CRiSTAL

CRiSTAL User's Manual Version 5

Community-based Risk Screening Tool – Adaptation and Livelihoods

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SEI Stockholm Environment Institute

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Introduction

Photo: Community members are discussing the impacts of climate variability and change on their livelihoods as part of a CRiSTAL application in Ghana.

Background

Climate variability is one of many stresses faced by local communities. Climate change may further alter climate variability over time by increasing the frequency and intensity of extreme weather events, by creating gradual changes in average climate conditions, or by generating new climate hazards.

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 a development project, particularly in communities characterized by climate-sensitive and/or 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 food security project may encourage dependence on a particular agricultural technology or crop species that may be negatively affected by climate change, 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 vulnerability and exposure, 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.

Box 1: Four interesting facts about CRiSTAL

- **Demand-driven**: CRiSTAL was developed 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.
- **Partnership-driven**: CRiSTAL was developed by four international non-governmental organizations (NGOs): International Union for the Conservation of Nature, International Institute for Sustainable Development, Stockholm Environment Institute and Helvetas Swiss Intercooperation. The CRiSTAL applications and revisions continue to build upon this partnership, which fosters knowledge exchange, creativity and learning.
- **User-endorsed**: CRiSTAL was developed and tested during the period 2004–2006. As such, it was one of the first community-based climate risk screening tools. From 2007 until 2012, CRiSTAL has been applied in over 20 countries in Asia, Africa and Latin America by various institutions and development professionals, thereby creating a worldwide pool of experts or "CRiSTAL champions."
- **Dynamic**: Since its launch in 2007, CRiSTAL has been updated to incorporate its users' needs and priorities as well as the latest thinking in the field of climate change adaptation. The current and completely revised version of CRiSTAL was developed between 2010 and 2012 based on extensive user experience and feedback.

Some 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 make a living (Adapted from Ellis, 2000).
Weather	The state of the atmosphere at a particular place and time as regards heat, cloudiness, dryness, sunshine, wind, rain, etc. (Online Oxford Dictionaries).
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], 2007).
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, 2007).
Climate hazards	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 (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, 2007; 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, 2007).
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).

Part 1 | CRiSTAL at a Glance

Photo: A project team is entering data collected during community consultations into the CRiSTAL tool.

What is CRiSTAL?

CRiSTAL is a project planning tool that helps users design activities that support climate adaptation (i.e., adaptation to climate variability and change) at the community level. CRiSTAL stands for "Community-based Risk Screening Tool – Adaptation and Livelihoods."

- "Community-based" – CRiSTAL focuses on projects at the local community level.
- "Risk Screening" – CRiSTAL helps users to identify and prioritize climate risks that their projects might address.
- "Adaptation and Livelihoods" – CRiSTAL helps users to identify livelihood resources most important to climate adaptation and uses these as a basis for designing adaptation strategies.

Box 2: Overview of CRiSTAL

Objectives: CRiSTAL helps users to understand:

- How current and potential future climate hazards affect/may affect a project area and local livelihoods.
- How men and women respond to the current and potential future impacts of these climate hazards.
- Which livelihood resources 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 livelihood resources.
- What project adjustments (revision of existing activities and/or design of new activities) can be made to support climate adaptation and reduce climate risk.
- To what extent the project contributes to climate adaptation.

Target user: CRiSTAL 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: CRiSTAL 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 leads to three main outputs:

1) List of livelihood resources that are most affected by climate hazards and most important for responding to climate impacts.
2) Proposed adjustments to existing projects and new activities to support climate adaptation.
3) List of desired adaptation outcomes and important influencing factors to be monitored.

Outcome: Projects improve livelihoods in the short and long terms in a context of climate risk.

Format: CRiSTAL is a desktop application compatible with Microsoft Windows 7 operating systems and greater versions. It is currently available in English. Translations of the tool in other languages will be released in the future (please check www.cristaltool.org for updates).

CRiSTAL is a tool to help users integrate climate adaptation into community-level projects

CRiSTAL helps users understand the links between a development project and its contribution to climate adaptation. The rationale of a development project may be to address one or more development challenges, such as poverty, environmental degradation or gender inequality. The impacts of climate variability and change may undermine efforts to address these challenges. Despite this, unless development projects have climate adaptation as an explicit objective, they rarely account for it. CRiSTAL helps project planners and managers ensure that their project supports or, at a minimum, does not constrain climate adaptation so that communities are able to achieve their development goals.

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

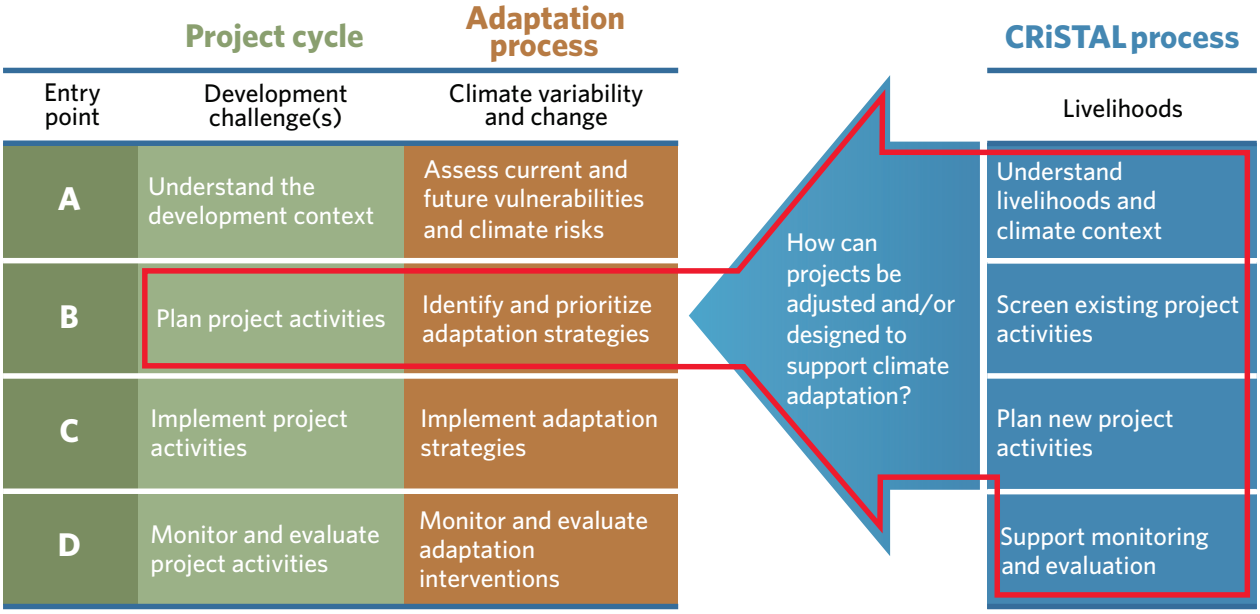


Figure 1 shows how CRiSTAL helps users to connect a project cycle with the process of adapting to climate variability and change:

- **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 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 comprised 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. Again, CRiSTAL supports users most in the **design of adaptation strategies** (step B of the adaptation planning process), although it also helps users gather some information on current and future risks and prepare users for the implementation stage.

- **CRiSTAL process**: CRiSTAL helps users to: (i) understand the livelihoods and climate context of a community or area of interest; (ii) screen existing project activities to assess their impacts on livelihood resources that are important to climate adaptation, and revise these activities accordingly; (iii) plan new project activities that support climate adaptation; and (iv) support M&E. The list of revised or new project activities contributes directly to step B in both the adaptation planning process and the project cycle. However, there are other links—that is to say, information gathered to establish the livelihoods and climate context in CRiSTAL can contribute to a risk assessment, as well as establish a monitoring and evaluation system.

CRiSTAL is a decision-making framework centred on livelihoods

Livelihoods provide the entry point for the CRiSTAL analysis. This is 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.

Specifically, CRiSTAL draws from the Sustainable Livelihoods Framework by characterizing livelihoods in terms of six categories of "assets" or resources (i.e., natural, physical, financial, human and social, and political resources).

The "livelihoods" approach helps users focus on:

- Development issues and people's interests (i.e., how to make, and sustain, a living) in the context of climate variability and change, rather than seeing climate risk as an environmental problem.
- Opportunities (i.e., what people have and do) rather than just constraints (i.e., what they lack).
- People's access to, and control over, these resources, rather than just the presence or absence of resources.

How does CRiSTAL Contribute to Climate Vulnerability and Risk Assessments?

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

However, CRiSTAL 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.[1] Rather, CRiSTAL is narrower in its focus; it takes users through a series of steps to gather and analyze information on local livelihoods and climate in order to understand which livelihood resources should be targeted in project activities so that communities are better able to manage climate risk/adapt to climate change. Table 1 clarifies the role of CRiSTAL in a climate risk assessment.

[1] See, for example: USAID's guidance manual for development planning, *Adapting to Climate Variability and Change (2007)*, available from http://pdf.usaid.gov/pdf_docs/PNADJ990.pdf; the Red Cross/Red Crescent's *Climate Guide* (2007), available from http://www.climatecentre.org/downloads/File/reports/RCRC_climateguide.pdf; and the PROVIA *Guidance on Assessing Vulnerability, Impacts and Adaptation (VIA)* (draft, 2012), available from: http://www.provia-climatechange.org/HOME/tabid/55173/Default.aspx

Table 1: Role of CRiSTAL in a climate risk assessment

	Comprehensive climate risk assessment			CRiSTAL	
	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 main changes in socioeconomic, political and environmental context changing? What will it look like in the future?	Partly (only focus on current livelihoods)	• Livelihood context (step 1, see Figure 2 next page)
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 men and women/ resources affected by climate hazards? Why? (Sensitivity)	Partly (only focus on current impacts, does not explore the "why" question in detail)	
			• What do men and women do to respond to the impacts? (Adaptive capacity)		
		• Current and future **climate risk**	• What are the probabilities and the range of potential harmful consequences of climate variability and change?	Partly (only focus 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 is 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?

