CRISTAL forests

CRiSTAL Forests User's Manual

Community-based Risk Screening Tool – Adaptation and Livelihoods
Focus on Forests and Ecosystems

iisd International Institute for Sustainable Development / Institut international du développement durable
CIFOR
IUCN
SEI Stockholm Environment Institute
HELVETAS Swiss Intercooperation

© 2013 The International Institute for Sustainable Development
Published by the International Institute for Sustainable Development.

The International Institute for Sustainable Development (IISD) contributes to sustainable development by advancing policy recommendations on international trade and investment, economic policy, climate change and energy, and management of natural and social capital, as well as the enabling role of communication technologies in these areas. We report on international negotiations and disseminate knowledge gained through collaborative projects, resulting in more rigorous research, capacity building in developing countries, better networks spanning the North and the South, and better global connections among researchers, practitioners, citizens and policy-makers.

IISD's vision is better living for all—sustainably; its mission is to champion innovation, enabling societies to live sustainably. IISD is registered as a charitable organization in Canada and has 501(c)(3) status in the United States. IISD receives core operating support from the Government of Canada, provided through the International Development Research Centre (IDRC), from the Danish Ministry of Foreign Affairs and from the Province of Manitoba. The Institute receives project funding from numerous governments inside and outside Canada, United Nations agencies, foundations and the private sector.

International Institute for Sustainable Development
Head Office: 161 Portage Avenue East, 6th Floor, Winnipeg, Manitoba, Canada R3B 0Y4
Tel: +1 (204) 958-7700 | Fax: +1 (204) 958-7710 | Web site: www.iisd.org

---

PHOTO CREDITS
Cover: iStockphoto
Page 4: Marius Keller, IISD
Page 7: Houria Djoudi, CIFOR
Page 16: Houria Djoudi, CIFOR
Page 53: Joel Gamys, Conservation International
Back cover: iStockphoto

Contents

Introduction **4**
Background 5
Key Concepts 6
CRiSTAL Forests at a Glance **7**
What is CRiSTAL Forests? 8
How Does CRiSTAL Forests Contribute to Climate Vulnerability and Risk Assessments? 10
How Do Users Apply CRiSTAL Forests? 12
What Methods Are Used? 13
What Resources Are Required to Apply CRiSTAL Forests? 14
CRiSTAL Forests Step-by-Step **16**
General 17
Step > Introduction 18
Step > Describe project 19
Step > Describe project activities 20
Step > Describe livelihoods context 21
Step > Describe forests and ecosystem services 23
Step > Summarize information on observed and projected climate change 26
Step > Describe current and potential future climate hazards 28
Step > Analyze climate risk 31
Step > Identify and assess existing response strategies 34
Step > Climate risk analysis summary report 36
Step > Revise existing project activities 38
Step > Identify new project activities 40
Step > Select evaluation criteria 43
Step > Evaluate and prioritize new project activities 45
Step > Identify potential to mitigate greenhouse gas emissions 47
Step > Assess potential for participating in REDD+ 49
Step > Identify opportunities and barriers to project implementation 51
Step > Project evaluation summary reports 52
Additional Useful Information **53**
Why Use CRiSTAL Forests? 54
Where and How is More Information Available? 54
References **55**

Introduction

Photo: Community members are discussing the impacts of climate variability and change on their forests, ecosystem services and livelihoods as part of a CRiSTAL application in Liberia.

Background

Climate variability and change affect both natural and human systems, altering the productivity, diversity and functions of many ecosystems and livelihoods around the world. For poor, natural resource-dependent communities, short- and long-term variations in climatic conditions may compound existing vulnerabilities. Settlement on marginal or unstable lands already heightens exposure to climate hazards. Heavy dependence on ecosystem services, including those provided by forests, places their welfare at the mercy of environmental conditions. As the availability and quality of natural resources decline, so does the security of these communities' livelihoods. Limited resources and capacities for responding to stresses such as floods, droughts, seasonal weather pattern shifts and their impacts on processes such as vegetation regeneration and species migration, constrain the ability of these communities to meet their basic needs and move out of poverty.

While climate variability and change may not always be the most important stresses affecting a specific community, they should always be considered when designing and implementing development and conservation projects, particularly in communities characterized by climate-sensitive and natural resource-dependent livelihoods. Indeed, any activity that does not account for present and future potential climate risks may inadvertently increase a community's exposure and vulnerability. For example, a reforestation project may foster dependence on species that may be negatively affected by climate change or reduce access to critical resources for marginalized social groups, thereby increasing local vulnerability in the longer term.

Without a tool to systematically assess the impacts of a project on some of the local determinants of exposure, vulnerability and adaptive capacity, it is difficult for project planners and managers to design activities that foster adaptation to climate variability and change. The Community-based Risk Screening Tool – Adaptation and Livelihoods (CRiSTAL) seeks to address this gap. As a specialized version of the CRiSTAL tool, CRiSTAL Forests focuses more explicitly on the role of forests ecosystem services in both creating vulnerabilities and supporting adaptive capacity.

Box 1: CRiSTAL

The original CRiSTAL tool was developed by a group of four international non-governmental organizations in response to the outcomes of the first phase of the Livelihoods and Climate Change Initiative, which demonstrated how ecosystem management and restoration and/or sustainable livelihoods projects contribute to risk reduction and climate change adaptation. Recognizing this potential, project planners and managers began asking how they could systematically integrate risk reduction and climate change adaptation into their work.

CRiSTAL was developed to respond to this need. Launched in 2007, it has since been applied in over 20 countries in Asia, Africa and the Americas by various institutions and development professionals. Between 2010 and 2012 a completely revised version of CRiSTAL was developed based on extensive user experience and feedback. More information is available on www.iisd.org/cristaltool.

Key Concepts

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).
Weather	The state of the atmosphere at a particular place and time in terms of heat, cloudiness, dryness, sunshine, wind, rain, etc.
Climate	"Average weather" or long-term averages of climate variables such as temperature, precipitation and wind across decades (usually 30 years) (Adapted from Intergovernmental Panel on Climate Change [IPCC], 2007a).
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 forcing, or to persistent anthropogenic changes in the composition of the atmosphere and land use (IPCC, 2007a).
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 (United Nations Development Programme [UNDP], 2005).
Climate variability	Variations (ups and downs) 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).
Climate impacts	The effects of climate hazards and climate change on natural and human systems (Adapted from IPCC, 2012).
Climate adaptation	A process of adjusting human and/or natural systems in response to actual or expected changes in climate to reduce adverse impacts or take advantage of opportunities (Adapted from IPCC, 2007a; Tompkins & Adger, 2003). In CRiSTAL, climate adaptation is closely related to climate risk management.
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 United Nations International Strategy for Disaster Reduction [UNISDR], 2009).
Climate risk management	The systematic approach and practice of using climate information in development decision-making to minimize potential harm or losses associated with climate variability and change (Adapted from UNISDR, 2009). In CRiSTAL, climate risk management is closely related to climate adaptation.
Exposure	Exposure of people and assets to climate hazards represents the number of people and types of assets present in climate hazard-prone areas (e.g., number of people in arid regions, number of dwellings in a floodplain) (Adapted from UNISDR, 2009).
Vulnerability	Susceptibility to harm. In CRiSTAL, it refers to the susceptibility of a community/project area to the adverse effects of a climate hazard. Vulnerability is a function of the system's sensitivity and adaptive capacity (Adapted from IPCC, 2012).
Sensitivity	Sensitivity of people and assets to climate hazards: the degree to which people and assets are affected, either adversely or beneficially, by climate variability or change (IPCC, 2007a).
Adaptive capacity	Adaptive capacity of institutions and people to climate hazards: 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).
Forests	A forest is typically defined as an area covered by trees, but there is no commonly agreed definition of attributes such as tree cover, density, size and species as well as land use (Lund, 2002).
Ecosystem services	Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; 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).
Climate mitigation	Technological change and substitution that reduce resource inputs and greenhouse gas emissions per unit of output (Adapted from IPCC, 2007b)
REDD+	Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. "REDD+" goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries [UN-REDD], 2013)

Part 1 | CRiSTAL Forests at a Glance

Photo: Community members in Burkina Faso are identifying key forest and livelihood resources.

What is CRiSTAL Forests?

CRiSTAL Forests is a decision-support tool that helps project planners and managers design activities that support adaptation to climate variability and change in forest-dependent communities. CRiSTAL stands for "Community-based Risk Screening Tool – Adaptation and Livelihoods":

- "Community-based" – focussing on projects at the community level.
- "Risk Screening" – helping helps users to identify and prioritize climate risks that their projects might address.
- "Adaptation and Livelihoods" – supporting users in identifying ecosystem services and livelihoods most important to climate adaptation and using these as a basis for designing adaptation strategies.

CRiSTAL Forests highlights the analytical focus on livelihoods that depend on forest ecosystem services.

Box 2: Overview of CRiSTAL Forests

Objectives: CRiSTAL Forests helps users to understand:

- How current and potential future climate hazards affect/may affect a project area, its forests, ecosystem services and local livelihoods.
- How communities respond to the current and potential direct and indirect impacts of these climate hazards.
- Which ecosystem services are most affected by current climate hazards and which ones are most important for the response strategies.
- How project activities affect access to, or availability of, these critical ecosystem services.
- What project adjustments (revision of existing activities and/or design of new activities) can be made to support climate adaptation and reduce climate risks.
- The potential of activities to reduce greenhouse gas emissions and participate in REDD+ schemes.

Target user: CRiSTAL Forests targets project planners and managers working at the local or community level. However, a wide range of other actors may also use the tool (including policy-makers and decision makers).

Approach: Conceptually, CRiSTAL Forests draws from the Millenium Ecosystem Assessment (2005) framework. It relies on information collected from desk-based review and stakeholder consultations at the local level (community and other local experts) using participatory methods.

Key outputs: Applying CRiSTAL Forests leads to two main outputs:

- Summary analysis of climate risks to ecosystems and livelihoods, including a list of ecosystem services that are most affected by climate hazards or important for responding to climate impacts.
- Proposed adjustments to existing projects and new activities to support climate adaptation.

Outcome: Projects improve ecosystems and the livelihoods they support in the short and long terms.

Format: CRiSTAL Forests is a desktop application compatible with Microsoft Windows 7 operating systems and subsequent versions. It is currently available in English.

CRiSTAL Forests helps integrate climate adaptation into projects for forest-dependent communities

CRiSTAL Forests helps users understand the link between a development project and its contribution to climate adaptation. Most projects are not designed with an explicit consideration of climate risks in a particular community. Even rarer are projects that take into account the longer-term implications of climate change and how project activities might influence ecosystem services that are vulnerable to climate change and/or underpin the capacity of local communities to adapt to change. CRiSTAL Forests is designed to provide a basis for improving community- and project-based decision making so that adaptation opportunities can be maximized, and maladaptation minimized. It also considers opportunities to mitigate greenhouse gases and a project's potential to participate in REDD+ schemes. It is expected to be relevant in project design as well as project evaluation.

Figure 1: Linkages between a project cycle, the adaptation process and the CRiSTAL process.

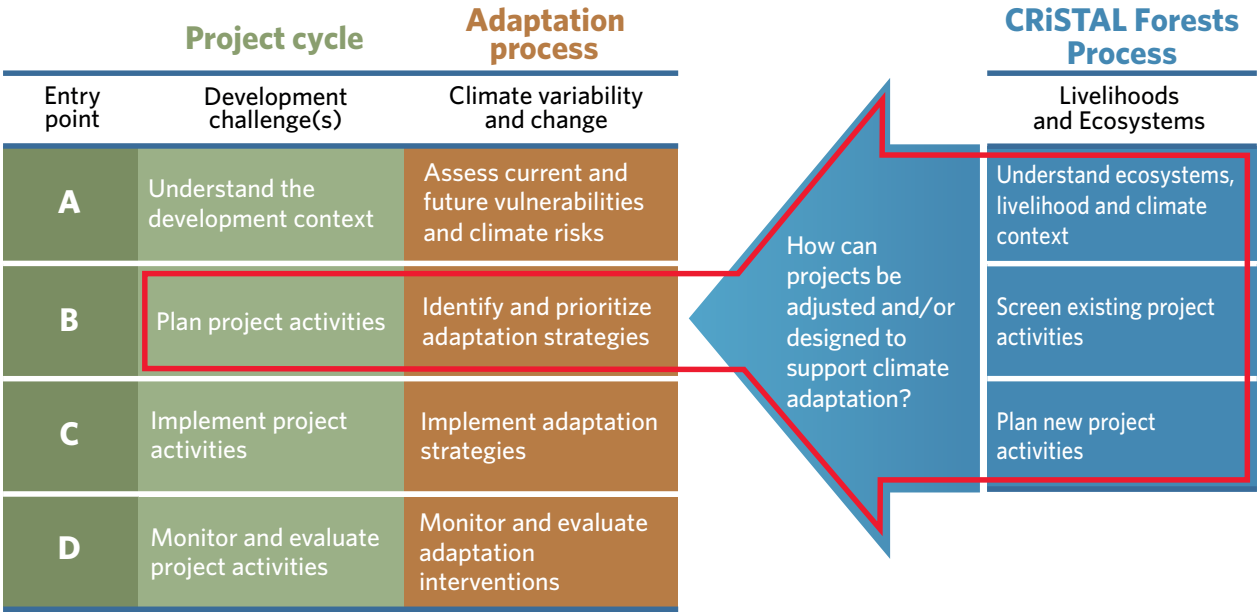


Figure 1 shows how CRiSTAL Forests helps users connect a project cycle with the process of adapting to climate variability and change:

- **Project cycle**: The process of undertaking a development intervention is usually described using the "project cycle," which involves four general steps: understanding the development context, planning, implementing, and then monitoring and evaluating (M&E) project activities. CRiSTAL Forests specifically targets community-level development projects and can be most useful at the planning stage (step B of the project cycle), where specific project activities are designed.
- **Adaptation process**: The process of adapting to climate variability and change is also typically composed of four broad steps: assessing vulnerability and climate risks, identifying and prioritizing adaptation strategies, implementing adaptation strategies, and M&E adaptation interventions. These match up nicely with the steps in the project cycle, thereby demonstrating how adaptation could be integrated into development projects—that is to say, assessing current and future vulnerabilities and risks could be part of efforts to understand the development context, identified adaptation strategies could be included in the list of planned project activities, and so on. CRiSTAL Forests supports users primarily in the design of adaptation strategies (step B of the adaptation process).

- **CRiSTAL Forests process**: The tool helps users to: (i) understand the livelihoods, ecosystems and climate context of a community or area of interest; (ii) screen existing project activities to assess their impacts on the ecosystem services that are important to climate adaptation, and revise these activities accordingly; and (iii) plan new project activities that support climate adaptation. The list of revised or new project activities contributes directly to step B in both the adaptation planning process and the project cycle. However, information gathered to establish the livelihoods, ecosystems and climate context in CRiSTAL Forests can also contribute to a risk assessment (step A of the adaptation process).

CRiSTAL Forests is a decision-making framework centred on livelihoods and the ecosystem services upon which they depend

Livelihoods provide a first entry point for the CRiSTAL Forests analysis, based on the assumption that managing current and future climate risk at the local level requires an understanding of how livelihoods are conducted and sustained. By understanding the dynamics of people's livelihoods, one can begin to understand how they will be affected by climate, how they might respond with the resources they have, what additional resources may be required, and how these conditions can be reflected and built upon for effective responses over the long term.

As a second entry point, CRiSTAL Forests is specifically interested in the ecosystem services that support the livelihoods of forest-dependent communities. It draws from the Millennium Ecosystem Assessment (2005) framework, which looks at three types of contributions of forests to people's livelihoods:

- **Provisioning services** are the products people obtain from ecosystems, such as food, fuel, fibre, fresh water and genetic resources.
- **Regulating and supporting services** are the benefits people obtain from the regulation of ecosystem processes, including air quality maintenance, climate regulation, erosion control, regulation of human diseases and water purification.
- **Cultural services** are the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences.

