

## **CRiSTAL Training Workshop and Application Report Senegal and Zambia 7-12 July 2009**

### **INTRODUCTION**

The International Institute for Sustainable Development (IISD) is supporting the implementation of the UNITAR project called C3D+ (Capacity Development for Adaptation to Climate Change and GHG Mitigation and Non-Annex I Countries). The objective of this project is to improve the ability of developing countries to address climate change by the development of adaptation measures and the planning of mitigation strategies. Within this project, IISD is providing targeted training and technical assistance related to the tool CRiSTAL (Community-based Risk Screening Tool – Adaptation and Livelihoods).

As part of its mandate, IISD is providing training to ENDA TM (Environmental Development Action in the Third World) in the use of CRiSTAL and supporting its application in the field. IISD organized a CRiSTAL training workshop for ENDA staff in Dakar, Senegal, on 7-8 July 2009. This was followed by a CRiSTAL training and a field application in Western Province, Zambia, on 11-12 July 2009. The main objectives of these CRiSTAL trainings and field application were to provide participants with a framework for understanding vulnerability and adaptation to climate change, and to enhance capacity to integrate climate change vulnerability and adaptation considerations into project design and management.

### **CRiSTAL TRAINING WORKSHOP IN DAKAR, SENEGAL, 7-8 JULY 2009**

The main objective of the training workshop offered by IISD to ENDA staff in Dakar, Senegal, was to provide participants with an introduction to some of the basic concepts and approaches to climate change adaptation and to a tool to mainstream climate change adaptation into development projects.

Additional expectations mentioned by participants at the beginning of the training workshop included:

- Master the CRiSTAL tool and become a CRiSTAL user and trainer;
- Share experiences with the tool;
- Understand fully and make deployable and trainable to others (particularly community-based organizations) a tool that can assist local vulnerable groups to reduce risk in their adaptation strategizing;
- Be able to use the CRiSTAL tool to improve project planning;
- Gain knowledge and understanding of climate change and community-level climate hazards, and be able to explain these clearly and in simple terms; and
- Understand how local livelihoods are affected by climate change and how local communities see and understand climate change.

The detailed training programme is included in Annex 1. PowerPoint presentations are available upon request from Béatrice Riché ([briche@iisd.org](mailto:briche@iisd.org)). The training was provided in both French and English to a total of 7 participants. The list of training participants is included in Annex 2.

The first day of the training workshop included 6 sessions:

### **1. Introduction to climate change**

During this session, participants were introduced to climate change drivers, impacts, observations and projections at global, regional and national levels. The main sources of information for this presentation were the 4<sup>th</sup> Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007) and the UNDP/Oxford Climate Change Country Profile for Senegal (UNDP, 2008).

The greenhouse effect was presented as a natural phenomenon which makes life on Earth possible. To keep a constant temperature, the Earth must shed energy into space at the same rate at which it absorbs energy from the sun. Solar energy arrives in the form of short wavelength radiation. Some of this radiation is reflected away by the Earth's atmosphere, but most of it passes straight through the atmosphere to warm the Earth's surface. The Earth sends this energy back out into space in the form of long wavelength, infra-red radiation (heat). Most of the infra-red radiation emitted upwards by the Earth's surface is absorbed in the atmosphere by water vapor and naturally occurring greenhouse gases (GHGs). These GHGs prevent energy from passing directly from the surface of the Earth out into space. Instead, many interacting processes (including radiation, air currents, evaporation, cloud-formation, and rainfall) slowly transport the energy high into the atmosphere. From there it can radiate into space. This slower, more indirect process is fortunate for us, because if the surface of the earth could radiate energy into space unhindered, the earth's surface would have an average temperature of about -18°C. GHGs are vital because they act like a blanket which keeps the Earth's average surface temperature at around 15°C.

However, since the industrial revolution in the 1850's, human activities are emitting additional GHGs, which thereby capture more heat than before. This is called the additional greenhouse effect, which results in global warming and in climate changes around the globe. Changes in the concentration of the main GHGs (carbon dioxide, methane and nitrous oxide) in the atmosphere during the last millennium, as well as the direct relationship between GHG concentrations and their radiative forcing (i.e. their influence in altering the balance of incoming and outgoing energy in the Earth-atmosphere system) were presented with graphics from the IPCC. The main sources of these greenhouse gases (fossil fuel burning, deforestation, agriculture, etc.) were also presented.

During the last century (1906-2005), the Earth's surface temperature has increased by 0.74°C, leading to sea-level rise, a decrease in the area covered by snow and ice, changes in precipitation patterns, and an increase in the frequency of extreme weather events, including

droughts, heavy precipitation events and heat waves. These trends are projected to continue over the next century, with significant impacts on ecosystems and livelihoods.

Africa is considered one of the most vulnerable regions in the face of climate change. According to the IPCC (2007), projected regional climate change impacts in Africa include:

- By 2020, 75-250 million people are projected to be exposed to increased water stress due to climate change;
- Agricultural production, including access to food, is projected to be severely compromised by climate variability and change;
- There is an expected decrease in area suitable for agriculture, length of growing seasons and yield potential, particularly along margins of semi-arid and arid areas;
- In some countries, yields from rain-fed agriculture could be decreased by up to 50% by 2020; and
- Local food supplies are projected to be negatively affected by a decrease in fisheries resources in large lakes due to increased water temperatures, which may be exacerbated by continued over-fishing.

According to the UNDP/Oxford Climate Change Country Profile for Senegal (UNDP, 2008), recent climate trends at the national level include:

- The mean annual temperature has increased by 0.9°C since 1960, an average rate of 0.20°C per decade. The rate of increase is most rapid in October to December.
- Sahelian rainfall is characterized by high variability on inter-annual and inter-decadal timescales, making long-term trends difficult to identify. Statistically significant decreases of around 10 to 15mm per decade have, however, been observed in the southern regions of Senegal in the wet season (July to September) between 1960 and 2006. Some unusually high rainfalls have occurred in the dry season (January to March) in very recent years (2000-2006), but this has not been part of a consistent trend. There are insufficient daily rainfall observations available from which to determine changes in extremes indices of daily rainfall.

Projections of future climate change in Senegal include (UNDP, 2008):

- The mean annual temperature is projected to increase by 1.1 to 3.1°C by the 2060s, and by 1.7 to 4.9°C by the 2090s. The projected rate of warming is faster in the interior regions of Senegal.
- All projections indicate substantial increases in the frequency of days and nights that are considered 'hot'<sup>1</sup> in the current climate. Projected increases in hot days and nights are more rapid in the south and east of the country than in the north and west.
- All projections indicate decreases in the frequency of days and nights that are considered 'cold'<sup>2</sup> in the current climate.

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<sup>1</sup> Hot day/night is defined by the temperature exceeded on 10% of days/nights in the current climate of that region and season.

