

# ALiVE

## Adaptation, Livelihoods and Ecosystems Planning Tool: User Manual

Version 1.0



International Ecosystem Management Partnership  
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## Ecosystem-based Adaptation Through South-South Cooperation (EbA South)

EbA South is a full-sized GEF project, funded through the Special Climate Change Fund. Officially known under the title “Enhancing Capacity, Knowledge and Technology Support to Build Climate Resilience of Vulnerable Developing Countries,” the project is implemented by UN Environment and executed by the National Development and Reform Commission of China, NDRC, through the Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, IGSNRR, CAS. The UN Environment-International Ecosystem Management Partnership (UNEP-IEMP) is a UN Environment collaborating centre based in China. It is the first centre in the South for the South and provides overall project management services, technical support and fosters South-South linkages for the project. The ALivE tool and its user manual are products of the EbA South project.

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## Acronyms

**ALivE** – Adaptation, Livelihoods and Ecosystems

**CBA** – Community-based Adaptation

**CBD** – Convention on Biological Diversity

**CEM** – Commission on Ecosystem Management

**CVCA** – Climate Vulnerability and Capacity Analysis

**EbA** – Ecosystem-based Adaptation

**ICIMOD** – the International Centre for Integrated Mountain Development

**ILRI** – the International Livestock Research Institute

**INDCs** – Intended Nationally Determined Contributions

**IPCC** – Intergovernmental Panel on Climate Change

**M&E** – Monitoring and Evaluation

**NAPs** – National Adaptation Plans

**NGOs** – Non-Governmental Organisations

**NRM** – Natural Resource Management

**NTFPs** – Non-Timber Forest Products

**ODI** – Overseas Development Institute

**UNCCD** – the United Nations Convention to Combat Desertification

**UNFCCC** – the United Nations Framework Convention on Climate Change

**WHO** – World Health Organization



## Key concepts

**Adaptive capacity:** The ability of institutions, systems and individuals to take advantage of opportunities or to cope with the consequences of potential damages (Millennium Ecosystem Assessment, 2005).

**Climate:** “Average weather” or long-term averages of climate variables such as temperature, precipitation and wind across decades (usually 30 years) (Adapted from IPCC, 2007).

**Climate change adaptation:** The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or to exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2014).

**Climate change:** A statistically significant change in the state of the climate that persists for decades or longer. It can be a change in the mean, extremes or frequencies of climate parameters. Climate change may be due to natural internal processes or external forcings or to persistent anthropogenic changes in the composition of the atmosphere and land use (IPCC, 2007).

**Climate hazards:** Potentially damaging hydro-meteorological events or phenomena; they can be events that have an identifiable onset and termination, such as a storm, flood or drought, as well as more permanent changes, such as shift from one climatic state to another (UNDP, 2005).

**Climate impacts:** The effects of climate hazards and climate change on natural and human systems (Adapted from IPCC, 2012).

**Climate risks:** The probability of harmful consequences or expected loss (e.g. death, injury, loss of livelihoods, reduced economic productivity, environmental damage) resulting from interactions between climate hazards, exposure to these hazards and vulnerable conditions (Adapted from UNISDR, 2009).

**Climate variability:** Variations in climatic conditions from long-term means on time scales beyond that of individual weather events. Variability may result from natural internal processes within the climate system (internal variability) or to variations in natural or anthropogenic external forcing (external variability) (Adapted from IPCC, 2001).

**Ecosystem:** A dynamic complex of plant, animal, and microorganism communities and the non-living environment interacting as a functional unit. Humans are an integral part of ecosystems (Millennium Ecosystem Assessment, 2005).



**Ecosystem-based Adaptation (EbA):** “The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change” (Convention on Biological Diversity [CBD], 2009). In this user manual and the ALivE tool, EbA refers to sustainable management, conservation, and restoration of ecosystems to build resilience and decrease the vulnerability of communities to climate change.

**Ecosystem services:** Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling (Millennium Ecosystem Assessment, 2005).

**Exposure:** The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected (IPCC, 2014).

**Livelihoods:** The combination of resources (natural, human, physical, financial, social, and political), activities, and access to these that together determine how an individual or a household makes a living (adapted from Ellis, 2000). Here we understand livelihoods as the productive activities (livelihood strategies) being undertaken in a particular location including farming, livestock rearing, tourism, etc.

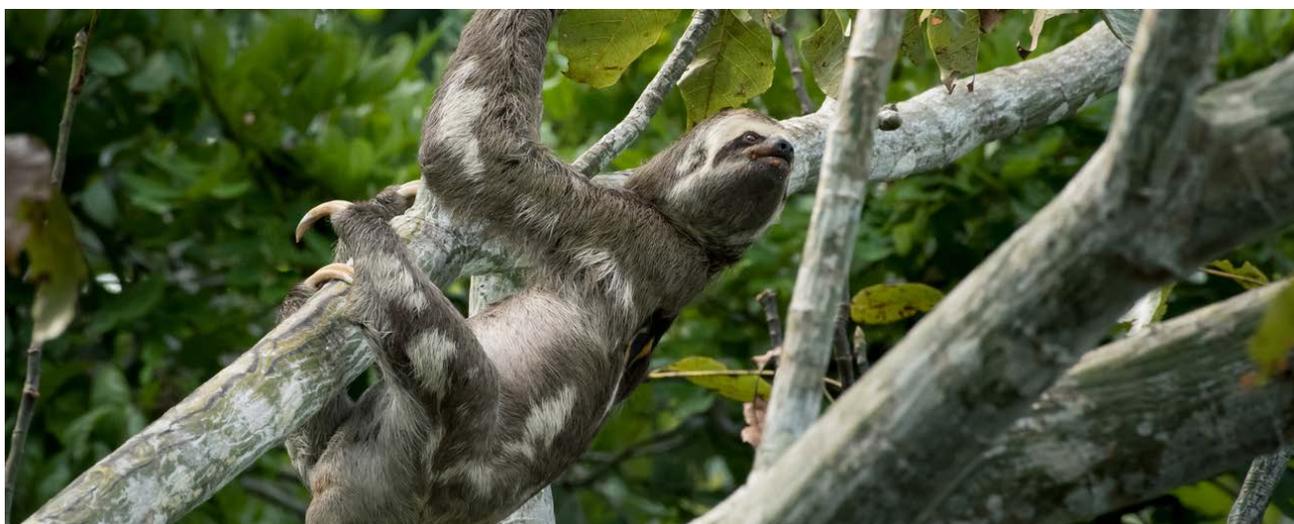
**Resilience:** The capacity of social, economic and environmental systems to cope with a hazardous event, trend, or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation (IPCC, 2014).

**Risk:** The potential for consequences where something of value is at stake and where the outcome is uncertain, recognising the diversity of values (IPCC, 2014).

**Sensitivity:** The degree to which people and assets are affected, either adversely or beneficially, by climate variability or change (IPCC, 2007).

**Vulnerability:** “The degree to which a system is susceptible to, or unable to cope with, the adverse effects of climate change, including climate variability and extremes” (IPCC, 2007). Vulnerability to climate change is determined by three elements: exposure, sensitivity and adaptive capacity. In EbA, the ecosystems and their vulnerabilities are included in the analysis together with the vulnerability of communities.

**Weather:** The state of the atmosphere at a particular place and time as regards heat, cloudiness, dryness, sunshine, wind, rain, etc. (modified from Online Oxford Dictionaries).



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# 1. Introduction

ALivE is a computer-based tool designed to support its users in organising and analysing information to plan effective EbA options within a broader EbA planning process. ALivE stands for Adaptation, Livelihoods and Ecosystems. It is a rapid qualitative assessment technique that can be applied in any ecosystem, enabling the users to:

- **Understand and analyse linkages among ecosystems, livelihoods and climate change.**
- **Identify and prioritise EbA options for community and ecosystem resilience.**
- **Design project activities that facilitate implementation of priority EbA options.**
- **Identify key elements and indicators for a monitoring and evaluation (M&E) framework.**

This user manual provides you with detailed guidance on applying ALivE as part of the EbA planning process. In addition to step-by-step instructions for using the tool itself, the manual provides a framework and methodologies for collecting and organising the information required to use ALivE, as well as guidance on identifying entry points for integrating EbA into policies and planning processes.





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### Box 1. Frequently Asked Questions

#### **Who is ALivE for?**

The target audience of ALivE is made up of two groups: users and stakeholders. Expected users of ALivE include project managers and practitioners working at the local or community level designing or implementing an EbA intervention. The secondary audience consists of stakeholders in the EbA planning process, including community members, local authorities, NGOs and policy-makers. Users of the tool will work closely with these stakeholders. Their engagement through participatory processes provides the necessary information that will be entered into the tool and validation of the results of the analysis.

#### **When should I use ALivE?**

ALivE is designed to be applied in the context of a larger adaptation project that has already established an objective to integrate EbA options. The tool should be applied during the design phase of such an initiative. It will be most effectively used in places where strong relationships with stakeholders have already been established.

#### **Why should I use ALivE?**

ALivE takes a step-by-step approach to identify EbA options, taking local ecosystems, livelihoods and climate change into consideration. It provides you with a user-friendly process to determine whether EbA options are feasible and likely to be effective. ALivE also helps you to identify elements for an M&E framework during the planning stage, emphasising the need for adaptive management.

#### **What do I need?**

Users will need to have access to a computer and internet connection to download the tool. However, the tool itself can be used offline. Access to existing information and analysis on ecosystems, livelihoods and climate change in the target area will provide input to the tool. Expertise in climate change adaptation and ecosystem restoration, conservation and management are useful but not mandatory. Strong facilitation skills are required for the participatory research and analysis phase.

#### **How long will it take?**

ALivE is a computer-based analysis that relies on information collected from desk-based and participatory research processes. The time required to undertake the gathering of information will vary and depend largely on the scope of the analysis, the amount of information already available about the target area and the existing relationships with local stakeholders. Once all information has been collected, using ALivE will generally only take a couple to a few days.

#### **What doesn't ALivE do?**

ALivE is not a substitute for a stand-alone comprehensive climate risk assessment or detailed environmental assessment. It does not take users through all of the steps and stages involved in a full project planning cycle. ALivE does not include a cost-benefit analysis for EbA options. A range of other tools and frameworks are available for this purpose.



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## 2. The EbA planning process and ALivE

ALivE is intended to be used as part of a planning process—especially during the design phase—for a project that has already established an objective to integrate EbA options into its design. In many cases, the project or planning objectives may be broader than EbA. Therefore, the EbA planning process—including the use of ALivE—will complement other analysis and larger adaptation planning processes, and the results can be incorporated in an overarching project implementation strategy and M&E framework. This section provides you with an overview of the EbA planning process and describes the purpose and structure of ALivE.

### The EbA planning process

The EbA planning process consists of three phases, each contributing to successfully planning, implementing and scaling up effective EbA options.

The EbA planning process typically involves gathering information (Phase 1), analysing the information, planning EbA options and validating them with stakeholders (Phase 2), and integrating EbA into policies and planning processes (Phase 3). Figure 1 lays out the phases of the EbA planning process and positions the application of ALivE within the overall process. It is important to allocate sufficient time for each phase for this process to be effective.

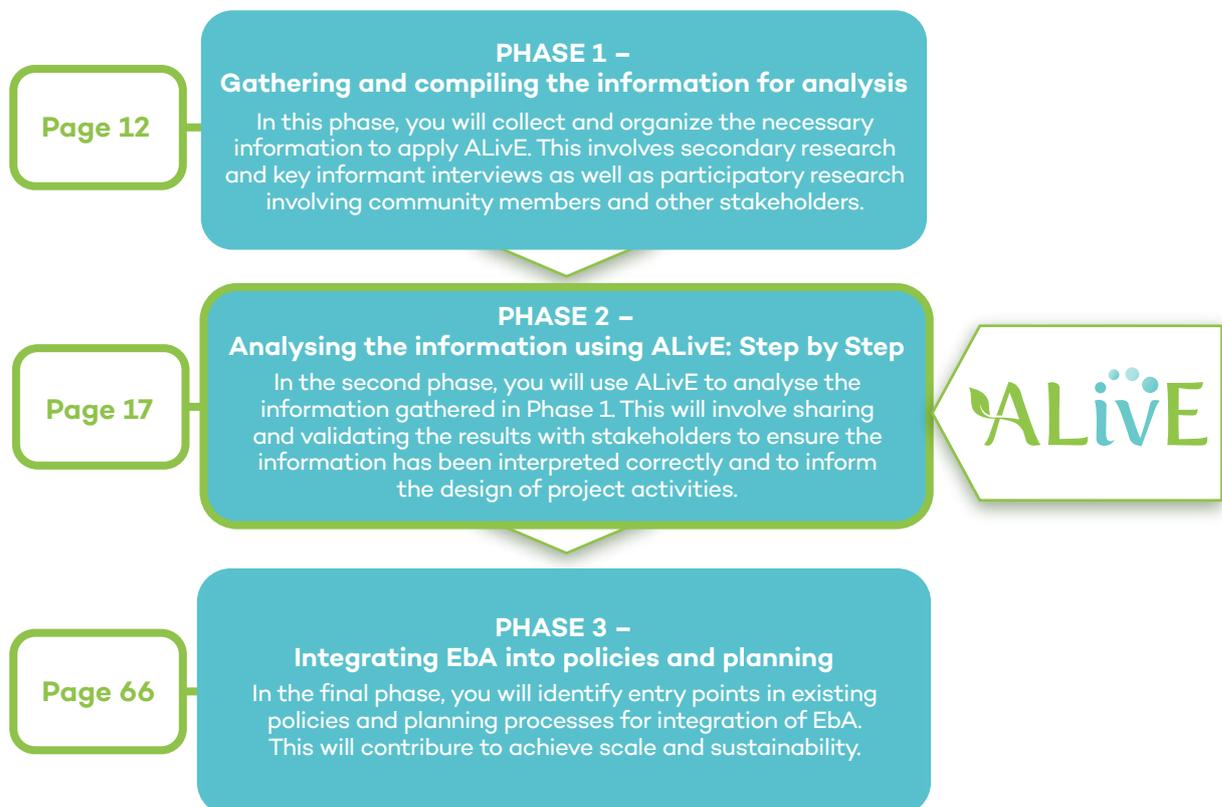


Figure 1. EbA planning process



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## What is ALivE?

As noted, ALivE is a computer-based tool which you will use to analyse the information gathered in Phase 1 of the EbA planning process. It walks you through a process of entering, organising and analysing information in a systematic manner. You can download different summary reports, revise your responses and modify data based on new information. The tool does not do the analysis for you; instead, it is a decision-support tool that helps you understand how livelihoods, vulnerable groups and ecosystems are affected by climatic and non-climatic stressors, in order to identify and prioritise effective and feasible EbA options based on your context-specific information. ALivE will help you to design project activities and elements of an M&E framework to support implementation and monitoring of prioritised options by communities.

### Box 2. ALivE and CRiSTAL

ALivE draws conceptually from the [CRiSTAL tool](#) (Community-based Risk Screening Tool – Adaptation Livelihoods). CRiSTAL is a qualitative risk screening tool that was developed to help project planners and managers to identify and prioritise climate risks and identify livelihood resources most important to climate adaptation and use these as a basis for designing adaptation strategies. Launched in 2007, it has since been applied in over 20 countries in Asia, Africa and the Americas by various institutions and development professionals.

ALivE is organised into three modules and five steps that build on each other:

- **In Module A**, you will systematically analyse links among ecosystems, livelihoods and climate change, to better understand vulnerability to climate change and the role of ecosystems in adaptation.
- **In Module B**, you will identify and prioritise EbA options for community and ecosystem resilience and design project activities that facilitate implementation of priority EbA options.
- **In Module C**, you will identify key elements and indicators for a monitoring and evaluation framework.

These modules comprise five steps, as shown in Figure 2.

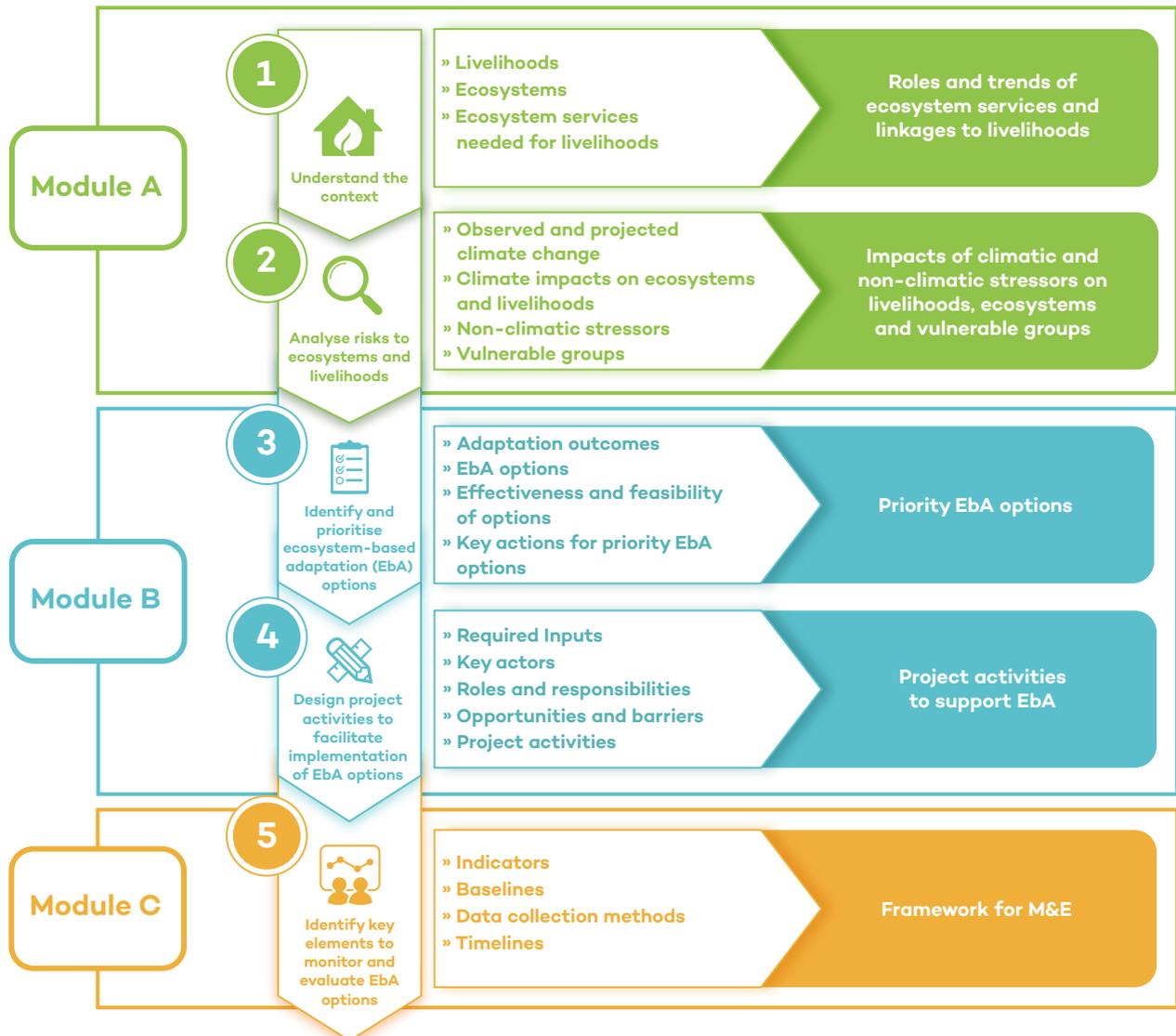


Figure 2. ALivE Framework



## 3. Ecosystem-based Adaptation: Background

This section provides an overview of concepts as they are applied within ALivE, as well as background on the EbA approach. Users who are already familiar with the conceptual framework of EbA can move directly to Phase 1 on page 12.

### Climate change and ecosystems

There is high confidence among scientists that climate change will lead to the reduction in biodiversity of ecosystems and the extinction of species. Increased climate variability is already affecting species and ecosystems globally and represents a driver of risk of poverty and disasters (IPCC, 2007). Livelihoods and economic development are highly dependent on productive ecosystems. Loss and degradation of ecosystems and their services due to climate change and other stressors directly affect peoples' livelihoods, human well-being and further increase vulnerability to climate risks. These changes particularly affect the poor, who often rely on subsistence-based livelihood strategies dependent on natural resources such as healthy soils, water resources, forest products, raw materials, fish, and medicinal plants (Reid, 2016).

The contributions and benefits of ecosystem services to basic needs, health and well-being have been well documented for many systems in terms of water supply, food production, provision of fuel and fibre, pest and disease regulation, and regulation of climate, water and nutrient cycling (MA, 2005). If conserved and managed sustainably, ecosystems and their ability to provide ecosystem services can play a vital role in helping people adapt to climate change. Ecosystems can mitigate the impact of natural hazards including landslides, flooding, hurricanes and cyclones and make a valuable contribution to human resilience (Sudmeier-Rieux, Masundire, Rizvi, & Rietbergen, 2006).

### Types of ecosystem services supporting adaptation to climate change

**Ecosystem services** are defined as the benefits that humans derive from ecosystems (Millennium Ecosystem Assessment [MEA], 2005). Ecosystem services can be categorised into four different types, each of which plays a role in adaptation, and each of which is affected by climate change:

**Provisioning services** supply the resources needed for people to adapt. They provide the raw materials for livelihoods in rural areas and as such are the basis for building climate-resilient livelihoods, including food, fresh water, wood, fibre, and fuel. These natural resources tend to be highly sensitive to changes in climate variables such as temperature and precipitation. Their use and management must therefore take into account not only the potential benefits in terms of livelihoods and adaptation, but also potential changes in their quality and availability over time due to climate change.