CRiSTAL Forests uses the concept of ecosystem services to understand the relationship between forests and people's livelihoods, how these linkages transmit climate impacts from ecosystems to livelihoods, and how ecosystem services support local response strategies to climate impacts. The tool also assesses the contribution of development projects to climate adaptation by looking at their influence on critical ecosystem services.

How Does CRiSTAL Forests Contribute to Climate Vulnerability and Risk Assessments?

CRiSTAL Forests can contribute to vulnerability and risk assessments by helping users to collect, synthesize and organize information about a) the socioeconomic and ecological context, b) the climate context, c) climate impacts and risks and d) the design of adaptation responses.

However, CRiSTAL Forests is not a stand-alone vulnerability or risk assessment tool. It does not take users through all of the steps for gathering and analyzing information needed to understand who and/or what is most vulnerable in a project area and why—a range of other tools and frameworks are available for this purpose. Rather, CRiSTAL is narrower in its focus; it takes users through a series of steps to gather and analyze information on local livelihoods, ecosystem services and climate in order to understand which ecosystem services resources should be targeted in project activities to support adaptation. Table 1 clarifies the role of CRiSTAL Forests in a climate risk assessment.

Table 1: Role of CRiSTAL Forests in a climate risk assessment

	Comprehensive climate risk assessment			CRiSTAL Forests	
	Must understand...	**Information required**	**Key questions**	**Addressed?**	**Where?**
A	**Current and future development trends**	• Development conditions, trends and challenges	• What are the development goals and objectives for the target community/area? What are the main non-climate stresses affecting their achievement? How are the socioeconomic, ecological and political contexts changing? What will it look like in the future?	Partly (only focus on current livelihoods)	• Livelihood context, forests and ecosystem services (step 1)
B	**Actual and expected climate context**	• Current weather and climate	• What are the current weather and climate conditions (rainfall and temperature patterns)?	Yes	• Climate risk analysis (step 2)
		• Current climate variability and extremes	• What are the main climate hazards (location, intensity, frequency)?	Yes	
		• Observable climate changes	• How have climate variables (temperature, rainfall) and hazards changed in recent years?	Yes	
		• Projected climate changes	• How will climate variables and hazards change in the coming decades?	Yes	
C	**Climate impacts and risks associated with actual and expected climate variability and change**	• Current and future **exposure**	• Which people/resources are located in areas prone to climate hazards?	Partly (only focus on current exposure)	• Climate risk analysis (step 2)
		• Current and future **vulnerability**	• How are people, resources and services affected by climate hazards? Why? (sensitivity)	Partly (focus mainly on current impacts, does not explore the "why" question in detail)	
			• What do people do to respond to the impacts? What resources and services are their responses based on? (adaptive capacity)		
		• Current and future **climate risk**	• What are the probabilities and the range of potential harmful consequences of climate variability and change?	Partly (focus mainly on current impacts)	
D	**Response strategies that minimize negative impacts and maximize positive ones**	• Response options available	• What do we want? What are the options? What's working now? What may work in the future?	Yes	• Revise existing projects and/or design new activities (steps 3 and 4)
		• Feasible and effective options	• What can be actually implemented based on costs, benefits, trade-offs, etc.?	Yes	

How Do Users Apply CRiSTAL Forests?

CRiSTAL Forests is organized according to two modules and five analytical steps that build on each other:

A. Understand the livelihoods, ecosystems and climate context

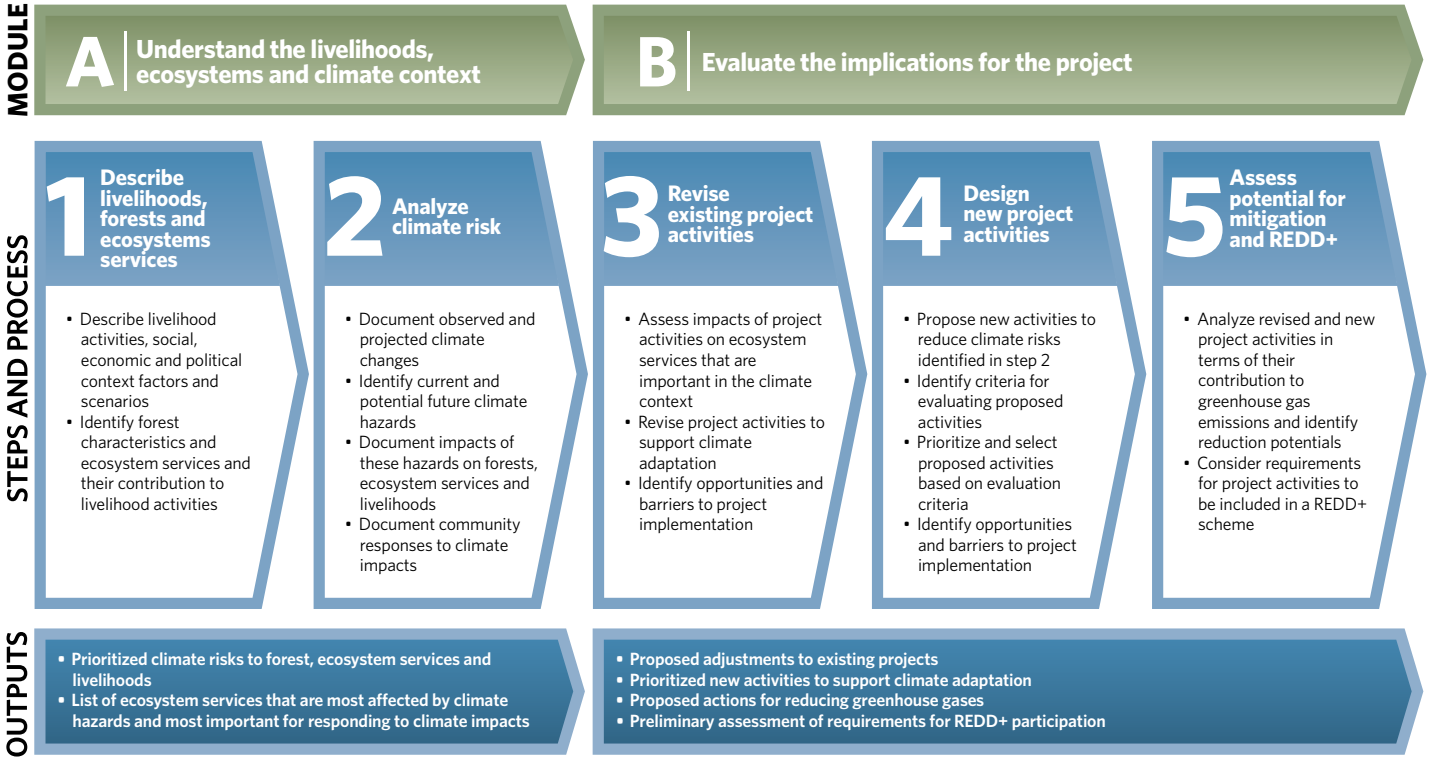
1. **Describe livelihoods, forests and ecosystems services**
2. **Analyze climate risk**

B. Evaluate the implications for the project

3. **Revise existing project activities**
4. **Design new project activities**
5. **Assess potential for mitigation and REDD+**

Depending on needs, users can select those steps that are relevant for their context. Module A, which focuses on understanding the livelihoods, ecosystem and climate context, is compulsory. The three steps of module B are optional. Users can decide to skip the module entirely or to conduct either or both of steps 3 and 4, which guide users through the revision of existing project activities and help design new activities, respectively. Step 5 is optional for those who have either completed step 3 or 4 (or both), and helps assess the potential of new and revised activities for mitigation and/or REDD+. Figure 2 summarizes the overall CRiSTAL framework.

Figure 2: The CRiSTAL Forests framework.



For each phase, the tool guides the user through different analytical steps with specific outputs:

- **Phase A: "Understand the livelihoods, ecosystems and climate context"**: The user is first asked to **describe local livelihoods, forests and ecosystem services (step 1)** of the community/area of interest and then to **analyze climate risk (step 2)**, specifying the impacts of and responses to identified climate hazards in the project area. The information collected and organized under these steps provides a basis for the rest of the analysis.

> **Main outputs: Prioritized climate risks to forest, ecosystem services and livelihoods, as well as a list of ecosystem services for men and women that are (i) most affected by climate hazards and (ii) most important for responding to the impacts of these hazards.**

- **Phase B: "Evaluate the implications for the project"**: Building on the information collected under the previous steps, users analyze how project activities affect ecosystem services that are either vulnerable to climate hazards or important for responding to the impacts of these hazards. Specifically, they assess the impacts of project activities on these climate-relevant livelihood resources. Users can then **revise the project activities (step 3)** so that ecosystem services that underpin livelihoods are less exposed or vulnerable to climate hazards, or are better able to support local responses to climate impacts. Users can also **design new project activities (step 4)** if they do not have an existing project to screen or feel that an existing project requires more than activity adjustments to reduce climate risks identified in step 2. Users are also asked to identify the opportunities and barriers to the implementation of the revised and/or new project activities. Finally, the **potential for reducing greenhouse gas emissions and for participating in REDD+ can be assessed (step 5)**.

> **Main outputs: Proposed adjustments to existing projects; prioritized new activities to support climate adaptation; proposed actions for reducing greenhouse gases; as well as a preliminary assessment of requirements for REDD+ participation.**

What Methods Are Used?

The CRiSTAL Forests analysis relies on a combination of primary information gathered through participatory methods (stakeholder consultations, project team discussions) and secondary information gathered through desk-based research. CRiSTAL provides a framework for organizing, in a simple and logical format, the information collected both at the local level (community and other local experts) and at the national level (e.g., scientific information on climate change projections).

Consultations are central to the CRiSTAL process

While secondary information is required to analyze climate risk (step 2) and the assess mitigation and REDD+ potentials (step 5), most of the analysis can be completed by collecting information through community consultations and discussions with other project stakeholders.

Project planners and managers often have experience with working in a community or possess different types of detailed information on a project area. But this knowledge does not necessarily include detailed information on the livelihoods, forest and ecosystem services as well as the local climate context necessary to undertake the CRiSTAL Forests analysis. As a result, it is highly recommended that CRiSTAL Forests users undertake consultations with the community and other key actors, experts and partners (e.g., local government representatives).

The approach and specific methods selected for engaging local stakeholders in applying CRiSTAL Forests are flexible and generally left to the discretion of the user. However, CRiSTAL Forests provides useful tips and references on how to collect most of the information. Specific information on participatory methods that can be used for each analytical step can be found in the second part of this manual.

Community consultations

CRiSTAL Forests users should engage community members to ensure projects are planned, adjusted and managed according to **local needs, priorities and conditions**. The structure, purpose and duration of these consultations can vary according to the user's need and resources. (See also the section entitled "What resources are required" on page X.)

Communities can be engaged **throughout the entire CRiSTAL Forests process** (from steps 1 to 5 of the CRiSTAL Forests framework, p. X) or engaged in certain aspects of the analysis. Typically, they should be consulted at least in steps 1 and 2 of the CRiSTAL Forests process to gather information on livelihoods, ecosystems and local climate context and to discuss the links between the three (i.e., how do climate hazards affect forests and thereby the ecosystem services they provide to local livelihoods?). The objective is to explore local-level perceptions on climate hazards and their impacts, as well as current and potential responses to current and potential future climate risks in selected communities.

The information can be collected through site visits, informal meetings and/or organized workshops using Participatory Rural Appraisal (PRA) tools (e.g., resource mapping, a vulnerability matrix). Different social groups often have different roles and responsibilities in a community, and as such they tend to be impacted by and respond to climate risks differently. Therefore, the analysis should take into account the experiences and opinions of different social groups, particularly men and women.

CARE's Climate Vulnerability and Capacity Analysis (CVCA) Handbook contains facilitation tips and a range of participatory field tools that are also referenced in the guidance for some of the CRiSTAL Forests steps. We particularly recommend reading the facilitation tips on page 30 before initiating the consultations.

Other key expert consultations

CRiSTAL Forests users are encouraged to complement and triangulate the information collected at the community level with additional information collected through meetings with researchers, academics, NGOs and government representatives.

Key information to be collected includes:

- Local livelihood conditions in the project area
- Information on forests and ecosystem services
- Regional and local climate conditions/forecasts
- Data on greenhouse gas emissions and mitigation potentials
- Information on REDD+ schemes and their requirements
- Other relevant environmental and socioeconomic trends affecting the project area and communities

Meetings may be formal or informal, but the main objective is to raise awareness about climate risks and the project, to ensure maximum buy-in and ownership of the results, and to gather additional information and triangulate it to complete the CRiSTAL Forests analysis.

What Resources Are Required to Apply CRiSTAL Forests?

The resources required to apply the CRiSTAL Forests tool can vary according to the objectives and capacities of the users. Typically, users will need between *two to five days* to conduct all the steps, which includes time for preparation, local consultations, and data entry into the tool and data analysis. Costs will vary, but generally involve those costs associated with the project team meetings and community consultations. It is highly recommended that new users acquire training to benefit the most from the tool.

Table 2 lists the key resources required for CRiSTAL Forests according to two different steps: (i) collecting data through the local consultations and expert meetings and entering the data into the desktop application and (ii) analyzing the results. Data entry and analysis could be done by a single user, but it is recommended that it is done with the cooperation of a variety of users by organizing a team workshop to stimulate the exchange of ideas and build ownership of the results between the project team and local partners.

Table 2: Summary of key resources required for CRiSTAL Forests

Resources	Data collection (i.e. local and expert consultations)	Data entry and analysis (individual or team meeting)
Knowledge	• Basic knowledge about climate variability and change, climate adaptation, livelihoods, community dynamics, community mobilisation, gender and diversity, participatory approaches, Rapid Rural Appraisal (RRA)/Participatory Rural Appraisal (PRA) tools	• Basic knowledge about climate variability and change, climate adaptation, livelihoods, community dynamics, gender and diversity
Skills	• Experience in applying RRA/PRA tools • Gender-sensitive facilitation skills (incl. ability to probe information from community members) • Ability to be fully functional in local language(s)	• Basic computer literacy • Ability to synthesize different sources and types of information • Analytical skills
Participants	• At least two facilitators (one moderator and one note taker) • Facilitation team should include both men and women. Female facilitators should work with women's groups to increase comfort. • At least two focus groups (one group of men and one group of women) per community, each consisting of about 10 participants (maximum 15). Where there is marked heterogeneity in the community, especially in terms of power relations and self-expression, more focus groups are recommended.	• The number of participants (project team and other local partners) will depend on the objectives and resources available. • CRiSTAL Forests works well with a group of a dozen of participants (project team and other local partners) but it can also work with smaller or larger groups. • It is highly recommended to involve a multi-stakeholder team (i.e., project team and partners from community, local government and civil society). For example, involving local government representatives can help to secure ownership of the results.
Time	• Plan at least four hours with each focus group and consult communities on an appropriate time for them. • Try to organize all focus group discussions at the same time but in different locations, to allow participants in different groups to speak freely.	• Typically, data entry and analysis can take between a half a day and two days.
Materials	• Flipchart paper, colour markers, coloured paper, masking tape, notebooks and clipboards • Local materials such as stones, sticks, seeds, etc. • Recording device and camera to document the process (if deemed appropriate) • Snacks/lunch/water (depending on how much time the meeting will take, and where it will take place)	• Computers/laptops – Ideally but depending on the number of participants, it is recommended that more than one laptop is made available to enter the data according to the different focus groups. • The new version of CRiSTAL Forests is only compatible with Microsoft Windows 7 operating systems and subsequent versions. • Printer (recommended but optional) – to distribute the summary reports to all participants to facilitate analysis
Cost	• Cost will vary according to the number and the location of community consulted. Keep in mind that consultations can be time consuming. • Plan to organize a meal for the community that has been consulted.	• CRiSTAL is a free desktop application, available online (www.iisd.org/cristaltool). Once users have downloaded the tool, it can be used without being connected to the Internet. • Meeting costs and human resources.

Part 2 | CRiSTAL Forests Step-by-Step

Photo: Community members in Burkina Faso are discussing climate risks and adaptation options.

General

Installing CRiSTAL Forests on a computer

- Download the tool from the CRiSTAL website (www.cristaltool.org) onto the computer.
- Double-click on the "setup.exe" file to run the application. The setup application will guide you through the installation process.