<sup>2</sup> Cold day/night is defined as the temperature below which 10% of days/nights are recorded in the current climate of that region and season.

- Projections of mean annual rainfall averaged over the country from different models project a wide range of changes in precipitation for Senegal, but tend towards decreases, particularly in the wet season (July to September).
- Despite the projected decreases in total rainfall, the proportion of total annual rainfall that falls in heavy events tends towards increases. Seasonally, this varies between tendencies to decrease from January to June, and to increase from July to December.

## 2. *Introduction to climate change vulnerability and adaptation*

During this session, **adaptation** was defined as adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC, 2007). The rationale for adaptation rests in the fact that even if GHG emissions are reduced to zero today, the global climate is locked into a pattern of change for at least the next century due to past emissions and the way in which the Earth's climate system is responding to them.

Different adaptation types (autonomous, planned) and approaches (ranging from top-down, scenario-driven, to bottom-up, vulnerability-driven) were also presented. Overall, adaptation was characterized as a context-specific, multi-level process which links micro- to macro-levels, engages a wide range of stakeholders, addresses current climate vulnerability and prepares for future changes, builds on local knowledge and capacity, and uses an integrated, holistic approach.

The type and level of adaptation required in the face of climate change is largely a function of the vulnerability of local communities. **Vulnerability** is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes (IPCC, 2007). Vulnerability is a function of exposure to climate stress, sensitivity and adaptive capacity. **Exposure** is the character, magnitude, and rate of climate change and variation to which a community is exposed to. It is generally determined by geography, therefore difficult to control. Our efforts should therefore focus on reducing sensitivity and enhancing adaptive capacity. **Sensitivity** to climate change is the degree to which a community is adversely or beneficially affected by climate-related stimuli. Sensitivity largely depends on the main livelihood activities practiced in a community, including the specific natural, physical, financial, human and social resources needed to carry out these activities, as well as the impacts of climate hazards on these key livelihood resources. The **adaptive capacity** of a community is its ability to adjust to climate change, to moderate or cope with the impacts, and to take advantage of the opportunities that may arise with climate change. Adaptive capacity is determined by the availability of, access to and control over livelihood resources that are key for adaptation. Availability, access and control are in turn determined by policies, institutions and power structures. To facilitate adaptation, resource availability, access and control must therefore be addressed.

Mainstreaming (or integrating) climate change adaptation was described as the integration of measures and policies that address climate change into development planning and decision-

making. Mainstreaming climate change adaptation ensures the long-term sustainability of interventions, avoids activities that increase vulnerability, and ensures that development activities reduce climate change vulnerability.

### **3. Introduction to the CRiSTAL tool**

CRiSTAL aims to facilitate the integration of climate change adaptation in community-level projects. It was developed by IISD, the International Union for Conservation of Nature (IUCN), the Swiss Foundation for Development and International Cooperation (Intercooperation) and the Stockholm Environment Institute in Boston (SEI-US). It is based on the rationale that community-level projects may improve or constrain local adaptive capacity. The tool purposes are to help users: 1) systematically understand the links between livelihoods and climate; 2) assess a project's impact on community-level adaptive capacity; and 3) make project adjustments to improve project impacts on adaptive capacity. The tool is divided into two modules and four key questions. It is available in multiple formats (Excel, hardcopy) and languages (English, French and Spanish). The CRiSTAL user's manual and the excel version of the tool were presented to participants. For more information or to download the latest version of the tool and user's manual, please consult the following website: [www.cristaltool.org](http://www.cristaltool.org).

### **4. Project information**

During this session, participants discussed in which projects climate change should be taken into consideration, and the best moment (in the project management cycle) to use CRiSTAL. It was agreed that climate change should be integrated:

- In all development projects that can be impacted by climate change (this depends on the sector of activity and on the geographical location of the project); and
- In all development projects which can affect the vulnerability (exposure, sensitivity and/or adaptive capacity) of local communities.

CRiSTAL should preferably be used when project activities can be modified, i.e. during the project design/conception phase or during a project review.

### **5. CRiSTAL Module 1**

Participants were introduced to the first module of CRiSTAL, called "Synthesizing information on climate and livelihoods". The objective of Module 1 is to help project planners and managers collect and organise information on the climate and livelihood context in their project area. This module includes two key questions and a few sub-questions:

Question 1: What is the climate context?

- 1.1. What are the anticipated impacts of climate change in the project area?
- 1.2. What climate hazards are currently affecting the project area?
- 1.3. What are the impacts of these hazards?
- 1.4. What are the coping strategies used by local communities to deal with these impacts?

Question 2: What is the livelihood context?

- 2.1. What resources are important to local livelihoods in the project area?
- 2.2. How are these resources affected by current climate hazards?
- 2.3. How important are these resources to implement coping strategies?

To help participants answer question 1.1., they were provided with a list of publications and websites where they can obtain information on the anticipated impacts of climate change at regional, national and sub-national levels. These sources of information included:

- Intergovernmental Panel on Climate Change (IPCC) summaries for regions and ecological zones: <http://www.ipcc.ch/ipccreports/ar4-wg2.htm>
- United Nations Framework Convention on Climate Change (UNFCCC) National Communications: [http://unfccc.int/national\\_reports/non-annex\\_i\\_natcom/items/2979.php](http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php)
- National Adaptation Programmes of Action (NAPAs): <http://unfccc.int/adaptation/napas/items/2679.php>
- UNDP/Oxford Climate Change Country Profiles: <http://country-profiles.geog.ox.ac.uk>

To help participants answer the following questions (1.2. to 2.3.), definitions and examples were provided for the following concepts:

- **Climate hazards:** Potentially damaging physical events or phenomena that result from weather or climate conditions. Examples: drought, floods, desertification, wildfires.
- **Climate hazard impacts:** The consequences of hazards on natural and human systems. Examples: crop damage, loss of income, reduced soil fertility, food insecurity.
- **Coping strategies:** Methods for using existing resources to achieve beneficial ends during abnormal or adverse conditions. Examples: liquidation of assets, rural/urban migration, rainwater harvesting, food rationing.
- **Livelihood resources:** These can be divided into five categories:
  - **Natural resources:** The natural resource stock upon which people rely both directly or indirectly.
  - **Physical resources:** The basic infrastructure and productive capital for transport, buildings, water management, energy and communications.
  - **Financial resources:** The stocks and flows of money that allow people to achieve their livelihood objectives.
  - **Human resources:** The skills, knowledge, capacity and good health important to the pursuit of livelihoods.
  - **Social resources:** The formal and informal social relationships and institutions from which people draw in pursuit of their livelihoods.

This was followed by a discussion on the difference between *coping* and *adaptation*. Coping strategies were described as short-term responses to climate hazards to minimize current

negative impacts, while adaptation was seen as a longer-term sustainable response to deal with observed and predicted climate change and exploit beneficial opportunities.