**Regulating services** maintain the quality of air and soil, provide flood and disease control, pollination, disturbance regulation, erosion control, and sediment retention. Ecosystems act as a buffer against natural hazards such as storms and floods, and provide protection from infectious diseases. Effective regulating services are important for the quality and availability of provisioning services.



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**Cultural services** have a less direct link to adaptation; however, they are important for livelihoods as they can potentially constitute an important economic resource (such as for nature- and culture-based tourism) and often have very specific and significant value to local people. Climate impacts may reduce the livelihood potential of these services (for example, through damage to coastal areas caused by sea level rise), creating an important motivation for sustainable use and management of ecosystems.

**Supporting services** provide the habitat for plants and animals and maintain a diversity of natural processes that underpin all other ecosystem services. Supporting services maintain biodiversity and genetic diversity. A changing climate will alter the ability to translate the various natural processes that provide and support provisioning, regulating and cultural services. Supporting services are fundamental to ecosystem health and therefore must be sustained for EbA to occur.

Annex G provides an indicative list of major ecosystem services by type, including examples.

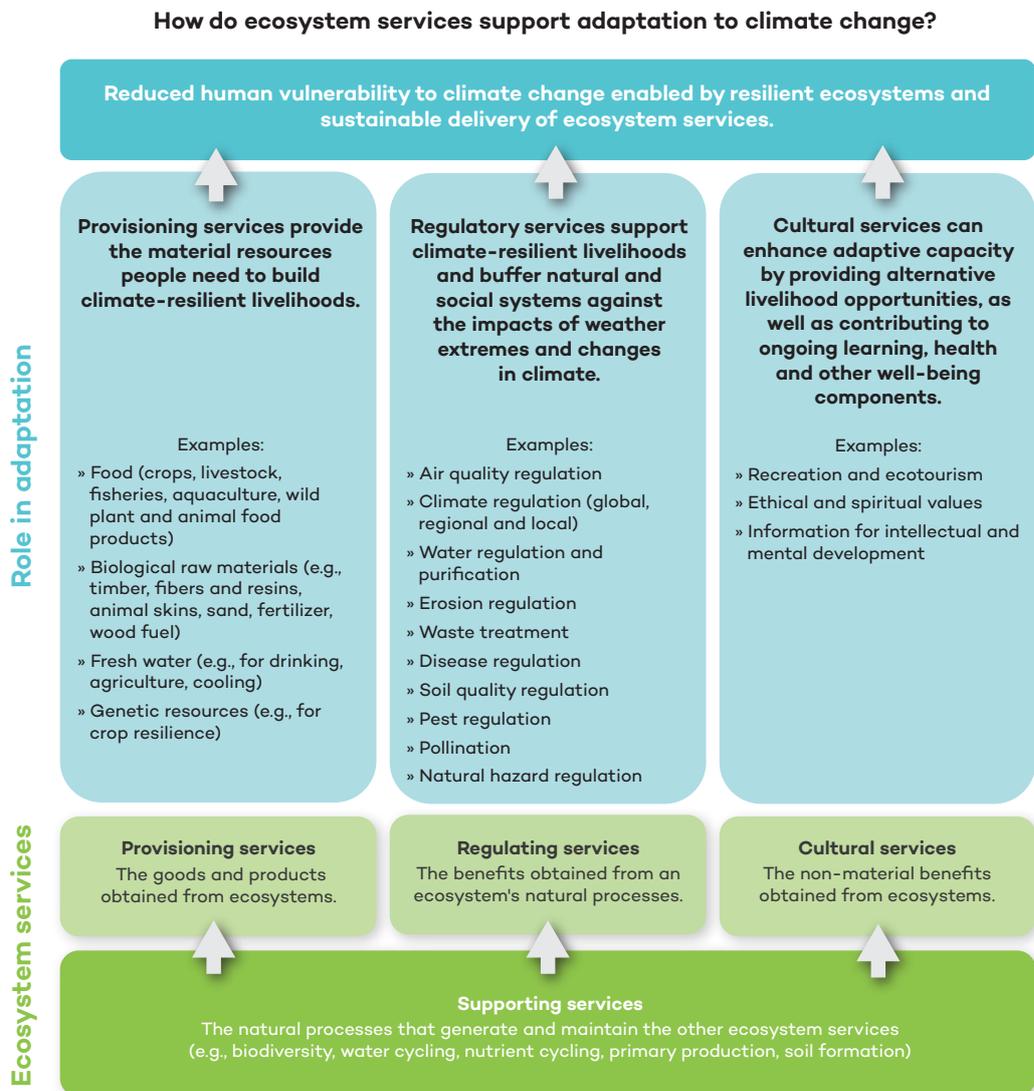


Figure 3. Role of ecosystem services in adaptation



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Only healthy, well-functioning ecosystems can provide full adaptation services, support livelihoods and enhance resilience to the adverse impacts of climate change. This means the sustained production of particular ecosystem services (e.g. food production) is dependent on the condition of an ecosystem in relation to its ability to provide the desired services. It is therefore necessary to evaluate the trend in condition (the ecological capacity of an ecosystem), and the trends in production for the provision of services under the implications of climate change.

## What is Ecosystem-based Adaptation?

As shown in the figure above, there are strong linkages between ecosystem health and adaptation to climate change. The concept of using ecosystems to adapt to climate change—Ecosystem-based Adaptation (EbA)—has emerged as a promising approach due to an increased recognition of the multiple environmental and socioeconomic benefits they provide. The United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention to Combat Desertification (UNCCD), the Ramsar Convention and Rio+20 Action on Adaptation Plan incorporated EbA into recent texts as an approach that can help people adapt and realise synergies between mitigation and adaptation. Ecosystem-oriented approaches have also gained traction within many Intended Nationally Determined Contributions (INDCs) submitted by developing and least developed countries (IIED, 2016).

The term Ecosystem-based adaptation (EbA) was officially defined by the Convention on Biological Diversity (CBD) as: **“the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change that may include sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy that takes into account the multiple social, economic and cultural co-benefits for local communities”** (CBD, 2009; CBD, 2010).

### Box 3. What is “adaptive capacity”?

Adaptive capacity is what enables people, institutions and systems to manage the risk, uncertainty and longer-term changes associated with climate change. It is a key element of resilience—the higher the adaptive capacity, the less vulnerable the entity is. Adaptive capacity is dynamic and context-specific. People’s adaptive capacity depends on access to information and knowledge of appropriate strategies to manage risks and uncertainties, as well as having the resources to put the strategies in place. It is strongly influenced by the social, economic and political systems within which they operate, and how these systems enable or constrain the options available to them. At the core of adaptive capacity is decision making that is flexible and forward-looking (ODI, 2010), and informed by climate information.



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The CBD definition underscores that in the EbA rationale, restoring and maintaining ecosystems are instrumental to ensure the good functioning of ecosystems, and ultimately to provide ecosystem services that contribute to people's adaptation to climate change.

In developing ALivE, we have come to understand EbA as a process that involves:

- **Restoration:** Strengthening and assisting the recovery of ecosystems that have been degraded, damaged or destroyed.
- **Conservation:** Strategies to conserve the function, structure and species composition of ecosystems, recognising that all components are interconnected.
- **Sustainable management:** Managing resources in ways that promote the long-term sustainability of ecosystems and the ongoing delivery of essential ecosystem services to society.

These actions are taken with two interrelated objectives:

- To support climate change adaptation and sustainable livelihoods for people.
- To ensure ecosystem health and resilience to climate change.

Examples of what EbA may look like in practice are presented in Box 4.

#### Box 4. Examples of EbA options

Options for ecosystem-based adaptation may include:

- Coastal protection through the maintenance and/or restoration of mangroves and other coastal wetlands to reduce flooding and erosion risks to coastal communities.
- Sustainable management of upland wetlands and floodplains for maintenance of water flow and quality for downstream communities, despite changing rainfall patterns.
- Conservation and restoration of forests to stabilise land slopes and regulate water flows, protecting people and assets from flash flooding and landslides as rainfall levels and intensity increase.
- Establishment of diverse agroforestry systems, incorporating climate-resilient tree planting and ground crops for human and animal consumption, to reduce crop damage from high temperatures and extreme rainfall events on crops and provide flexible livelihoods and income options to manage increased risk from climate change.
- Sustainable management of grasslands and rangelands to increase adaptive capacity and resilience of pastoral communities to flood and drought.
- Establishment of Marine Protected Areas to enhance coastal ecosystem's resilience to climate change impacts, enhance fish productivity and provide opportunities for nature-based tourism to diversify livelihoods and income to better manage risks.
- The use of indigenous plant species to strengthen and repair dunes and avoid sanding of human settlements in desert environments.



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## What is the difference between EbA and other approaches?

EbA builds on and is complementary to other approaches. Although the actions taken will often resemble traditional conservation or natural resource management (NRM) approaches, there are a few key differences. Firstly, EbA is a human-centric approach that purposely combines conservation and socioeconomic goals to sustain livelihoods and increase people's adaptive capacity to climate change. Secondly, EbA approaches directly address current and future climate risks, taking local and scientific knowledge into account. While development and nature conservation projects may result in positive ecological and socioeconomic benefits for adaptation, EbA approaches focus on adaptation needs right from the start.

EbA also draws on other climate change adaptation approaches, notably community-based adaptation (CBA), which takes a locally driven, participatory approach to reducing vulnerability to climate change. EbA and CBA share objectives and often use similar tools and strategies to engage stakeholders; however, EbA places strong emphasis on the role of ecosystems in supporting adaptation and the need to maintain ecosystem health for community adaptation efforts to be effective and sustainable.

EbA is also grounded in the community development and local governance processes that underpin the above. It recognises the importance of ensuring that vulnerable people have livelihood strategies that are sustainable and resilient now and into the future, drawing on decades of experience in livelihoods approaches. Furthermore, it emphasises the role of different actors—including communities, NGOs, research institutions and local government authorities—in ensuring that EbA approaches are supported, sustained and monitored over the longer term. EbA is not implemented in isolation, but rather as part of broader efforts toward sustainable development and effective governance of natural resources.

## What are the attributes of effective Ecosystem-based Adaptation?

Effective EbA approaches display the following characteristics:

- **Incorporates climate information:** As noted above, EbA options explicitly address observed and projected climate variability and change. Therefore, EbA planning must consider climate information, including historical trends and future projections, as well as community observations of changes at the local level.
- **Integrated within an overall adaptation strategy:** EbA should be included in broader adaptation strategies and plans, complementing other approaches to addressing climate risks and changes. Where feasible and appropriate, existing policies and planning processes should be assessed to identify potential entry points in development and adaptation planning and processes to scale up and increase the sustainability and effectiveness of EbA.
- **Participatory and community-centred:** The participation of communities and other stakeholders in planning, implementing and monitoring EbA measures is essential. Especially during the planning phase, it is critical to allow for inclusive stakeholder engagement and to understand

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and target adaptation needs of the most vulnerable groups, recognising the underlying causes of vulnerability.

- **Gender-sensitive:** EbA options must take into account social diversity, including differences based on gender, by recognising that women and men experience the impacts of a changing climate differently and consequently their capacity to adapt can differ greatly. This means EbA planning must be responsive to gender differences in terms of participation and influence in decision making, access to information, and ensuring that assets, opportunities, benefits and losses from implementation of EbA options are equitably shared (Dazé & Dekens, 2017).
- **Integrates adaptive management principles:** The uncertainty of climate change makes adaptive management a necessity for EbA. This involves an iterative process in which both the context and the specific EbA actions are monitored so that their effectiveness can be continuously assessed and refined based on new knowledge and information. This “learning by doing” approach is fundamental for adaptation to climate change over the longer term.
- **Promotes multi-level governance:** Effective EbA works toward collaboration between multiple levels of government, institutions and sectors. Identifying responsible institutions and actors for relevant policy and planning processes and initiating dialogues for coordination and information sharing can promote integration of EbA across sectors and levels.

The following sections of the user manual lay out the three key phases of the EbA planning process in more detail. Phase 1 provides specific guidance on gathering information and arranging the process. This involves a combination of secondary research, key informant interviews and participatory research. Phase 1 offers a useful overview of these methodologies. Phase 2 provides step-by-step instructions for analysing the information using the ALivE tool. Phase 3 explains the rationale for integrating EbA into policies and planning by providing specific guidance on identifying entry points and communicating to influence policy.



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## PHASE 1 – Gathering and compiling the information for the analysis

The first phase of the EbA planning process associated with ALivE focuses on gathering and compiling the necessary information about the study area to input to the tool. This stage is critical, as it involves engaging key stakeholders in dialogue and participatory analysis that will be used to inform the planning process. Effective EbA planning requires that scientific information is combined with local knowledge to identify locally relevant solutions to the challenges presented by climate change.

### Defining the study area

The EbA planning process described in section 2 is focused on the communities, livelihoods and ecosystems within a particular locality, which we call the study area. The study area may be the same as the project target area; however, this is not always the case. Depending on the size and nature of the area covered by the project, it may make sense to define several different study areas within the context of a single project to ensure that stakeholders can be effectively engaged and that locally-specific details are captured. In defining the study area, you may consider:

- The number and diversity of communities and ecosystems captured within the area.
- Differences in livelihood strategies and activities.
- Practicalities in terms of connecting with key informants and bringing stakeholders together for focus group discussions.
- The amount of information already available about the target area and the scale of information available.

Defining the study area is an essential first step in the EbA planning process.





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## Methodologies for information gathering

Applying ALivE effectively requires specific information about the study area. Gathering this information involves a combination of secondary research, key informant interviews and participatory research involving women, men and organisations from communities located in the study area. The following section provides more detailed guidance on these methodologies.

### Secondary research

Secondary research involves the review of existing documents to compile relevant information for EbA planning. Documents that may be useful for this process may include:

- Ecosystem assessment reports.
- Reports and monitoring information from past or ongoing conservation, development or adaptation projects in the study area.
- Local government conservation, natural resource management development or climate change adaptation plans.
- Climate change reports, including National Communications to the UNFCCC, vulnerability assessment reports for the study area or for relevant livelihood sectors and reports presenting observations of changes to date and/or future projections of climate change.
- National policies and planning documents, including National Adaptation Plans (NAPs) and other adaptation plans, as well as plans for natural resource management or conservation.

Part of this secondary research process should include the identification of potential key informants, as described in the following section. Additional secondary research may also be required afterwards to follow up on issues raised during the stakeholder dialogues.

### Key informant interviews

Key informants are people who can provide detailed information on the situation in the target area. Potential key informants for EbA planning may include:

- Community leaders in the study area, including political or religious leaders and/or representatives of community-based organisations such as women's groups, indigenous groups or resource user groups.
- Representatives from conservation and development organisations active in the study area.
- Local government representatives with responsibilities in the study area, particularly those focused on conservation, natural resource management and climate change.
- Academics/researchers on relevant topics with knowledge of the study area.

Key informant interviews should be used to fill the gaps in the information gathered through secondary research, as well as to provide information to be used in planning participatory research processes. Some interviews may also be required following the participatory research—for example to better understand the technical aspects of adaptation options identified by stakeholders.

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## Participatory research

Participatory research methodologies engage stakeholders in dialogue on their experiences. It generally involves focus group discussions with particular groups within communities on the challenges they face and proposed solutions. The [Participatory Methods](#) website managed by the Institute of Development Studies provides a wealth of resources on different aspects of participatory research and stakeholder engagement. General facilitation tips can be found in Field Guide 1 of the [Climate Vulnerability and Capacity Analysis \(CVCA\) Handbook](#) developed by CARE International.

## Information needed to apply ALivE

The information needed about the study area to effectively apply ALivE is presented in Table 1. As shown in the table, the information gathering process involves a combination of secondary research, key informant interviews and participatory research involving women, men and organisations from communities located in the study area. The template in Annex A provides examples of key questions to obtain the information required for this phase. Before beginning the detailed information gathering, you should undertake initial research to develop a general description of the study area, as well as an initial mapping of the key actors in conservation, natural resource management, climate change and development to identify key informants.

The information for Steps 1, 2 and 3 of ALivE should be gathered before starting the application of the tool, while the rest will be gathered through a validation workshop to be held after Step 3 is completed. Details on the validation workshop can be found in Phase 2 and Annex E.



Table 1. Information needed and methodologies

ALiVE Step	Information needed	Suggested methodologies to collect information
 <b>Step 1: Understand the context</b>	Livelihood strategies and associated activities	Participatory research: Seasonal calendar, well-being and livelihoods discussion
	Natural resources needed for livelihood activities	Participatory research: Household system diagram
	Major ecosystems in the study area (approximate size, important animals and plants, why the ecosystem is important, connections to the community, main users)	Secondary research Participatory research: Community resource mapping
	Trends in ecosystem functionality	Secondary research Participatory research: Ecosystem service trend analysis
 <b>Step 2: Analyse risks to ecosystems and livelihoods</b>	Description of climate in the study area (seasons, high and low temperatures, average precipitation and extreme events experienced)	Secondary research
	Observed trends in rainfall, temperature and climate hazards	Secondary research Participatory research: Historical timeline, hazard map
	Projected trends in rainfall, temperature and climate hazards	Secondary research
	Non-climatic stressors affecting ecosystems	Participatory research: Hazard mapping
	Impacts of climate change and other stressors on ecosystems and implications for livelihoods	Secondary research Participatory research: Vulnerability matrix, hazard map
	Social groups that are particularly vulnerable to climate impacts	Participatory research: Vulnerability matrix, well-being and livelihood discussion, discussion on vulnerable social groups
 <b>Step 3: Identify and prioritise EbA options</b>	Adaptation priorities identified in existing plans/policies	Secondary research
	Adaptation options identified by communities	Participatory research: Discussion on adaptation options
 <b>Step 4: Design project activities to facilitate implementation of EbA options</b>	Key actors in areas relevant to EbA	Key informant interviews Participatory research: Validation workshop
	Opportunities and barriers for priority EbA options	Key informant interviews Participatory research: Validation workshop
 <b>Step 5: Identify key elements to monitor and evaluate EbA options</b>	Adaptation indicators (from existing plans/policies or M&E systems)	Secondary research
	Baseline situation for key indicators	Secondary research



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For the EbA planning process, we recommend that a series of participatory learning and action tools be used to facilitate a structured dialogue. Annex B provides participatory research tools (e.g. community resource mapping, seasonal calendars, hazard maps) and a proposed process outlining how the suggested tools could be sequenced, including links to facilitation guidance for each tool. Where no appropriate tool could be found in existing resources, the facilitation guidance is included as an annex to this user manual. The specific process will need to be refined based on the amount of information already available from secondary sources and the degree and nature of stakeholder engagement to date.

### Box 5. Gender-sensitive facilitation

To ensure that participatory processes are gender-sensitive, the International Centre for Integrated Mountain Development (ICIMOD) has developed a set of Guidelines for Gender Sensitive Programming (ICIMOD, 2009). This document provides a checklist for gender-sensitive participatory approaches, which includes such issues as:

- The respective knowledge, skills and experience of women and men
- Enablers and obstacles to women's participation in public meetings
- Men's responses to women's participation
- Differences among women in terms of confidence to speak in public and influence when they do
- Timing, location and organisation of meetings to facilitate women's participation
- Language and literacy issues.

This presentation from the International Livestock Research Institute (ILRI) provides practical tips for addressing gender issues in participatory research processes (ILRI, 2011).

## Compiling the information

The information gathered will ultimately be entered in ALivE. However, it would be useful to arrange it all to ensure that the required information is complete and ready for entering in the tool. Annex A provides a template for organising the information so it is easily accessible for applying ALivE.



## PHASE 2 – Analysing the information using ALivE: Step by Step

Phase 2 involves the actual application of the ALivE tool. This section provides step-by-step instructions for entering information and using the tool to analyse it. We recommend that you keep this guidance handy for easy reference as you work through the tool steps.

### Navigating through ALivE

#### The left side menu:

This menu provides an overview of the different steps and allows you to instantly move from one step to the other. To access a particular point in the tool, click on any of the step icons and a sub-menu will open that allows you to go directly to the beginning of the step, or a particular sub-step. When you are working on a step, it will be highlighted on the menu to remind where you are in the process.

#### Basic functionalities:

- We recommend using one of the latest versions of the following Internet browsers: Google Chrome, Microsoft Edge or Microsoft Explorer to ensure optimal functionality of the tool.
- The **icon  in the upper right corner** allows you to go to the list of saved analyses and allows you to open an analysis previously saved.
- Each step includes a “**Previous**” and “**Next**” button which allows you to go back and forth between steps at any point in the process to revise, update or change information as needed.
- Each step includes a “**Save**” button to save the information entered or changes made.
- At the end of each step you can see a “**Summary**” button to create a summary report of this particular step, which can be saved as a PDF or printed. *We recommend that you print the summary reports in landscape format and adjust the scale if needed to fit more information on the pages.* The tool will produce a total of five summary reports, i.e. one for each step.
- Various steps in the tool include a red “**Guidance**” tab on the right side of the step. This function provides definitions and background information to help you complete the step.  
To see the guidance, click on the tab and a text box will appear. To hide it, click on the tab again and it will disappear. The user manual reminds you when to review the guidance tab using this symbol: **Guidance **
- In some steps you are able to add multiple options. This is indicated by a small blue sign  next to a text box that allows you to add another text box to enter additional information.
- A small red waste bin  next to a text box allows you to delete the text box and the information in it.



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## ALivE: Step by Step

### Opening page

Read the introductory text to make sure that you understand the purpose and objectives of the planning tool. You can choose to “Start a new analysis” or click on “List of saved analyses” to revise, update or add information to a previous analysis. To return to the opening page of ALivE, you are required to close the programme and reopen it. It is helpful to completely review this manual before starting the analysis so that you know how exactly the tool can support you.

