



# Capacity strengthening in climate change vulnerability and adaptation strategy assessments

## Exercise 1 Food Security and Climate Change



In collaboration with:



## Exercise 1: Food security and climate change

**Objective:** To analyse the evolution of food security with respect to climatic changes in order to identify potentially vulnerable groups, sectors and regions and to propose appropriate adaptation options and strategies.

This exercise is based on an analysis of the current vulnerability to food security, coupled with future climate change scenario(s), to explore how food security vulnerability may evolve in the future. Based on this analysis, adaptation options for different decision-making levels will be developed.

### To keep in mind:

The steps and tools that follow are only **illustrative**; they do not represent the sole way of conducting the analysis. As long as group work remains pragmatic, understandable and transparent, creativity and imagination are welcome.

Groups should keep an eye on the time to ensure they are able to complete the exercise and prepare a synthesis report for presentation in plenary.

Working groups must first decide at which **spatial scale** (global, regional, national or local), they would like to work on (e.g. regional level in the Sahel, national level in Mauritania or Rwanda, or the local level in the Niayes zone in Senegal or Bulozzi plain in Zambia). Food security conditions will vary with the geographical area chosen and the respective socio-economic characteristics. They depend on local and national environmental and socio-economic problems and trends (e.g. relationships between agriculture and livestock) as well as regional (climate variability) or international (grain market prices) characteristics.

At each step in the exercise, the group should identify the information needed (data, maps, etc) and the constraints in obtaining this information (scenarios not available for the selected scale, etc.). Furthermore, the group should identify which tools would yield the desired results (see box below **Examples of tools useful for this type of exercise**).

### Examples of tools useful for this type of exercise

**Scenario development and analysis:** Description and analysis of certain key parameters (climatic and other) for the selected time horizon.

**Brainstorming:** Constructing matrices, diagrams and lists of all the possible ideas and options related to a given subject.

**Role play:** A participatory 'game' that allows participants to elucidate the behaviour, tendencies and expectations of different actors.

**Oral histories:** Qualitative accounts of individuals' stories and strategies.

**Expert judgment:** Experts opinion regarding a specific problem or option.

**Vulnerability indicators:** Representation of different vulnerability indicators for different groups.

**Livelihood indicators:** An evaluation of the impact of climate on livelihoods.

**Focus groups:** A group assembled to discuss and share their opinions on a certain subject.

## **Step 1 - Determine the current food security situation at the selected spatial scale**

For the selected spatial scale (global, regional, national or local), the group must determine the structure and dynamic of food security and identify which components (vulnerable groups, sectors, crops, resources) that could be affected by climate change.

Figures 1a & 1b (at the end of this document) illustrate, by way of example, the present state of food security in Africa (at the regional, sub-regional and national levels) and identify some of the conditions that induce food insecurity. These figures provide one with an overview of some of the factors that affect food security. They may also be used as a basis from which to start an analysis at the selected spatial scale.

At the end of this step, groups should have identified the primary direct and indirect factors that influence food security in the study area. It is also possible to identify which of these factors are affected by climate and which are affected by other phenomena (population, economy, etc). Use illustrations and diagrams, to the extent possible, to summarize the results from this step.

## **Step 2 – Identify the groups, sectors and resources that are vulnerable to food insecurity**

The purpose of this step is to identify the different components of the ‘system’ (groups, sectors, resources, stakeholders, etc) that will either be affected by climate change or involved in the adaptation strategies to it. Adaptation options should be targeted to these different components, such as: the stakeholders concerned about the problem, the more vulnerable groups, livelihood activities, the most sensitive sectors and the environmental goods and services most at risk.

Identifying the different components of the ‘system’ should be based on group discussions, and knowledge of the current climatic crisis and its impacts on the study area’s resources, sectors and populations. The process should begin by identifying the main climate risks (drought, flood, sea-level rise) that have already contributed to periods of food insecurity in the region or at least have enhanced its vulnerability.