## 6. *Methods of data collection for Module 1*

Project planners and managers should gather information for Module 1 through stakeholder consultations, participatory workshops, site visits, document review, Internet research, and interviews. They can also use participatory community-level tools, such as CARE's Climate Vulnerability and Capacity Analysis (CVCA) community-level tools. Participants were introduced to some of these CVCA tools, including:

- **Hazard mapping:** Tool used to identify important livelihoods resources in the community; identify areas and resources at risk from climate hazards; and/or analyze changes in hazards and planning for risk reduction.
- **Seasonal calendar:** Tool used to identify periods of stress, hazards, diseases, hunger, debt, vulnerability, etc.; understand livelihoods and coping strategies; analyze changes in seasonal activities; and/or evaluate use of climate information for planning.
- **Historical timeline:** Tool used to get an insight into past hazards, changes in their nature, intensity and behavior; make people aware of trends and changes over time; and/or evaluate extent of risk analysis, planning and investment for the future.
- **Vulnerability matrix:** Tool used to determine the hazards that have the most serious impact on the community; determine which livelihood aspects are most vulnerable; and identify coping strategies currently used to address the hazards identified.

These tools should preferably be used with different community groups (such as men, women, youth, etc.) in order to detect differences in vulnerability within a given community. For example, women and men can be affected differently by climate hazards and can have developed different coping strategies.

Additional information on community-level tools can be obtained from:

- CARE International's Climate Vulnerability and Capacity Analysis (CVCA) Handbook: [http://www.careclimatechange.org/cvca/CARE\\_CVCAHandbook.pdf](http://www.careclimatechange.org/cvca/CARE_CVCAHandbook.pdf)
- ActionAid International's Participatory Vulnerability Analysis (PVA): [http://www.actionaid.org.uk/doc lib/108\\_1\\_participatory\\_vulnerability\\_analysis\\_guide.pdf](http://www.actionaid.org.uk/doc lib/108_1_participatory_vulnerability_analysis_guide.pdf)
- Oxfam's Participatory Capacities and Vulnerabilities Assessment (PCVA): [http://www.proventionconsortium.org/themes/default/pdfs/CRA/PCVA\\_2002\\_meth.pdf](http://www.proventionconsortium.org/themes/default/pdfs/CRA/PCVA_2002_meth.pdf)

This completed Day 1 of the training workshop. The second day included 4 additional sessions, presented below.

## 7. CRiSTAL Module 2

During this session, participants were introduced to the second module of CRiSTAL, called “Planning and managing projects for climate change adaptation”. The objective of Module 2 is to help project planners and managers analyse the links between planned or ongoing projects and the climate-livelihood context. This module includes two key questions and a few sub-questions:

Question 3: What are the impacts of project activities on livelihood resources that:

- 3.1. Are vulnerable to current climate hazards?
- 3.2. Are important to local coping strategies?

Question 4: How can project activities be adjusted to reduce vulnerability and enhance adaptive capacity?

- 4.1. How feasible is it to implement these changes in terms of:
  - Risks associated with future climate change?
  - Local priorities/needs?
  - Project finances?
  - Institutional capacity?
  - Policy framework?

Further information was provided to participants on synergies and barriers to project adjustments for climate change adaptation.

## 8. Methods of data collection for Module 2

Project planners and managers can carry out the analysis in Module 2 individually or through small project staff meetings. CRiSTAL users may also rely on additional stakeholder inputs to assist with the analysis, such as community leaders, researchers and partner organizations. At a minimum, users are encouraged to share proposed project adjustments with stakeholders for feedback. CRiSTAL users can also use different tools to help them identify synergies and barriers to adaptation, such as the CVCA tools at the community/institutional and national levels. The tools presented during this session included:

- **Policy Analysis:** Decisions made at the central level in governments can have a profound effect on the ability of communities to adapt to climate change. Therefore, an understanding of the policy environment is critical to identifying synergies and barriers to local adaptation. Relevant policies include sectors such as water, agriculture, health, infrastructure, and economic development.
- **Institutional Mapping:** This includes analyzing the roles and responsibilities of different organizations (governmental and non-governmental), target areas and sectors of work, interactions with target populations, interactions between organizations, strengths and weaknesses, capacity gaps, and plans and policies.

- **Interviews with key informants:** Key informants include decision makers in sectors such as climate change, water, agriculture and economic development, civil society representatives, donor organization representatives, policy analysis experts in relevant sectors, local governments, community group representatives, women group representatives, etc.

These tools facilitate an analysis of the enabling environment for adaptation at the local level.

## 9. *Group work*

During this 3-hour session, participants were divided into two groups: a group of French speakers and a group of English speakers. Each group practiced using the CRiSTAL tool (Excel document), using information from an existing project and community. Technical support was provided by IISD during this exercise.

## 10. *Feedbacks from participants*

At the end of the workshop, participants provided feedbacks on the CRiSTAL tool and on the training workshop.

General comments on the CRiSTAL tool included:

- Using the tool is relatively simple
- The tool provides an opportunity to revise and reflect on a project
- It is a flexible tool that that can be adapted for use in many situation
- It reflects well on real-life situations and can therefore be used by communities very well
- It is simple, transferable and teachable, thus aiding deployment in the field
- It is very participatory, encouraging discussions and debates
- It has a logical sequence and methodology, and it helps users structure their thoughts
- It integrates climate processes into socio-economic change and resilience very well; it focuses the mind on linkages between climate processes and livelihood activities

Challenges in using the tool:

- Using the tool requires a good knowledge of field conditions, local communities and local languages, in order to reflect community perceptions
- It can be challenging to relate subjective responses elicited from experiential and perceptive evidence of community members with hard scientific evidence which may differ in substance and nature
- As the tool will be employed at the local/community level, how to import and make understandable the information and knowledge constructed externally (e.g. climate science information), for use in the CRiSTAL methodology
- During community consultations, the CRiSTAL questions will have to be reformulated to be well understood by local communities
- Revising project activities can be a difficult/challenging step in the CRiSTAL analysis

Suggestion on how to improve the tool or its use:

- A multi-disciplinary team (including for example social scientists, climate change scientists, and local media) would be very useful in the application of the tool (we should stress this in the user's manual)
- In the user's manual and in the Excel tool, it would be useful to include more information (or links to where more information can be obtained) on methods of data collection, such as on community-level participatory tools
- It might be important to consider other drivers of local climate change vulnerability (e.g. demographic dynamics) in the analysis
- Some participants would like to adapt CRiSTAL to urban environments. For example, in setting the livelihood context, could we consider services in addition to resources?