CRiSTAL is organized according to three phases, which build on each other:

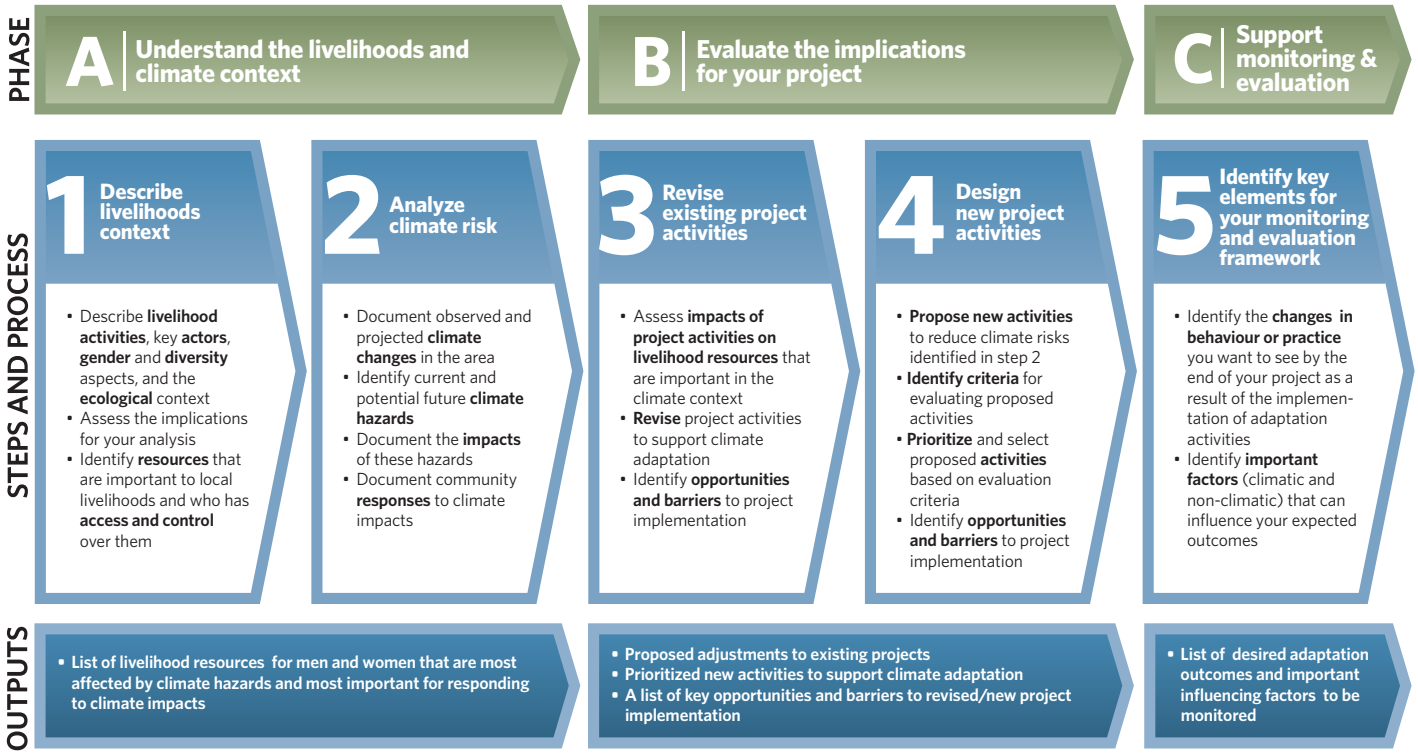
A. Understand the livelihoods and climate context

B. Evaluate the implications for the project

C. Support M&E of climate adaptation

Depending on needs, the user can decide to only focus on understanding the livelihoods and climate context of a focus community/area. Once one has done this, the user can go on to screen projects and prepare for their implementation; the user cannot, however, go the other way—screen projects or prepare their implementation without having first assessed the livelihoods and climate context. Figure 2 summarizes the overall CRiSTAL framework.

Figure 2: The CRiSTAL framework.



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

- **Phase A: "Understand the livelihoods and climate context of focus communities"**: The user is first asked to **describe the livelihood context (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 outcome: A list of livelihood resources 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 livelihood resources that are either vulnerable to climate hazards or important for responding to the impacts of these hazards. Specifically, the user assesses the impacts of project activities on these climate-relevant livelihood resources. The user can then **revise the project activities (step 3)** so that livelihood resources are less exposed or vulnerable to climate hazards, or are better able to support local responses to climate impacts. The user 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. The user is also asked to identify the opportunities and barriers to the implementation of the revised and/or new project activities.

> **Main outcome: A list of project adjustments and prioritized new activities that support climate adaptation and a list of key opportunities and barriers to revised/new project implementation.**

- **Phase C: "Prepare for the monitoring and evaluation of climate adaptation":** Finally, the tool helps the user to identify some **key elements to be integrated into an existing or newly developed M&E framework (step 5)**. The user is asked to think about the revised/new project activities in terms of the changes in behaviour or practice that he/she wants to see by the end of the project as a result of implementing the adaptation activities (i.e., adaptation outcomes) and to identify the important factors (climatic and non-climatic) that can influence the expected outcomes (i.e., key contextual factors).

> **Main outcome: List of desired adaptation outcomes and important influencing factors to be monitored.**

What Methods Are Used?

CRiSTAL 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 some scientific information is required to analyze climate risk (step 2), the remaining steps 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 and local climate context** necessary to undertake the CRiSTAL analysis. As a result, it is highly recommended that CRiSTAL 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 is **flexible** and generally left to the discretion of the user. However, CRiSTAL 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 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 needs and resources. (See also the section entitled "What resources are required" on page 14.)

Communities can be engaged **throughout the entire CRiSTAL process** (from steps 1 to 5 of the CRiSTAL framework, Figure 2, page 12) or engaged in certain aspects of the analysis. Typically, they should be consulted at least in steps 1 and 2 of the CRiSTAL process to gather information on livelihoods and local climate context and to discuss the links between the two (i.e., How are livelihood resources affected by current climate hazards? How important are these resources for responding to climate risks?). 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, vulnerability matrix). Different social groups often have different roles and responsibilities in a community, and as such they tend to be affected 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. CRiSTAL prompts the user at appropriate steps to consult different social groups separately using focus groups (see part 2 of this manual).

CARE's **Climate Vulnerability and Capacity Analysis (CVCA) Handbook**[2] contains facilitation tips and a range of participatory field tools that are also referenced in the guidance for some of the CRiSTAL steps. We particularly recommend reading the facilitation tips on page 30 before initiating the consultations.

Other key expert consultations

CRiSTAL 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
- Regional and local climate conditions/forecasts
- Other relevant environmental and socioeconomic trends affecting the project area and communities

Meetings can 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 analysis.

What Resources Are Required to Apply CRiSTAL?

The resources required to apply the CRiSTAL tool can vary according to the objectives and capacities of the users. Typically, the users will need between *two and five days* to conduct all the steps, which includes time for preparation, local consultations, data entry into the tool and data analysis. Costs will vary, but generally it involves the 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. Please refer to the CRiSTAL website (www.cristaltool.org) to learn about training opportunities.

Table 2 lists the key resources required for CRiSTAL according to two different steps: (i) collecting data through the local consultations 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.

[2] CARE's CVCA Handbook can be found at http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf

Table 2: Summary of key resources required for CRiSTAL

Resources	Data collection (i.e. local consultations)	Data entry and analysis (individual or team meeting)
Knowledge	• Basic knowledge about climate variability and change, climate adaptation, livelihoods, community dynamics, community mobilization, gender and diversity, participatory approaches, Rapid Rural Appraisal/Participatory Rural Appraisal tools	• Basic knowledge about climate variability and change, climate adaptation, livelihoods, community dynamics, gender and diversity
Skills	• Experience in applying 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 works well with a group of a dozen participants (project team and other local partners) but it can also work with smaller or larger groups. • It is highly recommended to involve a multistakeholder 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 is only compatible with Microsoft Windows 7 operating systems and greater versions. • Printer (recommended but optional) to distribute the summary reports to all participants to facilitate analysis.
Cost	• Cost will vary according to the number of participants and the location of the 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.cristaltool.org). Once users have downloaded the tool, it can be used without being connected to the Internet. • Meeting costs and human resources

Part 2 | CRiSTAL Step-by-Step

Photo: A women focus group in Ethiopia draws a map of their livelihoods resources and the main hazards affecting their community. The use of visual aids is recommended to maximize participation and interaction, particularly when there are language barriers involved. Community members may wish to be engaged throughout the entire CRiSTAL process or in certain aspects of the analysis.

General

Installing CRiSTAL 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

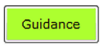
- **The left-hand side menu**: This menu provides an overview of the different steps and allows you to move from one step to the other. To move from one step to the other, click on any of the options on the menu and you will be taken directly to that specific page. Once you are on a specific page, this 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 about the tool and its development history, and the resources required for undertaking the analysis.
  - The "**Help**" link provides information about key concepts, useful guidance buttons, the CRiSTAL website and the application (version and copyright).

Entering and updating information

- **Flexibility**: CRiSTAL 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 word limit for the information to be entered in the different boxes, the user should be as specific as possible and use precise, concise sentences, as the information you insert will be automatically included 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.

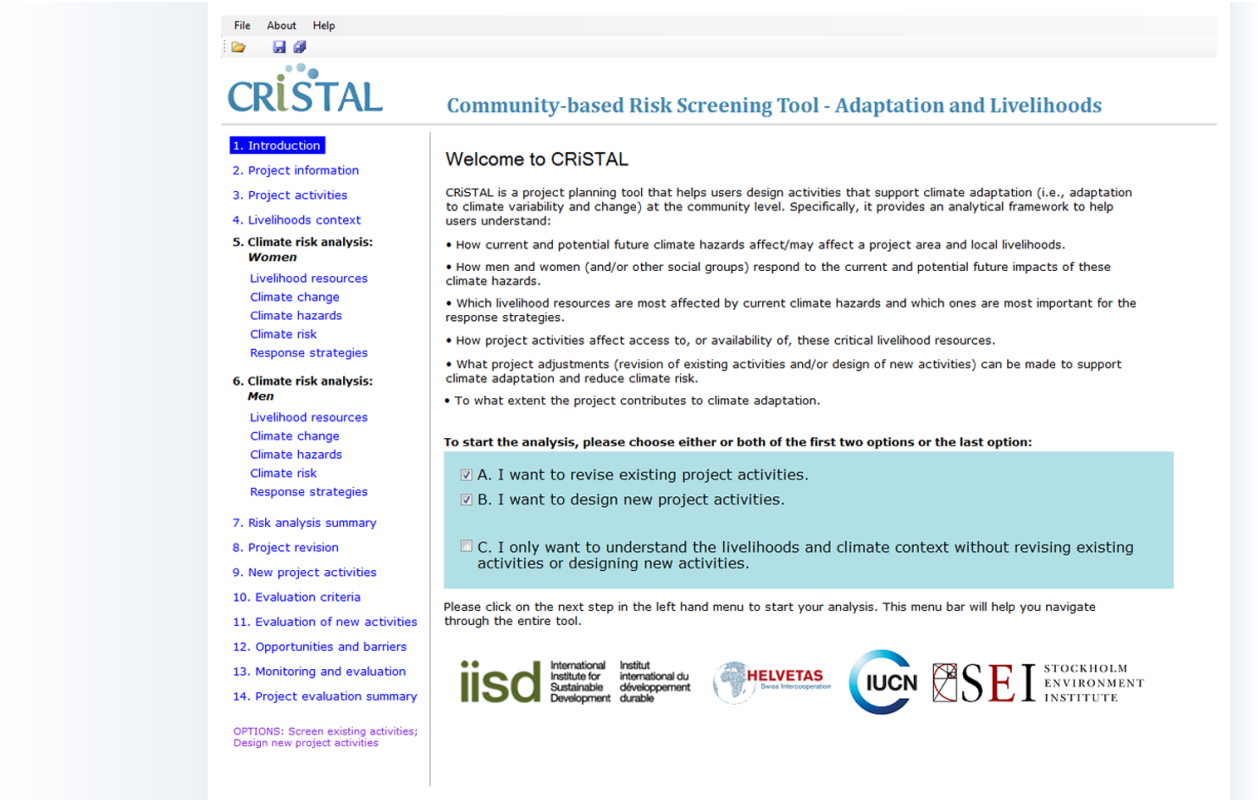
Step > Introduction

Purpose > **To understand the purpose and objectives of CRiSTAL and specify the 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. "I want to screen existing project activities": In this case, you already have project activities designed and want to assess the impacts of those activities vis-à-vis climate adaptation to adjust and design activities that foster adaptation.
  - B. "I want to design new project activities": In this case, you want to design new activities from scratch.
  - C. "I only want to understand the livelihoods and climate context without screening or designing a project": In this case, the user's objective is to get a better understanding of the livelihood resources most affected by climate hazards and most important for responding to climate impacts.