#### ALivE: Opening page



ALivE is a computer-based planning tool designed to support you in organising and analysing information to plan effective EbA options within a broader EbA planning process. ALivE stands for Adaptation, Livelihoods and Ecosystems. Please refer to the complementary user manual to provide you with specific guidance on applying ALivE.

ALivE helps you to:

- Understand and analyse linkages among ecosystems, livelihoods and climate change.
- Identify and prioritise EbA options for community and ecosystem resilience.
- Design project activities that facilitate implementation of priority EbA options.
- Identify key elements and indicators for a monitoring and evaluation framework.



#### ALivE: List of saved analyses page

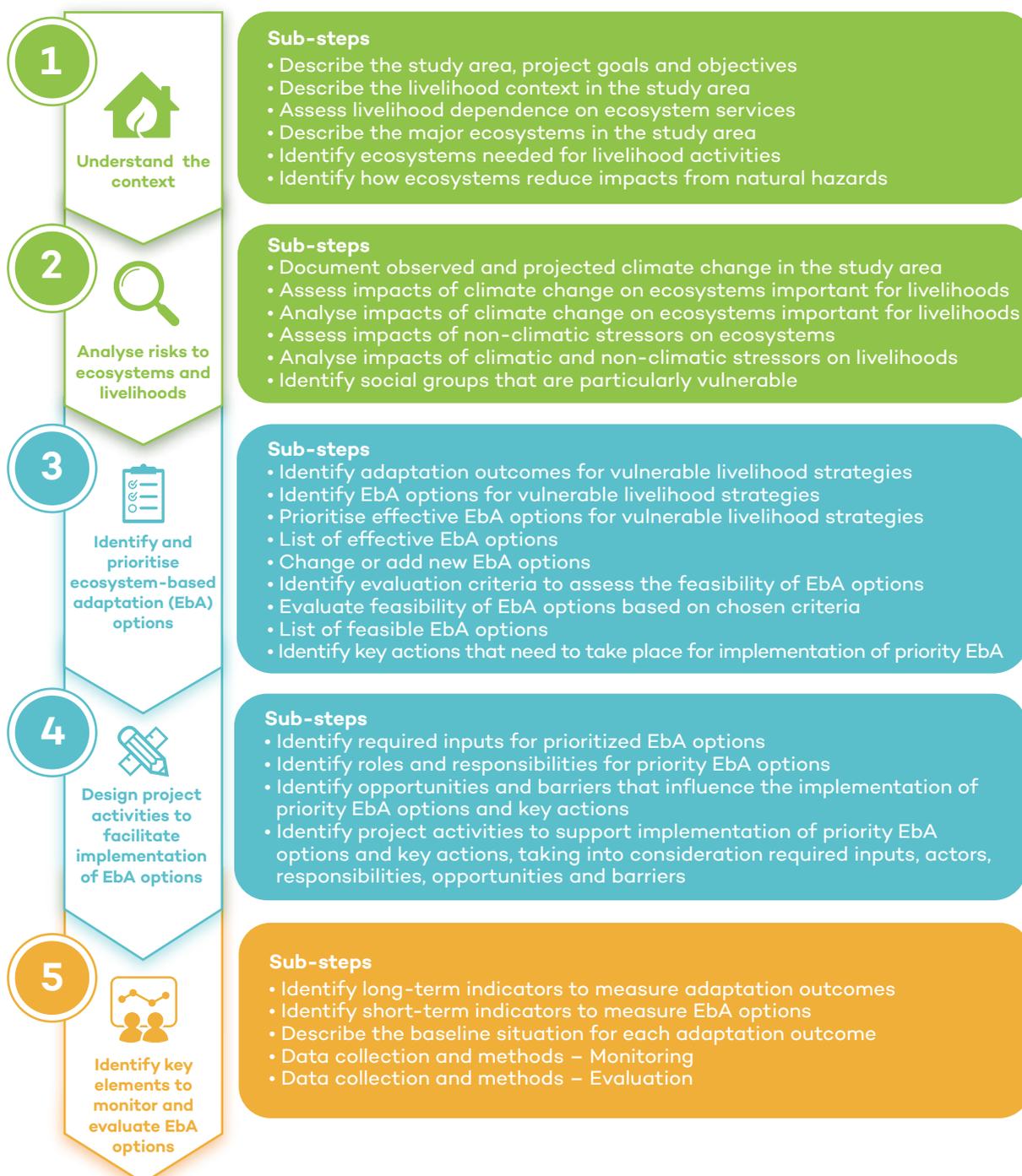
### LIST OF SAVED ANALYSES

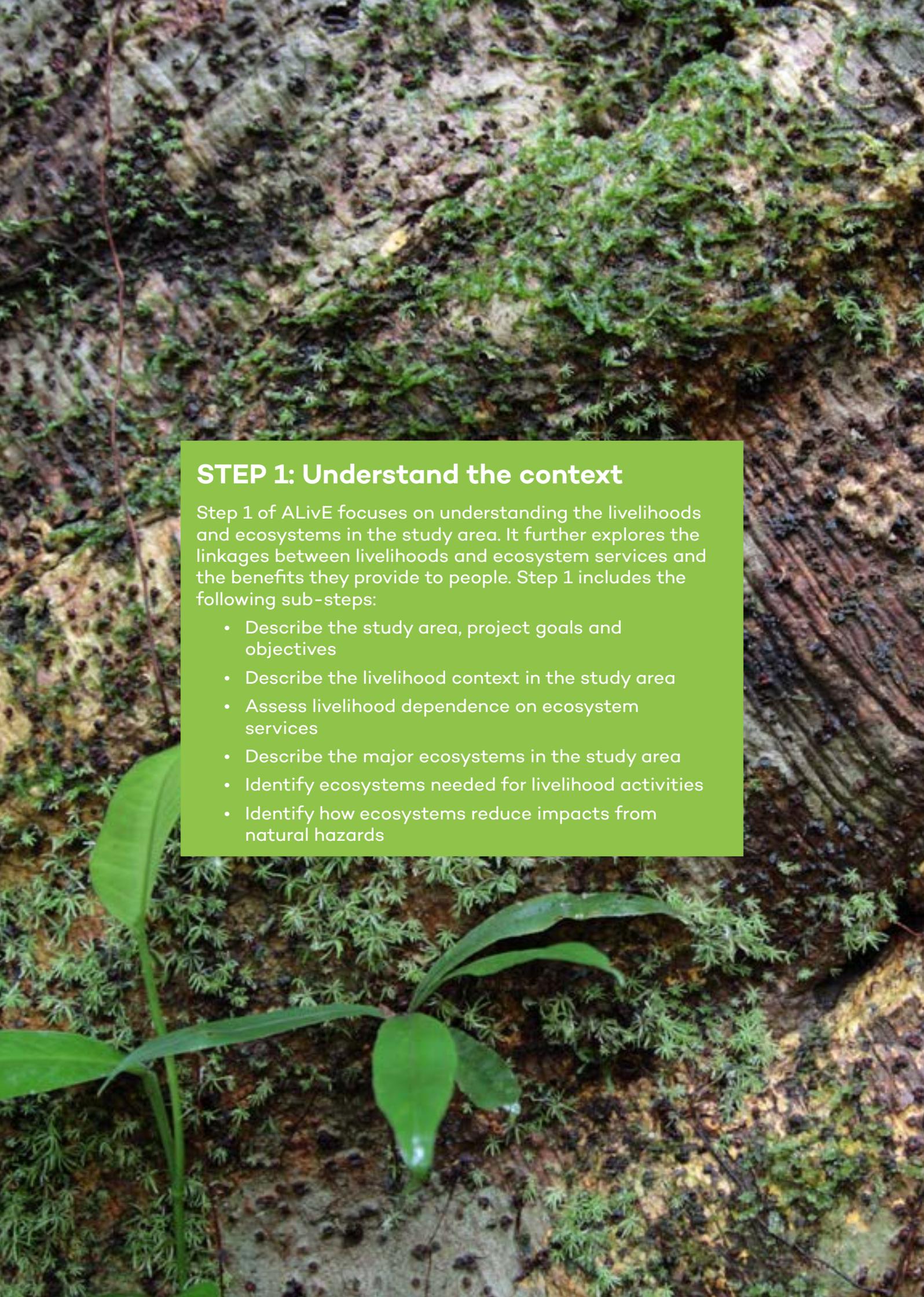


Show  entries Search:

Project Name	Date Modified	Action
Ecosystèmes pour la Protection des Infrastructures et des Communautés - Senegal	2017-11-16 13:35:55	
Ecosystem Based Adaptation (EbA) in Mountain Ecosystem in Nepal	2017-11-16 10:42:04	

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## STEP 1: Understand the context

Step 1 of ALivE focuses on understanding the livelihoods and ecosystems in the study area. It further explores the linkages between livelihoods and ecosystem services and the benefits they provide to people. Step 1 includes the following sub-steps:

- Describe the study area, project goals and objectives
- Describe the livelihood context in the study area
- Assess livelihood dependence on ecosystem services
- Describe the major ecosystems in the study area
- Identify ecosystems needed for livelihood activities
- Identify how ecosystems reduce impacts from natural hazards



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## Describe the study area, project goals and objectives

This step will help you summarise key information about the study area you wish to examine through a climate lens and where your activities will be implemented. It will also help you to define the scope of the analysis. This information includes:

**Project name:** Title of the project and name of the study area (if different from the project area).

**Description of the study area:** Provide information of the geographical location of the project (e.g. district, region, watershed) along with key information that helps to characterise the study area, especially the following:

- Unit of analysis to provide the boundaries of your study area
- Economic context
- Cultural and political context
- Type of management system, access and control over ecosystems (e.g. community-managed, privately managed).

**Describe the goals and objectives of the project:** Outline the overarching goal of your project and enter specific objectives or results that your project aims to achieve. Explain where EbA fits in the broader project.



Be concise and specific. You can decide on the level of detail to be entered, but generally be as specific as possible to provide a sound basis for the rest of the analysis.

While you may know the area well, it is recommended that you conduct background research to enrich your knowledge.



At the end of this sub-step, save the information you have entered by clicking on “Save.”

### [USER MANUAL - STEP 1: UNDERSTAND THE CONTEXT] Describe the study area and project goals and objectives



Project Name	Ecosystem Based Adaptation (EbA) in Mountain Ecosystem in Nepal
Briefly describe the study area and scale of the study area (e.g. village, district, community, region, or watershed)	Panchase, with an area of 278.7 square kilometres, represents the mountain ecosystem linking the lowlands and the high Himalayas of the Annapurna range. It is comprised of the Panchase Hill and 17 adjoining Village Development Committees (VDCs) of Koshi, Seti and Bheri districts.
Describe the goals and objectives of the project (e.g. what role will EbA play in the project)	The aim of the project is to strengthen the capacities of Nepal, and specifically to strengthen ecosystem resilience for promoting Ecosystem based Adaptation options and to reduce the vulnerability of communities, with

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## Describe the livelihood context in the study area

Summarise the main livelihood strategies and activities in your study area. Select one or more main **livelihood strategies** practised in the study area from list of options. If the livelihood strategy is not included, choose “other” and fill in your own strategy. Press “Ctrl” or “Command” to select multiple strategies from the list. For each livelihood strategy chosen, a field to the right will appear, with a description of the livelihood strategy.

In the field **description**, provide a concise narrative of the livelihood strategy practised. Describe each livelihood by providing information on:

- Description of what the livelihood entails (e.g. type of crops or livestock, fishing practices or specific products traded)
- Importance of this livelihood strategy to the communities in the study area
- Particular social groups involved in the strategy
- Information on gender roles and responsibilities in relation to the strategy



It is important to recognise the gender division in the description because men and women have different roles and responsibilities within a community. Fostering adaptation requires understanding gender similarities and differences and addressing these in planning and implementation of EbA.

For each livelihood strategy and description, you will find a field for key livelihood activities to the right. Use this field to describe the individual activities involved in the livelihood strategy (e.g. collection of non-timber forest products (NTFPs), fuel wood collection, collection of medicinal and aromatic plants).



Check the guidance tab in this step for a definition of “**livelihood strategy**” and “**key livelihood activities.**”

Specifically, **describe one activity at a time and click on the +** to add **further key livelihood activities** related to the livelihood strategy. You may add multiple key livelihood activities in order to describe the full range of activities involved in the livelihood strategy.



At the end of this sub-step, save the information you have entered by clicking on “**Save.**”

### Describe the livelihood context in the study area



Livelihood strategy	Description	Key livelihood activities
<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">                     Agricultural farming                      Pastoralism                      Agro-pastoralism                      Livestock farming                      Fishing                      Tourist guides                      Herding                      Trading                      Coffee farming                      Other                 </div> <div style="border: 1px solid #ccc; padding: 5px;">                     Forest-based farming  <small>(Press Ctrl / Command + Click to select multiple options)</small> </div>	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">                     Communities' livelihoods depend on agricultural farming but there are a very limited number of people practicing                 </div> <div style="border: 1px solid #ccc; padding: 5px;">                     After agriculture farming another important economic sector for livelihoods of local communities is forest based                 </div>	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">                     Bee keeping <span style="float: right;">+</span> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">                     Livestock farming (cow, buffalo, goat, poultry, pigs) <span style="float: right;">-</span> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">                     Vegetable farming (potato, cauliflower, tomatoes, cabbage, etc.) <span style="float: right;">-</span> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">                     Fuelwood collection <span style="float: right;">+</span> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">                     Collection of medicinal plants and aromatic plants (MAPs) <span style="float: right;">-</span> </div> <div style="border: 1px solid #ccc; padding: 5px;">                     Collection of non-timber forest products (NTFPs) <span style="float: right;">-</span> </div>

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## Assess livelihood dependence on ecosystem services

Natural resources often underpin key livelihood activities. To assess the dependence of specific livelihood strategies on ecosystem services, identify the **natural resources needed for the key livelihood activities identified** in the previous step. For each key livelihood activity identified, you can describe the natural resource(s) needed (e.g. water; forest, fodder, availability of medicinal plants). Add one or more natural resources per key livelihood activity by clicking on the +.

**Guidance** ? Check the guidance tab in this step for a definition of **“natural resources for livelihood activities.”**

If a specific key livelihood activity (e.g. purchasing livestock) does not require any natural resources leave the field to the right of it blank. The activity will not be carried forward into the next steps.

! At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

### Assess livelihood dependence on ecosystem services



Livelihood strategy	Key livelihood activities	Natural resources needed for livelihood activities <small>Describe the resources needed for each identified livelihood activities.</small>
Agricultural farming	Bee keeping	Flowering plants <span style="float: right; color: #0070c0; font-weight: bold;">+</span>
	Livestock farming (cow, buffalo, goat, po	Fodder and forage <span style="float: right; color: #0070c0; font-weight: bold;">+</span>
	Vegetable farming (potato, cauliflower, to	Water <span style="float: right; color: #0070c0; font-weight: bold;">-</span>
Forest-based farming	Fuelwood collection	Grazing Land <span style="float: right; color: #0070c0; font-weight: bold;">-</span>
	Collection of medicinal plants and aroma	Seeds <span style="float: right; color: #0070c0; font-weight: bold;">+</span>
	Collection of non-timber forest products	Water <span style="float: right; color: #0070c0; font-weight: bold;">-</span>
		Forest trees <span style="float: right; color: #0070c0; font-weight: bold;">+</span>
		Sustainable availability of medicinal pla <span style="float: right; color: #0070c0; font-weight: bold;">+</span>
		Planting materials <span style="float: right; color: #0070c0; font-weight: bold;">+</span>

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## Describe the major ecosystems in the study area

In this step, identify major ecosystems in the study area and describe their key characteristics. List the ecosystem(s) under **name of ecosystem** and for each one provide a **description of the ecosystem**<sup>1</sup>, taking into consideration the following:

- Size, type, and health of the ecosystem.
- Key plant and animal species, including native species and endangered ones.
- Sacred sites, archaeological sites or plants and animals that are valued for their spiritual importance by local communities.
- Touristic infrastructure critical to the communities’ livelihood strategies.

Under **trend in overall ecosystem functionality**, you can define the likely future trend of the ecosystem’s capacity to supply ecosystem services. You can choose from “improving” to “declining.”

By default, you can provide information up to three ecosystems. To add more, click on “**Add ecosystem**” on bottom left.

Optional—if needed, you can provide additional notes about the ecosystem and its services or functionality. These additional notes will not be taken forward in the analysis, but are important to keep in mind as part of the broader development and vulnerability context.

At the end of this sub-step, save the information you have entered by clicking on “**Save.**”

### Describe the major ecosystems in the study area



Name of ecosystem <small>Identify relevant ecosystems within the study area.</small>	Description of ecosystem <small>Briefly describe the ecosystem, approx. size, important animals and plants, why it is important, connection to the community, main users.</small>	Trend in overall ecosystem functionality	Notes <small>Use this space to provide specific information on ecosystem functionality, for example: tree canopy is stable but variety and species of plants are declining.</small>
Grassland	Grasslands, pastures and grazing patches within forests are critical to the... of people...	Declining	Ecosystem notes
Ponds/Lakes	The Harpan Khola and a number of seasonal streams account for 70% of the water...	Declining	Ecosystem notes
Forest	The forest ecosystem is an important habitat for plants and animal species, and plays a crucial...	Declining	Ecosystem notes
Rivers	The Panchase region comprises of three river systems, namely the...	Declining	Ecosystem notes

<sup>1</sup> See Annex G for ecosystem examples, descriptions and services they provide.



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## Identify ecosystems needed for livelihood activities

In the previous steps, you identified livelihood strategies, key livelihood activities and the natural resources supporting these activities as well as the major ecosystems in the study area. You will now analyse the linkages between livelihood activities, natural resources and ecosystems. On the left, you will see the livelihood strategy and each of the livelihood activities that relies on natural resources, along with the resources identified. Under “**Identify source ecosystem for each natural resource,**” you will find a dropdown menu listing the major ecosystems identified in the previous step.

To identify the source ecosystem(s) for each natural resource, **click on the dropdown list and select the ecosystem(s) that provides the natural resource listed.** If multiple ecosystems are the source of this natural resource, click “Ctrl/Command” and choose multiple ecosystems per natural resource from the dropdown menu.

At the end of this sub-step, save the information you have entered by clicking on “**Save.**”

### Identify ecosystems needed for livelihood activities



Livelihood strategy	Key livelihood activities	Natural resources needed for livelihood activities <small>Describe the resources needed for each identified livelihood activities:</small>	Identify source ecosystem for each natural resource <small>Choose from list of ecosystems identified earlier.</small>
Agricultural farming	Bee keeping	Flowering plants	Grassland Ponds/Lakes <b>Forest</b> Rivers <small>(Press Ctrl / Command + Click to select multiple options)</small>
	Livestock farming (cow, buffalo, goat, pig)	Fodder and forage	Grassland Ponds/Lakes Forest Rivers <small>(Press Ctrl / Command + Click to select multiple options)</small>
		Water	Grassland Ponds/Lakes Forest Rivers <small>(Press Ctrl / Command + Click to select multiple options)</small>
		Grazing Land	Grassland Ponds/Lakes Forest Rivers <small>(Press Ctrl / Command + Click to select multiple options)</small>



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## Identify how ecosystems reduce impacts from natural hazards

On the left you will see each source ecosystem that provides natural resources for livelihood activities you identified and selected in the last sub-step. In this sub-step, you are now able to identify what services these ecosystems provide to reduce impacts from extreme weather events or hazards. Select one or more categories of risk reduction potential for each ecosystem<sup>2</sup>:

- **Flood protection:** Ecosystems such as wetlands, marshes, peat bogs, lakes, mangroves, swamp forests and coral reefs absorb and reduce water flow and provide space for water spill.
- **Coastal protection:** Mangroves, coral reefs, sand dunes, coastal marshes and barrier islands, among other features, create physical barriers against tidal waves, storm surges and sea level rise, slowing down its intensity and providing space for tidal overflows.
- **Storm buffer/protection:** Healthy forests, shelter and shade trees and shelterbelts can provide important protection for crops, structures and other assets from strong winds and storms.
- **Forest fire management/protection:** Wetlands, savannah, dry and temperate forests and scrub can help maintain natural fire resistance.
- **Landslide prevention:** Forests and other vegetation on or beneath steep slopes, for example, can act as buffers against earth movements and stabilise soils.
- **Avalanche prevention:** Forests on steep slopes can act as buffers against avalanches.
- **Erosion protection:** Plant vegetation with deep roots—including native plants and woody perennials such as trees and shrubs—helps keep soil in place. Vegetation cover of grasslands and drylands can prevent soil erosion.
- **Drought protection:** Forests soak up excess water and are able to release it back into the water table. Wetlands retain excess water, return it to the water table during dry seasons and maintain soil moisture.
- **Other:** Select “other” if none of the above correctly defines the risk reduction potential provided by the ecosystem in your study area.

You can select multiple services per ecosystem by pressing Ctrl/Command and selecting options.



At the end of this step, **save the information** you have entered by clicking on “**Save**” and click on “**Summary**” in the right-hand corner to review, print or save the PDF summary report of the previously entered information in **Step 1 (Module A)**. This will open in a new tab in your browser.

<sup>2</sup> Modified from International Union for Conservation of Nature, World Commission on Protected Areas & Keidanren Nature Conservation Fund. (n.d.). Past changes in climate conditions and extremes that have occurred over the past 30 years in the study.



Identify how ecosystems reduce impacts from natural hazards



Source ecosystem

For each ecosystem - What other services do these ecosystems provide to reduce impacts from extreme weather events or hazards?  
Choose from the list of following services.