Things learned during this workshop included:

- Enhanced knowledge of the tool and capacity to teach others on how to use it
- Enhanced understanding of the linkages between climate change and local livelihoods
- Enhanced understanding of the concept of "local livelihood resources"
- Realization of the value of CRiSTAL in community-level project management
- Realization of the importance of good consultations with local communities during the CRiSTAL analysis
- Realization of the importance of group discussions and justification of answers when answering CRiSTAL questions

Suggestions to improve the workshop:

- The workshop could have been longer, especially to allow more time for the CRiSTAL group work/exercise
- It would have been good to include a field component (community consultations) in order to gather the information that could then be inserted into CRiSTAL (this was suggested by almost all participants).

Many workshop participants are planning to apply CRiSTAL in their own work in the near future. For example, some participants are planning to use CRiSTAL in the development of a food security and climate change programme. Other participants are planning to use CRiSTAL in an urban environment. A participant also mentioned that he will go back to the field to gather additional community-level information in order to complete the CRiSTAL analysis started during the group exercise.

The training evaluation form provided to participants at the end of the training workshop is included in Annex 3.

## **CRiSTAL APPLICATION IN ZAMBIA, 11-12 JULY 2009**

The CRiSTAL application in Western Province, Zambia, aimed to improve the capacity of local non-governmental organisations and community-based organisations to gather local information on climate change vulnerability and adaptation and integrate this information into project design and management, using the CRiSTAL tool.

The first morning, IISD provided a 4-hour training session to 10 representatives of local organisations in Mongu, Western Zambia. The participants list is included in Annex 4. Participants were introduced to climate change causes, observations, impacts and projections for Zambia. This was followed by a brief introduction to the CRiSTAL tool. PowerPoint presentations used for the training are available upon request from Béatrice Riché ([briche@iisd.org](mailto:briche@iisd.org)). The following morning, IISD provided a second 4-hour training session, during which participants practiced using the CRiSTAL tool, with technical support from IISD.

During the afternoons, four training participants joined IISD for community consultations in nearby villages. On the first afternoon, a community consultation was undertaken in Muoyo village and included 7 community members. On the second afternoon, a consultation was undertaken in Sefula village with about 15 community members. The objectives of these community consultations were:

1. To show training participants different methods to collect community-level climate change vulnerability and adaptation information, which can then be integrated into project design and management, using CRiSTAL
2. To gather local information/perceptions on:
  - a. The climate context: climate trends over the year; the main climate hazards affecting livelihoods; the impacts of these hazards; and current and potential coping strategies to deal with these impacts
  - b. The livelihood context: key livelihood resources and the impacts of climate hazards on these key resources
  - c. Climate change adaptation: potential adaptation strategies; resources which are important for adaptation; the enabling conditions and constraints to the implementation of adaptation strategies which had been identified during a previous workshop; and prioritization of these strategies.

Key findings of these community consultations are presented in the sections below.

### **1. The Climate Context**

Community members in both villages have been observing changes in weather patterns over the last 5 years. Changes in weather patterns observed by community members include:

- Increased intensity of floods and droughts
- Increased unpredictability/variability of the rains (including big variations in the start and end dates of the rainy season)
- Increased temperatures (mentioned only in Sefula)

These climate changes have led to modifications in cultivation patterns. Community members started noticing these changes in 2005-2006. In Muoyo, community members were unaware of the causes of these changes, had never heard of global climate change (or global warming)

before, and thought that these changes are only happening locally. In Sefula, however, some community members had heard of global warming on the radio. They had also heard people from elsewhere saying that weather patterns are changing in other places too. They therefore assumed that that these changes are happening everywhere. A community member in Sefula also suggested deforestation as one of the possible cause of global warming. However, no community member was able to clearly explain what global climate change is. The IISD staff therefore presented to community members some basic information on climate change causes, impacts and projections for Zambia.

The main climate-related hazards presently affecting communities in Muoyo and Sefula village are (in order of importance):

1. Floods
2. Droughts
3. Diseases (there is an increase in diseases, such as diarrhea, during floods and high temperatures, so this will be categorized as an *impact* of climate hazards, rather than as a climate hazard, in the sections below)
4. High temperatures (mentioned only in Sefula)
5. Cold temperatures

The impacts of the main two climate hazards (floods and drought) on people’s livelihoods, as well as current coping strategies to deal with these impacts, are presented in Tables 1 and 2 below. Some coping strategies mentioned by community members are not being implemented at the moment or are limited in their effectiveness due to various factors. These limiting factors are indicated in parenthesis beside the coping strategies.

**Table 1: Summary of climate hazards, impacts and coping strategies, Muoyo Village**

Main Climate Hazards	Primary impacts	Secondary impacts	Coping strategies
Floods	Crop failure	<ul style="list-style-type: none"> <li>• Hunger</li> <li>• Increased Poverty</li> </ul>	<ul style="list-style-type: none"> <li>• Drainage (but lack of implements)</li> <li>• Depending on upper lands for cassava cultivation (but lack of early maturing seeds)</li> <li>• Collecting wild foods (but there is not enough to feed everyone)</li> <li>• Buying food from other provinces (but need money and prices are very high, so limited effectiveness)</li> <li>• Using community clubs to make collective decisions</li> <li>• Increased cultivation on upper lands and margin lands</li> <li>• Collecting and selling firewood, charcoal burning, and timber selling (but lack implements for timber production)</li> <li>• Selling poultry</li> </ul>
	Dispersion of fish	Decrease in fish catches	<ul style="list-style-type: none"> <li>• Fish farming (but lack of implements like nets and boats)</li> </ul>

	Water accumulation	Increase in human diseases (amplified by overcrowding as people migrate to higher lands)	<ul style="list-style-type: none"> <li>• Buying chlorine</li> <li>• Drainage of canals</li> <li>• Buying mosquito nets (but not enough are available)</li> <li>• Going to health facilities (there are some close by but some are sporadic)</li> <li>• Boiling water</li> </ul>
	<p>Positive impacts of floods:</p> <ul style="list-style-type: none"> <li>• Make local transport easier (via the canal)</li> <li>• Allows the annual ceremonies to take place (Kuomboka)</li> <li>• The mounds in the lowlands are more easily cultivated (once the flood goes away)</li> <li>• The upper fields (where there is cassava) usually do very well when there are big floods in lower lands</li> <li>• Pastures improve for animals</li> <li>• Positive impact on forest growth</li> <li>• Increased yields from margin lands</li> </ul>		
Drought	Crop failure and decreased yields (due to decreased water availability and increased crop pests like stock burrow and underground worms)	<ul style="list-style-type: none"> <li>• Hunger</li> <li>• Malnutrition</li> <li>• Increase in human diseases (due to malnutrition and street work)</li> <li>• School drop out</li> <li>• Poverty</li> </ul>	<ul style="list-style-type: none"> <li>• Cutting and selling reeds (taken from the areas where lakes have dried)</li> <li>• Eating wild foods (such as tubers)</li> <li>• Using water pumps to irrigate the land (but they do not have these)</li> <li>• Winter plowing in areas where there is some moisture (but they do not have the implements to do this)</li> </ul>
	Decreased pasture availability for cattle		<ul style="list-style-type: none"> <li>• Migration of the cattle to the flood plain where there is grass (this is a usual yearly activity)</li> </ul>
	In some areas, decrease in fish resources		<ul style="list-style-type: none"> <li>• No coping strategy mentioned</li> </ul>
	Increase in livestock diseases (because the water is constrained in very small ponds)		<ul style="list-style-type: none"> <li>• No coping strategy mentioned</li> </ul>
	<p>Positive impacts of drought:</p> <ul style="list-style-type: none"> <li>• Easy to catch fish in small ponds</li> <li>• Maize production in the flood plain becomes possible</li> </ul>		

