too.

84. There are many resources also for species and ecosystem adaptation, which sometimes may or may not explicitly link to adaptive capacities of communities. For example, The Nature Conservancy’s (TNC) adaption document, “Primer for Assessing Impacts, Advancing Ecosystem-based Adaptation” and NOAA’s “Voluntary Step-by-Step Guide for Considering Potential Climate Change Impacts on Coastal and Estuarine Land Conservation Projects” explicitly look at vulnerability and EbA in the context of conservation. However, these resources stop short of leveraging healthy ecosystems and their services as a means to increase the resilience or adaptive capacity of socio-economic sectors or communities. The Framework considers socio-ecological systems as a whole, and hence provides guidance for assessing vulnerabilities of both socio-economic and environmental systems. Explicit linkages are provided for enhancing ecosystem services in order to reduce the vulnerability of humans and socio-economic sectors.

85. Care’s Climate Vulnerability and Capacity Handbook (CVCA) provide an operational framework and guiding questions for analyzing vulnerability and capacity to adapt to climate change at the community level (CVCA 2009). This operation framework provides highly useful tools
and guiding questions for community-based work. In addition, CRiSTAL (Community-based Risk Screening Tool – Adaptation & Livelihoods), is a project planning and management tool developed jointly by IUCN, IIISD, and the Stockholm Environmental Institute’s U.S. Center (SEI-US), and includes climate change considerations in development projects at the community level. This particular tool makes good use of the lesson learned that adaptation should be part of the larger development cycle. Both CVCA and CRiSTAL provide ample resources for participatory approaches; however, they rely predominantly on community knowledge for assessing likely climate change impacts on resources and they would also benefit from the additional infusion of other forms of knowledge, such as spatial analysis.

86. ICEM (International Centre for Environmental Management) has developed a framework methodology entitled, “Climate Change Adaptation and Mitigation Methodology” (CAM). This tool is unique in that it is an integrated approach to climate change adaptation and mitigation planning and implementation. This is useful in that the distinction between mitigation and adaptation is often overstated, and in many cases there are synergies between the two; well-thought-out mitigation approaches can also be adaptation, and vice versa. An analytical tool to guide this process is needed and fills a gap in the field. ICEM’s CAM methodology has been developed specifically for the Asia Pacific region. This methodology provides useful guiding principles that explicitly includes EbA and emphasizes the importance of spatial analysis in adaptation. In addition, the tool makes use of multiple rigorous tools, such as cost effectiveness analysis. Some of the operational guidance needed to accompany the methodology is located elsewhere (not in one document), and as needed by the scale and level of the project.

87. The Global Environment Facility (GEF) also provides guidelines on EbA, entitled, “Operational Guidelines on Ecosystem-based Approaches to Adaptation.” These guidelines are aimed at clarifying criteria for projects that intend to employ ecosystem-based approaches to adaptation and at providing practical, operational advice to implementing agencies, executing agencies, and project proponents that seek funding through the Least Developing Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) for such projects. These guidelines, while useful, are more at a higher level and in order for them to be operational would need to be developed further (GEF Operational Guidelines 2012). The guidelines call for the establishment of feedback linkages and loops between ecosystems and communities. Scenario analyses are mentioned specifically, and spatial analysis is described in terms of considering the possible trade-offs of implementing ecosystem management alternatives at different temporal and spatial scales. Cost effectiveness is also mentioned through the use of cost benefit and feasibility analyses to determine the most suitable EbA approaches.