Navigating through CRiSTAL Forests

- **The left-hand side menu**: This menu provides an overview of the different steps and allows you to move from one step to the other. To move from one step to the other, click on any of the options on the menu and you will be taken directly to that specific page. Once you are on a specific page, this step on the menu is highlighted to help you remember where you are in the process.
- **Top left corner menu**: This menu offers some basic functionalities, including:
  - The "**File**" link allows you to open an application previously saved and to save the current application.
  - The "**About**" link provides some background information, its development history and advice on the required resources for its application
  - The "**Help**" link provides information about key concepts, navigation and how to get more information.

Entering and updating information

- **Flexibility**: CRiSTAL Forests is flexible; you can navigate back and forth among the different pages at any point in the process to revise, update and change information as needed.
- **Level of detail and language**: While the application does not have a word limit for the information to be entered in the different boxes, the user should be as specific as possible and use precise, but concise, sentences, as the information you insert will be included automatically in summary reports.

Getting help and guidance

- **Blue question mark buttons**: This function provides short definitions and descriptions for specific steps. To see the information, place the cursor over the buttons and a text box will appear.

- **Green guidance button** (top right of each page): This button links to guidance on how to collect the necessary data and information for each step. Clicking on this button will open a page in the Internet browser where the guidance is displayed. This function works both off- and online.

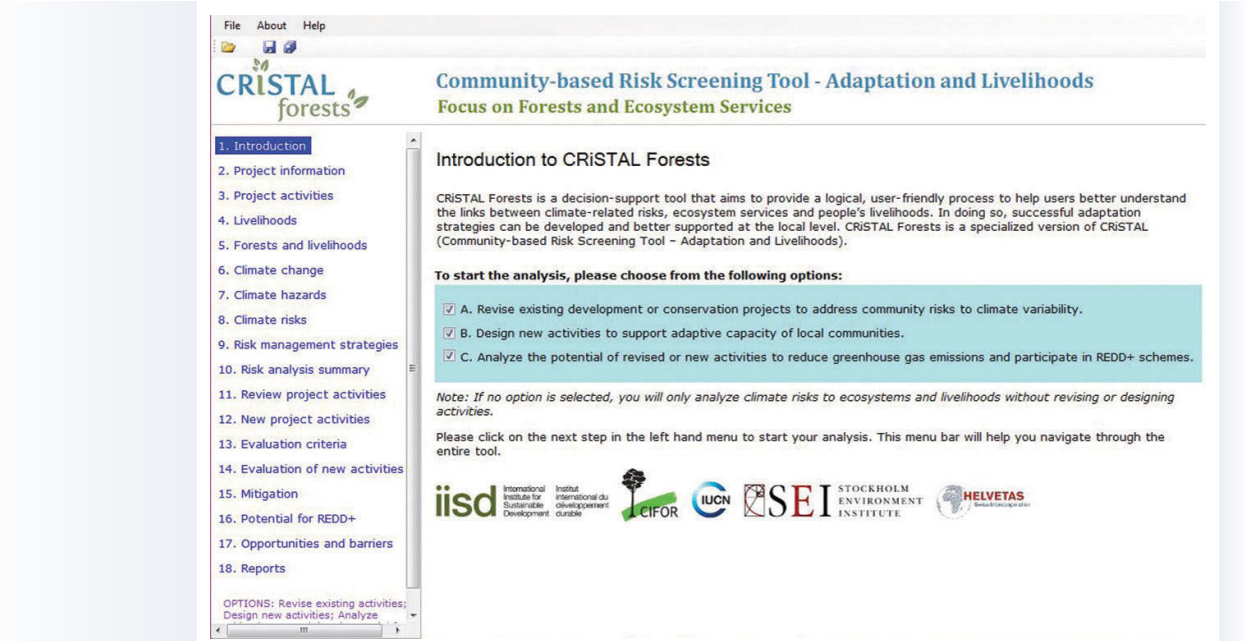
Step > Introduction

Purpose > **To understand the purpose and objectives of CRiSTAL Forests and specify user's objectives.**

Process >

- Read the introductory text to make sure that you understand the purpose and objectives of the tool.
- **Choose among three options**:
  - A. "Revise existing development or conservation projects to address community risks to climate variability": Select this option if you already have ongoing or planned project activities and want to assess the impacts of those activities on climate vulnerability and adaptive capacity, and revise them with a view to fostering climate adaptation.
  - B. "Design new project activities to support adaptive capacity of local communities": Select this option if you want to design new activities from scratch.
  - C. "Analyze the potential of revised or new activities to reduce greenhouse gas emissions and participate in REDD+ schemes": Select this option if you wish to consider the impact of revised or new activities on greenhouse gas emissions and identify potential sources for emission reductions. You will also conduct a quick assessment of the potential of your activities to participate in a REDD+ scheme.

  Note that if you select no option, only the steps relating to the understanding of the livelihoods, ecosystems and climate context will be shown. You will not revise or design activities. Option C is only available if either or both of A or B are selected.



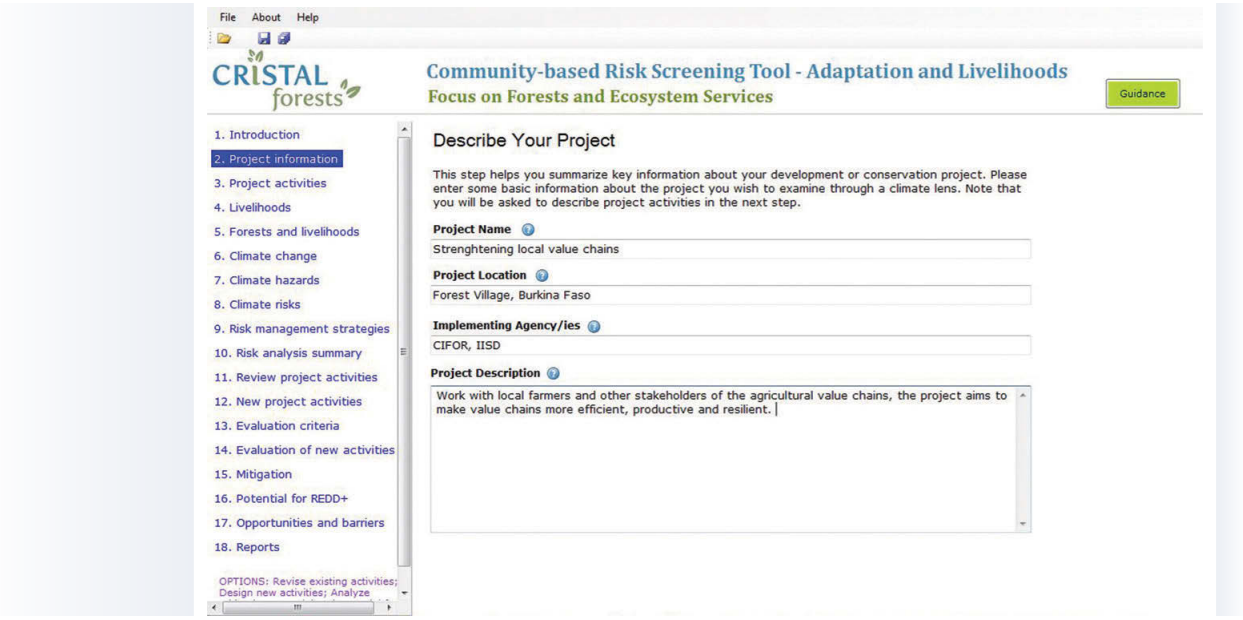
- Once you are familiar enough with the CRiSTAL Forests process and how to use the software, you can begin to enter information for the analysis.
- **Move to the next step by clicking on "Project Information" on the left-hand menu.**

Step > Describe project

Objective > **To summarize key information about the user's project.**

Process >

- Enter some basic information about the project you wish to examine through a climate lens. This information includes:
  - **Project name**: Name or title of the project being screened.
  - **Project location**: Geographical location of the project (e.g., village, town, parish, district, province, country).
  - **Implementing agency/ies**: Name of the organization(s) or institution(s) implementing the project.
  - **Project description**: Any other relevant project details such as:
    - ~ Project type (e.g., natural resource management, forest landscape restoration, rural development)
    - ~ Project goals and objectives
    - ~ Project duration (i.e., start date, number of months or years, end date)
    - ~ Type and number of beneficiaries
    - ~ Budget
    - ~ Funder
    - ~ Etc.
- To move to the next step, "Project Activities," use the left-hand menu.



Method > Review of existing **project documents** (e.g., project proposal, logframe).

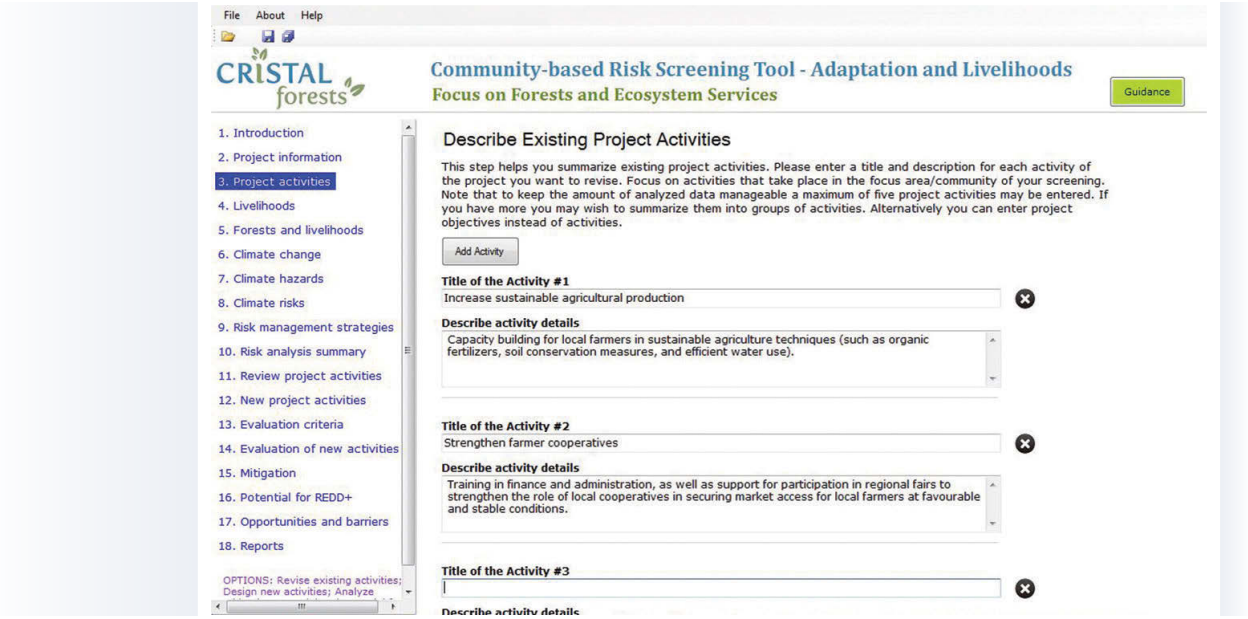
Tips >

- Be specific and concise.
- If you do not have any existing project activities, make sure to deselect option A on the "Introduction" page and this step will not be shown.

Step > Describe project activities

Objective > **To summarize the user's existing project activities.**

Process > Click on the "Add activity" button. You are then asked to enter a title and a description for each project activity you want to examine through a climate lens.



Method > Review of existing **project documents** (e.g., project proposal, logframe).

Tips >

- Focus on project activities that take place in the focus community/area of screening.
- Make sure sufficient details are entered for each activity, as this will help you screen activities at a later stage.
- You can add activities by clicking on the "Add activity" button and remove activities by clicking on the X-button.
- To keep the amount of analyzed data manageable, we have fixed a **limit of five project activities** that can be entered. If you have more activities, you are encouraged to summarize them into groups of activities. Alternatively, you may want to enter project objectives instead of activities.

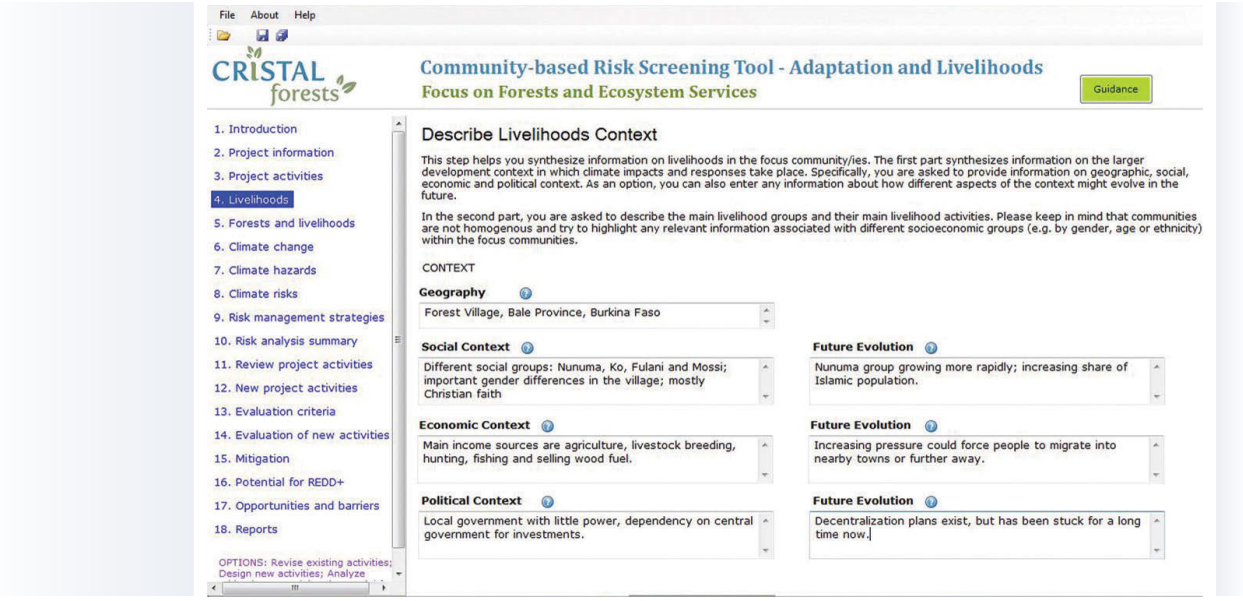
Step > Describe livelihoods context

Objective > **To synthesize information on livelihoods in the community/area of interest.**

Process >

1. **Describe the livelihood context** in the community/area of interest; specifically, enter information about the following themes:
   - **Geography**: The name of the community and the larger geographic areas it belongs to (e.g., municipality, district, department, region, country).
   - **Social context**: Observations or secondary information on gender, diversity and cultural practices, such as observed differences in the livelihood activities between men and women, age or other social groups; inequalities in access to, and control over, important resources, including income; religious practices; food preferences; etc.
   - **Economic context**: The main economic activities that dominate the wider geographic area; the focus is not on the income-generating activities of the community itself, but on important activities in the surrounding areas, which can represent both opportunities (e.g., employment) and pressures (e.g., land use, environmental impacts) on the community.
   - **Political context**: Describe key aspects of the political environment, such as governance systems, entitlements, power relations and potential or actual conflicts between stakeholder groups.

   There are optional boxes to describe the evolution of the social, economic and political contexts over the next five to ten years. This allows you to enter any information on projected future trends (e.g., expected establishment of a mining company in the area; population trends; escalating conflicts; etc.). You do not need to fill in these boxes if you do not have such information.
2. **Livelihood groups**: Describe the main livelihood groups (types), their main livelihood activities (beginning with their most important activity), and the involved social groups in the provided boxes. Ideally you identify up to five different livelihood groups.