**Table 2: Summary of climate hazards, impacts and coping strategies, Sefula Village**

Main Climate Hazards	Impacts	Coping strategies
Floods	Destruction of fields and crops	<ul style="list-style-type: none"> <li>• Selling chicken</li> <li>• Buying food</li> <li>• Selling firewood</li> <li>• Labor work</li> <li>• Those who have cassava fields in the higher lands will dig the tubers</li> </ul>
	Loss of human life (due to water accidents and increased diseases)	<ul style="list-style-type: none"> <li>• Go to the clinic</li> <li>• Use of mosquito nets (but only some people have them)</li> <li>• Give clean water to kids</li> </ul>
	Destruction of houses in the flood plain (Houses are destroyed every year now.)	<ul style="list-style-type: none"> <li>• Move to higher lands</li> </ul>

	This was not happening before, as there were no high floods like today)	
	It takes a long time for fields to dry/drain	<ul style="list-style-type: none"> <li>• Wait until fields are dry before cultivating</li> <li>• Cultivate late (but there is a risk that the field will be submerged again)</li> <li>• Could cultivate earlier/faster after floods if they had implements and oxen to plow the fields</li> </ul>
	Decrease in fish catches	<ul style="list-style-type: none"> <li>• Creating fish ponds (not doing this at the moment; they would have the labor and small native fish to put in the ponds, but they lack implements like wheel barrows, shovels and cement to put in place this coping strategy)</li> </ul>
<b>Drought</b>	Drying of fields and crops (maize and rice)	<ul style="list-style-type: none"> <li>• Labor work (like cleaning houses and getting water for others – there is quite a lot of demand for labor work)</li> <li>• Collecting and eating wild foods (but these are very scarce)</li> <li>• Charcoal burning</li> <li>• Making and selling wood poles</li> <li>• Cutting and selling reeds</li> <li>• Selling maize meal, i.e. buying it from milling companies and reselling it (this strategy was suggested by a community member but they are not using this strategy at the moment)</li> <li>• Engaging in pig and poultry production (only doing this at a very small scale at the moment)</li> </ul>
	Increase in human diseases (because water gets contaminated)	<ul style="list-style-type: none"> <li>• Putting chlorine in the water (but chlorine is difficult to obtain in the village)</li> <li>• Collecting water from boreholes (suggested as a potential strategy, but they do not have any boreholes at the moment)</li> </ul>
	Rotting of cassava tubers in the high lands	<ul style="list-style-type: none"> <li>• Early harvesting when the drought starts</li> <li>• Cultivating again</li> <li>• Collecting and selling firewood</li> </ul>
	Increase in crop pests, especially stock burrow	<ul style="list-style-type: none"> <li>• Nothing to do until there is water again in the fields</li> <li>• Buying pesticides was suggested as a strategy (but they do not have the financial resources to buy pesticides)</li> </ul>

It is important to note that, as indicated in Table 1, floods and drought also have positive impacts. Throughout history, communities in Western Zambia have adapted their livelihood activities to recurrent floods and droughts. However, in recent years, floods and droughts have increased in intensity and unpredictability, disturbing usual cultivation patterns, making previous coping strategies insufficient or ineffective, leading to increasing negative impacts on people's livelihoods, and forcing communities to rapidly find new coping/adaptation strategies. As shown in Tables 1 and 2, communities have many ideas on strategies to cope with climate hazards, but the implementation of these strategies is limited by many factors (such as access to resources).

## 2. The Livelihood Context

In Muoyo village, the main livelihood activities are small-scale farming (maize, rice and cassava cultivation, mostly for own consumption and sometimes for sale), fishing (for own consumption and sale), and cattle rearing (only a minority of people do this). The main livelihood activities in Sefula village are also small-scale farming (rice, maize, cassava and vegetable cultivation, for own consumption and sometimes for sale) and fishing (for own consumption and sale). Some villagers in Sefula also own chicken and small-scale piggeries. Villagers in Sefula are also planning to start some fish farming activities but are lacking tools to construct fish ponds.

The key livelihood resources on which these communities depend are summarized in Table 3.

**Table 3: Key livelihood resources**

Livelihood resource category	Key livelihood resources Muoyo Village	Key livelihood resources Sefula Village
Natural resources	Land Water sources (rivers/streams/canals) Trees (logs, firewood)	Land for cultivation Water (from open wells) Forests Grass (for livestock and houses)
Physical resources	Farming implements Markets Seeds	Houses Schools Hospital Roads and tracks Agricultural implements
Human resources	Agricultural knowledge Poultry know-how Fish farming know-how Knowledge of weather information and projections	Cultivating capabilities Knitting skills Cutting poles skills Brick laying skills Carpentry skills Handicraft skills
Financial resources	Crop selling Fish selling	Rice selling Firewood selling Labor work Chicken and pig selling
Social resources	Women club Barots Royal Establishment Cooperative groups Religious groups	Women club Youth club (doing carpentry) HIV/AIDS associations Farmers association

In Sefula village, community members were asked to assess the impacts of the main climate hazards (floods and drought) on each key livelihood resource. Findings are presented in Table 4. Resources in red are sensitive to (or significantly impacted by) at least one of the main climate hazards. As we can see, climate hazards are having a significant impact on many key natural, physical, human and financial resources on which community members depend.

**Table 4: Impacts of the main climate hazards on key livelihood resources, Sefula Village**

Livelihood resource category	Key livelihood resources	Impacted by floods? (Y=yes; N=no)	Impacted by drought? (Y=yes; N=no)
Natural resources	Land for cultivation Water (from open wells) Forests  Grass (for livestock and houses)	Y Y (being submerged) Y (indirectly affected by coping strategies) N	Y Y Y (indirectly affected by coping strategies) Y (it dries out)
Physical resources	Houses Schools  Hospital Roads and tracks Agricultural implements	Y (those on lowlands) Y (those on lowlands)  N (because on highlands) Y (the tracks in the plains) N	N N (but negative effect on education due to hunger)  N N N
Human resources	Cultivating capabilities Knitting skills Cutting poles skills Brick laying skills Carpentry skills Handicraft skills	Y N N N N N	Y N N N N N
Financial resources	Rice selling Firewood selling  Labor work Chicken and pig selling	Y (rice gets submerged) Y (due to migration of people to higher lands)  N N	Y (rice dries out) N  N N
Social resources	Women club Youth club (doing carpentry) HIV/AIDS associations Farmers association	N N N N	N N N N

### 3. Climate Change Adaptation

Community members were introduced to future climate change projections for Zambia. In simple terms, these projections are: increasing temperatures, more hot days and nights, less cold days and nights, no large change in total annual rainfall but more rain falling in heavy precipitation events (therefore higher flood risks). It is interesting to note that the projected rate of warming is a little more rapid in the southern and western regions of Zambia than the northern and eastern regions. For detailed projections, please consult the UNDP/Oxford Climate Change Country Profile for Zambia (UNDP, 2008b).