88. An analysis of the different EbA frameworks is presented in Table 7. This table takes three criteria into account: consideration of EbA, inclusion of spatial and/or scenario analysis, and inclusion of cost effectiveness analysis.
<table>
<thead>
<tr>
<th>Framework</th>
<th>Description</th>
<th>EbA approach considered?</th>
<th>Methodology: includes spatial/scenario Analysis?</th>
<th>Cost effectiveness analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Vulnerability and Capacity Analysis Handbook (2009) CARE International.</td>
<td>The CVCA methodology provides a framework for analyzing vulnerability and capacity to adapt to climate change at the community level. Recognizing that local actors must drive their own future, the CVCA prioritizes local knowledge on climate risks and adaptation strategies in the data gathering and analysis process.</td>
<td>No</td>
<td>Suggests different tools and a set of guiding questions targeted at national, local and international level (for interviews, group discussions etc.). Spatial analysis is not included.</td>
<td>Not included</td>
</tr>
<tr>
<td>Draft Principles and Guidelines for Integrating Ecosystem-based Approaches to adaptation in Project and Policy Design: a discussion document (2011) IUCN-CEM, CATIE, WWF and others.</td>
<td>This tool proposes a set of draft principles and guidelines to act as a foundation for planning EbA. They are intended for use when undertaking national adaptation planning and in project and research design.</td>
<td>Yes, but does not have detailed methodology and steps.</td>
<td>Gives a brief guideline for designing projects with EbA. Does not provide tools and methodology in detail. No spatial analysis included.</td>
<td>Not included</td>
</tr>
<tr>
<td>Ecosystem-based adaptation Guidance: Moving from principles to practice – working document (April 2012) United Nations Environment Programme (UNEP). Unpublished.</td>
<td>This guidance has been produced to provide assistance to adaptation practitioners in the: 1) Selection; 2) Design; and 3) Implementation of adaptation activities that consider EbA in the suite of available adaptation technologies.</td>
<td>Yes, but a detailed methodology is not outlined. However, a list of resources for further considerations is given.</td>
<td>Yes - a list of resources is listed, but detailed guidelines are not included in the framework.</td>
<td>Yes - provides a list of resources for different analyses for prioritizing adaptation options, including economic analysis, but it is not incorporated within the framework</td>
</tr>
<tr>
<td>Framework for assessing the evidence for the effectiveness of Ecosystem-based approaches to adaptation (2011) Munroe, R., Doswald, N., Roe D., Reid, H., Giuliani A.,</td>
<td>This document outlines an assessment framework for data extraction. It asks a series of questions to assess the state of evidence on the effectiveness of EbA to adaptation. It</td>
<td>Yes, there are no guidelines or methodology on conducting EbA assessment, but guidelines to help assess the effectiveness.</td>
<td>Does not provide detailed methodology for conducting EbA, but provides guidance on how the effectiveness of EbA projects (once completed) can be assessed.</td>
<td>No</td>
</tr>
<tr>
<td>Reference</td>
<td>Summary</td>
<td>A</td>
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<tr>
<td>Castelli, I. (2011) Birdlife, UNEP-WCMC, IIED, Cambridge, UK.</td>
<td>should be used in conjunction with the document Guidance on applying the Framework for Assessing the Evidence for the Effectiveness of Ecosystem-based Approaches to adaptation and the associated Logbook.</td>
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<tr>
<td>Toolkit for Designing climate change adaptation Initiatives (2010) UNDP.</td>
<td>This Toolkit aspires to support all those involved in the design of measurable, verifiable, and reportable adaptation initiatives. It provides step-by-step guidance. As such, it seeks to answer the following question: What are the basic steps in planning and designing an adaptation initiative?</td>
<td>No</td>
<td>Provides detailed methodologies with guiding questions for designing an adaptation project. Guidelines for Spatial and Scenario analysis are not provided.</td>
<td>No</td>
</tr>
<tr>
<td>Shaping Climate Resilient Development: a framework for decision-making (2009) Economics of Climate adaptation Working Group (ECAWG). Climate Works Foundation, Global Environment Facility, European Commission, McKinsey &amp; Company, The Rockefeller Foundation, Standard Chartered Bank and Swiss Re.</td>
<td>Focusing specifically on the economic aspects of adaptation, it outlines a fact-based risk management approach that national and local leaders can use to understand the impact of climate on their economies – and identify actions to minimize that impact at the lowest cost to society.</td>
<td>Yes, but methodology not provided.</td>
<td>Not relevant</td>
<td>Yes</td>
</tr>
<tr>
<td>Flowing Forward: Freshwater ecosystem adaptation to climate change in water resources management and biodiversity conservation (2010) World Bank, WWF, Water Partnership</td>
<td>Provides a structured approach (policy and operational guidance) for factoring the ecosystem implications of climate adaptation into integrated water resources planning, design, and</td>
<td>Yes, provides a step-wise operational guidance for freshwater ecosystems.</td>
<td>Spatial analysis is not included; though guidance is provided for future scenario analyses.</td>
<td>No</td>
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<tr>
<td>Program</td>
<td>operational decisions, as well as biodiversity conservation programs</td>
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<tr>
<td>Climate Change Adaptation and Mitigation Methodology (CAM) (2011) International Centre for Environmental Management</td>
<td>This is an integrated approach to climate change mitigation and adaptation planning. The methodology has and continues to be developed and adapted to project and case specific needs. Using a wide range and tools and processes this approach is unique in that it explicitly examines the connections between mitigation and adaptation at different levels and stages of planning. Yes, can be applied to both natural ecosystems and hard infrastructure projects. One of their guiding principles is the foundational role of natural systems in resilience, and the inverse, not to address CC through means that degrade ecosystems and its contribution to resilience. Yes, one of the guiding principles is the use of spatial planning as the foundation for adaptation. They use Dyna-CLUE, a practical, integrated assessment model. Yes, advocates addressing the adaptation deficit first and prioritized phasing in of options so that cost is not prohibitive. One method for prioritizing is based on through group consensus exercises. Cost-benefit analysis. They also utilize a suite of macro-economic analysis and economic valuation tools, including cost-effective analysis.</td>
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<tr>
<td>Global Environment Facility (GEF) Operational Guidelines on Ecosystem-based Approaches to Adaptation (2012)</td>
<td>These higher level guidelines are aimed at clarifying criteria for projects that intend to employ EbA and at providing advice to implementing agencies, executing agencies and project proponents that seek funding through LDCF and SCCF for such projects. The guidelines will complement the review criteria that are applied on all projects and programs submitted to the GEF Secretariat for funding approval. Yes, scenario analysis is mentioned and spatial analysis is generally described. Yes, cost effectiveness is considered in terms of cost benefit and feasibility analyses.</td>
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</table>