  You can choose either or both of the first two options or just the last option. The menu on the left hand side of the screen changes automatically depending on which option is checked.



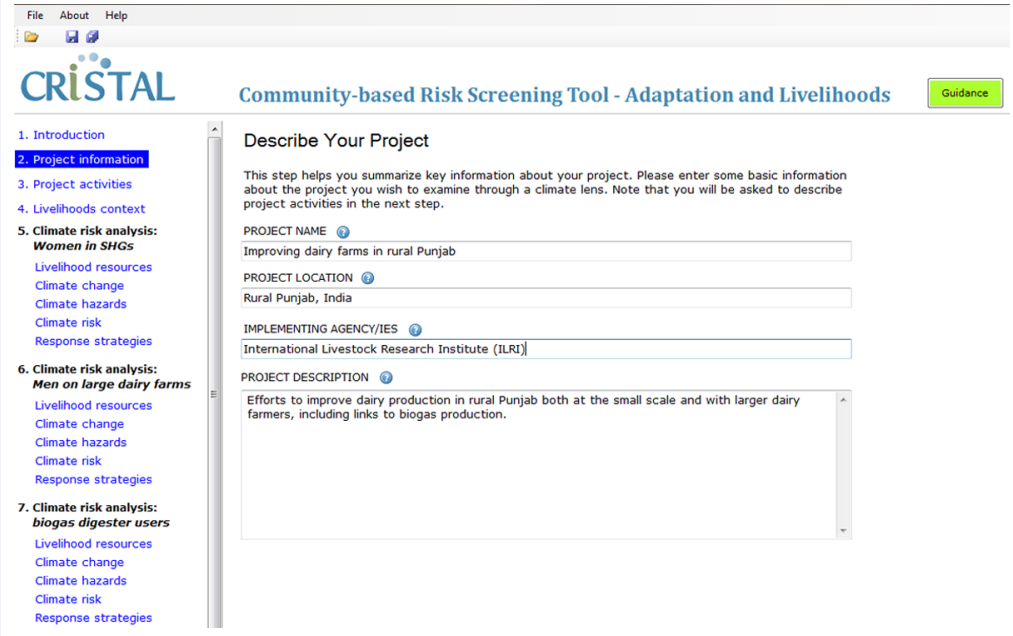
- Once you are familiar enough with the CRiSTAL process and how to use the software, you can begin to enter information for the analysis.
- **Move to the next step by clicking on "Project Information" on the left-hand menu.**

Step > Describe your 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).

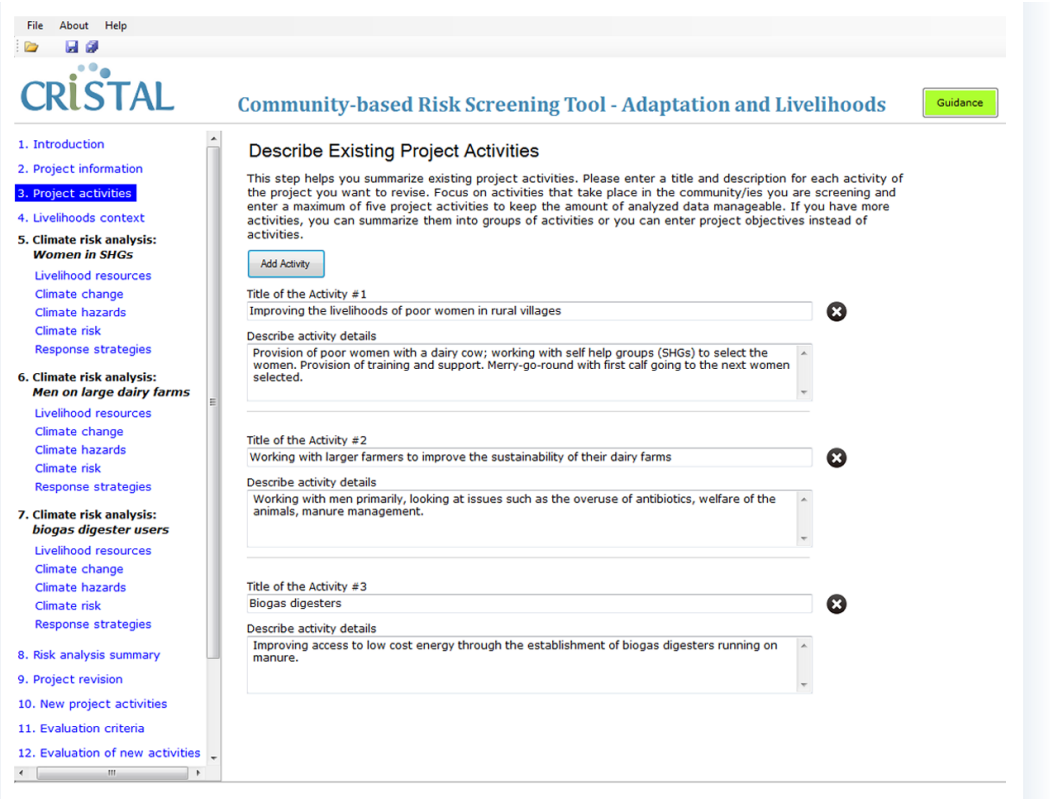
Tips >

- Be concise and specific.
- 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 existing 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 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

Purpose > **To synthesize information on livelihoods in the focus community/ies and assess the implications for the rest of the user's analysis.**

Process >

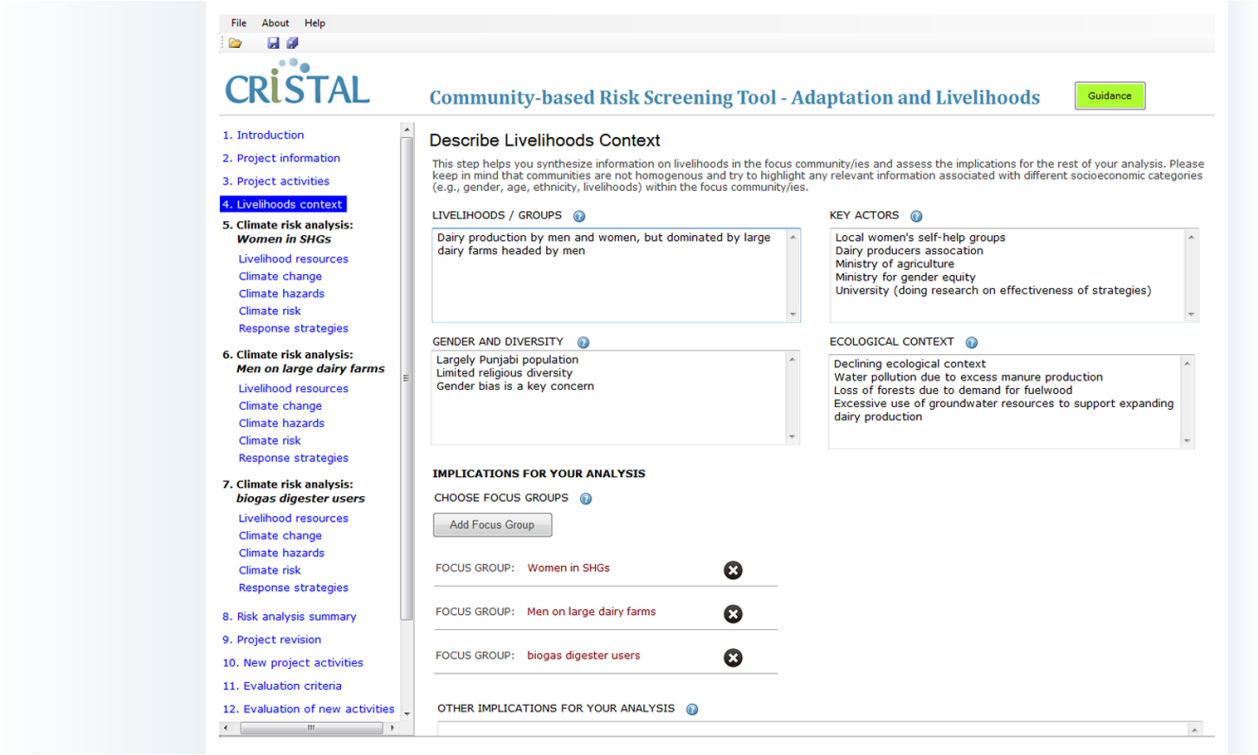
1. **Describe the livelihood context** in the focus community/ies; specifically, enter information about the following themes:
   - **Livelihoods/groups**: The main livelihood activities practiced in the focus community/ies (e.g., subsistence farming, fishing, tourism) and the number and type of social groups who are involved in these activities (e.g., "Only old men from ethnic group A are involved in fishing activities.").
   - **Key actors**: Names and activities of any relevant internal and external actors present in the area or having an important positive or negative influence on it (e.g., government agencies, NGOs, private companies).
   - **Gender and diversity**: 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.
   - **Ecological context**: Type of ecosystem(s) (e.g., forested, mountainous, coastal ecosystem) in the focus community/ies and information about the level of environmental degradation.
2. **Reflect on the implications for the user's own analysis**: Recognizing that communities are not homogenous, you should try to consult with representatives of different groups within a community/area separately, and collect disaggregated information according to different sociocultural and economic categories (e.g., gender, age, ethnicity, livelihoods).

   Specifically, **choose the focus groups** you would like to form, including:
   - **Types of focus groups**: By default, you are asked to consult **men and women** in separate groups (see justification in the "Tips" section below), but groups may also be formed based on age, ethnicity, livelihood activities, class, etc.
   - **Number of focus groups**: It is up to you to choose the number of focus groups. Keep in mind that the Climate Risk Analysis (next step) will be repeated for each focus group, so you need to consider the additional time needed for multiple groups.

   To select the different focus groups for the user's analysis, consider at least the following **criteria**:
   - Livelihoods context (based on the information filled into the previous boxes in this step)
   - Project objectives (e.g., is the project targeting a specific group?)
   - Resources available (community consultations can be time consuming)

   Based on the focus groups formed, the left-hand side menu will be automatically adjusted to conduct the Climate Risk Analysis (next step) separately for each group.

   Optional: In the note box "Other implications for the analysis," add any **further notes** on the livelihoods context that might be important to keep in mind in the subsequent analysis (e.g., specific norms, taboos, cultural sensitivities).



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 >

About the livelihoods context:

- You can decide on the **level of detail** to be entered, but generally it is recommended to 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.