Grassland

Avalanche prevention  
Erosion protection  
Drought protection  
Other

(Press Ctrl / Command + Click to select multiple options)

Ponds/Lakes

Avalanche prevention  
Erosion protection  
Drought protection  
Other

(Press Ctrl / Command + Click to select multiple options)

Forest

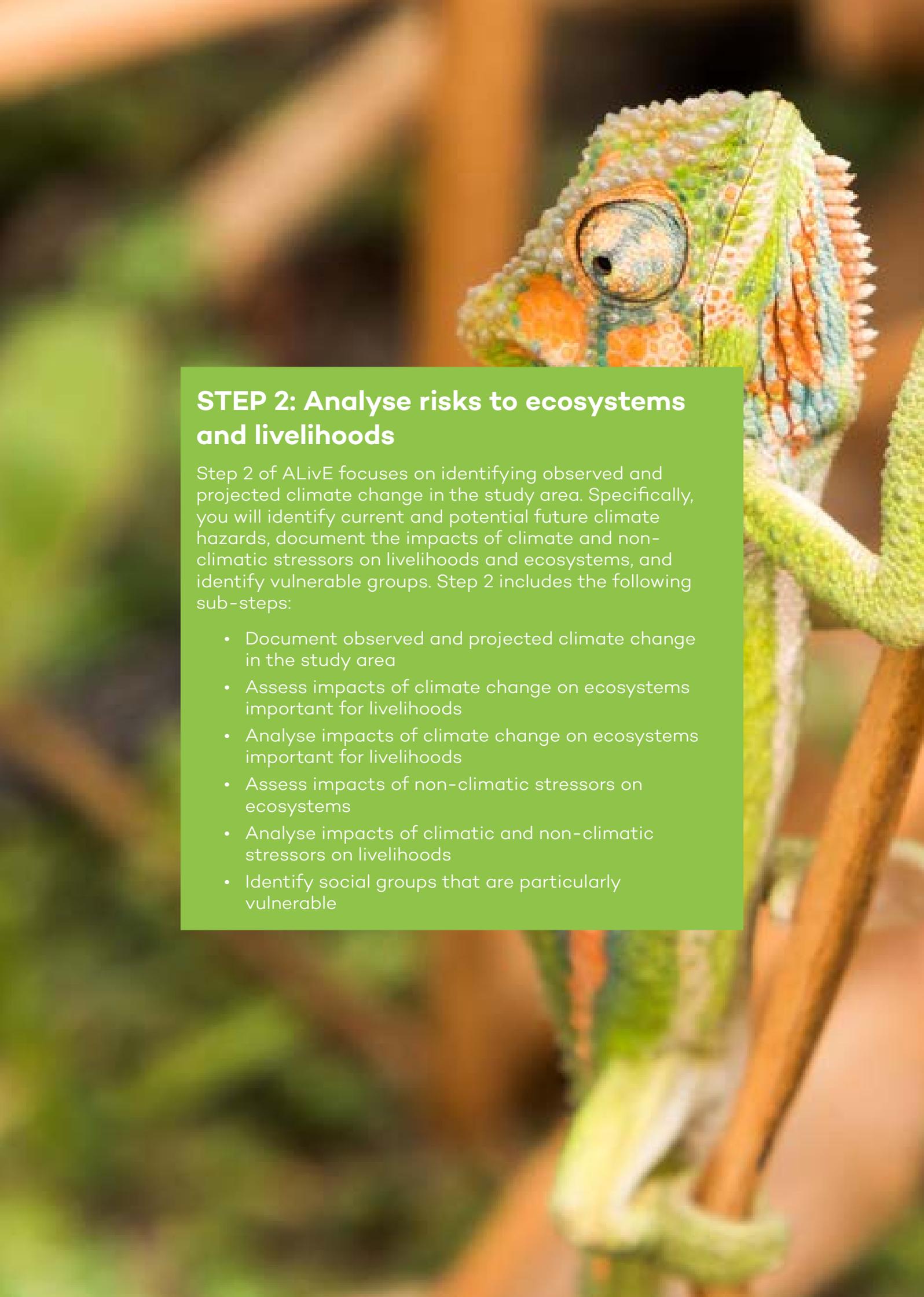
Coastal protection  
Storm buffer / protection  
Forest fire management / protection  
Landslide prevention

(Press Ctrl / Command + Click to select multiple options)

Rivers

Avalanche prevention  
Erosion protection  
Drought protection  
Other

(Press Ctrl / Command + Click to select multiple options)



## STEP 2: Analyse risks to ecosystems and livelihoods

Step 2 of ALivE focuses on identifying observed and projected climate change in the study area. Specifically, you will identify current and potential future climate hazards, document the impacts of climate and non-climatic stressors on livelihoods and ecosystems, and identify vulnerable groups. Step 2 includes the following sub-steps:

- Document observed and projected climate change in the study area
- Assess impacts of climate change on ecosystems important for livelihoods
- Analyse impacts of climate change on ecosystems important for livelihoods
- Assess impacts of non-climatic stressors on ecosystems
- Analyse impacts of climatic and non-climatic stressors on livelihoods
- Identify social groups that are particularly vulnerable



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### TIP

Compare the information on observed climate changes from scientific sources and stakeholder's observations. While the former is often available only for larger scales, stakeholders' observations allow you to validate these larger trends to understand the local perceptions of how the climate has been changing. Also, make sure to note any uncertainty ranges that are mentioned in the projections.

### TIP

Distinguish the causes from the consequences. Make sure that the issues identified are actual hazards and not a stressor such as "food insecurity." For example, food insecurity may be a result of a drought, which is a climate hazard. Crop diseases may be caused by frost-free winters, which is a climate hazard.

## Document observed and projected climate change in the study area

This step allows you to enter information about current and future climate changes and hazards, drawing on both scientific sources and participatory research. Provide a **general description of climate** in the study area, including information on seasons, high and low temperatures, average precipitation and extreme events in the past as well as changes in climate experienced based on the best available information.

### Box 6. Local knowledge

Scientists and government officials sometimes ignore the knowledge of the people living with risks. Case studies have revealed that local communities tend to distrust the climate information and support services from outside because they are rarely consulted. This is particularly true for the poorest and most marginalised segments of the population. Consequently, information and support services are inadequately adapted to local context and needs. Whenever possible, conduct inclusive stakeholder consultations to ensure that local level information is made available, discussed and incorporated in decision making.

Now you will describe observed and projected trends for key climate variables. Under **rainfall**, from the dropdown list, specify the currently **observed trend**<sup>3</sup> and use the text box to provide any additional information about observed changes in rainfall in the study area (e.g. timing, distribution of precipitation). Repeat the process to describe the **projected trend**. Do the same for observed and projected **temperature**.

Next, identify and describe the current and potential future climate hazards in the study area. Click the "change" button under **Hazard 1** and enter the key climate hazard for the area. To add another hazard, click on "change" under **Hazard 2** and **Hazard 3**. You can describe up to three hazards for the study area, so you will need to focus on those that have the most significant impact on livelihoods and ecosystems. For each climate hazard, you will then be asked to specify the **observed trend of the hazard's intensity and frequency** by selecting from of the arrows. Further, if sufficient scientific information is available, you can also specify the **projected trend of the hazard's intensity and frequency** by selecting from of the arrows:

↑ (Increasing)    → (Constant, no change)    ↓ (Decreasing)

### Guidance

Check the guidance tab in this step for a definition of "climate hazard."

**Intensity:** Intensity refers to the magnitude of the hazard over a given period of time (e.g. speed of wind, height of flood). How strong is the hazard when it occurs?

**Frequency:** The rate at which a climate hazard occurs or is repeated over particular period of time. How often does the hazard occur?

<sup>3</sup> Past changes in climate conditions and extremes that have occurred over the past 30 years in the study area.



**!** At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

**[USER MANUAL - STEP 2: ANALYSE RISKS TO ECOSYSTEMS AND LIVELIHOODS]**  
 Document observed and projected climate change in the study area



<p><b>General description of climate</b>                  Describe the climate in the project area, in terms of seasons, high and low temperatures, average precipitation and extreme events experienced, based on the best available information.</p> <p>The region's climate varies from subtropical to cold temperate. At lower elevations, summers are warm whereas at higher elevations these range from cold to very cold. In terms of large-scale climate patterns, the annual precipitation cycle of the region is similar to the rest of Nepal and is dominated by the Asian monsoon system. Monitoring of climatic parameters such as temperature, humidity, evaporation and precipitation across the Panchase region is inadequate.</p> <p>The data indicates that the mean maximum temperature in the region is about 30°C during the summer.</p>	<p><b>Rainfall</b>                  Describe any observed and projected changes in the timing or distribution of precipitation.</p> <p><b>Observed trend:</b>                  Increase</p> <p>Rainfall does not show significant inter-annual variability but hourly rainfall data during monsoon season</p> <p><b>Projected trend:</b>                  Increase</p> <p>Precipitation demonstrates huge uncertainty. By 2060 mean annual precipitation could</p>	<p><b>Temperature</b>                  Describe any observed and projected changes in temperature patterns or extremes.</p> <p><b>Observed trend:</b>                  Increase</p> <p>Data shows consistent and continuous warming, with the maximum temperature rising at an annual rate</p> <p><b>Projected trend:</b>                  Increase</p> <p>An increase is projected to be 1.3C to 3.8 by the 2060s.</p>	<p><b>Landslides</b></p> <p>Change</p> <p><b>Observed trend:</b></p> <p>Intensity: <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3</p> <p>Frequency: <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3</p> <p><b>Projected trend:</b></p> <p>Intensity: <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3</p> <p>Frequency: <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3</p>	<p><b>Hail and Thunderstorms</b></p> <p>Change</p> <p><b>Observed trend:</b></p> <p>Intensity: <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3</p> <p>Frequency: <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3</p> <p><b>Projected trend:</b></p> <p>Intensity: <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3</p> <p>Frequency: <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3</p>	<p><b>Dry spells</b></p> <p>Change</p> <p><b>Observed trend:</b></p> <p>Intensity: <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3</p> <p>Frequency: <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3</p> <p><b>Projected trend:</b></p> <p>Intensity: <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3</p> <p>Frequency: <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3</p>	<p>Guidance</p>
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## Assess impacts of climate change on ecosystems important for livelihoods

In this sub-step, you will identify which ecosystems important for livelihoods are most negatively affected by changes in rainfall and temperature patterns and identified climate hazards. On the left side, you will see the **ecosystems important to livelihoods** and the natural resources they provide for key livelihood activities, which you identified in Step 1 of the programme.

Assess the degree of impact from observed and projected changes in rainfall and temperature patterns and of each identified climate hazards for each **ecosystem important to livelihoods**. You can indicate the quality and severity of impact by clicking on the dropdown list and choosing from **high impact, medium impact, low impact and no impact**.

If your assessment within this particular step concludes that a specific ecosystem important for livelihoods will experience only **low or no impact** to the identified climate variables, it will not be carried forward to the next step for further analysis. For example, you may conclude that ponds and lakes are not impacted by changing temperatures and rainfall patterns or any of the identified climate hazards. In this case, “ponds and lakes” will be not be displayed in the next step to further describe the impacts.

At the end of this sub-step, save the information you have entered by clicking on “**Save.**”

### Assess impacts of climate change on ecosystems important for livelihoods



Ecosystems important to livelihoods	Natural resources important to livelihoods	Rainfall	Temperature	Landslides	Hail and Thunderstorms	Dry spells
<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Forest</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; background-color: #76b82a; color: white;">Flowering plants</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; background-color: #76b82a; color: white;">Forest trees</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; background-color: #76b82a; color: white;">Sustainable availability</div>		<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Observed trends: Increase</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Rainfall does not show significant inter-annual variability but hourly rainfall data</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Projected trends: Increase</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Precipitation demonstrates huge uncertainty. By 2060 mean annual</div>	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Observed trends: Increase</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Data shows consistent and continuous warming, with the maximum</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Projected trends: Increase</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">An increase is projected to be 1.3C to 3.8 by the 2060s.</div>	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Observed trends: Intensity↔ Frequency↑</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Projected trends: Intensity↓ Frequency↑</div>	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Observed trends: Intensity↔ Frequency↑</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Projected trends: Intensity↑ Frequency↑</div>	<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Observed trends: Intensity↔ Frequency↑</div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px;">Projected trends: Intensity↔ Frequency↑</div>
		High impact ▾	High impact ▾	Medium impact ▾	Low impact ▾	High impact ▾



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## Analyse impacts of climate change on ecosystems important for livelihoods

Following your assessment of the degree to which each ecosystem will be affected, you are now asked to provide specific information about the impacts of changing rainfall and temperature patterns and climate hazards for each ecosystem in the study area.

For each of the climate variables (e.g. rainfall, temperature, and identified hazards) **describe the direct effects, positive and/or negative, on the ecosystem and the natural resources** it provides for livelihood activities. It is also important to keep in mind your assessment of the observed and projected frequency and intensity of your identified climate hazards when analysing and describing the impacts on ecosystems.

In this sub-step, we refer to impacts as the consequences of climate hazards and changes on ecosystems. For example, the impacts of hurricanes (climate hazard) on mangroves (ecosystem) could be destruction of mangroves, loss of habitat for fish and loss of natural barriers for storm protection. The indirect effects on livelihoods will be discussed in a later step.

 At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

### Analyse impacts of climate change on ecosystems important for livelihoods



Ecosystems important to livelihoods	Natural resources important to livelihoods	Rainfall	Temperature	Landslides	Hail and Thunderstorms	Dry spells
		Observed trends: Increase	Observed trends: Increase	Observed trends: Intensity↔ Frequency↓	Observed trends: Intensity↔ Frequency↓	Observed trends: Intensity↔ Frequency↓
		Rainfall does not show significant inter-annual variability but hourly rainfall data	Data shows consistent and continuous warming, with the maximum			
		Projected trends: Increase	Projected trends: Increase	Projected trends: Intensity↑ Frequency↓	Projected trends: Intensity↑ Frequency↓	Projected trends: Intensity↔ Frequency↓
		Precipitation demonstrates huge uncertainty. By 2060 mean annual	An increase is projected to be 1.3C to 3.8 by the 2060s.			
Forest	Flowering plants Forest trees Sustainable availability	Changes to regulation of water availability and timing	Decrease the quality of biological raw materials; chance of incidence of pest and	Increasing natural hazards such as dry landslides	Decreasing quality of biological raw materials and plants	Increasing incidence of forest fires; changes in the biodiversity profile, decreased forest quality



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## Assess impacts of non-climatic stressors on ecosystems

Often, there are other stressors that affect ecosystem health and undermine resilience to climate stressors. These are important to note because other non-climatic trends, impacts and changes (e.g. urbanisation, road construction, illegal encroachment) may exacerbate the negative impacts of climate hazards on ecosystems and the resources they provide.

In this sub-step, you can specify up to three **non-climatic stressors** by clicking on “change” in the blue box to input the name of the stressor. In the box further down, fill in a **description** of how each specific stressor contributes to or exacerbates the negative impacts of climate hazards for each ecosystem and the natural resources it provides. Under **pressure of stressor**, you can indicate the severity of the stressor by choosing from the dropdown list (from high, medium, low).

At the end of this sub-step, save the information you have entered by clicking on “**Save.**”

Assess impacts of non-climatic stressors on ecosystems



1

Understand the context

2

Analyse risks to ecosystems and livelihoods

3

Identify and prioritise EbA options

4

Design project activities for options

Ecosystems important to livelihoods	Natural resources important to livelihoods	Increasing road construction	Pressure of Stressor	Forest encroachment and deforestation	Pressure of Stressor	Overgrazing	Pressure of Stressor
Forest	<div style="background-color: #76b82a; color: white; padding: 2px; margin-bottom: 2px;">Flowering plants</div> <div style="background-color: #76b82a; color: white; padding: 2px; margin-bottom: 2px;">Fodder and forage</div> <div style="background-color: #76b82a; color: white; padding: 2px; margin-bottom: 2px;">Forest trees</div> <div style="background-color: #76b82a; color: white; padding: 2px; margin-bottom: 2px;">Sustainable availability</div> <div style="background-color: #76b82a; color: white; padding: 2px;">Planting materials</div>	<div style="background-color: #76b82a; color: white; padding: 2px; margin-bottom: 2px;">Change</div> <div style="font-size: 8px; color: #76b82a;">Describe the impacts of the stressor</div>	High	<div style="background-color: #76b82a; color: white; padding: 2px; margin-bottom: 2px;">Change</div> <div style="font-size: 8px; color: #76b82a;">Describe the impacts of the stressor</div>	High	<div style="background-color: #76b82a; color: white; padding: 2px; margin-bottom: 2px;">Change</div> <div style="font-size: 8px; color: #76b82a;">Describe the impacts of the stressor</div>	High
Wetlands	Water	Drainage of wetlands	Medium	Description	Low	Description	Low
Grassland	Grazing Land	Description	Low	Description	Low	soil erosion, reduced	High



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## Analyse impacts of climatic and non-climatic stressors on livelihoods

This step helps you understand and describe the impacts of climate hazards and changes and non-climatic stressors on the livelihood strategies.

On the left side, you will see the main livelihood strategies and next to it the ecosystem(s) supporting them. Displayed beside it, you will see a summary of the impacts of climatic stressors and a summary of the non-climatic stressors on the ecosystem(s). All four columns of information will be filled in automatically with information from the previous sub-steps.

Now, you will need to describe the **combined impacts from climate hazards and non-climatic stressors on the main livelihood strategies** in the study area. It will be important here to recall the importance of natural resources supporting key livelihood activities. Also, keep in mind any projected changes for climate hazards and their potential impacts and how they could affect livelihood strategies in the future. Some have not yet occurred, but it is nevertheless important to note them.

Examples of impacts on the livelihood strategies from climatic and/or non-climatic stressors:

- Hurricanes’ (climate hazard) impact on mangroves (ecosystem) could result in the destruction of mangroves, loss of habitat for fish and loss of natural barriers for storm protection (impacts on ecosystem and its services). The impact on fishing (livelihood strategy) would be the destruction of fishermen’s homes near the shore and loss of income due to decreased fish stock and loss of habitat.
- Longer dry seasons’ (climate hazard) impact on a forest (ecosystem) could result in increasing incidences of forest fire, decreased quality of biological raw materials (impacts on ecosystem) which are exacerbated by forest encroachment (non-climatic stressor) leading to unsustainable harvesting of forest products. The impact on forest-based farming (livelihood strategy) would be the loss of income due to decline in non-timber forests products.

It is important to keep this climate impact chain in mind when entering the information.

 At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

### Analyse impacts of climatic and non-climatic stressors on livelihoods



Livelihood strategy dependent on ecosystems	Ecosystem supporting livelihood strategy	Impacts of climatic stressors on the ecosystem	Impacts of non-climatic stressors on the ecosystem	Impacts of climatic and non-climatic stressors on livelihood strategies <i>Describe the impact on the livelihood strategy</i>
Agricultural farming	Forest	Changes to regulation of water availability and timing Decrease the quality of biological raw materials; chance of incidence of pest	Increase encroachment into forest area; forest area degradation; loss of forest species; availability of biological raw materials may	Feminization of agriculture and natural resources sector; Reduced water availability for drinking and other needs; Reduced water availability for irrigation and energy; Reduction in production of crops, vegetables and legumes due to reduced water;
	Cropland	Shift in crop growing season due to change in rainfall, low pre-monsoon and winter rainfall Shift in crop growing season		
	Grassland	More intense rainfall in shorter durations, possibly less rainfall overall Increase in invasive species from higher temperatures, loss	soil erosion, reduced productivity and biodiversity, desertification	
	Wetlands	More rainfall in shorter durations drying of water sources, reduced water availability, increase in invasive species,	Drainage of wetlands	
	Ponds/lakes	Decreasing water table	Siltation and sedimentation.	



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## Identify social groups that are particularly vulnerable

The sub-step looks at the results of the previous information entered with the aim to identify **social groups that are particularly vulnerable** to climate hazards and changes in relation to each identified **livelihood strategy dependent on ecosystems**. Identifying vulnerable groups and understanding why they may require targeted strategies is a key step before identifying adaptation options.

There are many factors to consider when identifying vulnerable groups. Certain people, households or groups are more vulnerable to climate change and hazardous events because of:

- **Where they live:** Some parts of a community may be more exposed to climate risks than others, and in some cases, these areas are inhabited by a particular socioeconomic group (for example, landless people settling in river floodplains).
- **Their wealth:** Poorer people have fewer assets and may be more reliant on livelihood strategies that are climate-sensitive.
- **Their gender:** Women and men experience the impacts of climate change differently, and they have differing capacities to respond. Women may face particular barriers in access to information, resources and services that enable adaptation due to social norms and cultural values that limit their mobility and decision-making power.
- **Their religion or ethnicity:** In areas with multiple religious and/or ethnic groups, minority groups may face discrimination that limits their access to information, resources and services, thereby reducing their adaptive capacity.
- **Mobility challenges:** Elderly people, small children, pregnant women and people with disabilities who are less mobile may face challenges in securing their livelihoods and protecting themselves from hazards.

It is important to consider that the characteristics that exacerbate vulnerability are likely to have greater significance when they are combined. For example, a woman belonging to an ethnic minority group may be more vulnerable than a non-minority woman of similar socioeconomic circumstances due to discrimination and exclusion from community decision making; a poor person with a disability likely faces more challenges in mobility and access to information and services than a wealthier person. Considering how the above factors intersect is extremely important in identifying vulnerable social groups and also aids you in avoiding unhelpful generalisations (e.g. all women are more vulnerable).

The following questions can guide you when identifying vulnerable groups and explaining why they are vulnerable:

- Do specific groups face barriers in accessing information, resources and services because of their religion, gender, ethnicity, age or low literacy rates?
- Are there particular social groups that are excluded from community planning and decision-making processes?
- Are benefits from development investments and provision of services equitably shared among community members? If not, which social groups are receiving fewer benefits? Why?