**Gap analysis**

89. The review of existing frameworks highlights gaps that exist in providing guidance on EbA. Overall, there is limited operational guidance for vulnerability assessments that adopt a social-ecological perspective. In particularly, there is insufficient guidance on the role of ecosystem
services in reducing vulnerability of the communities or socioeconomic sectors. Understanding this dynamic is critical for identifying, selecting, designing, and implementing appropriate EbA options.

90. In order to facilitate effective transfer of knowledge and increased capacity, more guidance on scenario analysis and spatial analysis is needed. These can be powerful tools in working with communities, infusing bottom-up and top-down knowledge, and examining various options and their implications. In addition, these tools allow for a guidance framework to be at applied at different scales, including community, provincial, sectoral and national, as well as provide added value to planning processes.

91. Cost effectiveness plays a big part in influencing policy makers and is a determinant in success of an initiative. EbA measures are often cited as cost effective, and advocated for in part because of this attribute, without having adequate evidence of this. Most existing resources do not provide guidance on how to conduct a cost-effectiveness analysis, and the absence of this tool imbedded into EbA guidance represents a gap.

92. In addition, other gaps that existing in the current EbA frameworks include lack of applicability at different scales, limited to specific landscapes/ecosystems, insufficient integration of EbA and CbA, inadequate synergy between climate change adaptation and mitigation, and guidance that is too high-level in its form and not sufficiently operational for the target audience.

93. In recognition of these gaps, the draft Framework that accompanies this Literature Review attempts to fill these gaps in order to provide a tool that is needed and useful for communities, practitioners and decision-makers.

94. The draft Framework provides important value-added to the body of work concerning EbA and how it fits into the broader adaptation and sustainable development agendas. In essence, the Framework provides a tool for assessing EbA options at different scales and performing a cost-effectiveness analysis. One of the major facets of the Framework is that it provides a detailed operational guidance on assessing the vulnerability of a social-ecological system that includes both societies and ecosystems. As such, the framework will contribute to a more concrete understanding of how ecosystem services affect vulnerability of the communities and socio-economic sectors. In order to create a user-friendly tool a single document has been produced that users can utilize for clarification of key concepts and application in the field.

95. This Framework, while based on sound literature, is also field-tested and has been applied to the rigors of the real world. It has undergone field-testing in two different landscapes, and refined based on this collaborative process in order to ensure that it is practical and relevant. As a critical element of this, multi-stakeholder participation is incorporated in the design and field-testing of the framework.