About the focus groups:

- We strongly recommend that you keep the gender division because men and women tend to have different roles and responsibilities within a community and, as such, they tend to perceive climate hazards differently. They also tend to be affected by them and respond to them differently. Fostering climate adaptation therefore requires understanding and accounting for gender similarities and differences.
- Recognizing that gender does not stand alone and that other signifiers of differences should be taken into account, you can also modify "men" and "women" to make them more specific. To do so, specify which category of women and men within the community will be consulted. For example, "young women," "old women," "young men," "old men," "young women from a specific ethnic group," etc.

Further info >

- **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)

What's next?

Once you have chosen the type and number of focus group(s) you want to form, the next five steps should be repeated for each focus group selected. These steps are:

- Identify resources important to livelihoods.
- Summarize information on observed and projected climate change.
- Describe current and potential future climate hazards.
- Analyze climate risk.
- Identify and assess existing response strategies.

The CRiSTAL application will then automatically generate summary reports so you can review, analyze and compare the results from the different focus groups.

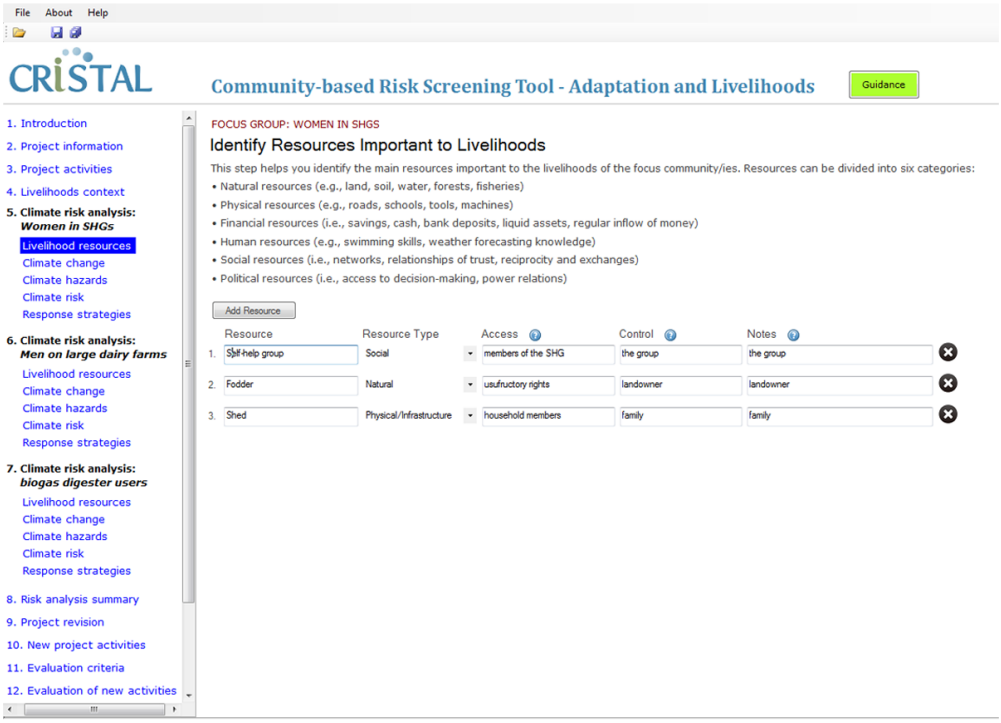
Step > Describe resources important to livelihoods

Objective > **To identify the main resources important to the livelihoods of the focus community/ies.**

Process >

- Click on the "Add Resource" button to list the **main resources** in the community/area of interest identified by a specific focus group.
- Specify the **type of resources** listed using the following categories:[3]
  - **Natural resources**: Natural assets such as land, soil, water, forests and fisheries, and associated ecosystem services (e.g., nutrient cycling, erosion protection) useful for livelihoods.
  - **Physical resources**: Infrastructure (such as roads, schools) and productive capital (tools, machines) for transport, buildings, water management, energy and communications.
  - **Financial resources**: The availability of cash or equivalent (savings, cash, bank deposits, liquid assets such as livestock and jewellery, but also regular inflows of money such as earned income, pensions or other transfers from the state, and remittances) that enables people to adopt different livelihood strategies.
  - **Human resources**: Skills, knowledge, ability to labour and good health important to the pursuit of livelihoods.
  - **Social resources**: The set of social relationships (i.e., networks; membership in more formalized groups; relationships of trust, reciprocity and exchanges) from which people draw in pursuit of their livelihoods.
  - **Political resources**: Access to decision-making processes, power relations.
- For each resource, specify who has access to and control over it.
  - **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.[4]
- Optional – If needed, you can provide **additional details** about livelihood resources, such as the current state of a resource or its desired future development. These additional notes will not be taken forward in the analysis, but are important to be kept in mind as part of the broader vulnerability context.

[3] Source: Department for International Development (DFID) (1999)
[4] Source: Ribot (1998)



Method >

Community consultations

- 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 livelihood resources**.
- **Prioritize the resources** with the group so as to limit the total number of resources to 15. Try to include at least two resources in each one of the six categories mentioned above.
- Using the map and resource list, discuss who has **access to (i.e., can benefit from) and control** over these resources. It may be that external actors have control over some resources.
- Make sure to **copy the map** by hand or to take a photo of the map.
- The facilitator should also take note of any additional useful information about resources that can be used for any important additional observations on the state or future development of a resource (e.g., the planned construction of a dam in the case of water resources).
- 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 resources**: Limit the total number of entered resources to 15 in order to keep the subsequent analysis at a manageable level.
- **Types of resources**: Try to identify at least two resources for each resource category. The six **categories of resources** are useful for data collection and analysis because they prompt the user to take into account a broad range of resource types. Otherwise, we often have a tendency to focus on tangible resources such as natural or physical resources, and overlook the intangible resources such as human and social resources, which are just as important in the pursuit of livelihoods.
- **Facilitation skills**:
  - During the community consultation, try not to mention the terms "resource types" or "resource categories" because they may be too abstract. Rather, the facilitator can ask participants how they earn an income, acquire food and other goods, or what they do in a typical day, and then ask them what things they need to undertake these activities. It is the role of the facilitation team to organize the identified resources within the six categories of resources proposed.
  - 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 >

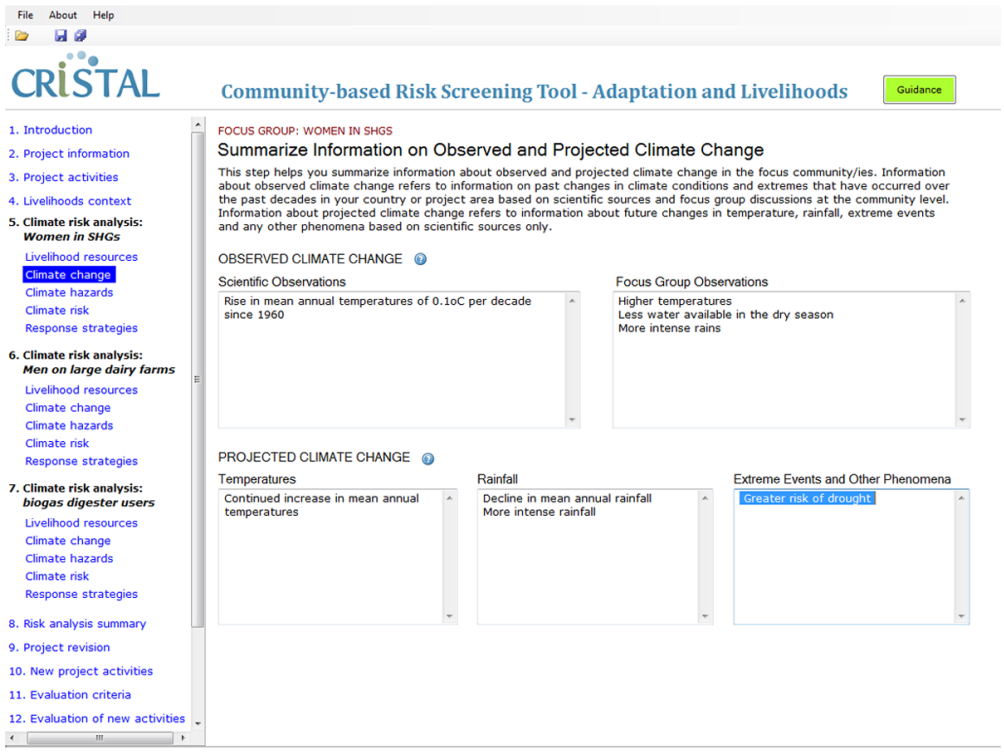
- **Livelihoods resources**: Consult the DFID *Sustainable Livelihoods Guidance Sheet 2: Framework.* (http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf)
- **Resource and hazard mapping**: Consult Field Guide 2 on page 33 of CARE's *Climate Vulnerability and Capacity (CVCA) Handbook.* (http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf)

Step > Summarize information on observed and projected climate change

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

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 the 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. While the former 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.



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").
- **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).
- **Organizing the scientific information**: Text entered by each focus group into the four boxes that rely on scientific information (i.e., "Scientific observations," "Temperatures," "Rainfall" and "Extreme events and other phenomena") is copied automatically into the respective boxes of the other focus groups. This is based on the assumption that this information should be similar regardless of the focus group.

Further info >

- **Intergovernmental Panel on Climate Change 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/submitted_natcom/items/653.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 **Adaptation Learning Mechanism** provides country summaries on observed and projected climate change and impacts. (www.adaptationlearning.net)

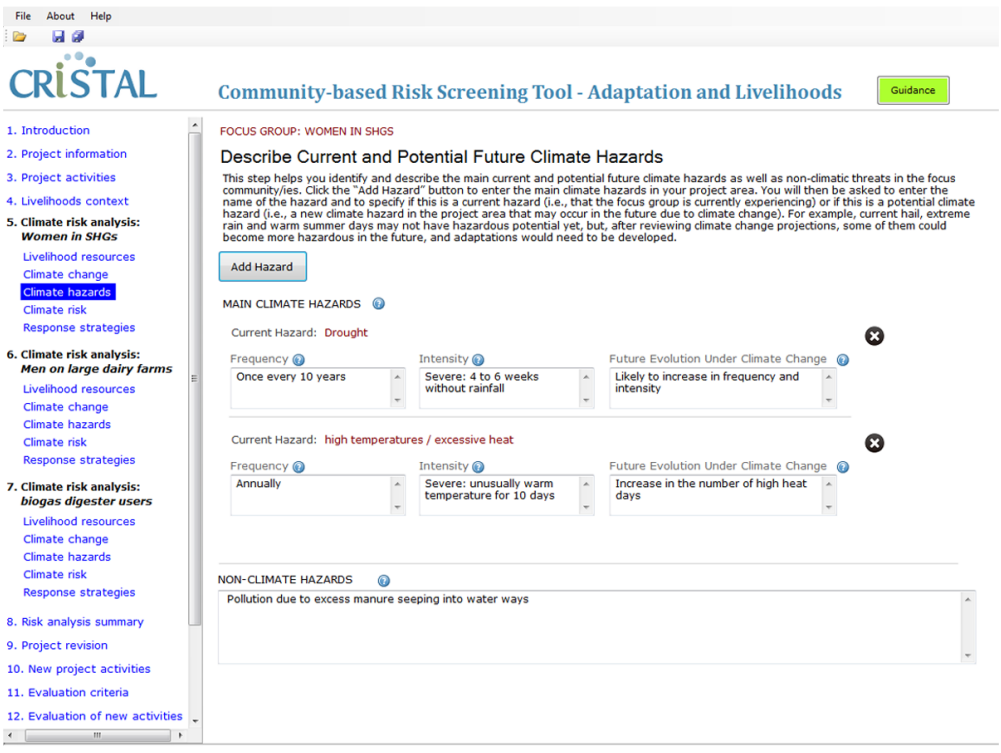
There are many other relevant sources of information, often region- or country-specific, which we cannot list here. Make sure to search the Internet thoroughly and to consult local experts.