By the end of this step, the group should have identified the main resources (or crops), activities, sectors or stakeholders groups that are particularly vulnerable to climate variability.

## **Step 3 – Climate change impacts on food security**

Figure 2 illustrates future possible impacts of climate change on Africa (specifically how future corn yields and production systems could be affected). The figure provides an overview of the possible impacts of climate change on elements that contribute to food security (production systems, crop yields) and can assist in the identification of needs for scenario development.

The group should begin by choosing one or more climate change scenarios. These scenarios may be very qualitative and narrative in nature as long as they include the main climate parameters that affect food security (namely, precipitation, temperature, etc). To the extent possible, groups should use existing scenarios that are appropriate for their selected spatial scale. A possible scenario could be: “by 2050, precipitation has decreased by 15%; the start of the rainy season occurs later in the

year; and flooding and drought periods have become more severe". This scenario is 'pessimistic'. One could choose a second scenario (perhaps a more 'optimistic' one) to study as well, however each scenario that is added will increase the complexity and length of the study (see box below: **Information on climate scenarios and trends: short vs. long term**).

After choosing a scenario, the group should elucidate the possible direct impacts this climate change scenario may have on food security in the study area (reduction in some crop yields, loss of livestock, etc). The group may also examine which resources, sectors, and groups would be the most vulnerable to these changes.

The group should then consider whether other factors that influence the structure and dynamism of the food security in the study area will affect the overall vulnerability. If it is determined that these factors will have an effect on future food security, the group should consider other types of scenarios (e.g. socio-economic or environmental scenarios) and briefly explain how such scenarios could assist in determining the resultant future vulnerability.

At the end of this step, the group will have identified the scenario(s) to use, determined the impacts of climate change on food security and will have identified the most vulnerable stakeholders, sectors and resources.

#### **Step 4 – Identify the potential adaptation responses and options to reduce vulnerability to food insecurity caused by climate change**

Having identified the vulnerable stakeholders, resources and sectors, the group must now identify adaptation options that could reduce this vulnerability. These options may be developed for a number of scales (local, regional, national, etc). For example, adaptation options could include: national agricultural policies, municipal level crop diversification projects and local level efforts to conserve multi-functional agricultural families. The adaptation options should either seek to limit the impacts (negative) or exploit the opportunities (positive impacts) caused by climate change.

First, adaptation options that address the impacts of the current climate crisis (severe drought, for example) should be identified, since frequency or magnitude of these phenomena could increase in the selected climate change scenario(s). The group may also analyze the limits, opportunities or constraints for each adaptation option.

The group may then identify other options that may be appropriate for development at different levels. Any barriers to the implementation of these options should also be identified. Groups may also include a brief analysis of how the possible adaptation options compliment and correspond to national and local level development policies.

By the end of this step, the group should have identified possible adaptation options that are suitable for different levels and that address the vulnerability induced by climate change faced by stakeholders, resources and sectors.

### **Information on climate scenarios and trends: Short vs. Long term**

Using available information and data, it is possible to analyze the recent change and trends in climate parameters. Simple data (minimum and maximum daily temperature, maximum and minimum rainfall, evapo-transpiration, sunshine duration, etc), more elaborate indicators (length of the growing season, etc) and complex indices (level of satisfaction of different crops water needs) allow one to identify short- and medium-term thresholds. When climate data is insufficient for the desired area, one may consult the regional and global databases to obtain, at least, monthly averages for most climate parameters.

See, for example:

*IPCC Data Distribution Centre*

<http://ipcc-ddc.cru.uea.ac.uk>,

*FAO climate data: CLIMWAT – A climatic database for CROPWAT*

[www.fao.org/ag/aql/aglw/climwat.stm](http://www.fao.org/ag/aql/aglw/climwat.stm)

*FAO climate data: METART*

<http://metart.fao.org/default.htm>

*Global climate forecasting and monitoring database*

<http://iri.columbia.edu>

Particular attention should be given to sectoral, national and regional studies, as these can provide the data needed to assess critical thresholds and specific tipping points. For instance, data on the recommended daily calorie intake, duration of the growing season, etc. are often available in poverty or food security reports. Furthermore, many regional and national reports on most climate hazards and events exist.