96. As a lesson learned from previous initiative emphasize the importance of mainstreaming EbA at national and sub-national levels, the project is being implemented in partnership with the Ministry of Natural Resources and Environment in both Lao PDR and Vietnam. Detailed policy analysis will be carried out in each country to provide entry points for integration of EbA strategies and guidance will be provided on mainstreaming EbA.

97. This Framework combines rigorous science, local knowledge, and participatory tools. Temporal and spatial analysis is integrated through the application of different tools such as InVEST, other multi-criteria analysis tools, etc. There is a clear evaluation of cost effectiveness as a
tool to compare various adaptation options, including hard adaptation measures, to support the evidence-base.

**Box 1 WWF GMS Consensus Statement on Principles of Good Adaptation Practice (2010)**

**Adaptation strategies must be custom-made.**
Adaptation is context specific. The impacts of climate change will not be the same throughout the region, and the capacity to act will differ in different sites. For this reason, appropriate strategies for communities to adapt to climate change will depend on local conditions including location, topography, weather, natural systems, surrounding influences and drivers, knowledge and institutional arrangements.

While it is good to learn from other experiences, it is not possible to directly copy solutions across the region. Therefore, adaptation responses must be suited to a particular site and need to consider human, community, environment, and economic dimensions.

**Good adaptation follows the same principles of good development.**
Good climate change adaptation adheres to the same principles of good development. Maintaining a balance of people, the environment, and the economy is more likely to be sustainable.

Sustainable solutions to climate change integrate many aspects: management of natural resources, change in people’s behavior, modification of infrastructure, economic incentives (policies and market mechanisms), land use planning and zoning, social policies, and sector-specific policies.

**Adaptation must respect the limits of natural systems.**
There is no use in adapting by undermining the natural system foundation for development. Doing so will lead to losses to the community over the long term. Directly or indirectly they depend on ecosystem services and products for their wellbeing, such as water quality, water catchment, soil quality, fish abundance, and protection from storms. Adapting by enhancing, rehabilitating, and maintaining natural systems is essential for sustainability.

**Adaptation strategies should have buy-in from the community.**
Experience shows that strategies that have community support are likely to be sustainable. Involving local communities in the design and planning process as well as throughout implementation leads to projects that are longer-lived and more successful.

**Adaptation actions should promote equity.**
Seek fair participation from all groups within a community in the decision making process. All gender groups, all ages and all socio-economic levels from the community should be given a fair chance to participate. This is more likely to lead to greater community support and equity in adaptation responses.

**Build adaptation strategies on what exists.**
Many existing community responses to extreme weather events or in response to other development challenges such as poverty alleviation are appropriate adaptation strategies for climate change. Review what is in place and build adaptation on the best in existing practices and arrangements.

**Support climate change adaptation from day one, but be precautionary**
Climate change predictions are uncertain and impacts of climate change in specific sites are still largely unknown. However, uncertainty must not be confused with ignorance. We have sound evidence that climate change will bring drastic changes, and the lack of detailed information on how these changes will unfold is not a reason to do nothing about adaptation. The sooner actions are taken the more effective they will be. It is important therefore that we do not delay adaptation actions in the wait for better climate change models.

However, in the face of uncertainty it is wise to take a cautious approach. This means acting in a way that minimizes losses. Adaptation actions should not close off options for future generations.
Management approaches in adaptation must adapt too
In times of high uncertainty, management approaches must be flexible and receptive to new findings. Adaptive management is a process where the management strategies and actions are re-evaluated and adjusted periodically and incorporate the lessons learned from its own performance as well as new information that become available. Planners and people making decisions about climate change adaptation need to acknowledge the uncertainty associated to this field and realize that over time more knowledge will build up. They must be prepared to incorporate new findings, re-evaluate the goals, needs, and priorities and be prepared to change the methods and allocate resources dynamically.

Adaptation planning is part of the development cycle.
Adaptation must not be seen as a field in isolation. It should be part of development planning. Climate change considerations should be evaluated in the context of current development plans as one more influence affecting development goals.