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.**

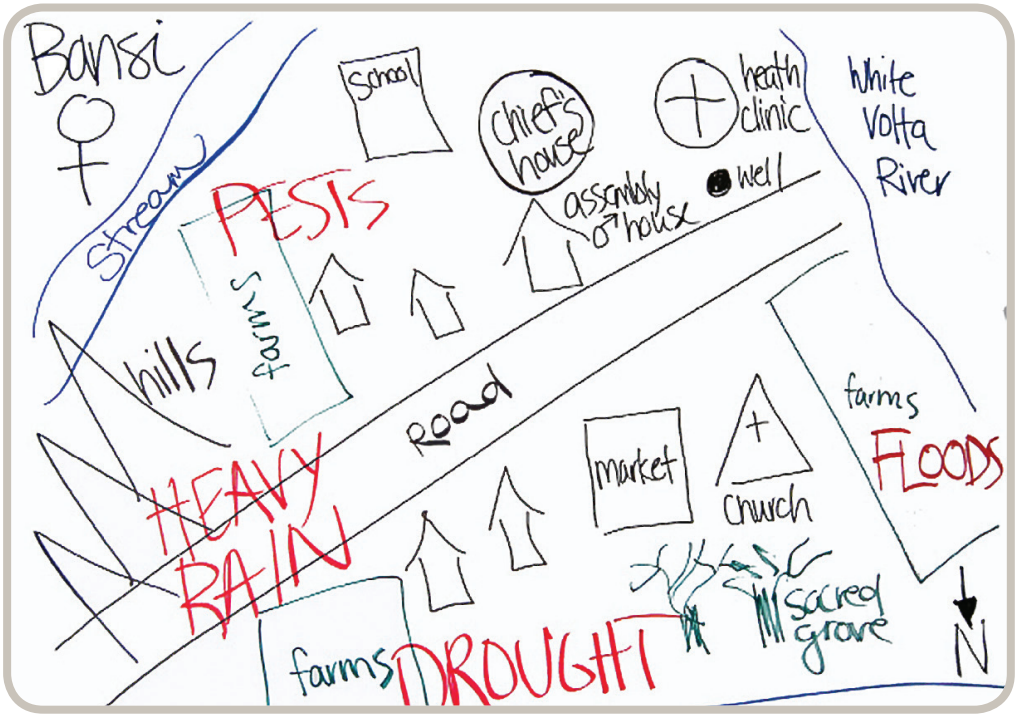
Process >

- 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 every 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 it 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 is explained under the previous "Livelihood Resources" 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 man-made. 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 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 affected). 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 some 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 the focus community/ies** 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 5 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 on the next step.

Further info >

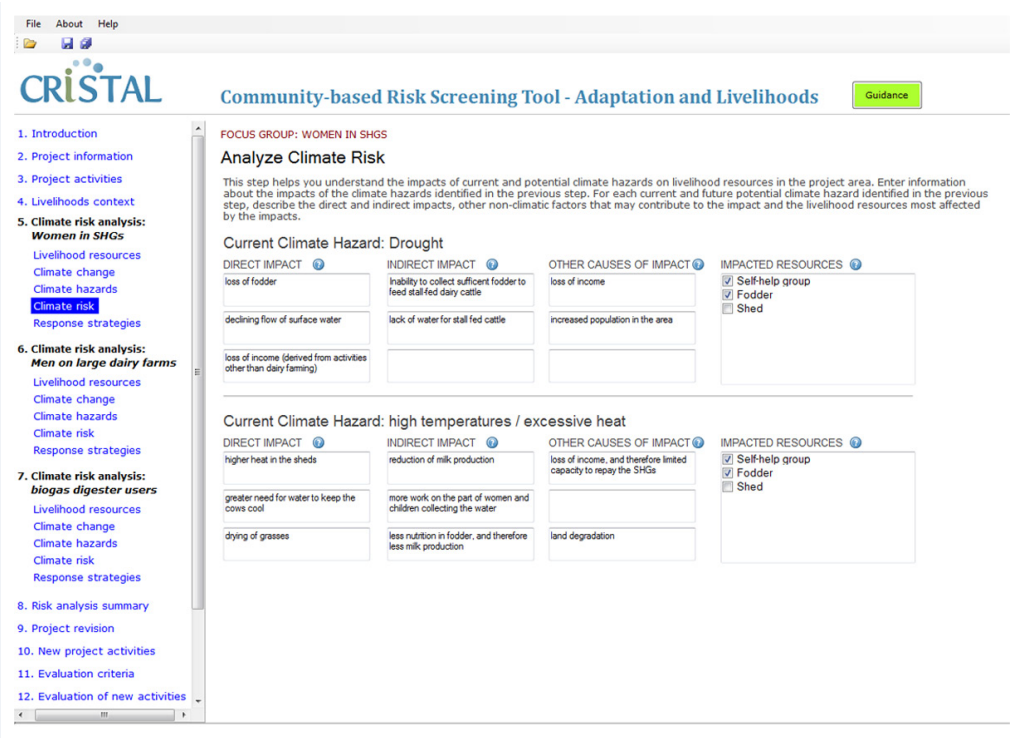
- **Hazard mapping**: Consult Field Guide 2 on page 33 of CARE's *Climate Vulnerability and Capacity (CVCA) Handbook*. (http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf)

Step > Analyze climate risk

Objective > **To understand the impacts of current and potential future climate hazards on livelihood resources.**

Process > Enter information about the impacts of climate hazards in the focus community/ies. For each current and future potential climate hazard identified in the previous step, identify:

- **Direct impacts**: The immediate effects, positive and/or negative, of a climate hazard on natural, physical and human resources (see examples in the "Tips" section).
- **Indirect impacts**: The positive and/or negative consequences of the direct impacts on local livelihoods (see examples in the "Tips" section).
- **Other causes of impacts**: 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.
- **Impacted resources**: Select the livelihood resources (from those identified in previous step, "Livelihood Resources") that are most affected, negatively or positively, by direct and indirect impacts.



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 identify three direct impacts of each hazard on their livelihoods. These may be positive and/or negative impacts on their livelihoods.
2. Ask for any indirect impacts that follow the direct impacts (one main indirect impact per direct impact).
3. Ask the group 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 identify impacts of potential future hazards easily, 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.

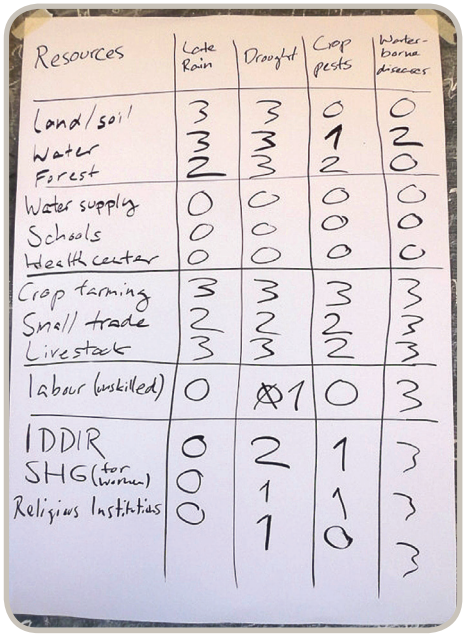
Examples of direct and indirect impacts (or climate impact chains) on livelihood resources:

- Drought ➔ trees dying (direct impact) ➔ soil degradation (indirect impact)
- Flood ➔ loss of crop, destruction of mosquitos breeding grounds (direct impact) ➔ income loss, social conflicts, migration, reduction of malaria transmission (indirect impacts)
- Hurricane ➔ infrastructure damage and loss of life (direct impacts) ➔ income loss, water-borne diseases (indirect impacts)

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

1. Prepare a matrix on a flipchart, with all prioritized livelihood resources from the earlier step 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 = high negative impact
   - 2 = medium negative impact
   - 1 = small negative impact
   - 0 = no impact
   - X = positive impact

   You can also use stones, symbols or different colours of markers (e.g., red = very high 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.



Vulnerability Matrix from Western Ethiopia (Source: Keller, 2010)

4. To transfer the results to CRiSTAL, tick all the highly negatively affected resources (i.e., those that received a score of 2 or 3 in the vulnerability matrix or in the visual equivalent) in the list provided in "Impacted Resources" for each hazard.

Further info >

- **Vulnerability matrix**: Consult Field Guide 5 on page 39 of CARE's *Climate Vulnerability and Capacity (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 Postdam 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)

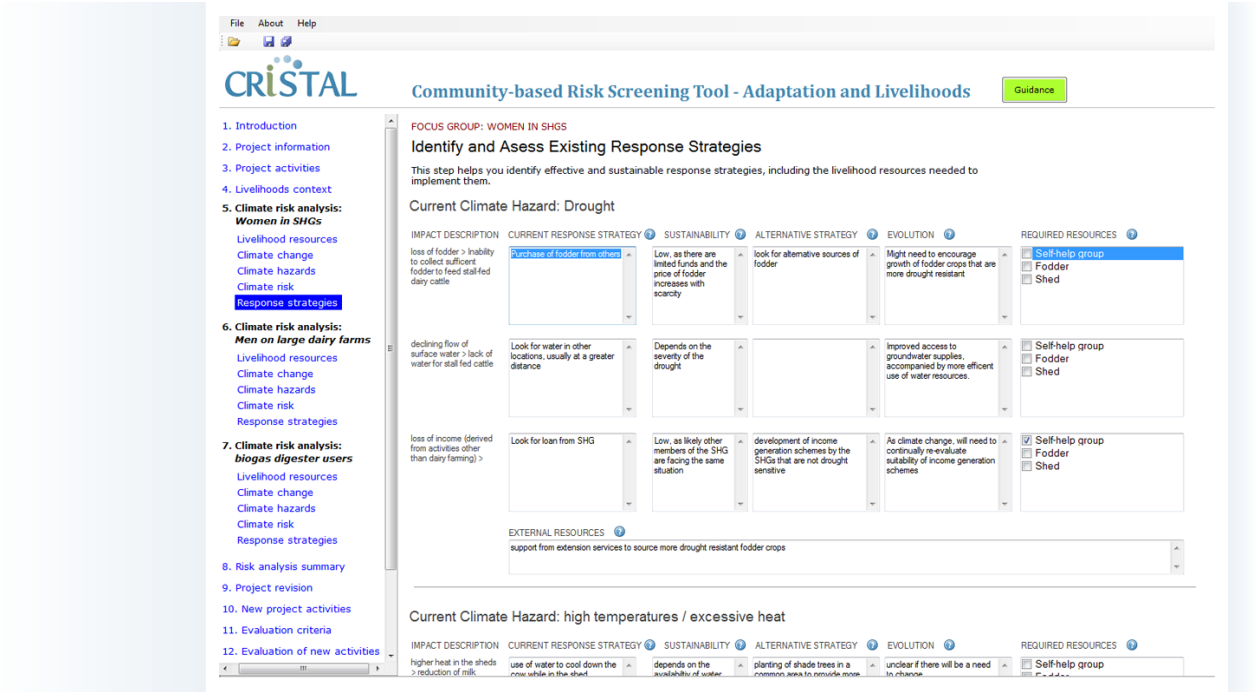
Step > Identify and assess existing response strategies

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

Process >

Enter information about current and alternative response strategies according to the key impacts identified in the previous step.