See, for example:

*USAID Famine early warning system network*

[www.fews.net](http://www.fews.net)

*FAO Global information and early warning system on food and agriculture*

[www.fao.org/gIEWS/english/index.htm](http://www.fao.org/gIEWS/english/index.htm)

For long-term climate change and trends, data on climate parameters and future thresholds can be derived from climate change scenarios. However, considering that most scenarios are global or regional in scope, they are of limited use for national level analyses. In the same vein, the timescales used in these scenarios (50 to 100 years) is not appropriate for the decision-making process (which needs to address urgent and immediate needs on a 10 to 20 year timescale).

See, for example:

*IPCC Data Distribution Centre*

<http://ipcc-ddc.cru.uea.ac.uk/>

*IPCC Report on Regional Impacts of Climate Change*

[www.grida.no/climate/ipcc/regional](http://www.grida.no/climate/ipcc/regional)

Given the often limited data, groups are recommended to focus on using historical and observed climate data and trends to construct good climate data series. If groups decide to use scenarios in the course of this exercise, they are recommended to select simple rather than complex ones. With respect to General Circulation Models (GCMs), one must always examine the accuracy of the results obtained for the study region and the parameters used. Techniques exist to transform information from a global scale, to a regional and then national one.

See, for example:

*Vulnerability Network & Observatory*

<http://vulnerabilitynet.org>

*Assessments of Impacts and Adaptation to Climate Change in Multiple Regions and Sectors Project - Meeting reports*

[www.aiaccproject.org/meetings/meetings.html](http://www.aiaccproject.org/meetings/meetings.html)

## **Synthesis**

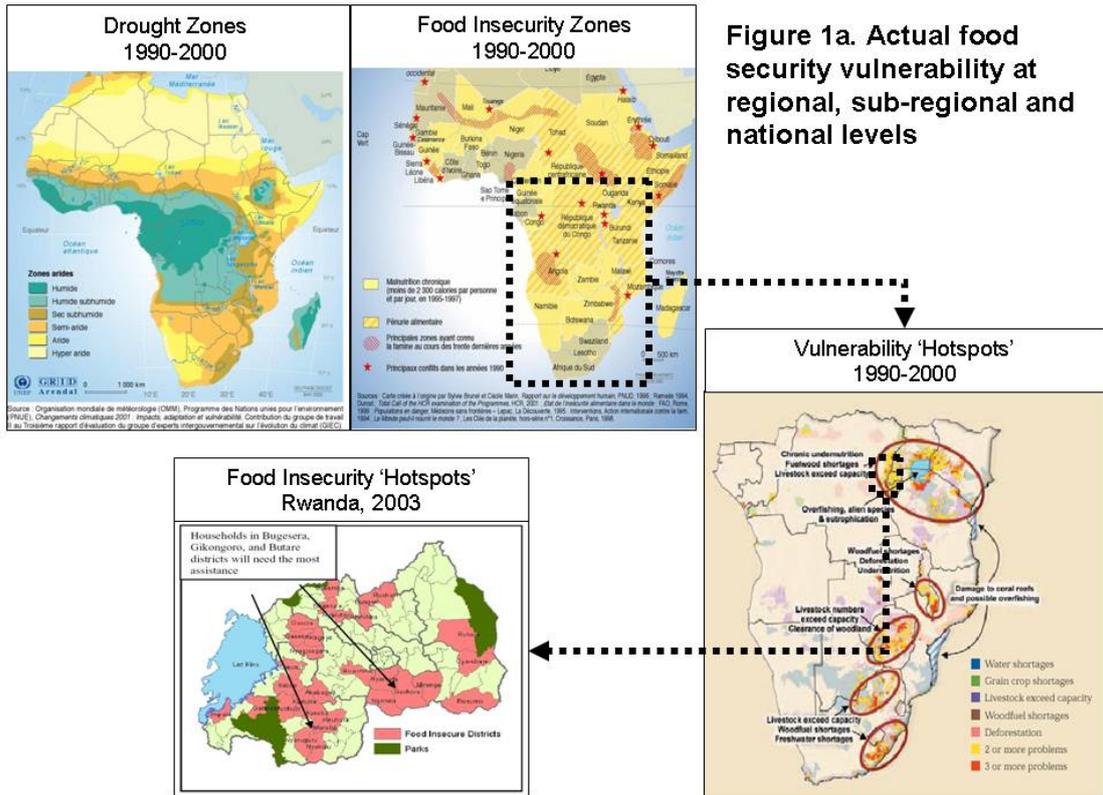
Each group will present the results of its work in plenary. In this presentation, groups should indicate, in the most concise and illustrative manner possible, the challenges encountered, the needs identified and the appropriate tools to use for each step.