VII. Situational context of Lao PDR and Vietnam

98. The Mekong Delta is considered one of the three most vulnerable deltas in the world to climate change (Parry et al. 2007; Dasgupta 2007 in WWF 2009) due to the millions of people who will be affected by these impacts and because of its importance for the region’s economy. For example, rice is by far the region’s most important crop, and climate change is projected to seriously affect the agricultural productivity in the region. In addition, the Mekong River has one of the most productive inland fisheries in the world with a commercial value of about US$3 billion per annum (MRC 2009). Aquaculture is also playing an increasing role in the region’s economy, in part to offset the losses incurring from fisheries. Already the GMS is struggling with the loss of its arable lands and coastal areas due to a rise in sea levels, more frequent storm surges, heightened coastal erosion, and saltwater intrusion. An increase in the frequency and intensity of extreme weather events will only escalate the threats to the region’s development. Without an effective adaptations strategy, the impacts will feed off each other, causing endemic health problems, loss of livelihoods, spread of invasive species, and overall damage to the social-ecological system.

99. Given the social, economic, and ecological characteristics of the region, a climate change adaptation approach that focuses on hard-engineered solutions is not appropriate. Such an approach would be expensive, likely contribute to negative downstream impacts, undermine stressed ecosystem services, and overall cause maladaptation that further undermines development goals. As such, EbA should be considered as a key part of the GMS’ adaptation strategy.

100. In order to help the GMS region integrate EbA into its policy and planning processes, Lao PDR and Vietnam were selected in the for field-testing the EbA Framework. These countries were selected because they are extremely vulnerable to climate change impacts, due to both geographical and socio-economic features. They are both limited in adaptive capacity at multiple levels, and many communities rely heavily on ecosystems and ecosystem services. More details that focus on their specific climate change threats and impacts can be found in various documents and grey literature, including Lao PDR’s National Adaptation Plan for Action (NAPA), internal WWF documents, UN discussion documents, and more.
101. Field-testing of the framework will occur at the provincial level in two contrasting ecosystems—a forest catchment in southern Laos (Champasak/Attepeu provinces) and a coastal area in Vietnam (Ben Tre province). Over the longer term, this study aims to accelerate the adoption of EbA strategies in Laos and Vietnam, and replicate them throughout the rest of the GMS.

**Situational context of Lao PDR**

102. Lao PDR is one of the poorest countries in the East Asia and Pacific region—about 73 percent of Lao PDR’s 5.6 million people live on less than US$2 per day and a per capita GDP of US$402 (WWF Background Document). The country’s human development ranking is 143rd among 175 countries. With this level of poverty, the country’s natural resource base becomes of critical importance in poverty alleviation and growth. However, natural resource degradation and inadequate provision of environmental services is disproportionately affecting the poor in Lao PDR.

103. For the field-testing site of Champasak/Attepeu provinces, most of the population relies on revenue generated from fisheries, agriculture, and forestry (WWF Background Document). Although not included in official Gross National Product (GNP) accounting, non-timber forest products also play an important role for local livelihoods. Champasak’s forests provide numerous services at local and global scales. At the local scale, they reduce the risk of natural disasters (e.g. flooding and land slides) resulting from extreme events. They also build soil fertility and regulate the water cycle, thus providing vital and unaccounted-for benefits such as water quality.

104. Lao PDR is one of the most vulnerable countries to climate change, as the country is poor and the population mainly depends on natural resources for their livelihood, with most people depending on agriculture. Reported impacts from climate change include losses in affected areas associated with floods, including rice and paddy fields, livestock, fishing equipment, firewood, and housing damage (Vulnerability Assessment of Climate Risk in Attapeu, Lao PDR).

105. While much work remains, the government is making efforts to address and streamline climate change into their development agenda. In 2008, Lao PDR established a National Steering Committee on Climate Change and a National Climate Change Office. The country prepared a National Adaptation Program of Action (NAPA) that was submitted to the UNFCCC in May 2009. In March 2010, Lao PDR approved a National Strategy on Climate Change (NSCC). Policies that relate to climate change adaptation include the National Environment Strategy/National Environmental Action Plan (NES/NEAP), National Biodiversity Strategy to 2020 and Action Plan to 2010 (NBSAP), National Growth Poverty Eradication Strategy (NGPES), National Forestry Strategy and Integrated Agriculture Development Strategy, as well as the Sixth National Socio- Economic Development Plan (NSEDP).