- **Current response strategy/ies**: Identify the current response strategy/ies for each combination of direct and indirect impacts.
- **Sustainability**: Describe whether the community considers the strategy/ies sustainable or not. 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).
- **Evolution**: Identify how each current or alternative response strategy might need to evolve given projected changes in climatic conditions.
- **Required resources** (for implementing current or alternative strategies): Select among the resources identified as important for local livelihoods in the previous step, those that are required to put the current or alternative response strategies into practice. Required resources can be selected from the list on the right-hand side.
- **External resources**: Identify other potential livelihood resources needed to implement the different response strategies but not listed previously.



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 a direct and an indirect climate impact, 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).
- 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.
- Next, ask if any adjustments will need to be made to the response strategy considering future changes in the climate (for example, an irrigation strategy may need to be complemented with additional water efficiency measures in the future if the climate becomes hotter and drier).
- Ask the focus group which of their livelihood resources are needed to implement each current or, if there is one, an alternative response strategy. 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 >

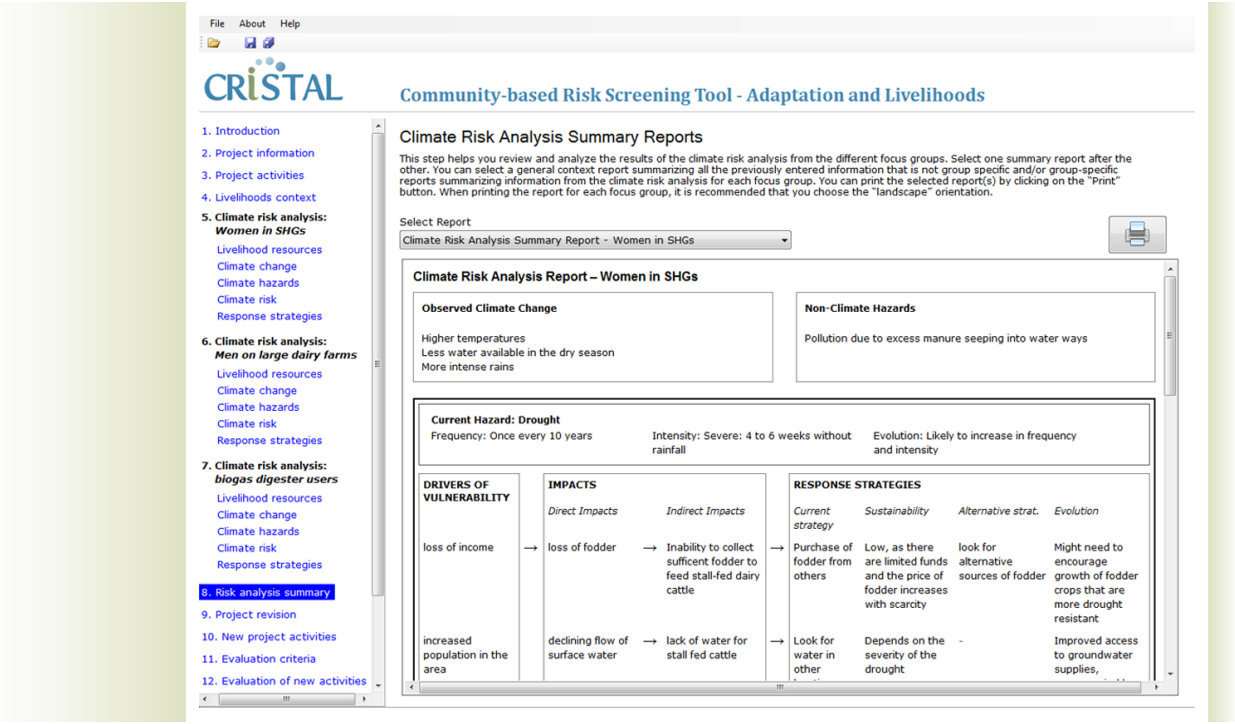
- Transferring the information collected using community consultation to CRiSTAL is straightforward, as the provided boxes have the same sequence as the steps in which the information is gathered.
- You can add more than one response strategy into the second column boxes, but try to prioritize a maximum of three response strategies to keep the level of information manageable in the following steps.

Step > Climate risk analysis summary report

Objective > **To review and analyze the results of the climate risk analysis from the different focus groups.**

Process >

- Select one summary report after the other. You can select a general context report summarizing all the previously entered information that is not group specific and/or group-specific reports summarizing information from the climate risk analysis for each focus group.
- Review the report(s) and the results and, if necessary, go back into the tool at any previous step to make adjustments so that the final report is as accurate, concise and comprehensive as possible.
- Save and print the final report(s).
- Analyze and discuss the results, in particular with regards to differences and similarities between focus groups.



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 and climate context within the project team and among the project teams, potential/existing beneficiaries and local partners.

Tips >

Reading the reports

- Context information: livelihoods context and scientific information.
- Focus group reports: In the top part, observed climate change and non-climate hazards are noted as context factors. The middle part shows impact chains per hazard, indicating the characteristics of the hazard, direct and indirect impacts, and response strategies, as well as the exacerbating factors. In the bottom part, the information related to livelihood resources is summarized, highlighting in particular which resources are sensitive to climate hazards and which ones are important for the response strategies.

Examples of key questions to discuss when analyzing the reports

- **Livelihood resources**
  - Which livelihood resources are sensitive to at least one climate hazard and/or are important (i.e., used) for the response strategies? How? Are some livelihood resources sensitive to all key climate hazards identified?
  - Who has access to, and control over, these critical resources? Which groups might be particularly vulnerable to climate hazards (i.e., those with little access to, and control over, critical resources)?
- **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 resources 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?
- **Focus groups**: Compare the results of the different focus groups and make sure to give the results of all the focus groups/of the different groups enough attention.
  - What are the differences and/or similarities in the results among the different focus groups and what does it mean? For example, are all people responding in the same way to the same climate hazards? What are the differences in terms of ethnic groups, gender, age, ethnicity, religion, class, educational status, spatial factors, etc.? Could the responses of some social groups in the face of climate hazards be detrimental to other groups?

What's next?

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

- Only understand the livelihoods and climate context for the user's project, then you have now completed the necessary steps.
- Revise existing project activities, then you can continue with the next step, "Project Revision."
- Design new project activities (without revising existing activities), then you can go to "Identify new project activities" (page 42).

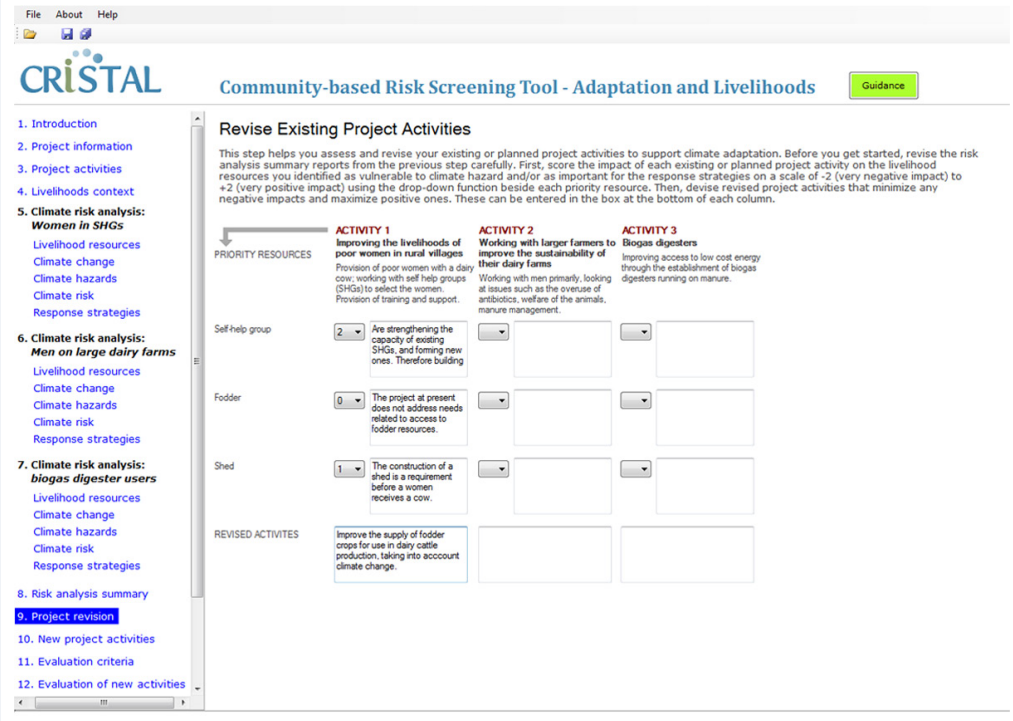
Step > Revise existing project activities

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

Process >

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

1. **Score the impact** of each existing project activity on the livelihood resources 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 resource.
2. **Explain the positive and/or negative impacts** of each existing project activity on the livelihood resources important for climate adaptation.
3. **Devise revised project activities** that minimize any negative impacts and maximize positive ones.