### **Useful on-line references for this exercise:**

Downing T., G. Ziervogel, 2005, Food System Scenarios: Exploring Global/Local Linkages, Working Paper, Poverty and Vulnerability Programme. Stockholm Environment Institute (SEI), Stockholm, Sweden.  
[www.sei.se/dload/2005/Food\\_System\\_Scenarioslowres.pdf](http://www.sei.se/dload/2005/Food_System_Scenarioslowres.pdf)

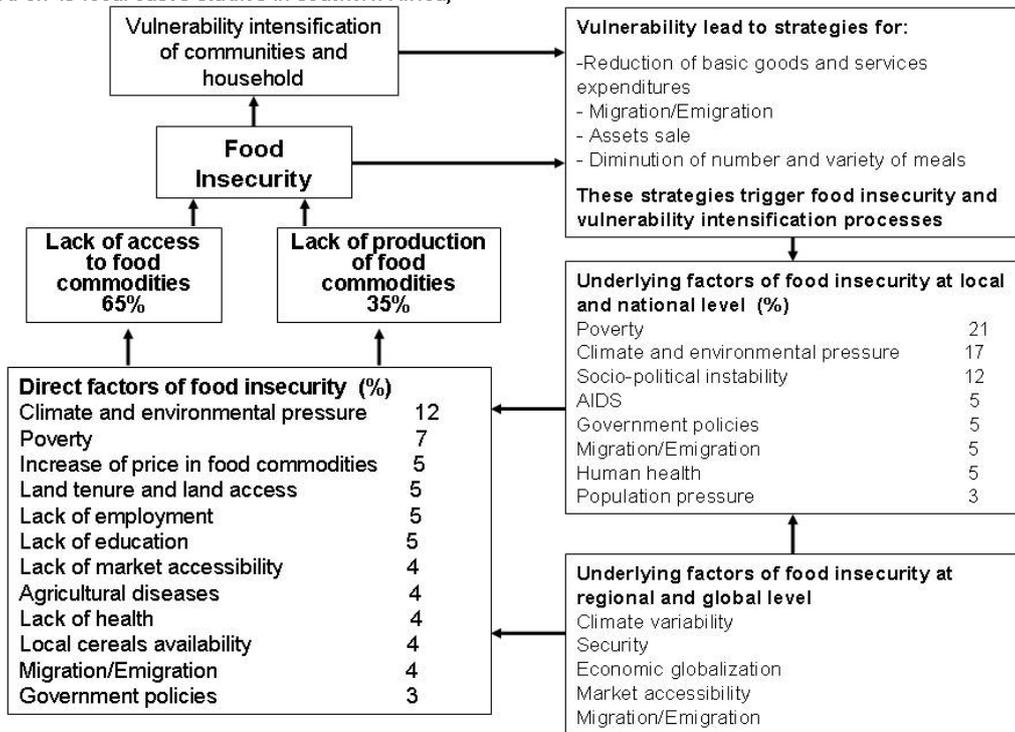
IRI, 2005, Sustainable development in Africa: Is the climate right, Position Paper, IRI, New York, USA.  
<http://iri.columbia.edu/africa/whatisnew/SusDevAfricafinal.pdf>