106. The country’s NAPA acknowledges constraints to adaptation implementation. One of the major constraints relates to coordination and cooperation among sectors concerned. In addition, there a weak institutional set-up; followed by low levels of public awareness on climate change issues; and limited budget available for the implementation of the priority adaptation activities identified in this NAPA (NAPA 2009). However, to date the country has generally focused primarily on hard-engineered solutions to climate change, and insufficient attention has been paid to the potential of soft solutions, such as EbA.
Situational context of Vietnam

107. A recent survey of climate change impacts on fisheries in 130 countries concluded that Vietnam is one of the most vulnerable countries to climate change because of its heavy dependence on fisheries, high exposure to climate risks, and limited coping capacity (Allison et al. 2009 in WWF 2009). The Mekong Delta is one of the three most vulnerable deltas in the world because of sea level rise, together with the Nile Delta (Egypt) and the Ganges Delta (Bangladesh). According to climate change scenarios, by the end of the 21st century, average temperatures in Vietnam would have increased by about 2-3°C, total rainfall during the rainy season increased, while rainfall during the dry season decreased, and sea level could rise. This would all have severe impacts on GDP and the livelihoods of millions.

108. Climate change has been identified as one of the priority issues of the government of Vietnam. The Government has promulgated many legal documents at the national and sectoral levels for climate change mitigation and adaptation. Specific actions and tasks are being addressed by the National Target Program to Respond to Climate Change (NTP-RCC) (2012-2015) and the Supporting Program to Respond to Climate change (SP-RCC). The National Committee on Climate Change has been established, along with a National Steering Committee on Climate Change. The Ministry of Natural Resources and Environment is the focal institution on climate change and Ministry of Agriculture and Rural Development is responsible for disasters.

109. However, it should be noted that almost of the strategies and plans focus primarily on climate change mitigation and less on climate change adaptation. On the other hand, mainstreaming climate change is mentioned across the various strategies, programs, and planning processes, such as National Target Program to Respond to Climate Change. Climate Change Action Plans (CCAP) have been developed by a few line ministries (Natural Resources and Environment, Agriculture and Rural Development, and Industry and Trade), and climate change is mentioned in the policy documents of a few key sectors, such as forestry, water resources, energy, and natural disasters. The mainstreaming effort that has already begun to occur represents an opportunity to integrate EbA in planning and policy processes.

110. There are some concrete points for mainstreaming EbA in national climate change and disaster strategies as well as sectoral planning processes. More analysis is done on this in a WWF policy companion document, but in summary there exists opportunities to mainstream via pilot projects/model provinces, national and local planning, and sectoral planning strategies.

111. In the field site of Ben Tre specifically, most of the population relies on harvests and revenues generated from agriculture and aquaculture activities. The climate change vulnerability and adaptation assessment presently being conducted under project has identified a range of estuarine ecosystem services, including those provided by the coastal alluvial areas, the mangrove forests, and the sand bars, that are important to the coastal communities and their livelihoods.

112. It should also be noted that Ben Tre is one of the two pilot provinces of the Government’s NTP-RCC. This means that the institutional NTP-RCC framework is more developed than other provinces in the country: the provincial NTP-RCC Steering Committee has been established (chaired by the Chairman of the Provincial People’s Committee); the NTP-RCC office under the Department of Natural Resources and the Environment (DONRE) is operational and has facilitated the development of a five-year climate change action plan (CCAP); and an annual CCAP for 2011 for the
province, the plan for 2012 is under preparation. Finally, the provincial Department of Agriculture and Rural Development (DARD) is preparing to develop a five-year CCAP for the sector. Being a pilot province also means that a budget has been earmarked for the province to implement climate change adaptation projects.

113. WWF also has a significant presence already in the province through the current EbA project as well as through previous works in sustainable aquaculture practices. WWF has established relationships and partnerships with local government and other stakeholders as a result. The current EbA project is in the process of conducting a participatory vulnerability and adaptation assessments in three coastal communes, based on which EbA pilot projects will be selected and implemented. An important element of the project will be to link and create synergies with the provincial NTP-RCC framework and ecosystem and natural resource-related activities in the provincial CCAP. Through this project WWF has also established close working relationships with non-governmental organizations involved in CCA projects in the province, including IUCN and Oxfam.
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