Method >

- **Project team discussions, ideally, if time and context 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 >

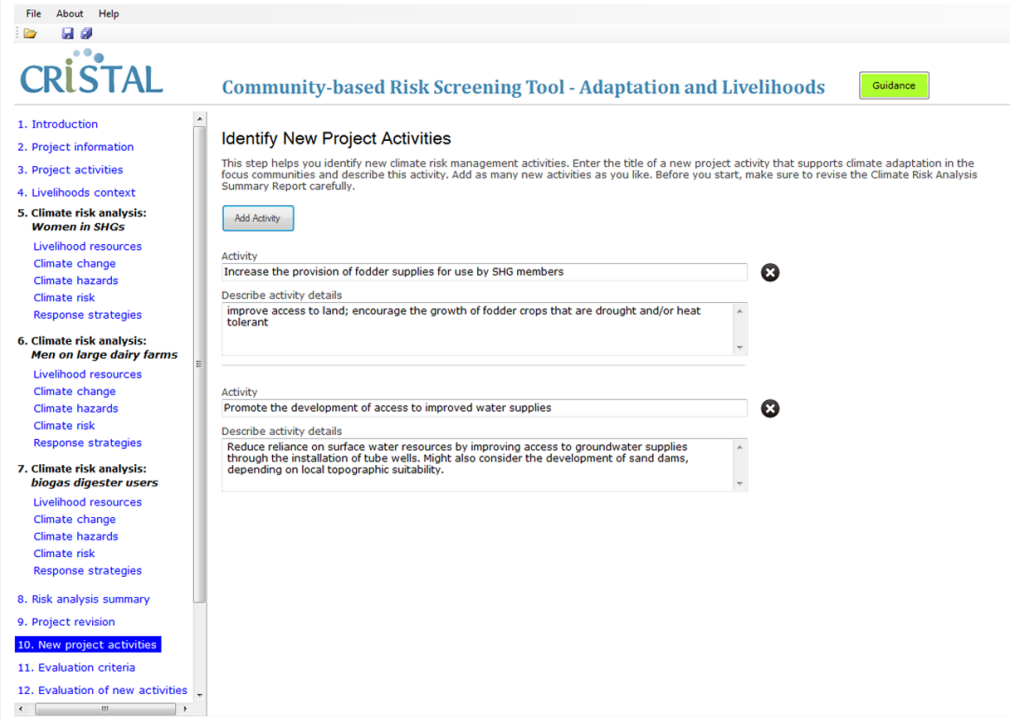
Using the climate risk summary reports, here are a few elements you should pay particular attention to when reading through the climate risk analysis summaries:

- **Livelihood resources**: Consider to what extent the project activities affect, or are affected by, who has access to and control over resources. Who controls the resources will influence the degree of 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 drought affects crops in specific periods of the year, is the project increasing water availability for crops in the same period?).
- **Responses**: Look at the ways in which livelihood resources are used in response strategies, and consider whether the project activities are supporting these functions or not.
- **Focus group**: Identify what groups need particular attention in the project activities and what are the potential conflicts within the 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 focus community/ies 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 context permit, with inputs 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 resources**: New climate risk management measures should target:
  - The livelihood resources 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 livelihood resources important for the response strategies that are sustainable. Activities that strengthen these resources tend to bolster the adaptive capacity of the community.
  - People's access to, and control over, resources 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 hazard.
- **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.
- **Focus group**: Ensure that the new activities are not detrimental to any specific groups of the community.

Explore a wide range of response strategies

Different social groups 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 >

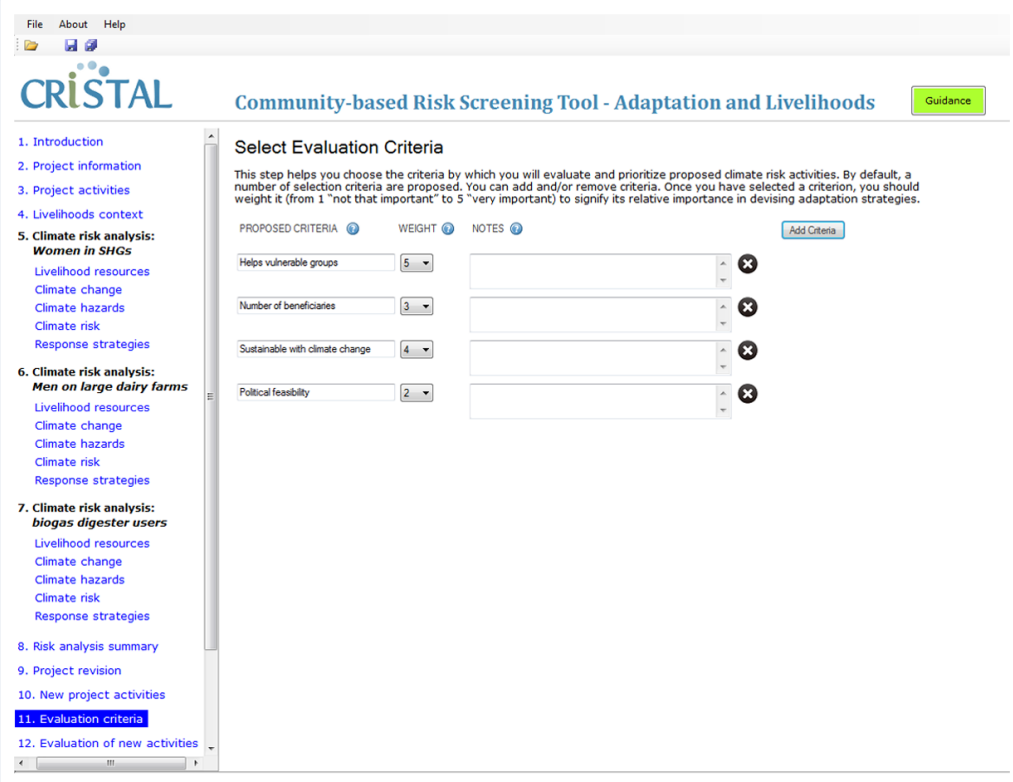
- The **Adaptation Learning Mechanism (ALM)** is a global knowledge sharing platform that hosts a database of adaptation practices, policy and planning tools, and capacity-building resources. (www.adaptationlearning.net)
- **weAdapt** is a knowledge platform that links to a range of case studies and 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)

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 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:

- **Helps vulnerable groups**: The most vulnerable socioeconomic groups have the greatest need to increase their adaptive capacity; therefore, activities that target vulnerable groups should be preferred over those that share their benefits indiscriminately across the population. You can identify which social groups tend to be more socially disadvantaged/marginalized, and therefore who could be more vulnerable, by looking at the results of the different focus group consultations and by considering those groups who most lack access and control over key resources for building capacity to cope with climate risks.
- **Number of beneficiaries**: This simple criterion counts how many people are likely to benefit from an intervention. More widely shared benefits might be preferred. This criterion may in some cases be in partial conflict with the previous one.
- **Sustainable with long-term 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.
- **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**: Changes induced by new activities also need to respect the local culture to be feasible. 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.
- **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 only pay off in the longer run. Looking at costs therefore needs to take into account not only the immediate implementation costs of the project, but also the avoided future costs of climate impacts.
- **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.

Step > Evaluate and prioritize new project activities

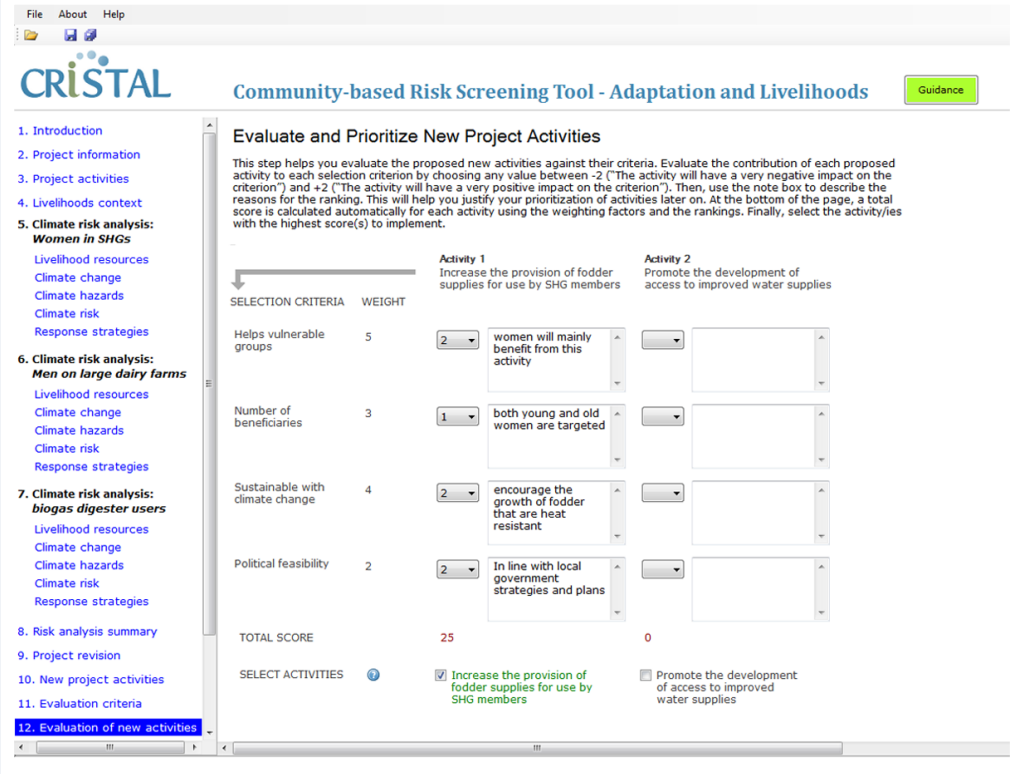
Objective > **To evaluate and prioritize the new climate risk management activities.**

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** the contribution of each proposed activity to each selection criterion by choosing any value between -2 (the activity will have a very negative impact on the criterion) and +2 (very positive impact).
- 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 context 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 analysis will only contribute towards adjusting them incrementally rather than deciding whether they should be implemented or not.

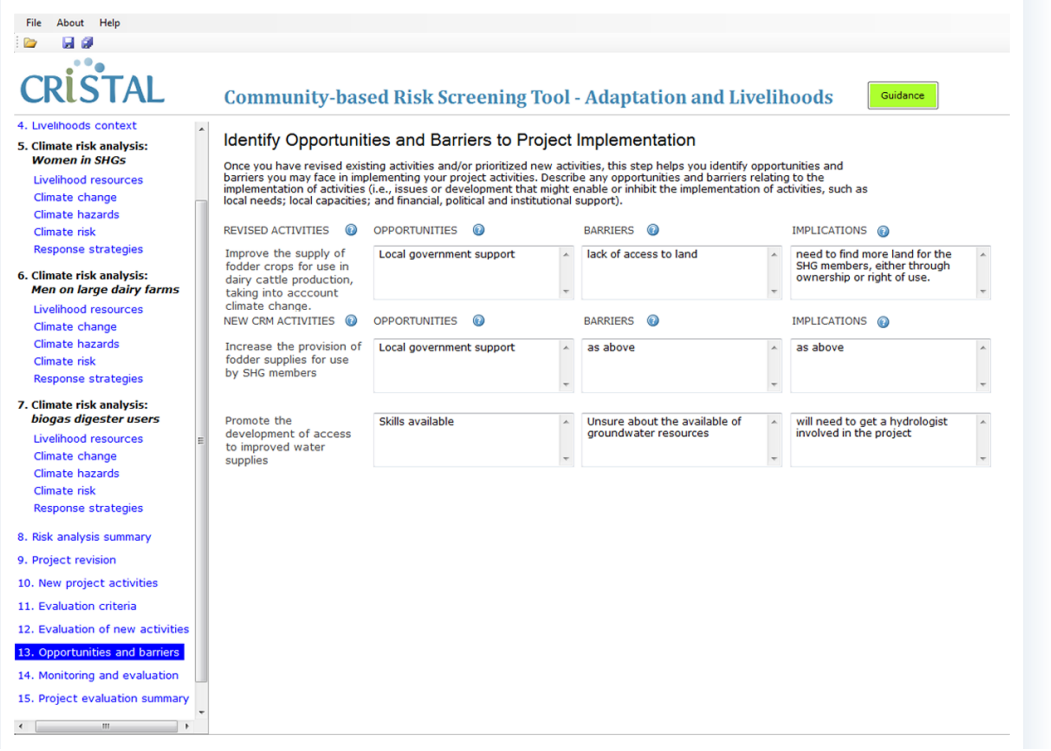
Step > Identify opportunities and barriers to project implementation

Objective > **To identify opportunities 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 project, 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.