After being presented with these projections, community members were asked how they could respond to, or prepare for, these expected future climate conditions.

In Muoyo village, community members suggested:

1. Banning forest fires (to mitigate climate change)
2. Preserving forests: Villagers mentioned that governments should take action to prevent charcoal burning and licenses/permits should be given for charcoal burning and timber cutting.

3. Preventing grass burning
4. Using hybrid seeds that mature quickly
5. Planting trees where trees have been cut: Benefits mentioned by villagers included preventing (mitigating) climate change, food production (such as fruits), decreased soil erosion by wind and water, and increased rain. However, they have no knowledge of tree planting and have never done it before. There are also some witch-related beliefs that make them dislike trees. In addition, they have no food-producing or commercial trees here that they can plant (such as mango, cashew nut and gum trees) – they only have natural forests.

Suggestions from community members in Sefula village on how to adapt to projected future climate change included:

1. Doing activities that are not impacted by drought and floods (e.g. carpentry, brick laying, chicken and pig production). This suggestion shows that community members clearly understood the previous exercise on the impacts of climate hazards on livelihood resources, and realized that some resources and activities are less sensitive than others in the face of climate hazards. However, most community members do not have enough capital to engage in these alternative activities, and lack the implements and knowledge needed to do these activities on a large scale.
2. Stop cutting trees and banning fires. Community members cut trees mostly for selling (it is a source of income to buy food) and plains are burnt to improve pastures. To stop cutting trees and burning plains, alternative income generating activities would need to be put in place.

Following this brainstorming on potential adaptation strategies, community members were presented with a list of adaptation strategies that had been identified by their village representatives during a previous climate change workshop (Lyambai Vulnerability and Adaptation (LYVA) Project, Community and Local Decision Makers Workshop, Mongu, Zambia, October 17-19, 2007). Although some community members from each village had attended this previous workshop, most participants in this current meeting had not attended this previous workshop. After being presented with this list of potential adaptation strategies, participants commonly agreed that all these suggested adaptation strategies would be very useful in helping them adapt to current and future climate change. However, many constraints and challenges are presently preventing communities from implementing these strategies. These adaptation strategies, as well as their enabling conditions, synergies, constraints and challenges, are presented in Tables 5 and 6. Community members were also asked to prioritize these adaptation strategies according to their potential effectiveness in increasing their adaptive capacity and improving their livelihoods. Adaptation strategies in Tables 5 and 6 are therefore listed in order of community priority.

Due to time constraints during the community consultations, Tables 5 and 6 are not meant to be an exhaustive list of enabling conditions, synergies, constraints and challenges, but the outputs of an initial community-based brainstorming session. More discussion with community members, as well as consultations with other key informants (such as local governments, NGOs,

etc.) will be needed in order to do a thorough analysis of the enabling environment for adaptation at the local level. In addition, more research and consultations will be needed to identify ways to address these constraints, overcome these challenges, and build on existing community-level strengths. As presented during the training workshop in Senegal, different tools can be used to identify synergies and barriers to adaptation, such as the CVCA tools at the community/institutional and national levels, including policy analysis, institutional mapping, and interviews with key informants.

**Table 5: Prioritization of adaptation strategies and identification of enabling conditions and constraints, Muoyo Village**

Prioritization of Adaptation Strategies	Enabling Conditions and Synergies	Constraints and Challenges
1. Canal and drainage clearance	<ul style="list-style-type: none"> <li>- They have the man power</li> <li>- They have the knowledge required</li> </ul>	<ul style="list-style-type: none"> <li>- They lack implements</li> <li>- People would have to be mobilized. They are used to government providing food-for-work, so they would expect to receive food in exchange for their work</li> </ul>
2. Equipment and seeds must be accessible in good time	<ul style="list-style-type: none"> <li>- No enabling condition mentioned</li> </ul>	<ul style="list-style-type: none"> <li>- There is no supporting organisation</li> <li>- Community members would need to obtain know-how on how to plant the seeds</li> <li>- Agricultural inputs, like equipment, seeds and fertilizer, are very expensive and poor households cannot afford them</li> </ul>
3. Agriculture demonstrating officers at hand to illustrate new methods (it goes with the strategy above; training especially needed regarding new planting methods)	<ul style="list-style-type: none"> <li>- There is already one officer working in this village</li> <li>- Community members are highly motivated to learn new agricultural methods</li> </ul>	<ul style="list-style-type: none"> <li>- The current officer does come to help out but she is not very active (she is mostly involved in distributing seeds and fertilizers to a few individuals).</li> <li>- Only a few individuals in the community currently receive support and agricultural inputs, like fertilizer, every year</li> </ul>
4. Introducing good fishing methods (selection of big fish and various fish species)	<ul style="list-style-type: none"> <li>- Some community members would be willing to change their fishing methods</li> </ul>	<ul style="list-style-type: none"> <li>- For this strategy to work, it would need to be adopted by all, including by governments, who presently have factories that use fishing nets with very small meshes</li> <li>- Incentives would need to be put in place to prevent community members from using mosquito nets to fish</li> <li>- Would require the support of an influential voice, such as the Royal Establishment</li> </ul>
5. Increasing availability of livestock drugs and good animal husbandry practices	<ul style="list-style-type: none"> <li>- Community members would highly support this strategy, as animal diseases is a big issue in this village</li> <li>- There is already one veterinarian officer in this area</li> </ul>	<ul style="list-style-type: none"> <li>- One veterinarian officer is not enough for this area</li> <li>- At least one person within the community would need to be trained on how to treat livestock diseases</li> </ul>

6. Control of piggeries so that they do not destroy pastures	- Community members would support this strategy	- People do not have the resources to buy pig feed
7. Weather data and forecasts provided by meteorological department (especially to know when to plant)	- This information is available, it is the ACCESS to this information which is the problem - This information is being translated into local languages	- Not everybody has a radio and they do not know when the forecasts will be presented - There is currently no supporting organisation. A supporting organisation would be needed to provide radios to community groups, facilitate weather-related discussions within the community, produce information leaflets and provide explanations.
8. Protection of forest and introducing tree planting	- Community members would support this strategy, as they recognize that trees bring them many benefits, including: preventing (mitigating) climate change, food production (such as fruits), decreased soil erosion by wind and water, and increased rain.	- Community members have no knowledge of tree planting and have never done it before - There are some witch-related beliefs that make them dislike trees - They have no food-producing or commercial trees here that they can plant (such as mango, cashew nut and gum trees) – they only have natural forests
9. Sand for house building taken from areas that are not prone to soil erosion	- Community members would support this strategy, as they recognize that soil erosion is a big problem in this area	- No constraints mentioned
10. Protection of reeds/papyrus as bird habitat	- Community members believe this is a good strategy, since birds bring them many benefits: they eat insects that eat crops, they are a source of food, and they are a tourist attraction (some tourist come here for bird watching)	- Reeds/papyrus are destroyed by fire. There is a ban on fire, but people do not follow it. Many people are not aware that there is a ban on fire. Sensitization would therefore be needed.