Method >	• **User's own experience of the area/community, literature review and interviews with key informants** who have lived and worked in the area covered by the analysis.
Tips >	• You can decide on the **level of detail** to be entered, but generally it is recommended you be as specific as possible so as to provide a sound basis for the rest of the analysis. • While you may know the area well enough to fill in the boxes, it is recommended that the views of more than one informant are reflected to enrich and verify any information.
Further info >	For further information, please consult the following: • **Livelihoods**: The DFID Sustainable Livelihoods Guidance Sheet 1 "Introduction" provides an introduction to the sustainable livelihoods approach. (http://www.eldis.org/vfile/upload/1/document/0901/section1.pdf) • **Gender**: The BRIDGE website (http://www.bridge.ids.ac.uk/) is a specialized gender and development research and information service within the Institute of Development Studies (IDS). Specifically the Bridge report, *Gender and Climate Change: An Overview* is useful. (http://www.bridge.ids.ac.uk/go/bridge-processes-and-publications/reports&id=59217&type=Document)

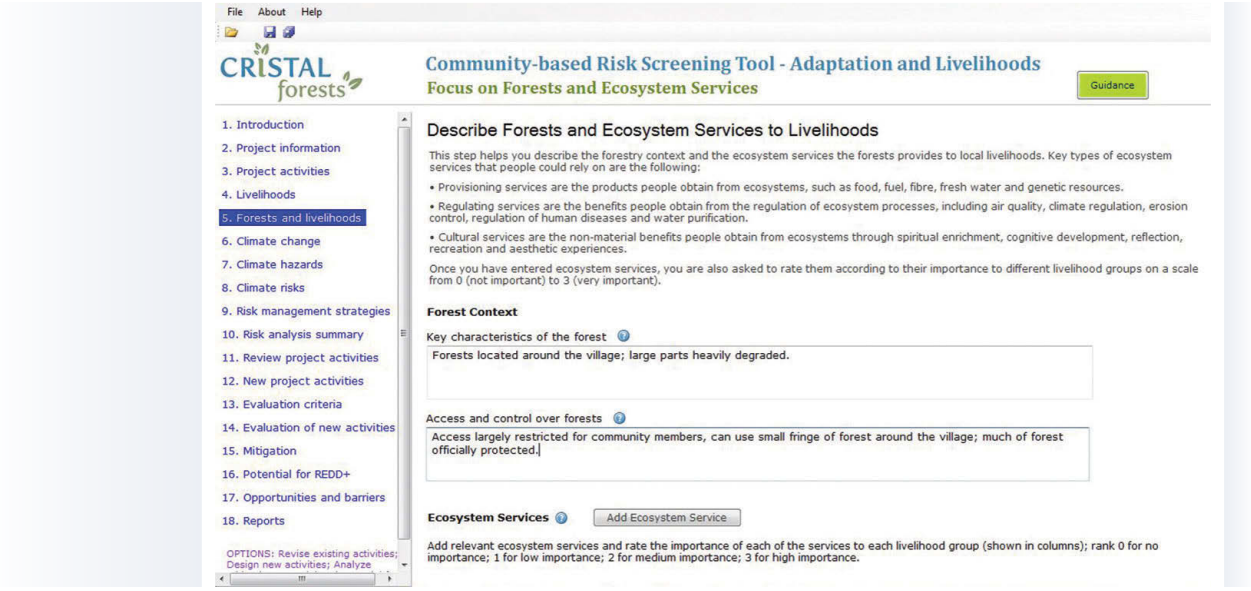
Step > Describe forests and ecosystem services

Objective > **To describe the forest context and to identify the main ecosystem services that underpin local livelihoods.**

Process >

- Describe the **key characteristics of the forests** in the focus area, including size, type, age and health of the forests; key endemic species and biodiversity in the forests; details on occurrence of pest and diseases in the past, affected species and ecosystems, and the severity of the impacts on the forests.
- Describe who has **access to and who has control over the forests**. **Access** refers to those who can benefit from this resource within the community. **Control** refers to people, within or outside the community, who have the ability to mediate other people's access to this resource.
- Click on the "Add Ecosystem Service" button to list the key ecosystem services forests provide to local livelihoods.
- Specify the **type of services** listed using the following categories:[1]
  - **Provisioning services** are the products people obtain from ecosystems, such as food, fuel, fibre, fresh water and genetic resources.
  - **Regulating services** are the benefits people obtain from the regulation of ecosystem processes, including air quality, climate regulation, erosion control, regulation of human diseases and water purification.
  - **Cultural services** are the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences.
- Evaluate the **importance of ecosystem services to livelihood groups** identified in the previous sheet. Livelihood groups will appear in separate columns. You can choose a number between 0 and 3 to rate the importance of each ecosystem to each livelihood group. 0 means not important at all, 1 means low importance, 2 means medium importance and 3 means high importance.
- Optional—If needed, you can provide **additional details** about ecosystem services and their contribution to livelihood groups. 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.

[1] Source: Millenium Ecosystem Assessment (2005).



Method >

- **Community consultations**
- It is recommended that you conduct a **resource and hazard mapping exercise** (see reference in the "Further Info" section below) with each focus group as follows:
  - Ask the group to draw **a map of their community** (either on a flip chart using coloured markers, or on the ground using local materials such as sand, stones and sticks).
  - Ask participants to draw on the map the **boundaries, key facilities and resources in the community** (e.g., crops, livestock, houses, schools, churches/mosques, health clinics, roads, forested areas, water bodies, humans, community groups, etc.). Include a legend if symbols are used.
  - Referring to the map, ask the group to identify their most **important contributions of forests to their well-being and livelihoods**.
  - **Prioritize the ecosystem services** with the group so as to limit the total number of services to 15. Try to include at least two ecosystem services in each one of the three categories mentioned above.
  - Make sure to **copy the map** by hand or to take a photo of the map.
  - The resource and hazard mapping exercise will be also be used in a future step in the tool (see the "Climate Hazard" step).

Tips >

- **Number of ecosystem services**: Limit the total number of entered services to 15 in order to keep the subsequent analysis at a manageable level.
- **Facilitation skills**:
  - During the community consultation, it may not be useful to mention the term "ecosystem services" because it may be too abstract. Rather, the facilitator can ask participants how the forests contribute to their wellbeing in different ways. The three categories of ecosystem services, after being translated into understandable terms, may be used to stimulate the discussion about what contributions forests make to local livelihoods.
  - The facilitator should always clarify generic terms such as "we," "people," "community" or "they" to get nuances about who exactly the participants of a specific focus group are referring to within the community. It is important to make it clear to participants that you want them to talk about their own livelihood activities and resources as individuals or representatives of a social group within the *community*, and not those of the household. This is particularly important with women's groups, who may be more inclined to speak about the activities and priorities of their husbands rather than their own.

Further info > *On forests:*

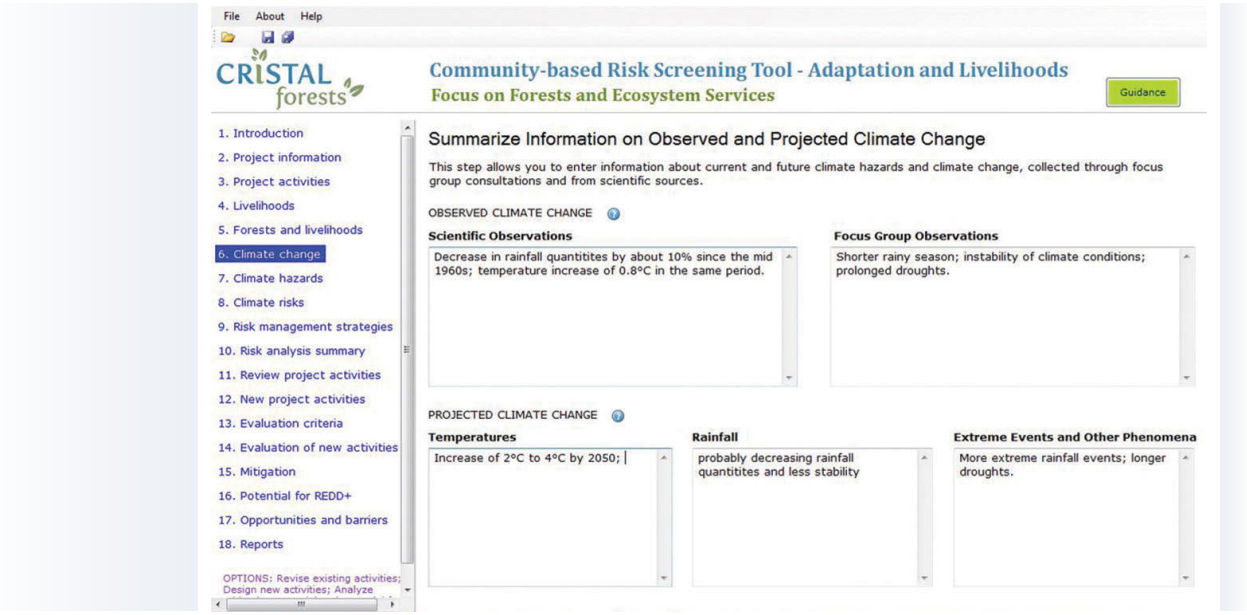
- **UNEP Atlases (e.g., UNEP Atlas of Africa):** A unique and powerful publication that contains stories of environmental change at more than 100 locations spread across every country in the selected continent. Using current and historical satellite images, the atlases provide scientific evidence of the impact that natural and human activities have had on the continent's environment over the past several decades (www.unep.org/dewa/africa/africaAtlas; check UNEP website for atlases from other regions)
- **International Union of Forest Research Organizations (IUFRO)**: A non-profit and non-governmental international network of forest scientists that promotes global cooperation in forest-related research and enhances the understanding of the ecological, economic and social aspects of forests and trees. They provide information on current and potential impacts of climate change on forests and an overview of adaptation actions that could enhance capacities of forests to respond to disturbances, including climate change, as well as information on linkages between community well-being and forests. (http://www.iufro.org/iufro/)
- **Center for International Forestry Research (CIFOR)**: A non-profit, global facility dedicated to advancing human well-being, environmental conservation and equity, providing information on linkages between forestry and livelihoods including services provided by forests to people. CIFOR's website offers specific case studies of climate change impacts, forests and people's livelihoods relevant for Africa, Asia and Latin America (http://www.cifor.org/)
- Please also consider local and regional assessments that may be more relevant for your project area than continental and global assessments.
- **Resource and hazard mapping**: Consult Field Guide 2 on page 33 of CARE's *Climate Vulnerability and Capacity (CVCA) Handbook.* (http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf)

Step > Summarize information on observed and projected climate change

Objective > **To summarize information about observed and projected climate change in the selected community/area.**

Process >

- Enter information about climate change in the area accordingly:
  - **Observed climate change (current)**: Information on past changes in climate conditions and extremes that have occurred over the past decades in the user's country or project area based on (i) scientific sources and (ii) focus group discussions at community level.
  - **Projected climate change (future)**: Information about future changes in temperature, rainfall, extreme events and any other important phenomena (e.g., glacier retreat and sea level rise) based on scientific sources only.
- Compare the information on observed climate changes from scientific sources and the community observations. Also see tips below.



Method >

- **Community consultations:** We recommend that you discuss observations on past climatic changes when doing the **resource and hazard mapping** exercise (see method described in the next step, "Climate Hazards").
- **Scientific literature review** on climate change projections in the country or region of interest (see list of selected key references in the "Further Info" section below).

Tips >

- **Dealing with uncertainties in future climate projections**: Climate projections are often based on imperfect climate models and on development scenarios that are inherently uncertain. We therefore recommend that you compare different sources and look for projections that are based on different models and scenarios. Also, make sure to note any uncertainty ranges that are mentioned in the projections (e.g., a projected 3°C temperature rise by 2050 may come with an uncertainty range of 1.5°C to 5°C; average rainfall projections may be negative but the uncertainty range can be from +20% to -50%; extreme events projections are often even more uncertain).
- **Comparing scientific and local climate information**: While scientific information is often available only for larger scales, focus group observations allow you to validate these larger trends and to understand the local perceptions of how the climate has been changing. Sometimes they may be in conflict as well. There is no general rule as to which one is "correct" – both are views on a complex issue from a different angle.

Further info >

- **Key scientific sources on projected climate change trends and impacts at national and regional levels**:
  - **IPCC reports**: These summarize the current knowledge on climate change and its impacts by region and for ecological zones. (http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html)
  - **United Nations Framework Convention on Climate Change (UNFCCC) National Communications**: These documents are prepared by signatory Parties to the UNFCCC, and communicate the results of national assessments of greenhouse gas emissions, as well as information on vulnerability, impacts and adaptation. Observed and anticipated trends and impacts of climate change for users' countries can be drawn from these documents. (http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php and http://unfccc.int/national_reports/annex_i_natcom/submitted_natcom/items/4903.php):
  - **The World Bank Climate Change Knowledge Portal**: This platform provides an online tool for access to comprehensive global, regional and country data related to historical, current and future climate impact and vulnerability. (http://sdwebx.worldbank.org/climateportal/index.cfm):
  - **Climate Wizard** provides climate change information and visualizes the impacts anywhere on Earth. (www.climatewizard.org)
  - The **Climate Information Portal (CIP)** is a web interface that offers a wealth of observational climate data and projections of future climate, as well as guidance documents on using climate information (http://cip.csag.uct.ac.za/webclient2/app/)
  - The **Climate Change, Agriculture and Food Security (CCAFS) Downscaled GCM Data Portal** offers access to downscaled climate data (www.ccafs-climate.org)
  - The **Adaptation Learning Mechanism** provides country summaries on observed and projected climate change and impacts. (www.adaptationlearning.net)
  - The **Climate Change Knowledge Navigator and Widget** helps users search for the most relevant online climate knowledge platform (http://kn.ids.ac.uk)

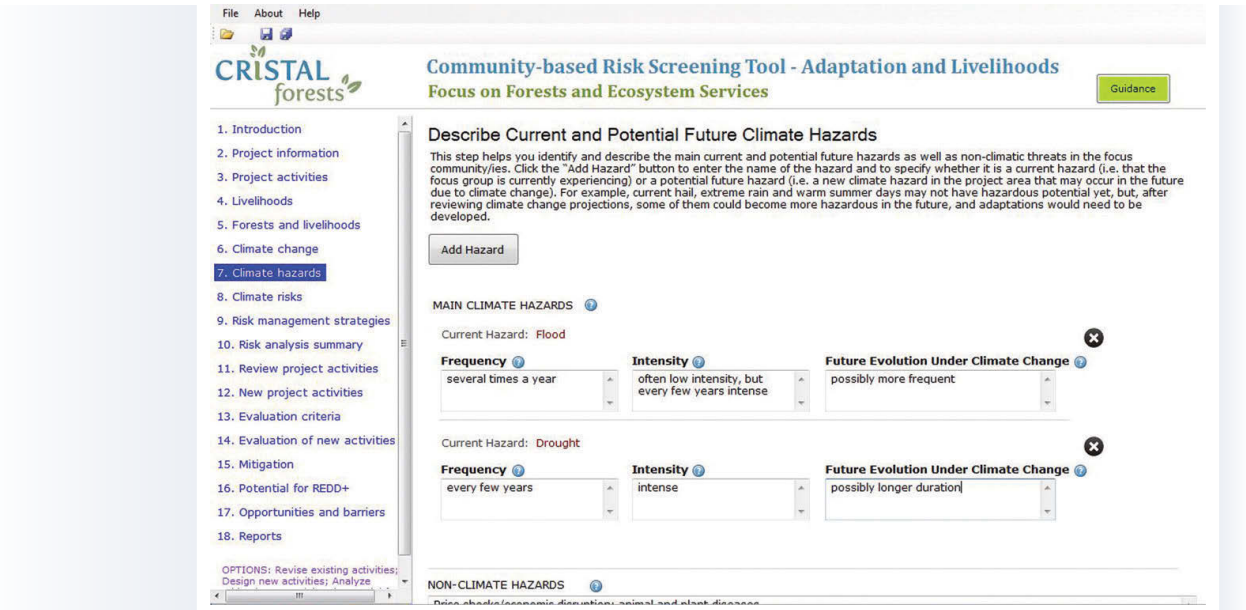
There are many other relevant sources of information, often region- or country-specific, that we cannot list here. Make sure to search the Internet thoroughly and to consult local experts.