R. Biggs, et al., 2004, Nature Supporting People: The Southern African Millennium Ecosystem Assessment, Integrated report, A contribution to the Millennium Ecosystem Assessment, Report prepared by the Southern African Millennium Ecosystem Assessment team, Council for Scientific and Industrial Research, Pretoria, South Africa.  
[www.millenniumassessment.org/proxy/document.70.aspx](http://www.millenniumassessment.org/proxy/document.70.aspx)



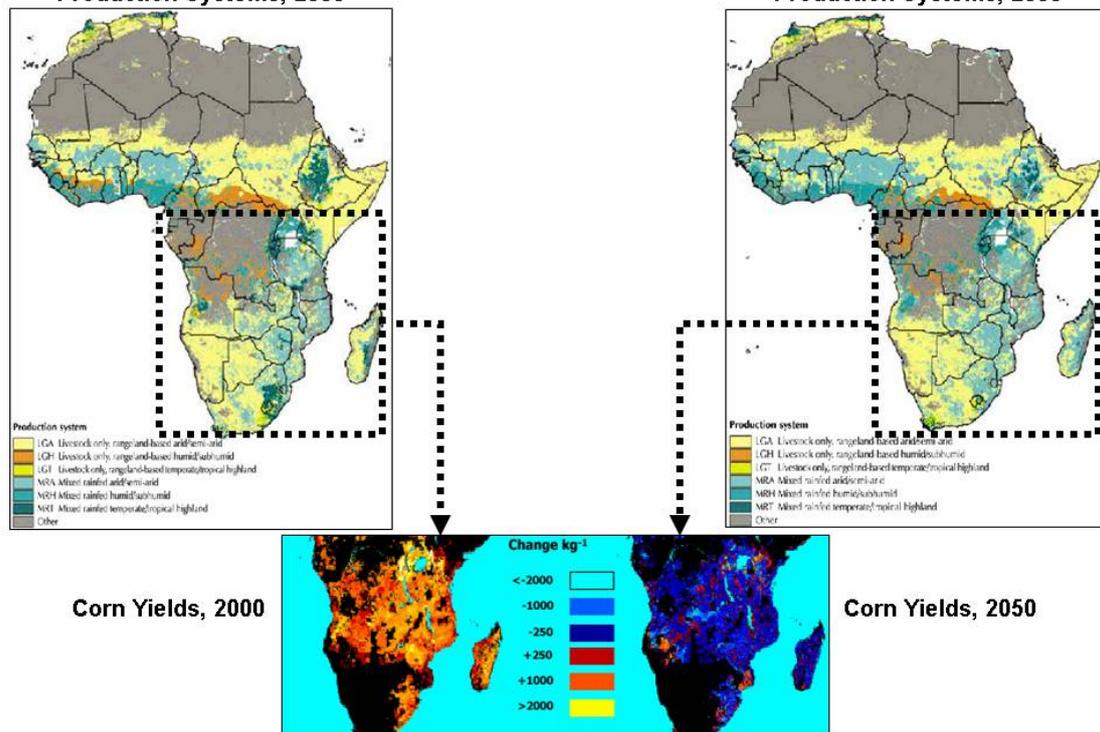
Sources: <http://www.vitalgraphics.net/> <http://www.millenniumassessment.org/en/subglobal.safma.aspx> <http://www.fews.net/imagery/>

**Figure 1b. The processes leading to food insecurity**  
(based on 49 local cases studies in southern Africa)



Sources: <http://www.millenniumassessment.org/en/subglobal.safma.aspx>

**Figure 2. Future vulnerability and adaptation needs for food security at regional and national levels**



Source: Thornton et al., 2002; Jones and Thornton, 2001; <http://www.vitalgraphics.net/>