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- What role does mobility play in adaptation in this context? Which groups face mobility challenges?
- Who has access to and control over natural resources in the community? Do specific social groups face barriers to accessing these resources?
- How does gender inequality influence adaptive capacity? How does gender intersect with other issues?
- Are there any areas that are prone to hazards where specific social groups tend to live?

Review the information under impacts of climatic and non-climatic stressors on the ecosystem-dependent livelihood strategies. In the text box next to the impacts, **identify any social groups vulnerable to these impacts. Identify one group with an explanation at a time and click on the + to add further groups.** For each vulnerable group, provide an explanation as to why they are particularly vulnerable.



At the end of this sub-step, **save the information** you have entered by clicking on “**Save**” and click on “**Summary**” in the right-hand corner to review, print or save the PDF summary report of the previously entered information in **Step 2 (Module A)**.

Identify social groups that are particularly vulnerable



Livelihood strategy dependent on ecosystems	Impacts of climatic and non-climatic stressors on livelihood strategies	Identify vulnerable social groups to impacts <i>For each livelihood strategy, identify particularly vulnerable groups to the impacts identified</i>	Explanation <i>Provide a short explanation</i>
Agricultural farming	Feminization of agriculture and natural resources sector; Reduced water availability for drinking and other needs; Reduced water availability for	Women + Smallholder farmers and the poor Elderly and poor, children	Urban migration of young men, reduced income levels, reduced health and quality of water Reduced income levels due to loss in crops and livestock, increasing stress on natural resources Reduced quality and quantity of drinking water, negative impact on health and food security
Forest-based farming	Reduced availability of fuelwood fodder NTFPs and medicinal and aromatic plants (MAPs); Loss of lives due to landslides;	Dalits + Women Elderly and poor, children	Groups without land that relies heavily on availability of fuelwood, fodder, NTFPs, medicinal and... Increased time to collect to collect fuelwood, fodder (traditional women's work) Poorer people often live in settlements close to forest and are

Previous Save Next Summary

## **STEP 3: Identify and prioritise ecosystem-based adaptation (EbA) options**

Step 3 of ALive focuses on describing adaptation outcomes for vulnerable livelihoods, followed by identifying and prioritising effective and feasible EbA options for the study area. Step 3 includes the following sub-steps:

- Identify adaptation outcomes for vulnerable livelihood strategies
- Identify EbA options for vulnerable livelihood strategies
- Prioritise effective EbA options for vulnerable livelihood strategies
- List of effective EbA options
- Change or add new EbA options
- Identify evaluation criteria to assess the feasibility of EbA options
- Evaluate feasibility of EbA options based on chosen criteria
- List of feasible EbA options
- Identify key actions that need to take place for implementation of priority EbA options



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## Identify adaptation outcomes for vulnerable livelihood strategies

Review the first two reports from Module A (Steps 1 and 2) and, if necessary, go back into the tool at any previous step to make adjustments so that summary reports are as accurate and comprehensive as possible. Keep the reports at hand for the following steps.

In this sub-step, the tool automatically summarises the information from the previous steps. It provides you with an overview of the main **livelihood strategies, the ecosystems supporting livelihoods and the climatic and non-climatic impacts on ecosystems and livelihoods.**

Review and analyse the information to identify and formulate long-term<sup>4</sup> **adaptation outcomes for each livelihood strategy.** You can identify multiple adaptation outcomes by using  to add another textbox.



Review national, regional or local plans and policies that have already been developed for adaptation that identify priorities relevant for the study area to inform adaptation outcomes.



A good starting point is to identify what is already happening and could be built upon. Are there plans, policies or strategies that already identify options to help manage the most significant risks? Or projects planned that will help to increase resilience and ability to adapt?

### Guidance

Check the guidance tab in this step for a definition of **adaptation outcomes.**

**When developing adaptation outcomes, ensure that they clearly articulate:**

- (1) The desired state of the ecosystem and/or its services achieved through restoration, conservation or management.
- (2) How the ecosystem(s) help people to adapt.
- (3) Which climate risk is addressed?

### Examples:

- Conservation and restoration of forest species increase community forest biodiversity and provide protection from landslides for forest-based farming livelihoods.
- Improved water availability for agricultural farming to address drying up of water sources due to changing rainfall patterns.

Going through this exercise will help you to understand where you want a community to be in the future with regard to climate change adaptation and articulate what a climate-resilient community looks like. It will also be something to refer back to throughout the planning process and while implementing adaptation actions.

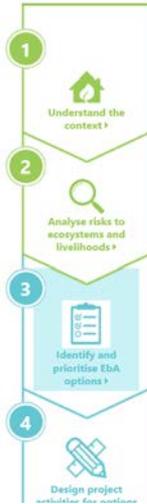


At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

<sup>4</sup> Long-term adaptation outcomes are often situation-specific and aim to achieve a change in state of ecosystems or society, environment or economy. Long-term analysis looks beyond the end of the project and focuses on a 5- to 10-year outcome.



[USER MANUAL - STEP 3: IDENTIFY AND PRIORITISE EbA OPTIONS]  
Identify adaptation outcomes for vulnerable livelihood strategies



Livelihood strategy	Ecosystems supporting livelihoods	Climate and non-climatic impacts on ecosystem	Climate and non-climatic impacts on livelihoods	Adaptation outcome <i>Clearly formulate the desired outcome for the ecosystem under a changing climate; build resilience of people and ecosystems.</i>	Guidance
Agricultural farming	Forest	Changes to regulation of water availability and timing Decrease the quality of biological raw materials; chance of incidence of pest and	Feminization of agriculture and natural resources sector; Reduced water availability for drinking and other needs; Reduced water availability for	Improved water availability for agricultural farming to address drying up of water sources due to changing rainfall patterns.	+
	Cropland	Shift in crop growing season due to change in rainfall, low pre-monsoon and winter rainfall Shift in crop growing season		An established climate-smart agricultural production system that is resilient to shifts in crop growing season and changing rainfall patterns to improve	
	Grassland	More intense rainfall in shorter durations, possibly less rainfall overall Increase in invasive species from higher temperatures, loss			
	Wetlands	More rainfall in shorter durations drying of water sources, reduced water availability, increase in invasive species,			
	Ponds/Lakes	Decreasing water table; decreasing water discharge			



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## Identify EbA options for vulnerable livelihood strategies

It should be noted that in some cases the negative impacts of climate risks on livelihoods and ecosystems are so severe or difficult to mitigate that engineered structural options or hybrid strategies must be considered. For example, seawalls are hard-engineered structures designed to prevent further erosion of a shoreline. Protecting riverbanks with gabion baskets mixed with revegetation efforts presents a hybrid option that combines ecosystem-based and hard infrastructure approaches.

However, this sub-step and the following ones will focus on identifying and prioritising EbA options that ensure the resilience of ecosystems and the services they provide for livelihoods while taking advantage of their potential to reduce climate risks.

Based on the identified adaptation outcomes, your understanding of current and future impacts, and the adaptation options discussed with communities through the participatory research process, you can now begin the process of identifying EbA options. These options should aim to achieve the desired adaptation outcomes.

### Guidance

Check the guidance tab in this step for a definition of **EbA options**.

**As recalled on page 9, EbA options can be categorised into three main types:**

**Restoration:** The process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed.

**Conservation:** Strategies to conserve the function, structure, and species composition of an ecosystem, recognising that all components are interrelated.

**Management:** Managing resources in ways that promote the long-term sustainability of ecosystems and the ongoing delivery of essential ecosystem services to society.

Ideally, EbA options should address issues of access to, and control over natural resources that are important for responding to climate impacts. Adaptive capacity is strengthened if vulnerable groups have more access and control over critical resources. **Annex F** provides you with an indicative list of potential EbA options for different ecosystems.

For each adaptation outcome, identify **potential EbA options**, within the categories above. You can identify multiple EbA options for each adaptation outcome by using  to add another textbox.



At the end of this sub-step, save the information you have entered by clicking on **“Save.”**



Identify EbA options for vulnerable livelihood strategies



Adaptation outcome	Potential EbA Options <i>Identify potential EbA options within the identified response categories.</i>
Improved water availability for agricultural farming to address drying up of water sources due to changing	Plantation for water recharge around water sources <span style="float: right;">+</span>
An established climate-smart agricultural production system that is resilient to shifts in crop growing	Water source protection and restoration (e.g wetlands, irrigation ponds) <span style="float: right;">+</span>
Conservation and restoration of forest species increase community forest biodiversity and provide protection	Piloting and promotion of drought resistant varieties <span style="float: right;">+</span>
	Application and promotion of climate smart technologies (mulching, drip irrigation, organic manure) <span style="float: right;">+</span>
	Introduce conservation and sustainable management measures for the community forest <span style="float: right;">+</span>
	Plantation of broomgrass to stabilize soils and provide source for fodder <span style="float: right;">+</span>

Guidance ②



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When ranking the potential EbA options against each criterion, be sure to carefully consider the exact meaning of each criterion and how each EbA option contributes to meeting it.

## Prioritise effective EbA options for vulnerable livelihood strategies

In order to prioritise the EbA options, the tool facilitates a multi-criteria analysis using five commonly recognised criteria for EbA effectiveness.

### Guidance

Check the guidance tab in this step for a definition of **effective EbA options**.

### EbA effectiveness criteria:

**Potential to reduce risks associated with current and future climate hazards and changes:** The EbA option directly addresses climate hazards, changes and uncertainty, taking into account both observations and projections of climate change. It is informed by both scientific information and traditional knowledge.

**Potential to improve peoples' adaptive capacity to climate change:** The EbA option enables adaptation to climate change, for example by improving stability of access to climate-sensitive resources, creating new livelihood opportunities that spread risks or improving systems for managing natural resources in ways that increase equity in access and control.

**Potential to generate benefits for vulnerable social groups and enhance gender equality:** Implementation of this EbA option can ensure that vulnerable social groups can participate and benefit from the results. It addresses social and gender inequalities that present barriers to adaptation.

**Makes sustainable use of biodiversity and ecosystem services to build resilience:** The EbA option harnesses ecosystem services to increase people's livelihood assets and their capacity to adapt to climate change in a way and at a rate that do not lead to the decline of the ecosystem's health.

**Build resilience of ecosystems to current and future climate hazards and changes:** The EbA option balances human adaptation with ecosystem resilience by supporting essential natural processes and the interconnections between different ecosystem services. Use of ecosystem services is at a rate that does not undermine the longer-term resilience of the ecosystem itself.

The proposed EbA options will be listed down the left side and the effectiveness criteria are displayed across the top. **Assess and evaluate the effectiveness of each potential EbA option by ranking from high to low** for each of the criteria.

ALivE will automatically calculate the total score by adding up the values for each potential EbA option based on your assessment (high = 3, medium = 2, low = 1). A threshold of 10 will be applied to highlight the most effective EbA options that are most likely to produce the desired results.



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### Box 7. Trade-offs and synergies

When the simultaneous delivery of several desired ecosystem services is not possible, prevent each other or cause conflict, ecosystem service trade-offs occur. A trade-off can potentially result in a conflict between users depending on who bears the burden and who benefits from the ecosystem service supply (Turlerboom et al., 2016). Managing ecosystems for adaptation may require prioritisation of certain services that ecosystems provide at the expenses of others. While win-wins may be attractive, they are not inevitable, and several studies suggest they may be unlikely in practice. A good way forward for EbA practitioners is to explicitly acknowledge trade-offs and aim to understand the underlying mechanisms and motivations for trade-offs and synergies. This can be beneficial for planning and managing ecosystem services because it can help to:

- (1) Predict where and when trade-offs might take place.
- (2) Reduce undesirable trade-offs and related conflicts.
- (3) Enhance desirable synergies (e.g. by applying strategies that deliver several ecosystem services simultaneously).
- (4) Promote honest dialogue, creativity, and learning between concerned stakeholder groups.
- (5) Lead to more effective, efficient and credible management decisions.
- (6) Obtain more equitable outcomes by considering distributive impacts of trade-offs (Turlerboom et al., 2016).

For example, the protection of coral reefs and marine areas strengthens coastal ecosystem resilience, enhances fish productivity and provides opportunities for eco-tourism. EbA options should balance the need of the most vulnerable, current and anticipated climate-related vulnerabilities, needs for resources and development and the limits of ecosystem functioning (Andrade, et al., 2011). It is therefore important that decisions to implement EbA options are subject to risk assessment, participatory planning and adaptive management approaches that recognise and incorporate these potential trade-offs.



At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

### Prioritise effective EbA options for vulnerable livelihood strategies



Adaptation outcome	Potential EbA Options	Makes sustainable use of biodiversity and ecosystem services to build resilience	Potential to improve peoples' adaptive capacity to climate change	Potential to generate benefits for vulnerable social groups and enhance gender equality	Potential to reduce risks associated with current and future climate hazards and changes	Build resilience of ecosystems to current and future climate hazards and changes	Guidance ⓘ
Improved water availability for agricultural farming to address design of	Plantation for water recharge around water sources	High	Medium	Medium	Medium	High	
	Water source protection and restoration (e.g. wetlands, irrigation)	High	Medium	High	High	Medium	
An established climate-smart agricultural production system that is resilient	Piloting and promotion of drought resistant varieties	Medium	High	High	High	High	
	Application and promotion of climate smart technologies (mulchless, drip)	High	Medium	Medium	Medium	Low	
Conservation and restoration of forest	Introduce conservation and	Medium	Low	Medium	Medium	Medium	



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## List of effective EbA options

The effectiveness of each potential EbA option has now been assessed and ranked. The potential EbA options are displayed based on their ranking in the previous step. Beside each EbA option, you will see the total score. The potential EbA option with the highest ranking first and the option with the lowest, last. Each potential **EbA option that received a score higher than 10 is highlighted in green**, each potential **EbA option that scored below 10 is highlighted in red**. The threshold 10 is used to highlight “effective” EbA options that are most likely to produce the desired results and to inform your decision-making process.

No action is required in this sub-step: it simply allows you to review the ranking and, if necessary, go back to the previous step and make adjustments.

 At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

### List of effective EbA options



Piloting and promotion of drought resistant varieties ( 14 )	Guidance 
Plantation of broomgrass to stabilize soils and provide source for fodder ( 14 )	
Water source protection and restoration (e.g wetlands, irrigation ponds) ( 13 )	
Plantation for water recharge around water sources ( 12 )	
Application and promotion of climate smart technologies (mulching, drip irrigation, organic manure) ( 10 )	
Introduce conservation and sustainable management measures for the community forest ( 9 )	

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## Change or add new EbA options

Following your assessment of the effectiveness of each EbA option, you now need to select which EbA options should be taken forward because they are most effective in producing the desired results and should be further analysed.

You can click in the box next to each EbA option to select those you would like to take through the next steps of the analysis. Each EbA option not selected will not be taken forward.

This sub-step also allows you to add a new EbA option. Click on “**Add new EbA option.**” You will then be asked to enter the EbA option and choose which **adaptation outcome this EbA option is contributing toward.**

When adding a new EbA option, ensure that this added option focuses on managing the supply of—and demand for—natural resources **to reduce the vulnerability of livelihood groups** to the identified climate hazards. EbA options should also target people’s access to and control over natural resources that are important for responding to climate impacts. If necessary, revisit the user manuals guidance on identifying potential EbA options (page 40). Change or add new EbA options.



At the end of this sub-step, save the information you have entered by clicking on “**Save.**”



### Change or add new EbA options



Piloting and promotion of drought resistant varieties	14	<input checked="" type="checkbox"/>
Plantation of broomgrass to stabilize soils and provide source for fodder	14	<input checked="" type="checkbox"/>
Water source protection and restoration (e.g wetlands, irrigation ponds)	13	<input checked="" type="checkbox"/>
Plantation for water recharge around water sources	12	<input checked="" type="checkbox"/>
Application and promotion of climate smart technologies (mulching, drip irrigati	10	<input type="checkbox"/>
Introduce conservation and sustainable management measures for the commu	9	<input type="checkbox"/>
<a href="#">Add new EbA option</a>		

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## Identify evaluation criteria to assess the feasibility of EbA options

By default, eight equally weighted criteria are proposed to help you assess the feasibility of each EbA option.

**Choose from the default criteria** by which EbA options will be evaluated and prioritised in the next sub-step. You must choose at least four criteria from the proposed list of default criteria. You can **add criteria by clicking on “add criterion”** and remove them again by clicking on the red waste bin. Make sure you select your own criterion by clicking in the box next to it before moving on to the next step.

### Guidance ?

**Check the guidance** tab for this step for a definition of Feasible EbA Options and a description of the proposed default criteria:

- Affordability
- Technical feasibility
- Political feasibility
- Cost to maintain
- Can be monitored
- Flexibility
- Supports large number of beneficiaries
- Culturally appropriate

It should be emphasised that ALivE does not provide an in-depth economic analysis component. Undertaking an economic benefit analysis can be challenging and will most likely depend on specific localised data and a careful selection of valuation methods. Box 8 provides an overview of common methods that could be used to value the benefits and costs of EbA options in more detail.

 At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

### Identify evaluation criteria to assess the feasibility of EbA options



Proposed criteria by default	
Affordability (consider long-term cost effectiveness)	<input checked="" type="checkbox"/>
Technical feasibility	<input checked="" type="checkbox"/>
Political feasibility	<input checked="" type="checkbox"/>
Cost to maintain	<input type="checkbox"/>
Can be monitored	<input checked="" type="checkbox"/>
Flexibility (can respond to feedback & learning)	<input checked="" type="checkbox"/>
Supports large number of beneficiaries	<input checked="" type="checkbox"/>
Culturally appropriate / socially acceptable	<input checked="" type="checkbox"/>

Guidance ?



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### Box 8. Valuing the benefits, costs and impacts of EbA options

Valuation is the process of describing, measuring and analysing how the costs, benefits and impacts of EbA are generated, received and perceived to support decision making. Economic values are often particularly convincing to decision makers. Proving the economic viability and cost effectiveness of EbA options can be helpful to make the case for EbA and communicate the benefits and results, as well as support mainstreaming efforts. However, undertaking cost-benefit analysis or determining the economic value of ecosystem services can be challenging. Few ecosystem services have a market price and consequently quantifying and estimating monetary values of such commodities can be difficult and based on incomplete information. This adds a level of complexity, which may not be presented in more conventional adaptation option cost-benefit analyses. Another challenge is availability of site-specific data. It may be necessary to use data from similar sites or other studies. Incorporating climate change consideration adds another level of complexity to highlighting the economic value of EbA options. All of the above require extensive background research and a careful selection of economic methods as well as a clear identification of scope, purpose, cost, benefits and impacts to be addressed. Below is a list of methods commonly used to value the benefits, costs and impacts of EbA options:

- **Mitigative & avoidance expenditures** (the cost of dealing with the effects of the loss of an ecosystem service).
- **Contingent valuation** (involves directly asking people how much they would be willing to pay to prevent loss, or enhance ecosystem service).
- **Choice experiments** (people choose from a “menu” of options with differing levels of ecosystem services and differing costs, e.g. policy decisions where a set of possible actions might result in different impacts on ecosystems).
- **Benefits transfer** (Transferring a value from studies already completed in another location and/ or context).
- **Market price** (Money paid for ecosystem goods and services that are traded on commercial markets).
- **Substitute prices** (The market price of a close substitute for a naturally-occurring product).
- **Effect on production** (Value is inferred by considering the changes in quality and/or quantity of a marketed good that results from an ecosystem change).
- **Travel cost** (It assumes that the value of a site is reflected in how much people are willing to pay to travel to the site).
- **Hedonic price** (Value of environmental amenities that affect prices of marketed goods, e.g. waterfront properties).
- **Replacement cost** (Value is based on the cost of replacing the ecosystem service or providing substitutes).

Note that the methods described above are not applicable to all types of ecosystem services. For example, the travel costs method is mostly used to assess the value of cultural services provided by ecosystems.

*Source: Kosmus, M., Renner, I., Ulrich, S. (2017). Integrating Ecosystem Services (IES) into Development Planning Training material.*



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## Evaluate feasibility of EbA options based on chosen criteria

This sub-step allows you to evaluate the proposed EbA options against your selected criteria. The EbA options and the criteria from the previous sub-step will automatically appear on the horizontal and vertical axes.

**Assess and evaluate the feasibility of each EbA option by ranking from high to low** for each criterion.

For example:

- The EbA option is very affordable (Rank: High)
- The EbA is somewhat technical feasible (Rank: Medium)
- The EbA option is not political feasible (Rank: Low)
- The EbA option would be very costly to maintain (Rank: Low)
- The EbA option can be easily monitored (Rank: High)
- The EbA option benefits large numbers of beneficiaries (Rank: High)
- The EbA option is not culturally appropriate (Rank: Low)
- The EbA option is somewhat flexible and can be adjusted if changes occur (Rank: Medium)

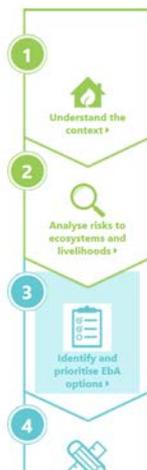
ALivE will automatically calculate the total score by adding up the values for each EbA option based on your assessment (high = 3, medium = 2, low = 1). In the next sub-step, the EbA options will be ranked and displayed according to their feasibility.

Click “next” to review your ranking of EbA options.



At the end of this sub-step, save the information you have entered by clicking on “Save.”

### Evaluate feasibility of EbA options based on chosen criteria



Potential EbA Option	Affordability	Technical feasibility	Political feasibility	Can be monitored	Flexibility
Piloting and promotion of drought resistant varieties	Medium	High	Medium	High	Medium
Plantation of broomgrass to stabilize soils and provide source for fodder	High	High	High	High	High
Water source protection and restoration (e.g wetlands, irrigation ponds)	Medium	Low	Medium	Medium	Low
Plantation for water recharge around water sources	Medium	High	High	High	Medium

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## List of feasible EbA options

The feasibility of each potential EbA option has now been assessed and ranked. The potential EbA options are displayed based on their ranking in the previous step.