Step > Describe current and potential future climate hazards

Objective > **To identify and describe the main current and potential future climate hazards as well as non-climatic threats in the focus community/ies.**

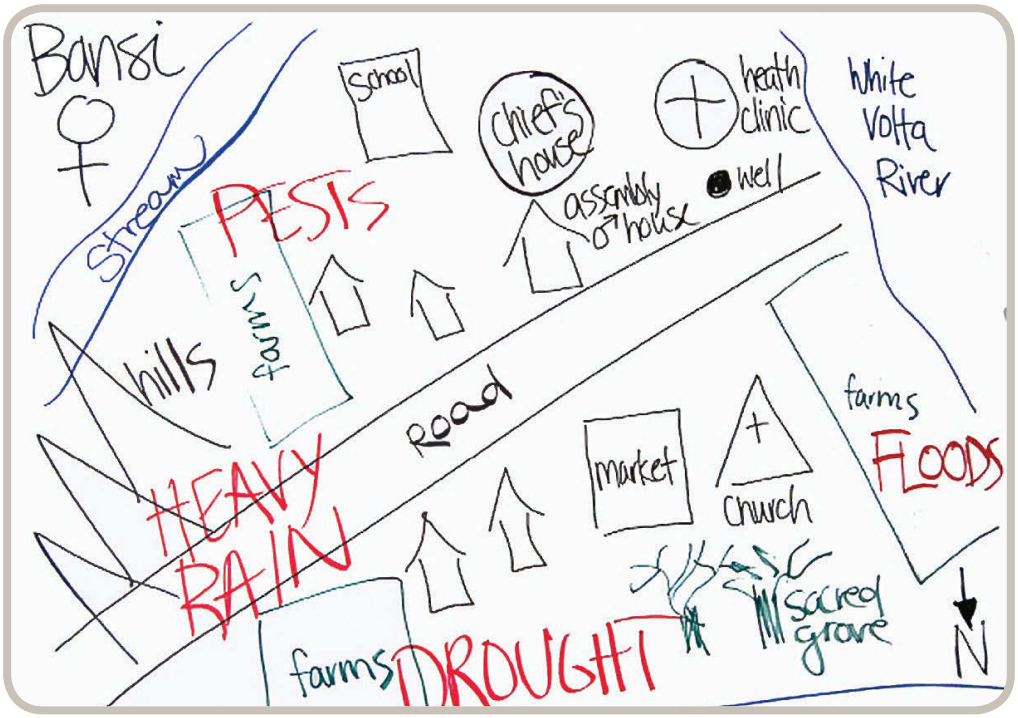
Process >

- Click the "Add hazard" button to enter the key climate hazards in the user's project area. You will then be asked to enter the hazard and to specify if this is a current hazard (i.e., that the focus group is currently experiencing) or if this is a potential climate hazard (i.e., a new climate hazard that may occur in the future due to climate change).
  - **Climate hazard** refers to "a potentially damaging hydro-meteorological event or phenomenon; 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).
- For each climate hazard selected, you will then be asked to specify:
  - Its **frequency**: How often a hazard occurs (e.g., once a year, twice a decade).
  - Its **intensity**: How "strong" the hazard is when it occurs (for examples, see the "Tips" section below).
  - Its **future evolution under climate change**: Anticipated changes in the location, duration, frequency and intensity of the hazard under climate change (e.g., storms are likely to occur less often but to become more intense in a specific area).
- Describe briefly other **non-climate hazards** mentioned by the focus group (e.g., earthquake, volcanoes, diseases). These will not be taken forward in the analysis but are important to be kept in mind because they can help you understand the broader vulnerability context.



Method >

- **Current climate and non-climate hazards**: This information should be mostly gathered through community consultations. We recommend that you conduct **a resource and hazard mapping** exercise with each focus group:
  - The first part of the resource and hazard mapping exercise is about drawing a map that identifies the boundaries and the key resources of the community. Further details on how to do this are explained under the previous "Forests and Ecosystem Services" step.
  - Once the focus group has finalized this map, you can start the discussion around key hazards that have affected the community in the past. Hazards may be natural or caused by humans. Do not limit the discussion to only climate-related hazards. This will clarify the importance of climate hazards compared to other risks. It may well be that climate hazards are not the most important hazards in the area.
  - Ask the group to identify those hazards that are related to climate. Among these hazards, the group should prioritize the three hazards that have the greatest impact on their ecosystem services and livelihoods.
  - Ask participants how often each of the three hazards occurs (several times a year, once a year, every five years, etc.) and how intense a typical occurrence is (i.e., short, long, severe, moderate, etc.). Ask them whether the frequency or intensity has changed over the past years and decades and ask them to explain how.
  - Ask the group to draw on the map where these hazards are occurring (showing which resources are impacted). Hazards that are not location-specific can be noted on the side.
  - When discussing climate hazards, you may also want to ask the focus group about observed climate changes over the past decades. This information can be filled into the respective box in the previous step ("Climate Change").
- **Information about potential hazards and future evolution under climate change**: Since community members are most likely not aware of new and changing future threats, it is recommended that you gather this information from the **scientific sources** provided in the previous step, "Climate Change."



Hazard map from Northern Ghana
(Photo: Angie Dazé; source: Dazé, Ambrose & Ehrhart, 2009)

Tips >

- **Links between climate and non-climate hazards**: Make sure to differentiate climate hazards from other hazards and to explore the potential linkages between the two:
  - Climate hazards (e.g., droughts, floods, rising temperatures) can influence other non-climate hazards, including biological hazards such as insects or other animal plagues and infestations; technological hazards such as industrial pollution, transport accidents, fires, etc.; and human health hazards such as waterborne diseases.
  - Participants may mention scarcity of resources, such as "lack of money," as one of the main threats or stresses they are facing. In this case, it should be determined whether the lack of a resource (in this example, financial resources) is the result of a climate hazard or any other hazard or combination of hazards, or whether the resource should be added to the list of priority resources identified in the previous step.
- **Distinguish the cause(s) from the consequence(s)**: Make sure that the issues identified are actual hazards and not conditions, such as "food insecurity." It is the role of the facilitator to ask the group to break down these conditions to determine if they are caused by climate hazards. For example, food insecurity may be the result of a drought, which is a climate hazard, or it may be the result of governance issues. Alternatively, food insecurity may be the result of a combination of both successive droughts and governance issues.
- **Be as specific as possible when characterizing the frequency and intensity of a climate hazard in a specific community/area** so that any outsider who is not familiar with the local context can understand what is meant. For example, what may be perceived and experienced as a "strong" flood in a specific area/community may be defined differently in another context.

Examples	General description	Detailed, more useful description
Frequency	"Rare flooding event"	"Once a year"
	"More frequent droughts"	"Forty years ago, droughts used to occur once every five years but in the last decade, droughts are occurring once a year or so."
Intensity	"Extreme flood"	"Floods the entire village and half the surrounding field"
		"River level increased one metre and floods nearby fields for a few weeks"
	"Moderate drought"	"Two to three weeks without rainfall and unusually warm temperatures"

Intensity refers to the magnitude of the hazard over a given period of time (e.g., speed of wind, height of flood, amount of rain falling in an hour). When describing the intensity of a climate hazard in a specific place, avoid focusing on the details of the impacts (i.e., how much damage is caused), as it is the focus of the next step.

Further info >

- **Hazard mapping**: Consult Field Guide 2 on page 33 of CARE's *CVCA Handbook* (http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf)

Step > Analyze climate risk

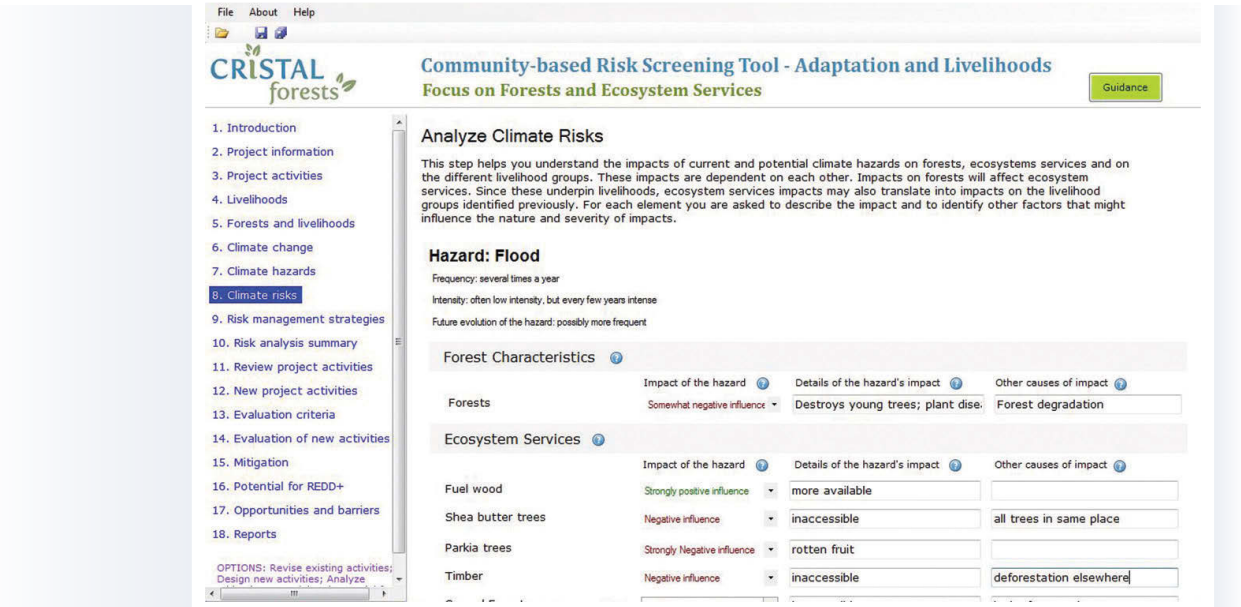
Objective > **To understand the impacts of current and potential future climate hazards on forests, ecosystem services and livelihood groups.**

Process >

Enter information about the **impacts of climate hazards** in the community/area of interest. **Impacts** refer to the consequences of hazards on natural and human systems, and can include forest and/or crop damage, income losses and reduced soil fertility. For each current and future potential climate hazard identified in the previous step, identify:

- **Impacts on forests**: The direct effects, positive or negative, of a climate hazard on the forests in the focus areas.
- **Impacts on ecosystem services**: The indirect effects, positive or negative, of a climate hazard on the ecosystem services the forests provide.
- **Impacts on livelihood groups:** The indirect effects of the combined climate impacts on forests and ecosystem services on each of the livelihood groups. It will be important here to recall the importance of each ecosystem service to each livelihood group as indicated on the previous step on "Forests and ecosystem services."

You can indicate the **quality and severity of each impact** by choosing one of seven descriptions (from "strongly positive impact" to "strongly negative impact") from a drop-down menu. You can also describe the impact in a box on "**Details of the hazard's impact.**" Finally, for each impact there is also a box on "**Other causes of impacts."** Here, you can enter other factors that contribute to the severity of direct and indirect impacts (e.g., soil erosion contributing to crop loss). This is important to note because other non-climatic trends and changes (e.g., poverty, environmental degradation) may exacerbate the negative impacts of climate hazards on livelihood resources.



Method >

Community consultations: We recommend starting with a discussion about impacts and then discussing impacts on livelihood resources using a vulnerability matrix exercise with the focus group.

- **Discussion on climate impacts**:

1. Refer to the priority hazards identified under the previous step and ask the focus group to discuss how these may directly affect the forests. They should come to an overall assessment as to how the forest is affected by each hazard.
2. Ask the group to identify the impacts on the ecosystem services identified in a previous step.
3. Ask them to evaluate how the combined forests and ecosystem impacts may affect each livelihood group.
4. Ask them also about what other factors might contribute to the impact, apart from the climatic hazard. For example, infrastructure damage can be provoked by a hurricane, but would not occur if there was not a lack of sufficiently strong building structures.

For this exercise, you may use large post-it notes for each direct impact, indirect impact and other causes, and put the notes in the right sequence on a flipchart or a wall. The community may not be able to easily identify impacts of potential future hazards, as they have not occurred yet. It is nevertheless worthwhile to discuss the potential direct and indirect impacts of such future hazards with focus groups.

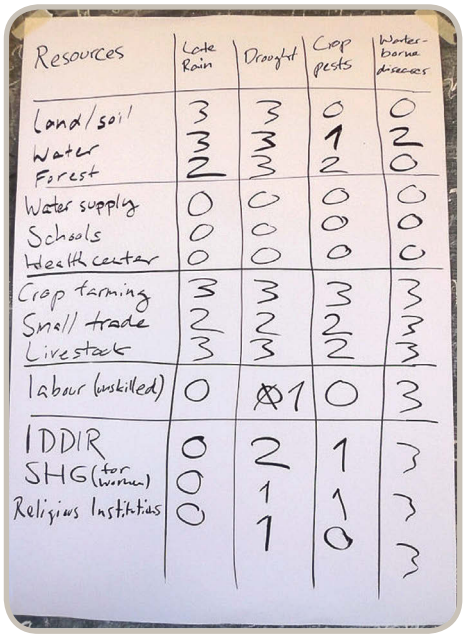
Examples of direct and indirect impacts (or climate impact chains) on livelihood groups:

- Drought ➔ trees dying (direct impact) ➔ soil degradation (indirect impact on ecosystem service) ➔ income loss for farmers (indirect impact on livelihood group)
- Hurricane ➔ destruction of mangroves (direct impact on forests) ➔ loss of natural barrier against storm surges (indirect impact on ecosystem service) ➔ destruction of fishermen's homes near the shore (indirect impact on livelihood group)

- **Identification of the most climate-sensitive livelihood groups using a vulnerability matrix**:

1. Prepare a matrix on a flipchart, with all forests, ecosystem services and livelihood groups listed in the left-hand column. Put the prioritized climate hazard in the top column.
2. Ask the focus group to score the impacts of each hazard on each resource according to the following scoring system:
   - -3 = strongly negative impact
   - -2 = medium negative impact
   - -1 = small negative impact
   - 0 = no impact
   - 1 = small positive impact
   - 2 = medium positive impact
   - 3 = strongly positive impact

   You can also use stones, symbols or different colours of markers (e.g., red = very high negative impact, etc.) to visualize the different impacts.
3. It is important to facilitate a discussion in which the group comes to consensus as to how to score impacts. The note taker should note key points of discussion that lead to the scores assigned, and any disagreements on the scores.



Resources	Late Rain	Drought	Crop pests	Water-borne diseases
Land/soil	3	3	0	0
Water	3	3	1	2
Forest	2	3	2	0
Water supply	0	0	0	0
Schools	0	0	0	0
Health center	0	0	0	0
Crop farming	3	3	3	3
Small trade	2	2	2	3
Livestock	3	3	2	3
labour (unskilled)	0	~~0~~1	0	3
IDDIR	0	2	1	3
SHG (for women)	0	1	1	3
Religious Institutions	0	1	0	3

Vulnerability Matrix from Western Ethiopia (note that a different scoring system was used here) (Source: Keller, 2010)

Further info >

- **Vulnerability matrix**: Consult Field Guide 5 on page 39 of CARE's *CVCA Handbook* (http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf)
- **Climate impact chains**: Consult the Climate Impacts: Global and Regional Adaptation Support Platform (ci:grasp) developed by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Potsdam Institute for Climate Impact Research (PIK) to learn more about climate impact chain and help you map the direct and indirect impacts of climate hazards in the user's community/area (http://cigrasp.pik-potsdam.de/about/impactchains)

Step > Identify and assess existing response strategies

Objective > **To identify effective and sustainable response strategies, including the ecosystem services needed to implement them.**

Process >

Enter information about current and alternative response strategies according to the key impacts identified in the previous step. For each hazard, you will see the chain of impacts entered in the previous step on top. This helps you identify response strategies that are aimed at any part of the impact chain:

- **Current response strategy/ies**: Identify the current response strategy/ies for each combination of direct and indirect impacts. You can identify up to five current response strategies per hazard.
- **Which livelihood group?**: Here you are prompted to indicate which livelihood group employs a response strategy.
- **Sustainability**: Identify whether the community considers the strategy/ies sustainable or not by choosing either "yes" or "no" from the drop-down menu. A strategy is not sustainable if it leaves individuals, groups or the entire community worse off in the long term; that is, if it undermines the communities' resource base and development objectives (e.g., selling of livestock or eating less during drought-induced food shortage). Explain why it is perceived as sustainable or not sustainable, for how long and for whom within the community.
- **Alternative strategies**: In case some response strategies are not sustainable, identify potential alternative strategies. Alternative strategies are proposed by the community although they are not in a position to implement them now (otherwise they would have mentioned them under current response strategy).
- **Required ecosystem services** (for implementing current or alternative strategies): Select among the ecosystem services identified as important for local livelihoods in a previous step, those that are required to put the current or alternative response strategies into practice. Required ecosystem services can be selected from the list on the right-hand side.
- **External resources**: Identify other potential services or resources needed to implement the different response strategies.