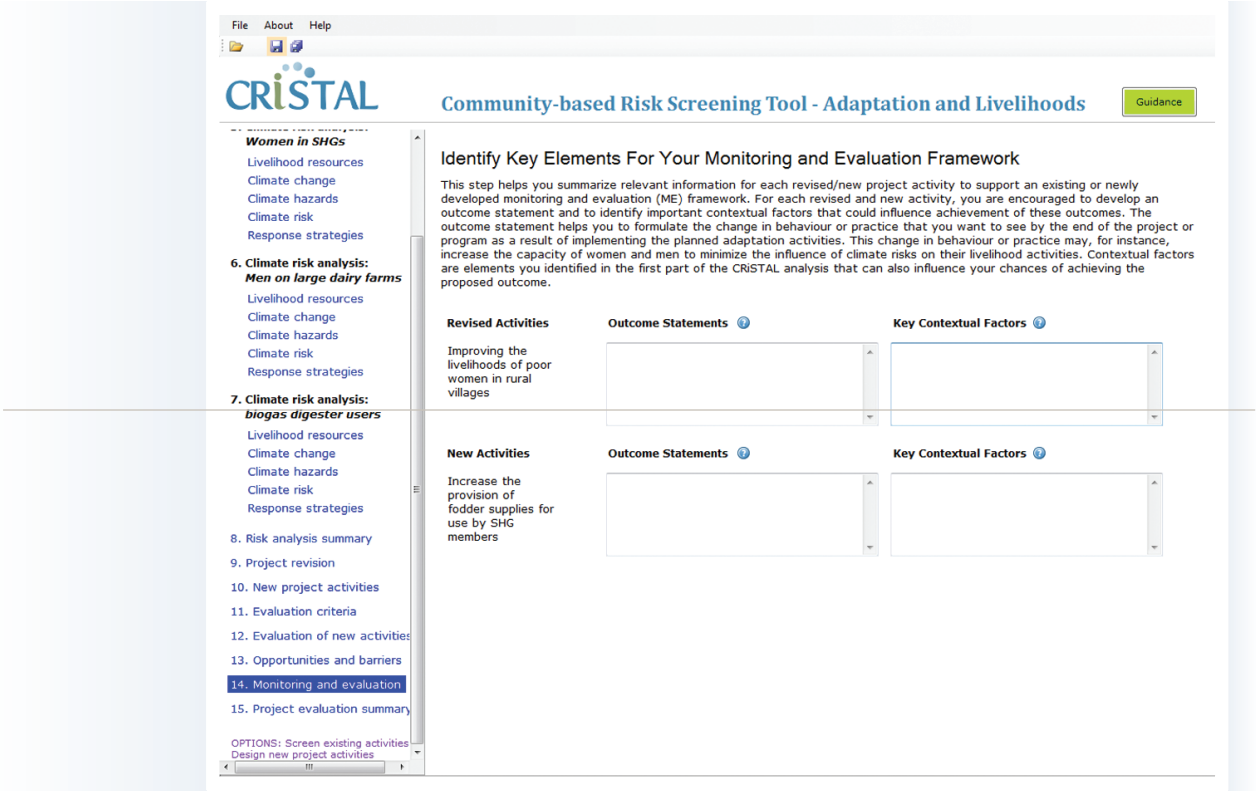
Step > Identify key elements for your monitoring and evaluation framework

Objective > **To summarize relevant information for each revised/new project activity to support an existing or newly developed M&E framework.**

Process >

For each revised/new project activity, you need to identify:

- **An outcome statement**: The changes in behaviour or practice that you want to see by the end of the project as a result of implementing the adaptation activity. This change in behaviour or practice may, for instance, increase the capacity of women and men to minimize the influence of climate risks on their livelihood activities. Make sure to identify concrete and measurable outcomes.
  - Example: "Reduced average annual crop losses due to drought as a result of crop diversification."
- **Key contextual factors**: Important factors (climatic and non-climatic) that can influence the chance of achieving the expected outcome. Please refer to the "Livelihoods and Climate Context" section.
  - Example: "Frequency and severity of droughts, activity of a microfinance institute in the region which could facilitate the achievement of the outcome."



Method >

- **Project team discussions, ideally, if time and context permit, with the involvement of community and other local actors to reflect their priorities.**

Tips >

The current context of high uncertainties due to climatic and non-climatic factors requires that you put learning and M&E at the centre of the project cycle. **Monitoring** is about tracking the progress of a project in terms of activities, inputs, outputs, targets, outcomes and context over time. **Evaluation** uses monitored information to assess whether and why stated goals are being achieved or not.

M&E requirements need to be taken into account right at the design stage of any project. While M&E is largely beyond the scope of CRiSTAL, this step of the tool can help you prepare for M&E. Yet, this step does not propose a detailed guideline for developing an entire M&E framework for climate adaptation. It simply structures information already gathered in the CRiSTAL analysis in a way that is useful for the development or adjustment of such a framework.

Ideally, the project team should go back to the focus communities after a specific time period and ask them to assess to what extent the expected outcomes have been achieved. The project team should also gather periodic information on the key contextual factors to understand how these factors have influenced the realization of the expected outcomes over a specific time period.

Further info >

- ***Making Adaptation Count: Concepts and Options for Monitoring and Evaluation of Climate Change Adaptation*** provides a six-step process for developing an M&E system for adaptation. (http://www.wri.org/publication/making-adaptation-count)
- **UKCIP AdaptME Toolkit** offers practical support in evaluating adaptation progress and performance. (www.ukcip.org.uk/adaptme-toolkit)
- **Monitoring and Evaluating Adaptation page by the Governance and Social Development Resource Center** summarizes some of the key challenges in M&E adaptation activities, and links to a range of further resources. (www.gsdrc.org/go/topic-guides/climate-change-adaptation/monitoring-and-evaluating-adaptation)
- **CARE's *Participatory Monitoring, Evaluation, Reflection and Learning for Community-based Adaptation (PMERL) Manual*** provides a participatory approach to measure changes in adaptive capacity and supports adaptive management of local adaptation strategies during and beyond a given intervention. (http://www.careclimatechange.org/files/adaptation/CARE_PMERL_Manual_2012.pdf)

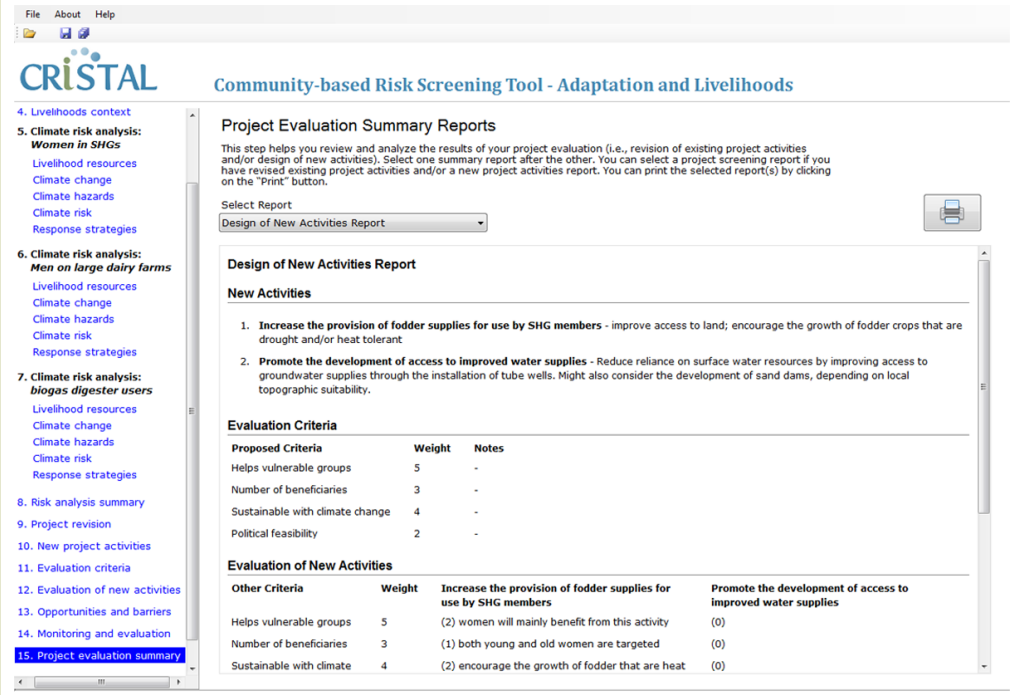
Step > Project evaluation summary report

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

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

- Revision of existing activities report
- Design of new activities report

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 the Fiji Islands. It is highly recommended that new users acquire training to benefit the most from the tool.

So, Why Use CRiSTAL?

CRiSTAL provides at least four key attributes and comparative advantages:

- **Simplicity and practicality**: CRiSTAL provides a systematic, simple and flexible framework for understanding and analyzing the links between climate risks, vulnerabilities and adaptive capacities, livelihoods and development projects. The steps of the CRiSTAL 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 process requires between two and five days and can lead to small incremental changes in community-based project design and management (versus transformational change).
- **Livelihood and climate-risk focused**: CRiSTAL does not treat climate risks solely as an environmental problem, but links it to the lives and development prospects of the concerned communities through its livelihoods approach. The emphasis on livelihoods 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 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 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 the local realities and empower communities and local actors to identify climate adaptation interventions that are in tune with local men's and women's needs, priorities and conditions.
- **Versatility**: CRiSTAL 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, agricultural policies, proposed adaptation activities or to support parts of a comprehensive climate risk assessment). CRiSTAL 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.cristaltool.org, including:

- Downloads of the tool and this *User's Manual*.
- **CRiSTAL Stories briefs,** documenting best practices associated with the application of CRiSTAL.
- **Examples of past CRiSTAL 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 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 sustainable livelihoods and how they relate to the CRiSTAL process. Group work and practical application are strongly emphasized. However, each of the training sessions are 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 tools into different languages, development of online training materials).

To learn more about CRiSTAL 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

Department for International Development. (1999). *Sustainable livelihoods guidance sheets*. London: DFID. Retrieved from http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf

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

Intergovernmental Panel on Climate Change. (2001). *Climate change 2001: Impacts, adaptation and vulnerability*. Cambridge, UK: Cambridge University Press.

Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Impacts, adaptation and vulnerability. Contribution of the 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

Intergovernmental Panel on Climate Change. (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

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.

Ribot, J. C. (1998). Theorizing access: Forest profits along Senegal's charcoal commodity chain. *Development and Change, 29*, 307–341.

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 & 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.

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