Each **EbA option that received a higher score than 8 is highlighted in green**, each **potential EbA option that scored below 8 is highlighted in red**. The threshold 8 is used to highlight “feasible” EbA options that can be possible, achieved, done or are reasonable.

Following your assessment of the feasibility for each EbA option, you now need to select which EbA options should be taken forward because they are considered feasible and achievable and should therefore be further analysed.

You can click in the box next to each EbA option to select those you would like to take through the next steps of the analysis. Each EbA option not selected will not be taken forward.

 At the end of this sub-step, save the information you have entered by clicking on “**Save.**”

List of feasible EbA options 



Plantation of broomgrass to stabilize soils and provide source for fodder	18	<input checked="" type="checkbox"/>
Plantation for water recharge around water sources	16	<input type="checkbox"/>
Piloting and promotion of drought resistant varieties	14	<input type="checkbox"/>
Water source protection and restoration (e.g wetlands, irrigation ponds)	11	<input checked="" type="checkbox"/>

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## Identify key actions that need to take place for implementation of priority EbA options

The EbA options that have been prioritised and selected are considered for implementation. On the left side, you will see the prioritised EbA options that have evolved through the prioritisation process in the previous steps. Now, you will identify key actions that are critical to successfully implement these EbA options.

You have already decided what change you would like to see by prioritising your EbA options (e.g. increase plantation for water recharge around water sources). In this step, you aim to identify and layout “what” needs to happen to achieve this change.

For each EbA option, you are now asked to **enter key actions that are required to implement or put in place the prioritised EbA options.**

**Guidance** ?

Check the guidance tab for this step for a definition of “key actions.”

Displayed next to the EbA option, it is important that you use only one text box to describe one key action and add another text box to describe a second key action. To add another key action for a specific EbA option, click on the **+**. You may add as many key actions as you like for each associated EbA option.



At the end of this sub-step, save the information you have entered by clicking on “Save” and click on “Summary” in the right-hand corner to review, print or save the PDF summary report of the previously entered information in **Step 3 (Module B)**.

### Identify key actions that need to take place for implementation of priority EbA options



Prioritized EbA Options	Key actions
Plantation of broomgrass to stabilize soils and provide source for fodder	Identify and assess the forest status and identify locations for planting <b>+</b>
	Plantation of new broom grass plants with local community <b>+</b>
	Ensure sustainable harvesting practices and access to plants <b>+</b>
	Regular monitoring of plants through social groups <b>+</b>
Water source protection and restoration (e.g wetlands, irrigation ponds)	Identify and assess water sources for protection and restoration <b>+</b>
	Put in place physical and social <b>+</b>

**Guidance** ?



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## Validating your findings

After you have completed this part of the analysis, we recommend your project team hold a validation workshop to share your findings with community representatives and stakeholders to **confirm the validity of your conclusions**. This will also ensure that the information has been interpreted correctly and that nothing is missing. Following the validation of your analysis and prioritised EbA options by the community, you should discuss these options in more detail and gather information around required inputs, key actors who need to be involved, opportunities and challenges and how can they be addressed. This will help you learn more about concerns and realities on the ground and inform the design of your project activities to support the implementation of the prioritised EbA options.

The validation is generally done in a workshop setting that brings together community representatives and a range of stakeholders to discuss and provide feedback on the results of the analysis. In preparation for the validation workshop, you will need to pull together the findings into a concise synthesis that can be easily presented and understood by a wide range of stakeholders. You can use the summary reports produced by ALivE at the end of Steps 1, 2 and 3.

The workshop should consist of a presentation of your results, followed by an opportunity for participants to discuss and validate the findings. Next, participants provide inputs on required inputs, key actors and opportunities and challenges related to the prioritised EbA options. Annex E provides a facilitation guide for this process.

Feedback from the validation workshop should be incorporated into the analysis, and you may be required to make adjustments to your entries in Steps 1, 2 and 3 of the tool.



## STEP 4: Design project activities to facilitate implementation of EbA options

Step 4 of ALive focuses on designing project activities to facilitate the implementation of EbA options. You will be required to identify required inputs, key actors and their responsibilities, opportunities and barriers and specific project activities. Step 4 includes the following sub-steps:

- Identify required inputs for prioritized EbA options
- Identify roles and responsibilities for priority EbA options
- Identify opportunities and barriers that influence the implementation of priority EbA options and key actions
- Identify project activities to support implementation of priority EbA options and key actions, taking into consideration required inputs, actors, responsibilities, opportunities and barriers



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## Identify required inputs for priority EbA options

The successful implementation of EbA options and key actions requires knowledge, human resources, supplies and other technical aspects. A clear understanding of these requirements is important to understand how the project can provide support to communities and local institutions. In this step, **identify all inputs that are required to implement associated key actions** for each prioritised EbA option.

**Guidance** ?

Check the guidance tab for this step for a definition of “**required inputs**” and the proposed categories for consideration:

- Equipment & materials
- Information
- Financial resources
- Skills and knowledge
- Training
- Natural inputs



At the end of this sub-step, save the information you have entered by clicking on “**Save.**”

[USER MANUAL - STEP 4: DESIGN PROJECT ACTIVITIES TO FACILITATE IMPLEMENTATION..] Identify required inputs for priority EbA options



Prioritized EbA Options	Associated key actions	Required inputs <i>Identify all required inputs for key actions.</i>
Plantation of broomgrass to stabilize soils and provide source for fodder	Identify and assess the forest status and identify locations for planting	Information about the forest composition and species and best places to plant
	Plantation of new broom grass plants with local community	Equipment (spade, shovel) Financial resources for work and plants
	Ensure sustainable harvesting practices and access to plants	Training of community to harvest sustainably Skills of community to harvest sustainably
Water source protection and restoration (e.g wetlands, irrigation ponds)	Regular monitoring of plants through social groups	Skills and training on monitoring and indicators
	Identify and assess water sources for protection and restoration	Knowledge and skills of local area and context and assessment skills
	Put in place physical and social infrastructure	Stone, mud water Equipment (spade, shovel, trowel)
Plantation of water-retaining species around the source	Remove unwanted materials (biological and non-biological) from around the source	Equipment (spade, shovel) Labour Financial resources for work
	Plantation of water-retaining species around the source	Planting materials Knowledge and skills of planting Maintenance skills and activities



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## Identify roles and responsibilities for priority EbA options

For each of the priority EbA options, the identified required inputs from the previous sub-step are now automatically displayed next to the key actions.

Now, in the text boxes next to the required inputs, **identify all actors** that need to be involved in successful implementation of this EbA option and its associated key actions. This could include community members, local government institutions and politicians, local groups, NGOs, the private sector, and any other social groups. If possible, identify specific focal persons for each group.

Next, describe the **role and responsibility** of each identified actor. Specifically, describe how they support the implementation of the key actions of the EbA option. This could relate to their authority to approve, financial resources they may be able to provide, or specific technical skills or knowledge they offer. In addition, consider the role of key individuals who may play a significant role in creating alliances because of their personal skills and recognition.



At the end of this sub-step, save the information you have entered by clicking on “Save.”

### Identify roles and responsibilities for priority EbA options



Prioritized EbA Options	Associated key actions	Required inputs	Actors <i>Identify all actors that need to be involved in successful implementation of this EbA option (e.g. community members, government entities, NGOs, private sector, social groups)</i>	Responsibilities <i>Describe role and responsibility in the implementation of the key actions of the EbA option</i>
Plantation of broomgrass to stabilize soils and provide cover for...	Identify and assess the forest status and identify locations for...	Information about the forest composition and...	Expert consultant Community forest group	Informing the planting process, conducting the study to understand forest status and help with providing local information to inform selection...
	Plantation of new broom grass plants with local community	Equipment (spade, shovel) Financial resources	Nursery worker Plant Expert Human local labour	For providing plantation materials Ensuring the plantation of proper species in proper place
	Ensure sustainable harvesting practices and access to plants	Training of community to harvest sustainably	Nursery worker Expert Local government bodies (VDCs and Range post)	Support training and skills workshops for sustainable harvesting practices
	Regular monitoring of plants through social groups	Skills and training on monitoring and indicators	Local government bodies (VDCs and Range post)	Regular monitoring and reporting back and share relevant information
Water source protection and restoration (e.g. watershed, irrigation...)	Identify and assess water sources for protection and...	Knowledge and skills of local area and context and...	Expert consultant Community water users group Local government bodies (VDCs and Range post)	For conducting study, analysis and report writing Providing local information
	Put in place physical and social infrastructure	Stone, mud water Equipment (spade, shovel, trowel)	Human skilled local labour Community water users groups Local government authority	Physical infrastructure construction Ensure, monitor, guidance of works, building social consensus and...

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### Box 9. Engaging with the private sector

When considering the potential role of the private actors in supporting EbA options, it is important to understand motivational and enabling factors that underpin the engagement of the private sector.

Business opportunities are one of the main incentives for the private sector to get involved. Financial decisions within the sector are typically informed by the business case that assesses the expected risks versus the potential benefits of a particular investment (Parry et al., 2017). These business opportunities could include the potential for increasing a specific sector's resilience, productivity or larger market access through higher quality products. This in turn would result in reducing the vulnerability of their portfolios and an ability to offer products to larger or other markets. One key aspect is the presence of products (e.g. timber, organic shrimp, specific financial products), which are both a part of the company's portfolio or supply chain and should be represented in the implementation of EbA options. These products carry a market value; hence, they create a link between the benefits of EbA options and the private sector's market (Dorkenoo, 2015).

Climate-related risks and hazards can directly affect the private sector's operations and investments. Private enterprises are increasingly interested in integrating climate risks into the management of their supply chains and developing adaptation strategies. Financing EbA and its intended benefits in terms of climate risk and hazard mitigation can present another motivational factor to the private sector to become involved in EbA (Parry et al., 2017). However, it is important to note that if the private sector does not perceive climate change as a risk or an opportunity to their business activities, they are unlikely to invest in climate change adaptation. This reinforces the need for climate risk assessments and the availability of regional climate data.

Other motivational factors for the private sector to consider are societal contributions. EbA initiatives can result in multiple co-benefits; low investment costs and involve local communities. Supporting local communities can help the private sector to achieve their social responsibility goals, along with their environmental responsibility goals (Dorkenoo, 2015). This also reiterates the importance of monitoring and evaluation of projects to value and document the effectiveness and benefits of EbA.

To enable further engagement from the private sector, mainstreaming of EbA will be a crucial step, as awareness of the risks of climate change among the private sector is still low and responses are mainly reactive. As a result, government support is important to create an enabling environment by integrating EbA into relevant policies and planning processes, particularly key economic sectors.





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## Identify opportunities and barriers that influence the implementation of priority EbA options and key actions

In the previous sub-steps, you have identified the required inputs, key actors and their responsibility for implementing your prioritised EbA options. This sub-step helps you to **identify opportunities and barriers** that may affect the successful implementation of your priority EbA options.

Going through this exercise of understanding the opportunities and barriers that may influence the implementation of your prioritised EbA options and key actions could help you avoid pitfalls when planning project activities in the next step.

Under **opportunities**, identify and list all factors that positively influence and facilitate the implementation of each EbA option (e.g. political will, local support, financial resources in place).

Under **barriers**, identify all factors that may provide obstacles to the implementation of each EbA option (e.g. no buy-in from the local population, technical expertise required, timelines, political will, and lack of funding).

Under **barriers to identified vulnerable groups**, identify and list barriers specific to the previously identified vulnerable groups involved in the livelihood strategy (e.g. access to a specific natural resource, illiteracy, accessing information, discrimination, participation).

**Guidance** ?

Check the guidance tab for this step for a definition of “opportunities” and “barriers.”



At the end of this sub-step, save the information you have entered by clicking on “Save.”

### Identify opportunities and barriers that influence the implementation of priority EbA options and key actions



Prioritized EbA Options	Associated key actions	Opportunities	Barriers	Barriers to identified vulnerable groups	Guidance ?
Plantation of broomgrass to stabilize soils and provide cover for	Identify and assess the forest status and identify locations for planting	Economically feasible options and technology Priority of the community Active community participation Utilization of local knowledge	Potential political instability Geographical difficulty Natural disaster (Flood, landslides) Financial resources lost from	Managing the time for participation (heavy work load) Discrimination and underestimation of capacity and skill	
	Plantation of new broom grass plants with local community				
	Ensure sustainable harvesting practices and access to plants				
	Regular monitoring of plants through social groups				



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## Identify project activities to support implementation of priority EbA options and key actions, taking into consideration required inputs, actors, responsibilities, opportunities and barriers

Once required inputs, actors and responsibilities, opportunities and barriers have been identified and entered in previous sub-steps, they will automatically appear vertically next to each prioritised EbA option and key actions. Review the information for each EbA option before you identify specific project activities.

Following your review, **identify and describe project activities** that can support the key actions required to implement each prioritised EbA option, taking into consideration opportunities and barriers (e.g. how can they be addressed?) as well as actors and resources required (how can they be supported?)

**Guidance** ?

Check the guidance tab for this step for a definition of “**project activities**.”



At the end of this step, **save the information** you have entered by clicking on “**Save**” and click on “**Summary**” in the right-hand corner to review, print or save the PDF summary report of the previously entered information in **Step 4 (Module B)**.

Identify project activities to support implementation of priority EbA options and key actions taking into consideration required inputs, actors, responsibilities, opportunities and barriers



Prioritised EbA Options	Associated key actions	Required inputs	Actors	Responsibilities	Opportunities	Barriers	Barriers to identified vulnerable groups	Project activities: which and how? and how to implement the project activities? (How can the actors be supported? How can the inputs be provided? How can the opportunities be utilised?)
Plantation of bromegrass to stabilise soils and provide source for fodder	Identify and assess the forest status and identify locations for planting	Information about the forest composition and species and best places to plant. Money for	Expert consultant Community forest group	Initiating the planting process, conducting the study to understand forest status and help with providing local	Economically feasible options and technology Priority of the community Active community participation Utilization of local knowledge	Potential political instability Geographical difficulty Natural disaster (flood, landslides) Financial resources lost from	Managing the time for participation (heavy work load) Discrimination and underestimation of capacity and skill	project activities project activities project activities project activities
	Plantation of new brom grass plants with local community	Equipment (spade, shovel) Financial resources for work and plants People for work	Nursery worker Plant Expert Human local labour	For providing plantation materials. Ensuring the plantation of proper species in proper place				
	Ensure sustainable harvesting practices and access to plants	Training of community to harvest sustainably Skills of community to harvest sustainably	Nursery worker Expert Local government bodies (VDCs and Range post)	Support training and skills workshops for sustainable harvesting practices Coordinate and ensure fair access to resources				
	Regular monitoring of plants through social groups	Skills and training on monitoring and education	Local government bodies (VDCs and Range post)	Regular monitoring and reporting back and share relevant information				
Water source protection and restoration (e.g. wetlands, irrigation ponds)	Identify and assess water sources for protection and restoration	Knowledge and skills of local area and context and assessment skills Money for consultant to undertake assessment	Expert consultant Community water users group Local government bodies (VDCs)	For conducting study, analysis and report writing Providing local information	Economically feasible options and technology Priority of the community Active community participation Utilization of local knowledge	Potential political instability Geographical difficulty Natural disaster (flood, landslides) Financial resources lost from	Managing the time for participation (heavy work load) Discrimination and underestimation of capacity and skill	- Hire national expert to hydrological study - Conduct Hydrogeology - Community and other consultation
	Put in place physical and social infrastructure	Stone, mud water Equipment (spade, shovel, tools)	Human skilled local labour Community water users	Physical infrastructure construction Excise, maintain				

## STEP 5: Identify key elements to monitor and evaluate EbA options

The current context of high uncertainties due to climatic and non-climatic factors requires that you put learning and monitoring and evaluation (M&E) at the centre of your project. Adaptive management is one way to reduce such uncertainty and increases the likelihood that adaptation outcomes will be achieved. Box 10 provides an overview of what adaptive management means, including a number of examples.

Step 5 of ALive focuses on identifying key elements to monitor and evaluate EbA options. You will use the adaptation outcomes and EbA options to identify both short- and long-term indicators. This is followed by identifying the baseline for your EbA options and data collection methods. Step 5 includes the following sub-steps:

- Identify long-term indicators to measure adaptation outcomes
- Identify short-term indicators to measure EbA options
- Describe the baseline situation for each adaptation outcome
- Data collection and methods – Monitoring
- Data collection and methods – Evaluation

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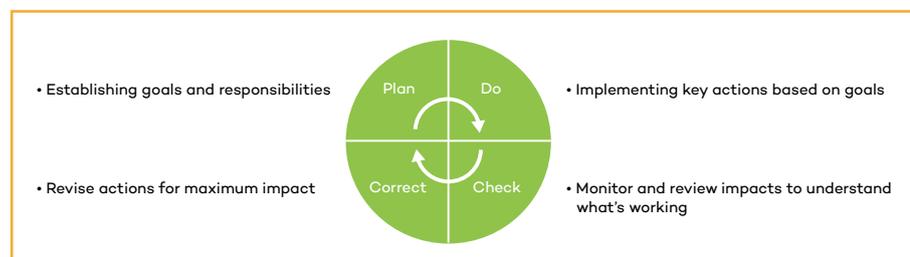
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### Box 10. Adaptive management

Uncertainties arise due to present and future climate variability as well as incomplete knowledge regarding how species, habitats, ecosystems, and people respond to these uncertainties. Adaptive management is one way to reduce such uncertainty and increase the likelihood that adaptation outcomes will be achieved. Adaptive management of natural ecosystems is an iterative process in which adaptation actions are followed by targeted long-term monitoring. It involves the understanding of current and future climate impacts, the design of actions to cope with them, followed by monitoring of climate-sensitive ecosystems, species and processes to evaluate the effectiveness of adaptation options, and the redesign and improvement of these options (ECAP, 2015). Therefore, long-term monitoring becomes critically important. Knowledge gained through these monitoring efforts can be applied to adapt and improve the performance of ongoing or future EbA-related activities. It also enhances the ever-important communication that is required among scientists, managers, and stakeholders.

#### Key elements of adaptive management:



Source: IISD, 2017

#### Adaptive management example:

*To ensure the reproduction of fish stocks and recovery of coral reefs, local authorities implemented a regular monitoring protocol that requires assessing and researching fish stocks, water quality, and reef health and analyzing the effects of climate change. Each year they consider the state of the fish stock and reef health to determine which recreational and fishing activities should be restricted. The adaptive management approach provides an explicit process for using and monitoring information directly to make management decisions about recreational and economic disturbance to ecosystems. (adapted from Reef Resilience Network)*



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Sustainable M&E can be supported by linking M&E activities such as data collection and review to activities occurring outside of your project itself. An example would be to engage local universities to lead data collection activities for monitoring change in ecosystem services. The data collected could continue to be collected and analysed after completion of the project, if ownership for M&E is vested in the university.

## Identify long-term indicators to measure adaptation outcomes

In the first sub-step, **identify long-term<sup>5</sup> indicators for each adaptation outcome** previously identified in Step 3. Indicators should aim to monitor and measure the two components of the adaptation outcome:

- (1) Desired state of ecosystem and its services -> You aim to measure how management, restoration, and conservation are affecting ecosystems and ecosystem services under climate change and variability-induced stress.
- (2) Increased adaptive capacity of people to manage the identified climate risks -> You aim to measure the ability of people to take advantage of opportunities or to cope with the consequences of potential damages associated with climate hazards, changes and uncertainty.



Check the guidance tab for this step for a definition of “**indicator**” and what to consider.

Make sure that you develop **SMART** indicators, which stands for: **S**pecific, **M**easurable, **A**ttainable, **R**elevant and **T**ime-bound.

You can enter as many long-term indicators per adaptation outcome as you wish. To add another long-term indicator for a specific adaptation outcome, click on the **+**.



At the end of this sub-step, save the information you have entered by clicking on “**Save.**”

### [USER MANUAL - STEP 5: IDENTIFY KEY ELEMENTS TO MONITOR AND EVALUATE..] Identify long-term indicators to measure adaptation outcomes



Adaptation outcome	Long-term indicators
Improved water availability for agricultural farming to address drying up of water sources due to changing rainfall patterns	Number of months of the year that water is available in water source Number of households with reduced water fetching time Number of farmers that have started using natural water for agricultural farming
Conservation and restoration of forest species increase community forest biodiversity and provide protection from landslides for forest-based	Improved status of biodiversity and availability of species in the community forest Damage from destruction of forest land and infrastructure from landslides (% of forest land damaged, houses damaged) during extreme events

<sup>5</sup> Long-term looks beyond the end of the project and focuses on a 5-10 year outcome.



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Before starting, identify whether you already use an M&E framework in which you could integrate these indicators. If you already use an M&E framework, review it first and consider designing new indicators, as some of the existing ones might already be useful.

## Identify short-term indicators to measure EbA options

In this sub-step, you will **identify short-term<sup>6</sup> indicators** to monitor the effectiveness and progress of the implementation of your **prioritised EbA options**. Short-term indicators should be linked to specific key actions that are required for the successful implementation of EbA options.

For comparison, short-term indicators should show that a particular action is completed, while long-term indicators show that actions have resulted in changed outcomes.

Displayed on the left-hand side are the adaptation outcomes and long-term indicators identified in the previous sub-step. Next to it, you will see the associated prioritised EbA options with the text box to identify short-term indicators. You may enter as many short-term indicators per EbA option as you wish. To add another short-term indicator for a specific EbA option, click on the **+**.