Method >

Community consultations: We recommend that users link the discussion on response strategies to the exercises on climate impacts in the previous step.

- Start the discussion by referring to each set of direct and indirect climate impacts on forests, ecosystem services and livelihood groups, and ask the community what their main response strategy is (you can add more than one if there are several main strategies, but make sure not to list more than three).
- Ask the community which groups within the community employ the strategy. If you consult the livelihood groups separately, indicate the group that has identified a given strategy.
- Next, discuss with them whether they consider the different strategies sustainable or not, for whom within the community, and the reasons.
- For any unsustainable strategy, ask the focus group to identify an alternative strategy that they would consider sustainable. They are typically not able to implement such strategies currently.
- Ask the focus group(s) which of the ecosystem services are needed to implement each current (or, if there is one, alternative) response strategy. For example, to deal with floods or droughts a community may decide to implement agroforestry systems, which rely on the forest's climate- and water-regulation services. If they mention any additional, external resources that are needed to make a strategy work, note them separately (this may often be the case for alternative strategies).

Tips >

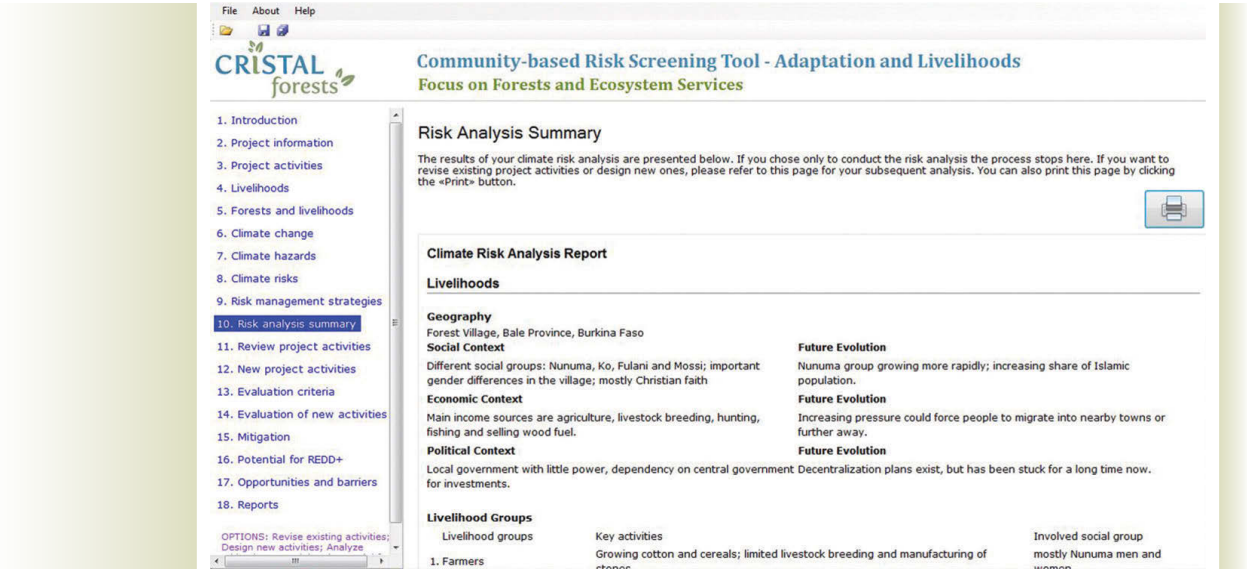
- Transferring the information collected using community consultation to CRiSTAL Forests is straightforward, as the provided boxes have the same sequence as the steps in which the information is gathered.

Step > Climate risk analysis summary report

Objective > **To review and analyze the results of the climate risk analysis.**

Process >

- Review the report and the results and, if necessary, go back into the tool at any previous step to make adjustments so that the summary report is as accurate, concise and comprehensive as possible.
- Save and print the summary report.
- Analyze and discuss the results. Keep the report at hand for the following steps (if you selected any of the options on the introduction page).



Method >

- **Project team discussions and ideally, if time and context permit, discussions with community members and other local partners.**
- This is an opportunity to develop a **common understanding** on the livelihoods, ecosystems and climate context within the project team and among the project teams, potential/existing beneficiaries and local partners.

Tips >

Examples of key questions to discuss when analyzing the reports

- **Livelihoods**
  - How does the livelihood context affect the vulnerability of livelihood groups to climate variability and change?
- **Forests Ecosystem services**
  - What is the role of ecosystem services in transmitting climate impacts from forests to livelihood groups? What is their role in reducing negative impacts (through their importance for response strategies)?
  - Who has access to, and control over, the forest resources that underpin these critical ecosystem services?
- **Climate change**
  - How might climate hazards (and therefore climate impacts) change with future climate change, and what does it mean for the sustainability of response strategies?
- **Impact chains**:
  - Which livelihood groups are affected by climate hazards? How and why?
  - How might non-climate hazards interact with climate hazards to create additional stresses?
- **Response strategies**:
  - How well is the community able to respond to impacts (analyze the information entered under "sustainability")? Are some social groups better able to respond to the impacts? Why and how?
  - What is already working well (i.e., which impacts does the community feel it can handle well)? What needs improvement?
  - How do livelihood resources contribute to effective responses?

What's next?

If you have chosen to (on the introductory page of this tool):

- Revise existing project activities, than you can continue with the next step, "Review project activities."
- Design new project activities (without revising existing activities), than you can go to "New project activities" (page X).
- If you have selected neither of the two options above, then you have completed the necessary steps.

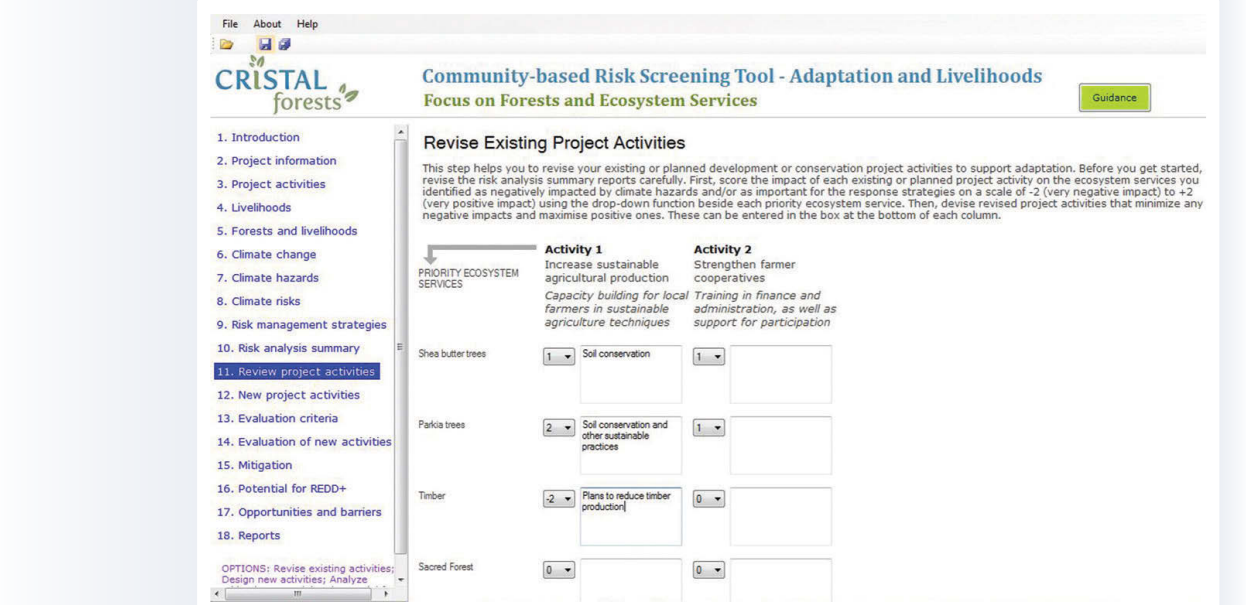
Step > Revise existing project activities

Objective > **To assess and revise planned project activities to support climate adaptation.**

Process >

Once existing project activities are entered and priority ecosystem services for local livelihoods in the community/area of interest are identified in the previous steps, they will automatically appear on this page (on vertical and horizontal axes).

- **Score the impact** of each existing project activity on the ecosystem services you identified as vulnerable to climate hazard and/or as important for the response strategies with any number between -2 (very negative impact) and +2 (very positive) using the dropdown function beside each priority service.
- **Explain the positive and/or negative impacts** of each existing project activity on the ecosystem services important for climate adaptation.
- **Devise revised project activities** that minimize any negative impacts and maximize positive ones.



Method >

- **Project team discussions, ideally, if time and circumstances permit, with inputs from community members and other local partners.**
- This step builds upon the results of the previous steps. Before getting started, review the climate risk analysis summary reports thoroughly to ensure you build on those results.

Tips >

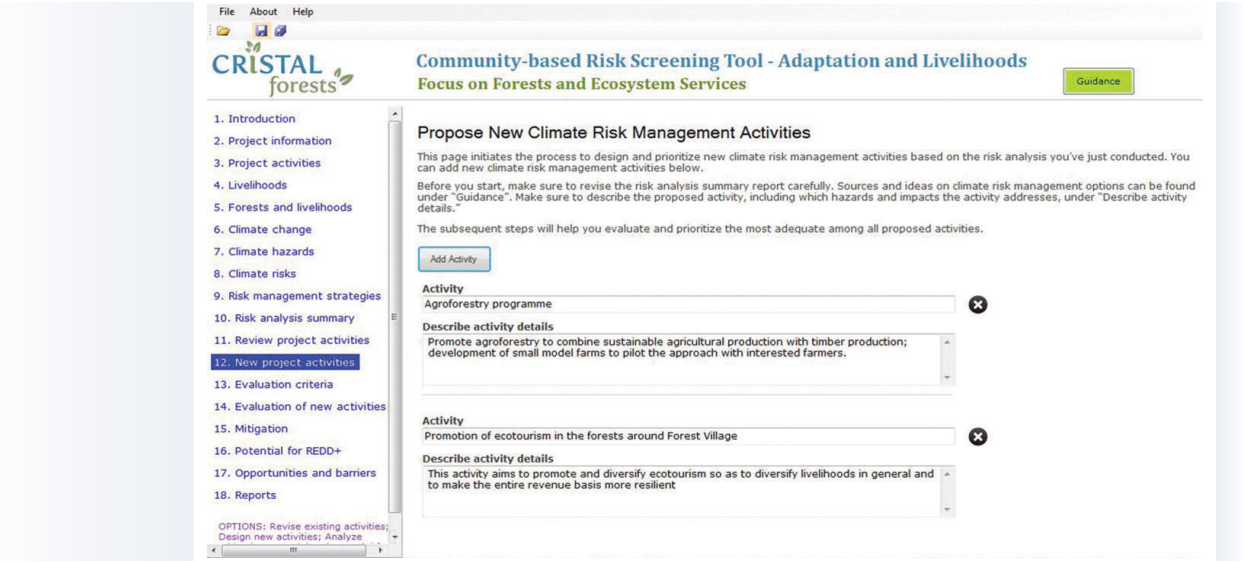
Using the climate risk summary reports, here are a few elements you should pay particular attention to when reading through the climate risk analysis summaries:

- **Forests and ecosystem services**: Consider to what extent the project activities affect, or are affected by, who has access to and control over forest resources and the ecosystem service they provide. Those who control the resources will influence the success in implementing the project. Adaptive capacity is strengthened if vulnerable groups have more access and control over critical resources.
- **Climate change**: Consider to what extent the project activities account for the positive and/or negative impacts of future potential climatic change.
- **Climate impact chains**: Consider whether the user's project activities contribute to reducing (positive impact) or increasing (negative impact) specific vulnerabilities (e.g., if a hurricane destroys trees that help regulate water and avoid floods, is the project providing alternative flood-protection measures or is it, on the contrary, helping move key crops into vulnerable areas?).
- **Responses**: Look at the ways in which ecosystem services are used in response strategies, and consider whether the project activities are supporting these functions or not.
- **Livelihood groups**: Identify which groups need particular attention in the project activities and what potential conflicts within a community you should take into account.

Step > Identify new project activities

Objective > **To propose new climate risk management activities.**

Process > Click the "Add activity" button. You will then be asked to enter the title of a new project activity that supports climate adaptation in the community/area of interest and to describe this activity. At this stage, you can add as many new activities as you like.



Method >

- **Project team discussions, ideally, if time and circumstances permit, with input from community members and other local partners** based on the results of the climate risk analysis summaries.
- **Literature review on climate adaptation strategies relevant to the project context.**

Tips >

Build upon a climate risk analysis: Here are a few elements you should pay particular attention to when reading through climate risk analysis summaries:

- **Livelihood groups**: The climate risk analysis identified the vulnerabilities and response strategies of different livelihood groups. When proposing new activities, be sure to target particularly vulnerable groups, and also make sure that new activities targeting one group are not detrimental to any other specific groups of the community.
- **Ecosystem services**: New climate risk management measures should target:
  - The ecosystem services identified as climate sensitive (i.e., that are affected by climate hazards) and find ways of reducing their sensitivity to current and potential future hazards.
  - The ecosystem services important for sustainable response strategies. Activities that strengthen these resources tend to bolster the adaptive capacity of the community.
  - People's access to, and control over, forestry resources (and the ecosystem services they provide) that are important for responding to climate impacts: When designing new activities, consider how they affect access and control. Adaptive capacity is strengthened if vulnerable groups have more access to, and control over, critical resources.

Tips > (continued)

- **Climate change**: Think of how the new activities will work or not under a changing climate in the short and long terms. Climate change may make currently minor risks more important, or lead to new ones. Make sure new activities account for the broader socioeconomic, political and ecological context that may increase people's vulnerability to climate hazards (refer to the livelihood context description under the climate risk analysis).
- **Responses**: Build upon solutions identified by local actors themselves instead of proposing new solutions. The community has already identified current strategies that are considered sustainable as well as alternative ones. These are examples of what works or what could work, and therefore provide an excellent starting point for any additional climate risk management activities. Also, assess what additional support the community might require to implement sustainable strategy ("External Resources" section) as a basis for designing new project activities.

Explore a wide range of response strategies

People can respond to climate hazards in many different ways, including by doing nothing or by decreasing, transferring or avoiding the negative impacts of climate risks on their livelihoods. The table below (adapted from Burton, 1996) classifies response strategies into seven different categories. This table is a useful tool to help you analyze the different types of responses documented through the community consultations and explore how the project can strengthen and even diversify those response strategies (i.e., if one strategy does not work, people can still rely on other response strategies). Similarly, some strategies may be more effective for certain groups in the community than others, and you can investigate why and how to take this into account in the new project activities. Not all response strategies are sustainable and some should be avoided (e.g., the project activities should help communities to move away from "bearing losses").