**Table 6: Prioritization of adaptation strategies and identification of enabling conditions and constraints, Sefula Village**

Prioritization of Adaptation Strategies	Enabling Conditions and Synergies	Constraints and Challenges
1. Canal rehabilitation to support drainage network	- Community members already have some experience in canal rehabilitation. Sometimes they mobilize themselves to do it on their own land (for example on the land belonging to the local school)	- Community members lack the implements/tools to do this - They would not normally do it unless they are provided with food-for-work - Often they are only renting the fields in the highlands so they would not normally clear the canals unless they are paid to do it
2. Planting early maturing varieties of crops	- Seeds are available - Community members believe they have the knowledge required to use these seeds	- Community members have no resources to buy these seeds

3. Create crop market	<ul style="list-style-type: none"> <li>- This strategy corresponds to a local need and community members would support this strategy. At the moment, people simply come to villages to buy and sell goods. There is no clear market area.</li> </ul>	<ul style="list-style-type: none"> <li>- The community presently does not have the capital required to create this market area</li> </ul>
4. Extend the canals so that other areas can benefit as well	<ul style="list-style-type: none"> <li>- Community members have seen the advantages of these canals because they rent the land there, so they would highly support this strategy</li> <li>- The existing canals in the highlands are working well (no major problems have been experienced), so they would probably work well elsewhere too</li> </ul>	<ul style="list-style-type: none"> <li>- The community lacks implements/tools to do this</li> <li>- They lack an organization to help them do this</li> </ul>
5. Sharing lessons on how to conserve natural resources (this will lead to the next strategy)	<ul style="list-style-type: none"> <li>- This is being done already to some extent</li> </ul>	<ul style="list-style-type: none"> <li>- Community members do not consider lessons on natural resource conservation very much because they have to deal with more pressing issues such as hunger</li> <li>- The community does not have foresters that manage the forest anymore (there used to be in the past)</li> </ul>
6. Conservation of forests especially Mukusi tree species	<ul style="list-style-type: none"> <li>- Communities understand the links between forests and climate change mitigation and adaptation, and would therefore support this strategy</li> </ul>	<ul style="list-style-type: none"> <li>- To stop cutting trees and burning plains, alternative income generating activities would need to be put in place</li> </ul>

As we can see from the adaptation strategies listed above, canal rehabilitation is the first strategy prioritized by both communities. Communities have seen the benefits of canal rehabilitation in the highlands, but lack the implements, mobilization, and short-term incentives needed for them to implement this strategy.

Improving access to affordable early maturing seeds and other agricultural inputs is the second strategy prioritized by communities. Communities are aware that early maturing seeds are crucial for their adaptation to current and future climate change. However, the accessibility and affordability of early maturing seeds and other agricultural inputs are key problems in these communities. In addition, limited access and understanding of weather forecasts limit the communities' ability to effectively plan agricultural activities (such as planting times).

Both communities also realize the importance of promoting alternative income generating activities that would be less affected by climate change than traditional agricultural and fishing activities. Alternative income generating activities suggested by communities as coping or adaptation strategies (see Tables 1 and 2, and p.17) include: carpentry work, brick laying, various labour work (such as cleaning houses), selling wood, chicken and pig production, and fish farming. However, important knowledge and financial limitations prevent most community members from engaging in these alternative income generating activities.

Communities also realize that protecting their environment (such as fish resources, pastures, forests, bird habitats, etc.) is important for their long-term adaptation to climate change.

However, more urgent and short-term priorities often limit the implementation of these conservation strategies. In addition, some coping strategies based on short-term considerations, survival needs or lack of alternatives (such as charcoal and firewood selling) can worsen environmental degradation and thereby diminish future adaptive capacity and livelihood options.

## CONCLUSION

Local actors in Senegal and Zambia, including non-governmental organizations and community-based organizations, have been observing changes in weather patterns over the last few years, including increased frequency and intensity of extreme events (such as floods and drought), increased temperatures and increased rainfall unpredictability. These changes are having significant impacts on their activities and on local communities with whom they work. Climate change is still a very blurred concept for many people and local actors often lack the capacity to integrate climate change adaptation considerations into their interventions. Without a clear understanding of climate change and without a tool to integrate climate change into their work, it can be difficult for local actors to ensure that their activities are having a positive impact on local resilience to climate change.

The CRiSTAL training workshops in Senegal and Zambia in July 2009 aimed to provide participants with this climate change knowledge and tool. Representatives of non-governmental and community-based organizations were introduced to climate change causes, impacts, observations, projections, vulnerability and adaptation. They were also introduced to a community-level tool, called CRiSTAL, which can help them integrated climate change adaptation considerations into their own work.

Following these training workshops, community consultations were undertaken in two villages in Western Zambia, to show training participants in Zambia different methods to collect community-level climate change vulnerability and adaptation information which can then be inputted into CRiSTAL. Local perceptions on climate-livelihood linkages, as well as current and potential adaptation strategies, were collected and analysed. During the consultations, community members were able to draw clear linkages between climate change and local livelihoods (including the impacts of climate hazards on key livelihood resources, and the importance of key resources for adaptation) and were able to come up with, and prioritize, diverse adaptation strategies. Communities already have significant experience dealing with recurrent floods and droughts, but as these are becoming more and more intense and unpredictable, communities are forced to come up with new coping and adaptation strategies. They have plenty of ideas but often lack the implements, financial resources, short-term incentives, community mobilisation, and a supporting/leading organisation to help them implement these adaptation strategies.

The CRiSTAL application in Western Zambia was a key step in raising local climate change awareness and capacity. However, further discussions with community members, as well as consultations with other key informants (such as local governments, NGOs, etc.) will be needed

in order to complete a thorough analysis of the enabling environment for adaptation at the local level. More research and consultations will also be needed to identify ways to address barriers to adaptation and build on existing community-level capacities.