Again, make sure that you develop **SMART** indicators.

**!** At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

### Identify short-term indicators to measure EbA options



Adaptation outcome	Long-term indicators	Prioritized EbA Options	Short-term indicators <small>Identify short-term indicators for each EbA option.</small>
Improved water availability for agricultural farming to address drying up of water sources due to changing rainfall patterns	Number of months of the year that water is available in water source  Number of households with reduced water fetching time  Number of farmers that have started using natural water for agricultural farming	Water source protection and restoration (e.g wetlands, irrigation ponds)	Number of water sources protected or improved (+)  Quality of vegetation around the source (-)  Number of groups actively engaged in water source protection (-)
Conservation and restoration of forest species increase community forest biodiversity and provide protection from landslides for forest-based	Improved status of biodiversity and availability of species in the community forest  Damage from destruction of forest land and infrastructure from landslides (% of forest land damaged, houses damaged) during extreme events	Plantation of broomgrass to stabilize soils and provide source for fodder	Number of plants planted and established around the forest (+)  Number of farmers with improved reliable access to fodder for livestock (-)

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<sup>6</sup> Short-term refers to the implementation of project outputs, including, but not limited to, increased capacity and access, awareness and built physical structures. Short-term focuses on 1- to 3-year timespan.



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## Describe the baseline situation for each adaptation outcome

Now that you have developed your set of indicators, it is helpful to understand the baseline against which the progress of your adaptation outcomes and EbA options can be gauged. Adaptation baseline data provides a record of the study area’s current condition in relation to vulnerability and risk. Review the set of indicators you identified to create a baseline that can be used to record the study area’s current conditions.

Describe the **baseline situation** for each adaptation outcome and for each prioritised EbA option. A baseline is a description of the initial condition/situation before an intervention takes place. It provides a critical reference point for comparing the situation and assessing changes before and after an intervention.

Keep in mind that the more information that is gathered at this stage, the better equipped your team will be to communicate the successes of your EbA options.

At the end of this sub-step, save the information you have entered by clicking on **“Save.”**

### Describe the baseline situation for each adaptation outcome



Adaptation outcome	Baseline (Adaptation outcome) <small>Describe the baseline situation if available.</small>	Prioritized EbA Options	Baseline (EbA Options) <small>Describe the baseline situation if available.</small>
Improved water availability for agricultural farming to address drying up of water sources due to changing rainfall patterns	Combined yield of 52 water sources toward the end of the monsoon (September) was 9.4 L/s.	Water source protection and restoration (e.g wetlands, irrigation ponds)	Out of the 52 identified water sources currently in place, 37 are in good condition and 15 are declining
Conservation and restoration of forest species increase community forest biodiversity and provide protection from landslides for forest-based	No baseline available	Plantation of broomgrass to stabilize soils and provide source for fodder	No broomgrass plants planted

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## Data collection and methods – Monitoring

Previously, you identified short-term indicators to monitor the progress and implementation of your prioritised EbA options. In this sub-step, you will identify how you will collect the data, what methods to use, when the information will be collected and where.

On the horizontal axis, you will see your prioritised EbA options and the associated short-term indicators. For **each short-term indicator**, identify the following:

- How will the information be collected?
- Who will collect the information?
- When will the information be collected and at what time interval?
- Where will the information be collected?

Monitoring of the prioritised EbA options is essential and should be undertaken either biannually or annually to track project activities.

 At the end of this sub-step, save the information you have entered by clicking on “Save.”

### Data collection and methods - Monitoring



Prioritized EbA Options	Short-term indicators	Method? <i>How will the information be collected?</i>	Who? <i>Who will collect the information?</i>	When? <i>When will information be collected and at what time intervals?</i>	Where? <i>Where will the information be collected?</i>	Guidance ⓘ
Water source protection and restoration (e.g., wetlands, irrigation ponds)	Number of water source protected or improved	Survey local villagers/farmers	local organization (IUCN)	yearly	project/intervention site	
	Quality of vegetation around the source	Engage expert consultant to assess quality of vegetation/ survey water user groups	local organization (IUCN)	yearly	project/intervention site	
	Number of groups actively engaged in water source protection	Survey water user groups, local villagers/farmers	local organization (IUCN)	yearly	project/intervention site	
Plantation of broomgrass to stabilize soils and provide source for fodder	Number of plants planted and established around the forest	Survey community forest committee, local villagers/farmers	local organization (IUCN) / community forest committee	yearly	project/intervention site	
	Number of farmers with	Survey community forest	local organization	yearly	project/intervention site	



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**TIP**

Local stakeholders are best placed to recognise the gradual signals of change in ecosystems and their service delivery. Consequently, qualitative data can be collected via discussions with local stakeholders, which is a critical supplement to quantitative data collection activities.

## Data collection and methods – evaluation

The contribution of EbA options to adaptation outcomes, such as improved resilience of ecosystems and reduced vulnerability of communities may not be readily apparent for several years. Therefore, many EbA projects measure the implementation of project activities, but do not assess the actual adaptation outcomes that EbA can deliver.

For this reason, long-term monitoring of adaptation outcomes should be considered during project design. Tracking the adaptation outcomes will help evaluate progress, boost confidence and investment in EbA options and support long-term adaptive management.

You already identified **long-term indicators** to assess whether the stated outcomes are being achieved. This sub-step will help you identify how you will collect the data, what methods to use, when the information will be collected and where.

On the horizontal axis, you will see your adaptation outcomes and the associated long-term indicators. For **each long-term indicator**, identify the following:

- How will the information be collected?
- Who will collect the information?
- When will the information be collected and at what time interval?
- Where will the information be collected?

Monitoring and evaluation of long-term adaptation outcome indicators should happen at the mid-point and end of the project—and ideally beyond.

At the end of this sub-step, **save the information** you have entered by clicking on “**Save**” and click on “**Summary**” in the right-hand corner to review, print or save the PDF summary report of the previously entered information in **Step 5**.

### Data collection and methods - Evaluation



Adaptation outcome	Long-term Indicators	Method? <i>How will the information be collected?</i>	Who? <i>Who will collect the information?</i>	When? <i>When will information be collected and at what time intervals?</i>	Where? <i>Where will the information be collected?</i>	Guidance
Improved water availability for agricultural farming to address drying up of water source due to changing	Number of months of the year that water is available in the water source	survey local famers/ villagers	local organization (IUCN) with village committee (VDC)	end of project	project/ intervention site	
	Number of households with reduced water fetching time	survey local famers/ villagers; specifically women	local organization (IUCN) with village committee (VDC)	end of project	project/ intervention site	
	Number of farmers that have started using natural water for agricultural farming	survey local famers/ villagers	local organization (IUCN)	end of project	project/ intervention site	
Conservation and restoration of forest species increase community forest	Improved status of biodiversity and availability of species in the community forest	Engage local consultant/ expert to assess status of community forest; survey local community forest committee	local organization (IUCN)	end of project	project/ intervention site	
	Damage from destruction of forest land and	survey local famers/ villagers / local	local organization (IUCN)	end of project	project/ intervention site	



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## Next steps

The outputs of ALivE provide you with an operational plan that will help guide the implementation of your EbA options. Next steps following the analysis involve a time-bound work plan that clearly identifies timelines for your project activities, who is responsible for which project activities, and regular monitoring of progress and implementation.

It is important for your team to review and assess whether your EbA options are progressing as desired or if any adjustments are necessary to help increase effectiveness. Apart from implementing your EbA options, another important task is closing any knowledge gaps that may have appeared during the planning phase.

The final report and anticipated work plan should also be shared with stakeholders or other actors working in the study area, including local authorities, NGOs and the community itself. You could also hold a workshop or meeting to present the results to community representatives and local actors.

To increase the sustainability and scale of EbA, it should be integrated into policies and planning processes. Phase 3 will provide tailored guidance on identifying entry points and communicating for policy influence.



## PHASE 3 – Integrating EbA into policies and planning

In order for the results of ecosystem-based approaches to climate change adaptation to be scaled up and sustained over time, it is critical that an enabling environment is created by integrating EbA into relevant policies and planning processes. This section explains the rationale for this, and provides guidance on identifying entry points and communicating for policy influence.

### Why integrate EbA into policies and plans?

There are a number of reasons why EbA practitioners should seek to influence policies and plans to incorporate EbA approaches. Key among these are:

- **Raising awareness:** Engaging decision makers in dialogue on EbA raises their awareness of the potential of EbA as one of a suite of available adaptation approaches.
- **Achieving scale:** While specific EbA options are typically implemented at the local level, for broader impact EbA must be applied at scale, within and across ecosystems and political boundaries. Integration into policies and plans can facilitate this.
- **Institutionalisation:** Projects have limited lifetimes, so it is imperative that EbA approaches be institutionalised by governmental and non-governmental actors, to ensure that results are sustained over time, and that the learning informs future policy and implementation.
- **Finance:** Adaptation finance, as well as other resources oriented toward conservation and development objectives, is typically allocated on the basis of national or subnational government plans. Integration of EbA in such plans will help ensure that resources are available for implementation and maintenance of EbA options over the longer term.
- **Improving environmental sustainability:** By including EbA approaches as part of the range of options available for adaptation, we can help to ensure that adaptation efforts do not cause negative impacts on ecosystems.
- **Longer-term monitoring:** As noted above, the impact of EbA options will likely only be seen over the longer term, often beyond the lifetime of projects that have initiated their implementation. Integrating EbA into policies can help to ensure ongoing monitoring and adaptive management over the longer term.

### Identifying entry points

The first step in integrating EbA in policies and plans is to identify the best entry points. The Overseas Development Institute (ODI) has developed an excellent [guide](#) on policy engagement and influence, which identifies key issues to explore to understand the policy and institutional context in a particular country (Young et al., 2014, p. 20):

- Identifying the branch or level of government that has the power to make the desired policy change.
- Understanding where and how political debates occur.
- Recognising the role of informal politics.



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- Analysing existing opportunities or capacity limitations that may influence if and how change occurs.
- Identifying external forces that may have an influence on the change process.

These issues are critical to identifying appropriate entry points for policy influence. In the case of EbA, specific questions to consider would include:

- Which ministry/department of government is responsible for climate change adaptation at the national level? Which institution is responsible for ecosystem management and conservation? Do they collaborate on planning and policy development?
- What subnational planning processes present opportunities for integrating EbA?
- Who are the key non-governmental players in ecosystem management and conservation? In climate change adaptation?
- Where does knowledge and capacity on EbA sit (both within government and outside)? Where are the gaps?
- Are there existing networks or working groups that bring together relevant actors where opportunities and barriers to EbA integration could be discussed?
- Are there other priorities that may take away from integration of EbA?

**Box 11. National Adaptation Plan (NAP) processes: A key opportunity for integrating EbA**

Over the last few years, countries around the world have been engaged in National Adaptation Plan (NAP) processes, responding to the mandate established by the UNFCCC. The NAP process aims to i) reduce vulnerability to climate change by building resilience and adaptive capacity, and ii) facilitate integration of climate change adaptation in policies and plans (UNFCCC, 2011). As a key mechanism for advancing adaptation action in developing countries, NAP processes present a strategic opportunity to raise the profile of EbA approaches, providing a framework and, potentially, financial resources for implementation at scale.

Conservation International, IUCN and CEM have developed a [pilot tool](#) for integrating ecosystems in climate change adaptation planning. The tool identifies four strategic objectives that may guide integration of ecosystem-based approaches in the NAP process (Conservation International, IUCN & CEM, 2015):

- Ensuring that ecosystem impacts of adaptation options are considered, aligning with national or local regulations and/or funder safeguard policies.
- Integrating adaptation into conservation planning, to ensure that conservation approaches take climate risks and changes into account.
- Exploring opportunities to use ecosystem services to reduce human vulnerability to climate change.
- Identifying adaptation options to protect ecosystem services from the impacts of climate change.

While these are not mutually exclusive objectives, they provide a basis for considering how to engage with the NAP process, depending on the particular process of the country and how the issues are framed.



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## Developing a strategy for policy influence

The specific process for integrating EbA approaches will depend on the context—the policy engagement strategy must be tailored to the particularities of the policy environment and actors in the country. However, regardless of the context, there are a few key steps you will need to take to develop an effective strategy for policy influence (ODI, 2014; WHO, 2006):

**Clearly define targets:** Identify the decision makers who have the power to make the policy changes you want to see. These are most often government actors within your country, but they may also include donors, NGOs, private sector actors or community leaders. You may also need to consider those actors who may work against the changes, in order to include them in the strategy.

**Identify the desired changes:** Define the changes you want to see in concrete terms. These may include adjustments to specific policies, as well as changes in the way that such policies are funded and implemented, how different institutions work together or how decisions related to the relevant policies are made. Be as specific as possible in order to develop a focused strategy.

**Identify allies:** Effective advocacy often involves working in partnership with others. Seek out networks, organisations or individuals who share your interests to explore possibilities for working together toward the desired policy changes.

**Develop key messages:** Clarify how you will communicate the desired changes to targeted decision makers by crafting your key messages. Your primary message should be a clear, compelling and convincing statement that can be communicated in a concise manner through different channels. This primary message can be reinforced by supportive secondary messages. You may need different versions of the key messages for different audiences, taking into account their priorities and motivations. The World Health Organization (WHO) has developed a useful advocacy [guide](#) that provides tips on developing key messages (pp. 24–26).

**Develop the evidence:** Identify facts, statistics and stories that back up your key messages, balancing numbers with concrete examples that demonstrate the potential benefits of the desired policy changes. Ensure that monitoring systems for EbA initiatives generate data that feeds into policy influence.

**Use a mix of engagement strategies:** To reach target decision makers with your key messages, employ a range of different strategies, which may include direct engagement through meetings and events; using websites, email and social media; petitions and letter writing campaigns; and working with the media.



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## ANNEX A: Template for compiling information from PHASE 1

ALivE Step	Key questions	Notes
<b>Step 1: Understand the context</b>	<b>Livelihood strategies and associated activities</b>	
	What are the key livelihood strategies pursued in the study area? What are the activities associated with these strategies?	
	<b>Natural resources needed for livelihood activities</b>	
	What are the natural resources that are needed for the different livelihood activities?	
	<b>Major ecosystems in the study area</b>	
	What are the major ecosystems in the study area? Describe them: approximate size, important animals and plants, location in relation to communities, etc. Why is the ecosystem important? Who are the main users?	
<b>Step 2: Analyse risks to ecosystems and livelihoods</b>	<b>Trends in ecosystem functionality</b>	
	What is the trend in functionality for each of the major ecosystems? Describe it as improving/stable/declining. Why is this?	
	<b>Description of climate in the study area</b>	
	Describe the seasons in the study area, including high and low temperatures, average precipitation and extreme events experienced	
	<b>Observed trends in rainfall, temperature and climate hazards</b>	
	Describe the observed trends in rainfall, temperature and climate hazards, drawing on both scientific data and community observations.	
	<b>Projected trends in rainfall, temperature and climate hazards</b>	
	Describe the projected trends in rainfall, temperature and climate hazards.	
	<b>Non-climatic stressors affecting ecosystems</b>	
	What are the non-climatic stressors that affect ecosystems?	
<b>Impacts of climate change and other stressors on ecosystems and implications for livelihoods</b>		
How do the observed and projected trends in rainfall, temperature and climate hazards affect ecosystems? How do non-climatic stressors affect ecosystems? What do these effects mean for livelihoods?		
<b>Social groups that are particularly vulnerable to climate impacts</b>		
Which social groups are particularly vulnerable to the impacts? Why?		



ALive Step	Key questions		Notes
<b>Step 3: Identify and prioritise EbA options</b>	<b>Adaptation priorities identified in existing plans/policies</b>		
	What plans or policies have already been developed for adaptation?		
	Consider local adaptation plans, as well as any sectoral or national-level plans or policies that identify priorities that are relevant for the study area.		
	<b>Adaptation options identified by communities</b>		
	What adaptation options were identified by communities through the participatory research?		



## ANNEX B: Participatory research tools for information gathering in EbA planning

Participatory Tool	Description	Facilitation Guidance	Specific Issues for EbA Planning
Community resource mapping	Community resource mapping engages community members in identifying important resources such as infrastructure and ecosystem that are found within or near the community. It provides insights into livelihood activities and how resources are used.	Participatory Tools for Micro-Level Poverty and Social Impact Analysis: <a href="#">Community Resource Mapping</a>	Encourage community members to provide detailed information on ecosystems and the services they provide.
Seasonal calendar	The seasonal calendar provides an overview of activities throughout the year and how they align with the seasons. In addition to eliciting useful information on livelihood activities, it provides a basis for discussing changes in seasonal patterns.	<a href="#">CVCA Handbook</a> : Field Guide 3, pages 35–36	Try to draw out enough detail about the livelihood activities to use as a basis for discussions to follow. Also ensure that gender differences in activities are captured (e.g. by conducting a seasonal calendar exercise with women and men separately).
Well-being and livelihoods discussion	This focus group discussion identifies different characteristics of well-being from the perspective of community members. By breaking the community down into groups with differing levels of well-being, it can help to identify particularly vulnerable people or groups.	<a href="#">Participatory Data Collection for Ecosystem Services Research – A Practitioner’s Manual</a> : pages 35–38	During the discussion, ask what the differences between the well-being groups mean for their ability to manage climate risks.
Household system diagram	This exercise explores the linkages between local livelihoods and ecosystems.	<a href="#">Participatory Data Collection for Ecosystem Services Research – A Practitioner’s Manual</a> : page 43	Use the seasonal calendar as a prompt for identifying livelihood activities. Focus the discussion on how ecosystems contribute to well-being and livelihoods, as well as any changes in the supply or quality of ecosystem services.
Hazard map	The hazard map uses the community resource map as a basis and identifies areas that are exposed to hazards.	<a href="#">CVCA Handbook</a> : Field Guide 2, pages 33–34	During the discussion, note any areas where ecosystems are providing a buffer from hazards, or where environmental degradation is exacerbating risks.
Historical timeline	The historical timeline identifies important events in the history of the community and provides a basis for discussing trends in relation to climate hazards.	<a href="#">CVCA Handbook</a> : Field Guide 4, pages 37–38	Prompt participants to identify any changes in land use that may have implications for ecosystems.
Ecosystem service trend analysis	This tool identifies trends in the supply of ecosystem services over time, and includes a step to project how this will change in the future. This provides an opportunity to discuss the potential impacts of projected climate changes on the supply of ecosystem services.	<a href="#">Participatory Data Collection for Ecosystem Services Research – A Practitioner’s Manual</a> : pages 90–93	Use the ecosystem services identified in the household system diagram as a basis and focus on the trend analysis (Step 11, page 91). For the future projection, ensure that participants are taking projected climate changes into account. During the discussion, focus on responses/adaptations to identified trends.
Vulnerability matrix	The vulnerability matrix assesses the impact of hazards on resources that are important for livelihoods. It helps to identify both the hazards that have the most impact on livelihoods and the resources that are most sensitive to hazards.	<a href="#">CVCA Handbook</a> : Field Guide 5, pages 39–40	If possible, focus the analysis specifically on those livelihood resources that rely on ecosystems, using the household system diagram as a basis.
Discussion on vulnerable social groups	This discussion looks at the results of the previous exercises with the lens of identifying social groups that are particularly vulnerable to climate hazards and changes.	Annex C	Consider access to and control over resources dependent on ecosystems as one aspect of vulnerability. Gender may be a key factor here.
Discussion on adaptation options	This is a brainstorming exercise to get community input on options for adapting to the risks and changes they are facing.	Annex D	As much as possible, try to focus the discussion on EbA options, emphasising the importance of ecosystem resilience for human adaptation.
Validation workshop	The validation workshop is held when you complete Step 3 of the ALivE, to share the findings with stakeholders and gather their feedback.	Annex E	Ensure an open, inclusive discussion to build ownership of proposed EbA options.

Sources: Dazé, Ambrose, & Ehrhart, 2009; Schrekenberg et al., 2016; World Bank, 2016.