Response category	Definition	Note/example
Bear losses	Do nothing, absorb losses	No capacity to respond; responding costs too much
Share losses	Spread the burden of losses across different systems or populations	Extended families, publicly funded reconstruction, insurance
Change location	Move the activity or system	Relocating major crops to new areas; migration
Prevent losses	Continue activity, but in a modified manner to prevent effects of climate risk	Structural (reservoirs), on-site operations (crop management), institutional (land-use planning)
Change use	Stop and substitute economic activities not sustainable under climate change	Change crops, turn farmland into conservation area
Build adaptive capacity	Enhance resilience of system to improve ability to deal with stress	Research, raise awareness, change standards/policy
Modify the threat	Exercise a degree of control over the environmental threat	Climate change mitigation, specific hazard—e.g., flood control

Further info >

- In addition to the wealth of information you have gathered in the risk analysis, here is a selection of **external sources** that can point you to good ideas for designing climate risk management activities.
  - The **Adaptation Learning Mechanism (ALM)** is a global knowledge sharing platform that hosts a database of adaptation practices, policy and planning tools, and capacity-building resources. (www.adaptationlearning.net)
  - **weAdapt** is a knowledge platform that links to a range of case studies and articles on practical adaptation solutions**.** (www.weadapt.org)
  - The **Climate Adaptation Knowledge Exchange (CAKE)** is a knowledge base for managing natural systems in the face of rapid climate change. It offers, among other things, a wide range of case studies with practical adaptation solutions. (www.cakex.org)
  - The **Adaptation Partnership** offers a review of worldwide adaptation action that can inspire individual or community action plans. (www.adaptationpartnership.org/blog/activities)

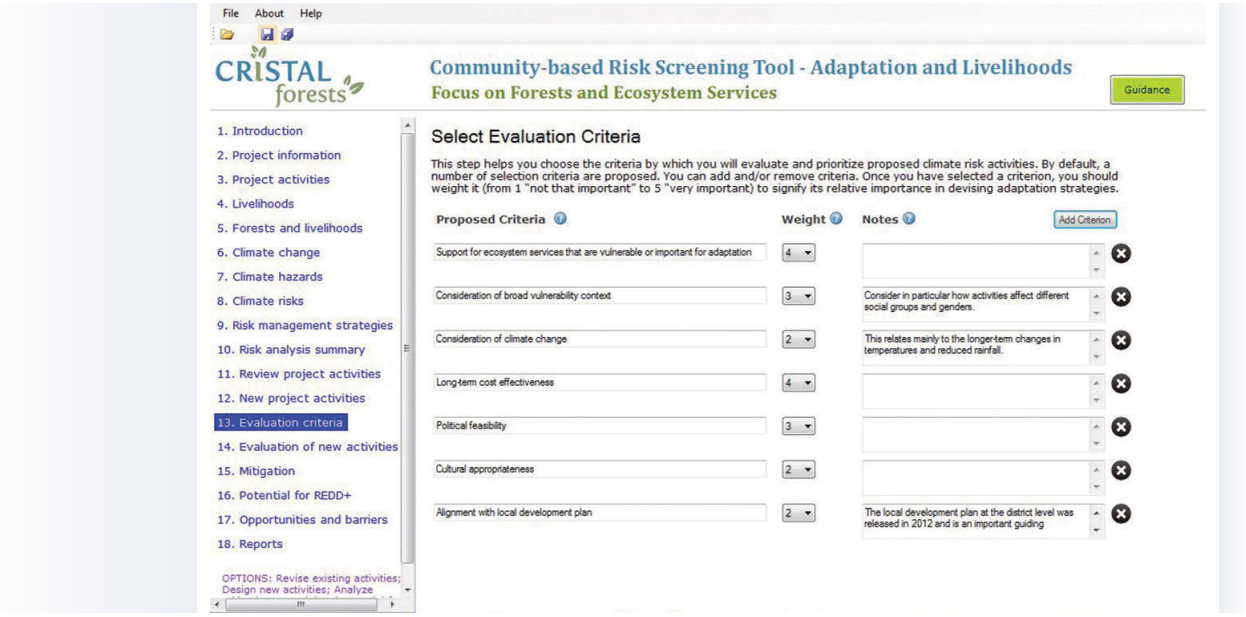
Many more resources can be found online and through contacting local experts.

Step > Select evaluation criteria

Objective > **To identify evaluation criteria for the selection of the new climate risk management activities.**

Process >

- **Choose the criteria** by which proposed climate risk management activities will be evaluated and prioritized. By default, a number of selection criteria are proposed (see below). You can add criteria by clicking on "Add criteria" and remove criteria by clicking on the X-buttons.
- **Weight the criteria** to signify their relative importance in devising adaptation strategies. Use the scrolling button to select a ranking from 1 (not that important) to 5 (very important).
- Optional: A note box is available to allow you to **describe why** you chose a given criterion and weight.



Method >

- **Project team discussions, ideally, if time and context permit, with inputs from community members and other local partners.**

Tips >

By default, seven equally weighted criteria are proposed:

- **Support for ecosystem services that are vulnerable or important for adaptation**: The climate risk analysis in the first part of the tool has identified key ecosystem services and looked at how they are impacted by climate hazards, and whether response strategies depend on them. The underlying logic is that if a project activity strengthens ecosystem services that are either vulnerable to climate hazards and/or important for coping, then it helps to reduce climate risk for the local communities.
- **Consideration of the broader vulnerability context**: Climate adaptation takes place in a larger social, economic, political and ecological context. Effective strategies need to take this context and its evolution over time into account. Information entered in the "livelihoods context" step in the first part of the tool can be considered here. Targeting the most vulnerable socioeconomic groups (e.g., those with less access to and control over critical resources) should form part of the evaluation under this criterion.
- **Consideration climate change**: The proposed activities should already take into account the impacts of climate change. Nevertheless, practical actions often focus on the more short-term risks. This criterion is intended to make sure that the projected longer-term climatic changes summarized in the analysis are explicitly taken into account. However, the user may also decide that addressing more immediate climate hazards is more important and this can be reflected in the weighting.
- **Long-term cost effectiveness**: Less costly solutions should be preferred for obvious reasons; however, cost effectiveness should be considered over the long term, as adaptation solutions will by their very nature often pay off only in the longer run. Looking at costs therefore needs to take into account not only the direct implementation costs of the project, but also the avoided future costs of climate impacts.
- **Political feasibility**: Running into strong political resistance with certain activities may undermine activities. Nevertheless, the transition towards sustainable development can be contentious and encounter political opposition. This criterion should therefore not be used to rule out innovative thinking.
- **Cultural appropriateness**: To be feasible, changes induced by new activities also need to respect the local culture. Otherwise, you may find that changes are not widely adopted. Similar to the previous criterion, this should not rule out change, as deeply rooted behaviours may often be part of the problem.
- **Greenhouse gas emissions**: While reducing carbon footprint may not be a priority for local development of poor and vulnerable populations, synergies between low-carbon and climate-resilient development should be exploited whenever possible. The operations of development organizations should also be run with as few emissions as possible. Note that if you have selected the "Mitigation and REDD+" option on the introduction page, your activities will be screened later for their contribution to increasing or reducing greenhouse gas emissions. In this case, you may want to delete this criterion here.

Step > Evaluate and prioritize new project activities

Objective > **To evaluate and prioritize the new climate risk management activities.**

Process >

This step allows you to evaluate the proposed new activities against their criteria. The proposed new climate risk management activities and the criteria from the previous steps will automatically appear on the horizontal and vertical axes.

- **Evaluate** to what extent each proposed activity meets each selection criterion by choosing any of the following values:
  - -2: the activity will have a very negative impact on the criterion
  - -1: the activity will have a negative impact on the criterion
  - -0: the activity will have a no important impact on the criterion
  - 1: the activity will have a positive impact on the criterion
  - 2: the activity will have a very positive impact on the criterion
- A note box is available to allow you to describe the reasons for the ranking. This will help you **justify your prioritization** of activities later on.

At the bottom of the page, a **total score** is calculated automatically using the weighting factors and the rankings. The total score can inform the types of activities selected for implementation (i.e., the higher the score, the better the activity). You can click on the "Select" button to choose the activities you want to implement.

Method >

- **Project team discussions, ideally, if time and circumstances permit, with inputs from community members and other local partners.**
- At the end of the page you will see the total score for each activity, which is calculated by multiplying the provided ranking with the weight of the respective criteria.

Tips >

- When ranking the activities according to each criterion, be sure to carefully consider the exact meaning of each criterion. If necessary, go back to the previous step and look at any notes provided to describe the criterion.
- The table below provides an example of how the total score is calculated:

Example	Weight	Activity ranking	Score for criterion (multiplication of weight and ranking)
Criterion 1	3	2	6
Criterion 2	1	0	0
Criterion 3	2	-1	-2
Total score			**4**

- The revised project activities are not evaluated in this step because it is assumed that it has already been decided that these activities will be implemented. The CRiSTAL Forests analysis will only contribute towards adjusting them incrementally rather than deciding whether they should be implemented or not.

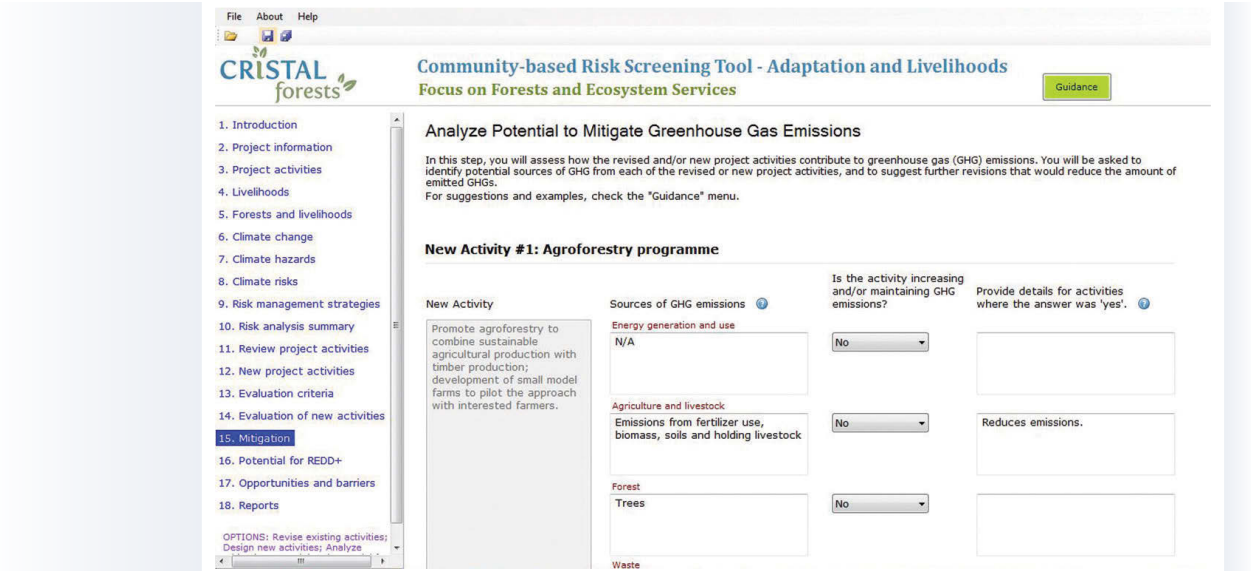
Step > Identify potential to mitigate greenhouse gas emissions

Objective > **To assess how revised and new project activities contribute to greenhouse gas emission and identify potential mitigation measures.**

Process >

Each existing and new activity will be taken through the following steps:

- **Identify the potential sources of greenhouse gas (GHG) emissions** in your project area. The focus is on four types of GHG emission sources, which are explained under "tips" below.
- Establish **whether your activity might be increasing and/or maintaining GHG emissions** of any of the four types.
- For activities that do increase or maintain GHG emissions, **explain how they do so**.
- Suggest **revisions to your activity** that can help reduce GHG emissions, based on the analysis in the previous steps.



Method >

- **Project team discussions, ideally, if time and circumstances permit, with inputs from community members and other local and regional partners.**
- You may wish to consult external experts if you want to conduct a deeper analysis. However this exercise is also useful for non-experts as it raises awareness on emissions sources and potential ways to reduce emissions.

Tips >

Types of GHG emissions sources: In CRiSTAL Forests, we recognize four types of GHG emission sources, which could include the following specific sources of GHGs in your project activities. (adapted from Keller, 2010):

- **Energy generation and use** (the combustion of fossil fuels leads to emissions of carbon dioxide [CO_2]). A project or a region can affect those emission sources in the following ways:

Tips > (continued)

- Use of *vehicles*: Emissions depend on how frequently vehicles are used and how fuel efficient they are.
- Use of *electricity*: Emissions depend on how much electricity is used and where it comes from (i.e., whether it comes from renewable energy sources such as hydro, wind, or solar power, or from sources producing GHG emissions such as thermal plants or generators)
- Use of *energy in buildings*: Potential sources include heating and cooking stoves. Emissions depend on how much energy is used in buildings and whether energy sources are renewable or not.

• ***Agriculture and livestock*** (agricultural production could lead to GHG emissions, including CO_2, nitrous oxide and methane). The following potential emission sources or sinks should be considered:

- Use of *soils*: Soils perform an important function as carbon sinks, whereas degraded soils can capture less carbon. Activities contributing to soil erosion, such as drainage, salinization, acidification, the destruction of organic matter and excessive cultivation, tend to have negative effects on climate change, whereas those contributing to revegetation, such as use of organic fertilizers, leaving crop residues on the fields, increasing soil cover and intelligent irrigation systems, can be expected to improve carbon capture of soils.
- Use of *biomass*: Burning biomass on fields contributes to climate change, whereas if it is used as a source of energy (thereby replacing fossil fuels) it can have positive effects. Livestock manure produces GHG emissions, mainly nitrous oxide. However, it can be used as a fertilizer. It can therefore help avoid emissions from producing and applying synthetic fertilizers.
- Use of *fertilizers*: Synthetic fertilizers lead to emissions of certain GHGs during their production process and when applied in large quantities to soils. Replacing them with organic fertilizers tends to reduce emissions.
- *Deepwater cultivation*, for instance with rice, can lead to significant methane emissions.
- *Holding livestock* can result in important emissions of methane due to enteric fermentation from ruminants. The total amount of emissions depends on the species and number of animals as well as on nutrition practices. Holding livestock can also lead to land use and land-use change, considering damage the livestock can cause to soils, and the deforestation caused if forests are slashed or burned for use as pastures.

• ***Forests*** (forests capture CO_2, and their destruction increases GHG concentrations in the atmosphere). Projects or a region can influence the climate change impact of forests in the following ways:

- *Area* of the forest and *size and type of trees*, which can be influenced through deforestation, reforestation and afforestation, which are in turn influenced by the use of land, firewood etc. Note that degraded forests can also become a source of GHG emissions.
- Practices of *agroforestry* can allow agricultural use of lands without deforesting an area. This depends, however, on the type of forest.
- **Waste** (emissions through the production processes of packaging and other unconsumed parts, their combustion, and processes of decomposition). Emissions from waste depend on the following factors:
- Quantity of waste, considering recycling and the amount of consumption of products with a lot of packaging.
- Type of waste, considering that plastic and other synthetic materials influence emissions negatively, whereas waste consisting of biomass could be used in organic fertilizer production (composting—see next item).
- Use of waste, considering the beneficial use of some waste products as fertilizer, and considering negative effects from burning waste.