**Annex 1: Programme of the CRiSTAL Training Workshop  
Dakar, Senegal  
7-8 July 2009**

<b>Jour 1 : 7 juillet 2009</b>		
9.00-10.00	<b>Bienvenue et introductions</b>	<ul style="list-style-type: none"> <li>- Objectifs de l'atelier</li> <li>- Présentation du programme</li> <li>- Introductions des participants et attentes</li> </ul>
10.00-10.45	<b>Session 1: Introduction aux changements climatiques</b>	<ul style="list-style-type: none"> <li>- Causes</li> <li>- Observations, conséquences et prévisions : Monde, Afrique, Sénégal</li> </ul>
10.45-11.00	Pause	
11.00-11.30	<b>Session 2: Introduction à la vulnérabilité et à l'adaptation aux changements climatiques</b>	<ul style="list-style-type: none"> <li>- Faire face aux changements climatiques: atténuation et adaptation</li> <li>- Approches et caractéristiques de l'adaptation</li> <li>- Déterminants de la vulnérabilité et de la capacité d'adaptation</li> </ul>
11.30-12.30	<b>Session 3: Introduction à l'outil CRiSTAL</b>	<ul style="list-style-type: none"> <li>- Introduction générale</li> <li>- Questions et discussion</li> </ul>
12.30-13.30	Lunch	
13.30-13.45	<b>Session 4: Information sur le projet</b>	<ul style="list-style-type: none"> <li>- Dans quels projets devrait-on prendre en considération (intégrer) les changements climatiques?</li> <li>- Quel est le meilleur moment pour utiliser CRiSTAL?</li> </ul>
13.45-14.30	<b>Session 5: CRiSTAL Module 1, Question 1: Quel est le contexte climatique?</b>	<ul style="list-style-type: none"> <li>- Impacts prévus des changements climatiques dans la zone de projet, sources d'informations scientifiques, et incertitudes</li> <li>- Risques climatiques actuels, conséquences et stratégies d'adaptation (définitions et exemples)</li> <li>- Exemples d'entrées dans CRiSTAL</li> <li>- Différence entre stratégies d'adaptation temporaires (<i>coping strategies</i>) et stratégies d'adaptation durables</li> </ul>
14.30-15.00	Pause	
15.00-16.00	<b>Session 6: CRiSTAL Module 1, Question 2: Quel est le contexte des moyens d'existence?</b>	<ul style="list-style-type: none"> <li>- Ressources importantes aux moyens d'existence (divisées en 5 catégories)</li> <li>- Influence des changements climatiques sur les ressources</li> <li>- Importance des ressources pour la mise en œuvre des stratégies d'adaptation</li> </ul>
16.00-17.00	<b>Session 7: Méthodes de collecte d'information pour le Module 1</b>	<ul style="list-style-type: none"> <li>- Consultations communautaires</li> <li>- Facilitation / Animation de groupes</li> <li>- Exemples d'outils participatifs au niveau communautaire</li> </ul>

<b>Jour 2 : 8 juillet 2009</b>		
9.00-9.30	<b>Récap du jour 1, révision du programme pour le jour 2</b>	
9.30-10.00	Session 8: <b>Module 2, Question 1: Quels sont les impacts des activités du projet sur les ressources importantes aux moyens d'existences?</b>	<ul style="list-style-type: none"> <li>- Impacts des activités de projet sur les ressources qui sont:               <ul style="list-style-type: none"> <li>o vulnérables aux CC; et/ou</li> <li>o importantes pour la mise en œuvre de stratégies d'adaptation</li> </ul> </li> <li>- Impacts sur la disponibilité, l'accès et le contrôle</li> </ul>
10.00-10.30	Session 9: <b>Module 2, Question 2 : Comment peut-on adapter les activités de projet afin de réduire la vulnérabilité et améliorer la capacité d'adaptation?</b>	<ul style="list-style-type: none"> <li>- Adapter les activités afin de diminuer la vulnérabilité et augmenter la capacité d'adaptation</li> <li>- Durabilité des activités face aux CC</li> <li>- Synergies et obstacles à l'adaptation</li> </ul>
10.30-10.45	Pause	
10.45-11.15	Session 10: <b>Méthodes de collecte d'information pour le Module 2</b>	<ul style="list-style-type: none"> <li>- Entretiens avec différentes parties prenantes au niveau local, municipal, provincial et national</li> </ul>
11.15-12.30	Session 11: <b>Travail en équipe : CRiSTAL Module 1 et 2</b>	
12.30-13.30	Lunch	
13.30-15.30	Session 11: <b>Travail en équipe : CRiSTAL Module 1 et 2 (continuation)</b>	
15.30-15.45	Pause	
15.45-17.00	Session 12: <b>Réflexions des participants sur le processus</b>	<ul style="list-style-type: none"> <li>- Présentations de chaque groupe</li> <li>- Intégration des changements climatiques: que nous manque-t-il?</li> <li>- Intégration des changements climatiques: la voie à suivre</li> </ul>
17.00-17.30	<b>Evaluation et clôture</b>	

## Annex 2: CRiSTAL Training Participants, Dakar, Senegal

Name	Organization
Lawrence Flint	ENDA TM
Aby Drame	ENDA TM
Gifty Ampomah	ENDA TM
Fatima Kaba	ENDA TM
Moussa Na Abou	ENDA TM
Boubacar Fall	ENDA TM
Fabian Lohmann	ENDA TM

## **Annex 3: CRiSTAL Training Evaluation Form**

### **Évaluation Atelier de formation CRiSTAL (Dakar, Sénégal, 7-8 juillet 2009)**

***Veillez SVP partager vos impressions sur cet atelier***

1. Est-ce que cet atelier a répondu à vos attentes? Si oui, comment? Si non, pourquoi?

2. Entre 1 et 5, quel score donneriez-vous à cet atelier en termes d'utilité? 1 = inutile, 3= moyennement utile, 5 = extrêmement utile (Encerler le chiffre correspondant)

1                      2                      3                      4                      5

3. Quels ont été les points culminants de l'atelier pour vous?

4. Quelle a été votre session favorite et pourquoi?

5. Avez-vous des suggestions pour améliorer l'outil CRiSTAL?

6. Avez-vous des suggestions pour améliorer les ateliers de formation CRiSTAL?

## Annex 4: CRiSTAL Training Participants, Western Province, Zambia

Name	Organization
Carol M. Mubita	Barotseland.com
Kashewe Petty	Barotseland.com
Milton M. Muzaza	Lewawika G. Hospital
Nasileke Musa	Barotseland.com
Moonga Chimanda	Barotseland.com
Kaumba Mwananyambe	
Mashewani Akatumwa	Foundation RDE
Mukeya Liwena	Radio Lyambai
Kagoli Muyangali	Barotseland.com
Maxwell Muhwimi	Barotseland.com