## ANNEX C: Facilitation guide for discussion on vulnerable social groups

<b>Purpose</b>	To identify particularly vulnerable social groups within the community
<b>Timing</b>	Approximately 1 hour
<b>Facilitation</b>	If time permits, this discussion could be facilitated separately for different groups (women/ men, different livelihood groups, different wealth groups) and the results compared and compiled across the groups. If time is limited, hold the discussion with a mixed group, with representatives of different members of the community.
<b>Materials</b>	Flipchart or other large paper Markers Results from resource and hazard mapping, vulnerability matrix and well-being and livelihoods discussion
<b>Instructions</b>	
<b>1</b>	Start by asking the participants to identify the different social groups that exist within the community. Encourage them to consider characteristics such as gender, age, ethnicity, wealth and livelihoods. List the groups on a large piece of paper, using symbols to identify them for participants with low literacy.
<b>2</b>	Refer back to the important resources that were analysed during the resource mapping and vulnerability matrix exercises. Ask which of the social groups have control over these resources. If there are groups that face barriers in access to the resources, put a check mark beside them. Ask why and document this in your notes.
<b>3</b>	Refer back to the high-impact risks identified during the vulnerability matrix. Ask the participants to identify any social groups that are particularly affected, and place a check mark next to these groups. Ask why and document this in your notes.
<b>4</b>	Show the group the hazard map and ask if there are any areas that are affected by hazards where particularly vulnerable groups tend to live. Put a checkmark next to these groups. Note down the areas and which groups are living there.
<b>5</b>	Looking at the table developed through the well-being and livelihoods discussion, ask if the groups with lower well-being characteristics are also particularly vulnerable to climate risks and changes. If so, put a checkmark next to these groups. Ask why and document this in your notes.
<b>6</b>	Ask if there are any other issues that make certain social groups more vulnerable to climate risks and changes than others. Put a checkmark next to these groups and note why.
<b>7</b>	Conclude the discussion by identifying the social groups with the most checkmarks and ask the participants if they feel the results represent the particularly vulnerable groups within the community.
<b>Purpose</b>	To identify adaptation options to address identified climate risks and changes



## ANNEX D: Facilitation guide for discussion on adaptation options

<b>Timing</b>	Approximately 1.5 hours
<b>Facilitation</b>	Ideally, this discussion should also be separately facilitated with different groups (women/men, different livelihood groups, different wealth groups) and the results compared and compiled across the groups. If time is limited, hold the discussion with a mixed group, trying to ensure that it represents different members of the community.
<b>Materials</b>	Flipchart or other large paper Markers Results from resource and hazard mapping, vulnerability matrix and well-being and livelihoods discussion
<b>Instructions</b>	
<b>1</b>	Review the key climate risks and changes identified through the seasonal calendar, hazard map, historical timeline and vulnerability matrix exercises. Agree on two or three that the participants will focus on in this discussion (generally these should be the ones ranked as having the highest impact in the vulnerability matrix).
<b>2</b>	Select one of the risks/changes and ask the participants what they are currently doing to manage this risk/change <i>that is working well</i> . List these strategies in your notes.
<b>3</b>	Ask them how these strategies could be improved, so that they are more effective in reducing the impacts of climate risks and changes. Note these adjustments down alongside the relevant strategies. Ask how these strategies could be made more sustainable in terms of their impact on ecosystems. Note these adjustments down alongside the relevant strategies.
<b>4</b>	Ask if there are different things they would like to do to manage these risks and changes. Note these down as potential new strategies.
<b>5</b>	Ask if they think these new strategies would have a positive or negative impact on ecosystems. Focus the following question on those that will have a positive effect.
<b>6</b>	Ask what they would need to adopt these alternative strategies, in terms of resources, knowledge, etc.
<b>7</b>	Repeat for the other risks/changes.
<b>Purpose</b>	To validate the findings of your analysis and prioritised EbA options



## ANNEX E: Facilitation guide to validate your findings and inform project activities

<b>Timing</b>	Approximately 1 day
<b>Facilitation</b>	The validation workshop should be facilitated with a mixed group, trying to ensure that it represents different members of the community and stakeholders of the study area.
<b>Materials</b>	ALivE summary reports Flipchart or other large paper Markers Note paper Definitions of key terms
<b>Instructions</b>	
<b>1</b>	Introduce yourself, explain the purpose of the workshop with clear expectations for the day, then ask participants to introduce themselves. Explain what your project team has been doing and what type of information you gathered and analysed.
<b>2</b>	Start by reviewing the first adaptation outcome that has been formulated and present the list of EbA options that have been prioritised based on the adaptation outcome. Explain the multi-criteria analysis your team has applied to prioritise the most effective and feasible EbA options for this adaptation outcome. Verify that the participants are in agreement with the adaptation outcome and associated EbA options.
<b>3</b>	Discuss the technical aspects of the EbA options and identify required inputs that are needed by communities and local institutions to implement the EbA options.
<b>4</b>	For each EbA option, ask participants to brainstorm key actors that should be engaged in the implementation of EbA options based on their knowledge, influence, resources or skills. You can use a stakeholder analysis exercise (WWF Programme Standards: <a href="#">Stakeholder Analysis</a> ) to identify the key actors for implementation of EbA options.
<b>5</b>	Lead a discussion around any opportunities and barriers that influence and facilitate the implementation of EbA options (e.g. political will, local support, financial resources in place). Explain what you mean by opportunities and barriers and provide relevant examples.
<b>6</b>	Following a discussion, you may ask participants to record different opportunities and barriers on Post-It notes and stick them next to the prioritised EbA options.
<b>7</b>	Repeat the process for each adaptation outcome and its associated EbA options.
<b>8</b>	Conclude the workshop by thanking the participants and review together what was verified and learned during the workshop. Explain what the next steps are for the project.



## ANNEX F: Indicative list of potential EbA options

Ecosystem	EbA option	Description
<b>Coastal ecosystem</b>	Mangrove reforestation and coastal habitat conservation	These measures buffer against extreme events such as cyclones, flooding and storm surges by protecting the coast from erosion. They also provide opportunities for carbon sequestration, habitats for species, and provision of raw materials.
	Beach nourishment	Addition of sediment to a beach area to maintain beach width can provide storm protection. It is used in response to shoreline erosion and may also prevent flooding.
	Artificial sand dunes and rehabilitation	Restoration of natural or artificial sand dunes to increase function and provide greatest coastal protection benefits. Both methods aim to reduce coastal erosion and flooding in nearby lowlands.
	Revegetation	Used in the coastal zones to prevent/reduce erosion, improve river bank ecosystem structure/function and to improve water quality.
	Wetland restoration	Often aims to reduce coastal flooding and erosion. It can also provide new habitats, water sources and other environmental benefits.
	Coastal setbacks/buffers	A pre-determined distance from a coastal feature within which all or certain types of development are prohibited, used to adapt to coastal erosion or flooding.
	Coral reef rehabilitation and restoration	Aims to assist the recovery of a coral reef ecosystem that has been degraded, damaged or destroyed through partially or fully replacing structural or functional characteristics of a reef system.
	Marine protected areas	Designated areas where restrictions apply in order to conserve marine biodiversity, maintain ecological processes, and provide space for ecologically sustainable use and public appreciation and/or education.
	Fisheries management plans	Management of a renewable resource in order to balance current consumption with future production capacity, emphasising reduction in by-catch and destructive fishing practices.
<b>Forest</b>	Forest management using a diversity of adapted tree species	This kind of management may include community-based forest management, providing climate regulation and extreme weather events buffering. Other benefits include maintenance of genetic diversity, recreation, provision of medicinal resources, food, water and raw material provision, and habitat.
<b>Agroecosystems</b>	Soil and water conservation (SWC) technologies	These measures include grass strips on contour, hedges, mulching, filter and diversion dams and plant windbreaks to prevent erosion. Other benefits include water, food and raw material provision, as well as maintenance of genetic diversity.
	Conservation tillage	A number of strategies and techniques for establishing crops in a previous crop's residues, which are purposely left on the surface. This strategy slows water movement and reduces erosion.
	Integrated nutrient management	Integrates the use of natural and man-made soil nutrients to increase crop productivity and preserve soil productivity.
	Crop diversification	Introduction of new cultivated species and varieties to improve plant productivity, health and nutritional value.
	Ecological pest management	An approach that increases the strengths of natural systems to reinforce the natural processes of pest regulation and improves agricultural production.
	Agro-forestry	Integrated approach, which produces trees and non-tree crops or animals on the same piece of land to increase resilience of agricultural production to climate change.
<b>Water ecosystems</b>	Vegetative erosion control for river banks	Use of bamboo fences or gabions along with strips of grass, bushes and trees to provide a buffer against erosion and extreme weather events. These methods also provide habitats for species and provision of fresh water.
	Rainwater collection from ground surfaces—small reservoirs and micro-catchments	Use of micro-catchments to collect rainfall from ground surfaces to divert or slow runoff so it can be stored for use. This strategy can also collect water from a river or storm and be used to improve soil moisture for agriculture.
<b>Mountain</b>	Alpine ecosystem restoration	These measures may include sustainable management of grasslands to prevent erosion and habitat loss. These methods may also provide food, water and medicinal resources, supporting agricultural productivity and economic diversification.

Source: Table adapted from Travers, et al., 2012; GLZ, n.d. List of Ecosystem Services



## ANNEX G: List of major ecosystem services

Service	Sub-category	Definition	Examples
<b>Provisioning services—The goods and products obtained from ecosystems</b>			
<b>Food</b>	Crops	Cultivated plants or agricultural produce harvested by people for human or animal consumption	<ul style="list-style-type: none"> <li>• Grains</li> <li>• Vegetable</li> <li>• Fruits</li> </ul>
	Livestock	Animals raised for domestic or commercial consumption or use	<ul style="list-style-type: none"> <li>• Chicken</li> <li>• Pigs</li> <li>• Cattle</li> </ul>
	Capture fisheries	Wild fish captured through trawling (net) and other non-farming methods	<ul style="list-style-type: none"> <li>• Cod</li> <li>• Crabs</li> <li>• Tuna</li> </ul>
	Aquaculture	Fish, shellfish, and/or plants that are bred and reared in ponds, enclosures, and other forms of freshwater or saltwater confinement for purposes of harvesting	<ul style="list-style-type: none"> <li>• Clams</li> <li>• Oysters</li> <li>• Salmon</li> </ul>
	Wild foods	Edible plant and animal species gathered or captured in the wild	<ul style="list-style-type: none"> <li>• Fruits and nuts</li> <li>• Fungi</li> <li>• Bush meat</li> <li>• Insects</li> </ul>
<b>Fibre</b>	Biological raw materials from timber and wood fibres	Products made from trees harvested from natural forest ecosystems, plantations or non-forested lands	<ul style="list-style-type: none"> <li>• Industrial round wood</li> <li>• Wood pulp</li> <li>• Paper</li> <li>• Construction materials</li> </ul>
	Other fibres (e.g. cotton, hemp, silk)	Non-wood and non-fuel based fibres extracted from the natural environment for a variety of uses	<ul style="list-style-type: none"> <li>• Textiles (clothing, linen, accessories)</li> <li>• Cordage (twine, rope)</li> <li>• Natural rubber</li> </ul>
	Animal skins	Processed skins of cattle, deer, pig, snakes, stingrays or other animals	<ul style="list-style-type: none"> <li>• Leather</li> <li>• Rawhide</li> <li>• Cordwain</li> </ul>
	Sand resources	Sand formed from coral and shells	<ul style="list-style-type: none"> <li>• White sand from coral and white shells</li> <li>• Coloured sand from shells</li> </ul>
	Ornamental resources	Products derived from ecosystems that serve aesthetic purposes	<ul style="list-style-type: none"> <li>• Tagua nut</li> <li>• Wild flowers</li> <li>• Coral jewellery</li> </ul>
<b>Biomass fuel</b>		Biological material derived from living or recently living organisms—both plant and animal—that serves as a source of energy	<ul style="list-style-type: none"> <li>• Fuelwood</li> <li>• Charcoal</li> <li>• Grain for ethanol production</li> <li>• Dung</li> </ul>
<b>Freshwater</b>		Inland bodies of water, groundwater, rainwater, and surface waters for household, industrial and agricultural uses	<ul style="list-style-type: none"> <li>• Fresh water for drinking, cleaning, cooling, industrial processes, electricity generation or mode of transportation</li> </ul>
<b>Genetic resources</b>		Genes and genetic information used for animal breeding, plant improvement and biotechnology	<ul style="list-style-type: none"> <li>• Genes used to increase crop resistance to disease</li> </ul>
<b>Biochemical, natural medicines, and pharmaceuticals</b>		Medicines, biocides, food additives, and other biological materials derived from ecosystems for commercial or domestic use	<ul style="list-style-type: none"> <li>• Echinacea, ginseng, garlic</li> <li>• Paclitaxel as basis for cancer drugs</li> <li>• Tree extracts used for pest control</li> </ul>



Service	Sub-category	Definition	Examples
<b>Regulating services—The benefits obtained from an ecosystem's control of natural processes</b>			
<b>Regulation of air quality</b>		Influence ecosystems have on air quality by emitting chemicals to the atmosphere (i.e., serving as a "source") or extracting chemicals from the atmosphere (i.e., serving as a "sink")	<ul style="list-style-type: none"> <li>Lakes serve as a sink for industrial emissions of sulphur compounds.</li> <li>Trees, forests and other plants play an important role in regulating air quality by removing pollutants from the air.</li> </ul>
<b>Climate regulation</b>	Global	Influence ecosystems have on the global climate by emitting greenhouse gases or aerosols to the atmosphere or by absorbing greenhouse gases or aerosols from the atmosphere	<ul style="list-style-type: none"> <li>Forests capture and store carbon dioxide.</li> <li>Marine organisms act as a carbon sink in the ocean and facilitate carbon burial in seabed sediments; the ocean also regulates temperatures.</li> <li>Forests and trees can reflect or trap solar radiation (warming or cooling effect).</li> <li>Peatlands provide important long-term carbon storage.<sup>7</sup></li> </ul>
	Regional and local	Influence ecosystems have on local or regional temperature, precipitation and other climatic factors	<ul style="list-style-type: none"> <li>Forests and mountains can impact regional rainfall levels.</li> <li>Forests and trees provide shade from heat and UV light and shelter from wind and precipitation.</li> <li>Wetlands and floodplains provide extensive carbon sequestration; also affect regional climate (cooling effect, reduced evaporation, modifies cloud cover).</li> <li>Marine ecosystems and coastal margins regulate weather patterns through uptake of atmospheric carbon dioxide.<sup>5</sup></li> </ul>
<b>Erosion control</b>		Role vegetative cover plays in soil retention	<ul style="list-style-type: none"> <li>Vegetation such as grass and trees prevents soil loss and siltation (sediment pollution) of water ways due to wind and rain.</li> <li>Forests on slopes hold soil in place thereby preventing landslides.</li> </ul>
<b>Water purification and waste treatment</b>		Role ecosystems play in the filtration and decomposition of organic wastes and pollutants in water; assimilation and detoxification of compounds through soil and subsoil processes	<ul style="list-style-type: none"> <li>Wetlands remove harmful pollutants from water by trapping metals and organic materials.</li> <li>Soil microbes degrade organic waste rendering it less harmful.</li> </ul>
<b>Regulation of diseases</b>		Influence ecosystems have on the incidence and abundance of human pathogens	<ul style="list-style-type: none"> <li>Some intact forests reduce occurrence of standing water, a breeding area for mosquitoes, which can reduce the prevalence of malaria</li> <li>Biodiversity of small mammals reduce people's risk of contracting Lyme disease (ticks that transmit Lyme disease acquire the pathogen from the white-footed mouse); e.g. ecosystem services like forest fragments of more than 2 hectares in area harbouring small mammal species can reduce the number of ticks feeding on mice, reducing transmission to humans.<sup>6</sup></li> </ul>
<b>Regulation of pests</b>		Influence ecosystems have on the prevalence of crop and livestock pests and diseases	<ul style="list-style-type: none"> <li>Predators from nearby forest, such as bats, toads, snakes, consume crop pests.</li> <li>Conserving the genetic diversity of crops will protect and enhance natural pest control services providing economic and food production benefits.</li> <li>Landscapes with abundant field margins and perennial crops are associated with low pest establishment.<sup>5</sup></li> <li>Aphids are agricultural insect pests that can cause significant damage to crops; natural enemies, such as parasitoids and pathogens, are key regulators of aphids.<sup>5</sup></li> </ul>
<b>Pollination</b>		Role ecosystems play in transferring pollen from male to female flower parts, without which many plants cannot reproduce	<ul style="list-style-type: none"> <li>Bees from nearby forests pollinate crops.</li> </ul>



Service	Sub-category	Definition	Examples
<b>Regulation of natural hazards</b>		Capacity for ecosystems to reduce the damage caused by natural disasters such as hurricanes and tsunamis and to maintain natural fire frequency and intensity	<ul style="list-style-type: none"> <li>• Mangrove forests and coral reefs protect coastlines from storm surges</li> <li>• Biological decomposition processes reduce potential fuel for wildfire</li> </ul>
<b>Cultural services—The nonmaterial benefits people obtain from ecosystem services</b>			
<b>Indigenous traditional knowledge</b>		Encompasses the beliefs, knowledge, practices, innovations, arts, spirituality and other forms of cultural experience and expression that belong to Indigenous communities worldwide; handed down through generations by cultural transmission, oral tradition and first-hand observation about the relationship of living beings (including humans) with one another and with their environment. <sup>3</sup>	<ul style="list-style-type: none"> <li>• Traditional knowledge systems exist in the form of songs, proverbs, stories, folklore, community laws, common or collective property and inventions, practices and rituals transmitted by community knowledge holders, such as elders.</li> <li>• Indigenous traditional knowledge systems contain a rich understanding of plant, crop and tree species, medicines, animal breeds, and local ecological and biological resources, including useful technologies and adaptations to local environments.</li> </ul>
<b>Ethical values</b>		Spiritual, religious, intrinsic or other values people attach to ecosystems, landscapes or species	<ul style="list-style-type: none"> <li>• Spiritual is fulfilment derived from sacred lands and rivers.</li> </ul>
<b>Educational and inspirational values</b>		Information derived from ecosystems used for formal and informal education, culture, art, language, design and innovation	<ul style="list-style-type: none"> <li>• Biodiversity, ecosystems and natural landscapes act as a source of inspiration for art, culture and increasingly for science.</li> <li>• The structure of tree leaves has inspired technological improvements in solar power cells; school fieldtrips to nature reserves and parks aid in teaching scientific concepts and research skills.</li> </ul>
<b>Traditional technologies</b>		Protocols, practices and institutions applicable to the management of natural resources documented or transmitted through oral tradition.	<ul style="list-style-type: none"> <li>• Development of plant cultivars is part of landscape organisation by traditional societies in South America.</li> <li>• Grazing systems of native Camelidae in the Punas</li> <li>• Complex lacustrine agricultural systems of Mexicans chinampas</li> </ul>
<b>Aesthetic values</b>		Beauty or aesthetic value found in various aspects of ecosystems	<ul style="list-style-type: none"> <li>• Reflected in the support for parks, scenic drives</li> <li>• Selection of housing locations</li> <li>• Use of plants and flowers in decoration of interiors</li> </ul>
<b>Recreation and ecotourism</b>		Recreational pleasure people derive from natural or cultivated ecosystems	<ul style="list-style-type: none"> <li>• Hiking, camping and bird watching</li> <li>• Going on safari</li> <li>• Scuba diving</li> </ul>
<b>Cultural identity</b>		Cultural identity, value systems and economic well-being shaped through the close interaction of human societies with the natural environment-cultural diversification creates a variety of lifestyles and livelihoods based on different ecosystem conditions.	<ul style="list-style-type: none"> <li>• Nomadic pastoralism for those living in the Savannah grasslands of tropical Africa, Tibetans and central Asian highlands</li> <li>• Shifting agriculture for traditional forest dwellers in the tropics</li> <li>• Coastal and arctic communities depend on fishing</li> </ul>
<b>Cultural heritage values</b>		Cultural heritage associated with ecosystems and landscapes elements that provide a sense of continuity and understanding of one's place in the natural and cultural environment are increasingly valued through designation of cultural landscapes and sites.	<ul style="list-style-type: none"> <li>• High value is placed by many societies on the maintenance of either historically important landscapes (cultural landscapes) or significant species. (e.g. old trees, remains of traditional cultivation systems or historical artefacts).</li> </ul>
<b>Sense of place</b>		Associated customs (religions and traditional knowledge) created by nature are important for creating a sense of belonging; "Sense of place" associated with recognised features of environment, including aspects of the ecosystem is valued by many.	<ul style="list-style-type: none"> <li>• Specific forests, caves or mountains are considered sacred or have a religious meaning.</li> </ul>



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<b>Social relations</b>		Ecosystems influence the types of social relations that are established in particular cultures.	<ul style="list-style-type: none"> <li>Fishing societies differ in many respects in their social relations from nomadic herding or agricultural societies.</li> </ul>
<b>Mental and physical health</b>		Cultural ties between people and ecosystems play a crucial role in maintaining mental and physical health	<ul style="list-style-type: none"> <li>Traditional knowledge systems through plant medicine helps with pandemics like AIDS and cancer.</li> <li>Walking and playing sports in green space is a good form of physical exercise that allows people to relax.</li> </ul>
<b>Supporting services—The underlying processes that are necessary for the production of all other ecosystem services</b>			
<b>Habitat</b>		Natural spaces that maintain species populations and protect the capacity of ecological communities to recover from disturbances	<ul style="list-style-type: none"> <li>Native plants in gardens and fields provide pollinators with food and structure for reproduction.</li> <li>Rivers and estuaries provide nurseries for fish reproduction and juvenile development.</li> <li>Migratory species including birds, fish, mammals and insects all depend upon different ecosystems during their movements.</li> </ul>
<b>Nutrient cycling</b>		Process by which nutrients—such as phosphorus, sulphur and nitrogen—are extracted from their mineral, aquatic, or atmospheric sources or recycle from their organic forms and ultimately return to the atmosphere, water or soil	<ul style="list-style-type: none"> <li>Transfer of nitrogen from plants to soil, from soil to oceans, from oceans to the atmosphere, and from the atmosphere to plants</li> <li>Soil deposition by rivers</li> </ul>
<b>Primary production</b>		Formation of biological material through assimilation or accumulation of energy and nutrients by organisms	<ul style="list-style-type: none"> <li>Algae transform sunlight and nutrients into biomass, forming the base of aquatic ecosystems food chain</li> </ul>
<b>Photosynthesis</b>		Process by which carbon dioxide, water and sunlight combine to form sugar and oxygen	<ul style="list-style-type: none"> <li>Plants convert sugar and energy from water, air and sunlight into energy to grow</li> </ul>
<b>Soil formation</b>		Process by which organic material is decomposed to form soil	<ul style="list-style-type: none"> <li>Organic matter that comes from the decomposition of leaves and grass roots forming soil</li> </ul>
<b>Water cycling</b>		Flow of water through ecosystems in its solid, liquid or gaseous forms	<ul style="list-style-type: none"> <li>Transfer of water from soil to plants, plants to air, and air to rain</li> </ul>
<b>Biodiversity</b>		Variety of genes between and within species populations that distinguishes different breeds or races from each other	<ul style="list-style-type: none"> <li>The Bird's Head Seascape in Indonesia is home to more than 1,200 species of fish and 600 species of coral.<sup>4</sup></li> </ul>

## Table References

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