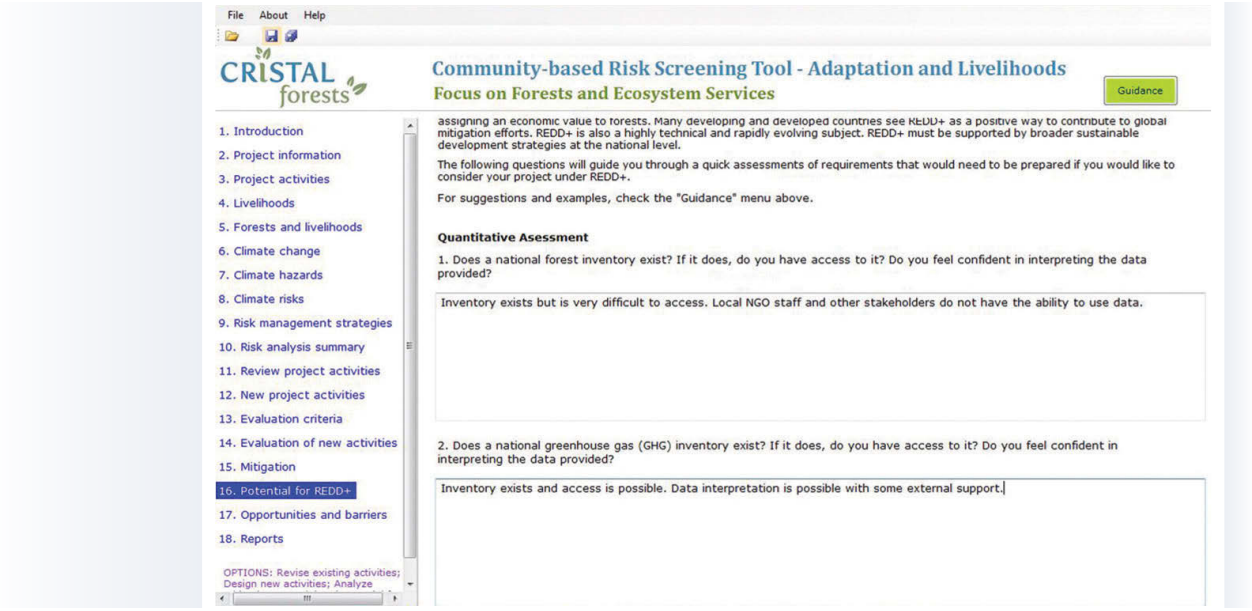
Step > Assess potential for participating in REDD+

Objective > **To assess the feasibility of participating in REDD+ schemes.**

Process >

By answering the following questions, you will conduct a preliminary assessment of enabling factors for considering your project activities under a REDD+ scheme. Negative answers will point to an environment in which it will be difficult or impossible to establish a REDD+ scheme.

- Quantitative assessment:
  - Does a national forest inventory exist? If it does, do you have access to it? Do you feel confident in interpreting the data provided?
  - Does a national Greenhouse Gas (GHG) inventory exist? If it does, do you have access to it? Do you feel confident in interpreting the data provided?
  - Do ongoing measurement, data collection, and analysis of carbon stocks occur within your project area? If so, do you know who is responsible? Do you have access? Do you feel confident in interpreting the data provided? If not, do you have any experience or expertise available to begin measuring carbon stocks in your project area?
- Qualitative assessment:
  - Are any existing international agreements or certification schemes regarding safeguards applied or enforced in the project area? (Yes/No) If yes, which ones?
  - Are there transparent and effective forest governance systems in place in your project area? If there are, do you feel that local knowledge is included or reflected in the governance system? Does the governance system provide opportunities for effective participation of relevant stakeholders?
  - Are you able to identify additional environmental or social benefits that could come from your project? If so, what are they?
  - Describe any needed new activities beyond the scope of the analyzed project.



Method >

- **Project team discussions, ideally, if time and context permit, with inputs from community members and other local partners.**
- You may wish to consult external experts if you want to conduct a deeper analysis.

Tips >

- Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. "REDD+" goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (UN-REDD, 2013)
- The CRiSTAL Forests provides an initial and broad assessment of whether or not your project might have the potential to be a REDD+ project in the future and the types of requirements that need to be taken into consideration. This worksheet includes a series of simple questions about data, monitoring and forest governance in your area to help you identify what is needed to be potentially relevant for the REDD framework.
- REDD+ has the potential to accrue economic, environmental and social benefits, but it is not a panacea or "silver bullet" solution. REDD implementation must be supported by broader sustainable development strategies at the national level. While a number of challenges must be addressed moving forward, REDD remains an innovative and constructive element of the international climate change negotiations and is translating into real action on the ground.

Further info > Further resources and information on REDD+ can be accessed at http://www.iisd.org/climate/land_use/redd/resources.aspx.

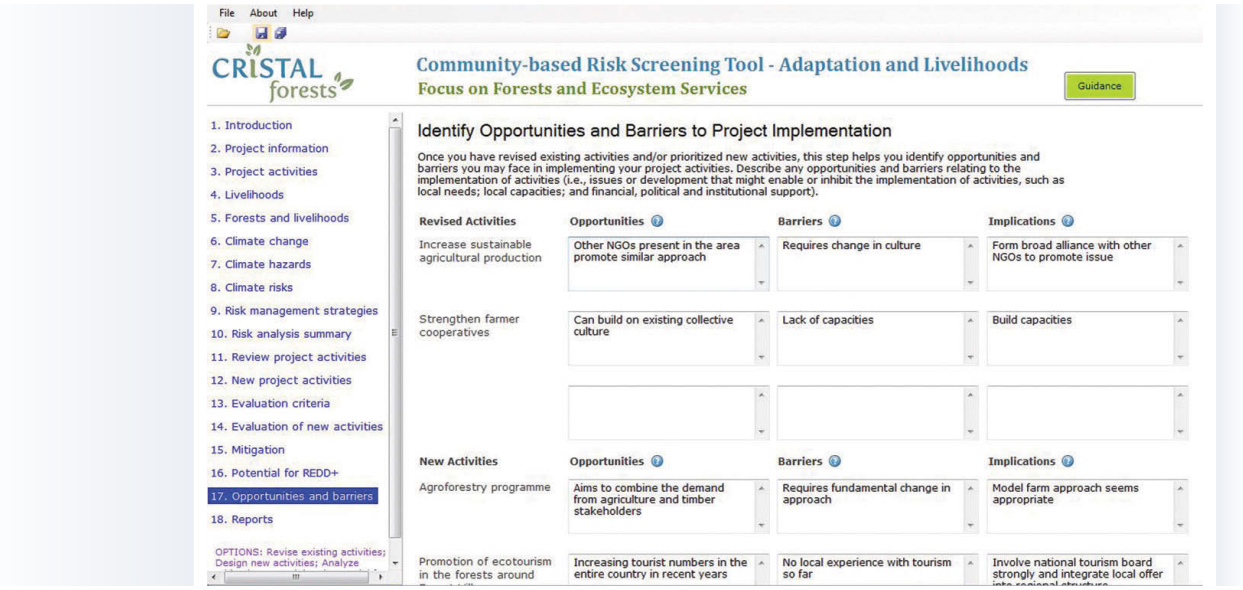
Step > Identify opportunities and barriers to project implementation

Objective > **To identify opportunities for and barriers to the implementation of the project activities.**

Process >

Once you have entered revised and/or new project activities in the previous steps, they will automatically appear on the left-hand side of this page (horizontal axis). You are then asked to identify the following:

- **Opportunities**: List any factors that will facilitate the implementation of each activity (e.g., strong local support, synergies with other projects, funding prospects, political will, etc.).
- **Barriers**: List any factors that may provide obstacles to the implementation of each activity (e.g., skepticism of the local population, duplication with other initiatives, lack of funding, political opposition, etc.).
- **Implications**: Note what the combination of opportunities and barriers means for the activity (e.g., further consultations with locals if there is skepticism, consult with other project teams to exploit synergies and avoid duplication, move ahead quickly to exploit a funding opportunity, engage political leaders, etc.).



Method >

- **Project team discussions** completed in some cases with additional interviews and consultations with key informants or stakeholder groups to identify key issues.

Tips >

- Filling in the boxes is optional, but going through the three steps for each activity could help you avoid pitfalls and build on synergies when implementing the activities.

Step > Project evaluation summary reports

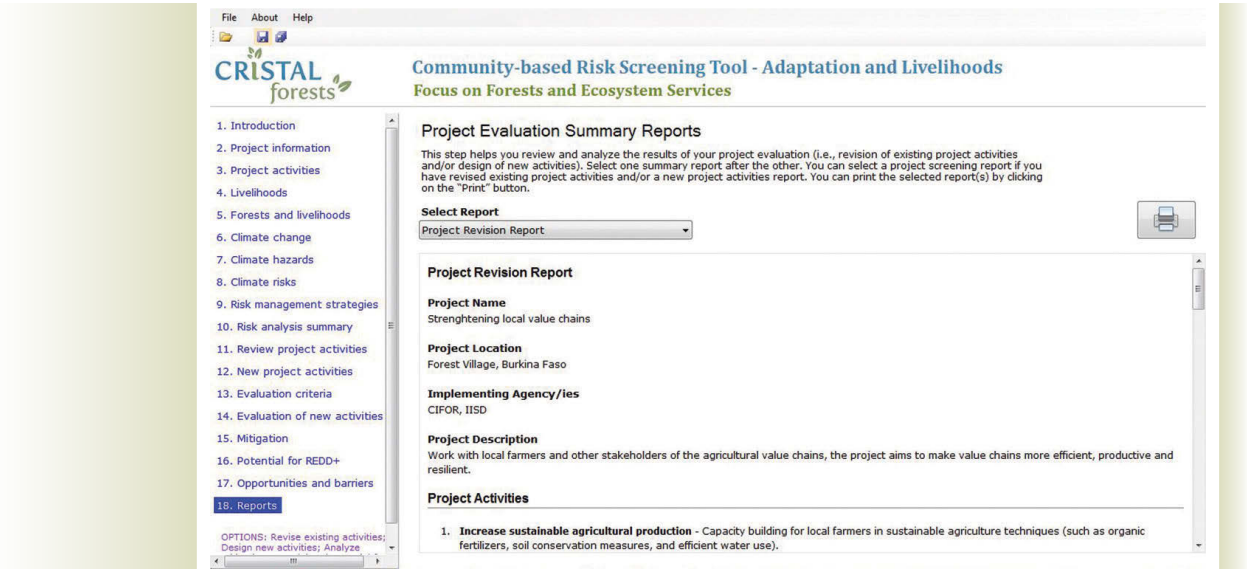
Objective > **To review the results of the tool application.**

Process > Select one summary report after the other. You can choose to select among three different reports:

- Project revision report
- New project activities report
- Potential for REDD+

These reports can be selected and printed as the risk analysis summary reports.

They should help you implement activities.



Additional Useful Information

Photo: Participants in a CRiSTAL training in Liberia. It is highly recommended that new users acquire training to benefit the most from the tool.

Why Use CRiSTAL Forests?

Four key attributes and comparative advantages

- **Simplicity and practicality**: CRiSTAL Forests provides a systematic, simple and flexible framework for understanding and analyzing the links between climate risks, vulnerabilities and adaptive capacities, livelihoods, ecosystems and development projects. The steps of the CRiSTAL Forests analysis are explicitly and logically linked. The tool helps users summarize, consolidate and organize the information collected at the community level in a very logical manner. The summary reports further facilitate the data analysis process. The CRiSTAL Forests process requires between two to five days and can lead to both incremental and more substantial changes in community-based project design and management.
- **Livelihoods, ecosystems and climate-risk focused**: CRiSTAL Forests does not treat climate risks solely as an environmental problem, but links them to the lives and development prospects of the concerned communities through its approach centered on ecosystem services and livelihoods. The emphasis on livelihoods and ecosystems also allows the user to focus on opportunities and capacities (i.e., what people have and do) rather than just constraints (i.e., what they lack). CRiSTAL Forests focuses on both climate variability and climate change. Current vulnerabilities and risks as indicated by the target community are the point of departure of the analysis; however, long-term climate projections are taken into account as well.
- **Participatory**: CRiSTAL Forests explicitly and systematically relies on communities' and local experts' knowledge and experience, and applies participative methodologies to collect the relevant information. This approach helps to ground the analysis in local realities and empower communities and local actors to identify climate adaptation interventions that are in tune with local needs, priorities and conditions.
- **Versatility**: CRiSTAL Forests can be (and has already been) used at different scales (from community to national-level interventions) and for different purposes (i.e., to screen natural resource management projects, forestry policies, proposed adaptation activities or to support parts of a comprehensive climate risk assessment). CRiSTAL Forests can also provide different levels of details. For example, it can be used more than once in the same area/community to gather detailed information about specific groups.

Where and How is More Information Available?

A range of resources are available on the **CRiSTAL website**, www.iisd.org/cristaltool, including:

- Downloads of the tool and this *User's Manual*.
- **CRiSTAL Stories briefs,** documenting best practices associated with the application of CRiSTAL and CRiSTAL Forests.
- **Examples of past CRiSTAL and CRiSTAL Forests applications** around the world, including a database of users' reports. These reports can allow users to identify the "CRiSTAL champions" in the user's country or region.
- **An events calendar** showing upcoming training sessions and other activities.

CRiSTAL Forests training workshops are conducted periodically in different regions around the world. Previous experiences with using CRiSTAL have demonstrated that, for new users, it is important to attend a training session. The training workshops often provide participants with an introduction to some of the basic concepts and approaches to climate change adaptation, its links to ecosystem services and sustainable livelihoods and how they relate to the CRiSTAL process. Group work and practical application are strongly emphasized. However, each one of the training sessions is different, tailored to expressed needs and available resources. Examples of completed training sessions are available through the website.

Please check the website regularly for updates about the tool and its applications (e.g., translation of the tool into different languages, development of online training materials).

To learn more about CRiSTAL Forests and associated training opportunities, or simply to share your experience with the CRiSTAL application, please contact: Marius Keller (mkeller@iisd.org) or Anne Hammill (ahammill@iisd.org) at the International Institute for Sustainable Development (IISD).

References

Burton, I. (1996). The growth of adaptation capacity: Practice and policy. In J.B. Smith, N, Bhatti and G Menzhulin (Eds.). *Adapting to climate change: Assessments and issues*. Verlag, Berlin: Springer.

Dazé, A., Ambrose, K. & Ehrhart, C. (2009). *Climate vulnerability and capacity analysis handbook.* CARE Climate Change Information Centre. Retrieved from http://www.careclimatechange.org/files/adaptation/CARE_CVCAHandbook.pdf

Ellis, F. (2000). *Rural livelihoods and diversity in developing countries*. Oxford: Oxford University Press.

Intergovernmental Panel on Climate Change (IPCC). (2001). *Climate change 2001: Impacts, adaptation and vulnerability.* Cambridge, UK: Cambridge University Press. Retrieved from http://www.grida.no/publications/other/ipcc_tar/

IPCC. (2007a). *Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).* M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, (Eds.). Cambridge, U. K.: Cambridge University Press. Retrieved from http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm

IPCC. (2007b). *Climate change 2007: Mitigation of climate change. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).* B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, & L.A. Meyer (Eds.). Cambridge, U. K.: Cambridge University Press. Retrieved from http://www.ipcc.ch/publications_and_data/ar4/wg3/en/contents.html

IPCC. (2012). Glossary of terms. In C. B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken & K.L. Ebi et al. (Eds.). *Managing the risks of extreme events and disasters to advance climate change adaptation. A special report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC)* (pp. 555–564). Cambridge, U. K.: Cambridge University Press. Retrieved from http://www.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf

Keller, M. (2010). *Participatory tool on climate and disaster risks integrating climate change and disaster risk reduction into community-level development project* (Working Paper [Ver. 5]). Hilfswerk der Evangelischen Kirchen Schweiz (HEKS). Retrieved from http://www.heks.ch/fileadmin/user_upload/domain1/1_news_and_service/pdf/Materialien/2010_CliDR_Englisch.pdf

Lund, H. G. (2002). *When is a Forest Not a Forest? Journal of Forestry, 100*(8), 21–27. http://home.comcast.net/~gvde/2002notforest.pdf

Millennium Ecosystem Assessment. (2005). *Ecosystems and human well-being: Current state and trends. (Vol 1). Findings of the Condition and Trends Working Group.* R. Hassan, R. Scholes & N. Ash. Washington, D. C.: Island Press. Retrieved from http://www.millenniumassessment.org/documents/document.766.aspx.pdf

Tompkins, E. L. & Adger, W. N. (2003). *Building resilience to climate change through adaptive management of natural resources* (Tyndall Working Paper 27). Retrieved from http://www.tyndall.ac.uk/sites/default/files/wp27.pdf

United Nations Development Programme. (2005). *Adaptation policy frameworks for climate change: Developing strategies, policies and measures.* Eds. Bo Lim and Erika Spanger-Siegfried. UNDP/GEF. Retrieved from http://www.preventionweb.net/files/7995_APF.pdf

United Nations International Strategy for Disaster Reduction. (2009). *2009 UNISDR terminology on disaster risk reduction.* Geneva, Switzerland: UNISDR.

United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD). (2013). About REDD+. Retrieved from http://www.un-redd.org/aboutredd/tabid/582/default.aspx

CRISTAL forests

For more information, please consult www.iisd.org/cristaltool