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resilience of food security to climate risks
in Burkina Faso**

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Summary

The development of relevant methodological tools for the design, the management and the monitoring of adaptation to climate change processes is still one of the basic scientific challenges that pose the changes in climate in the Sahel region. These tools comprise notably models of intervention for increasing resilience to climate.

This working paper proposes a scheme of intervention for increasing the resilience of food security to climate change in one of the Sahel countries, Burkina Faso. It includes perceptions and solutions of the main institutional actors of food security sector in response to climate change, and has three components which are an institutional leadership, a climate risk management process and a set of indicators that are progress markers.

Key words: Food security, climate changes, adaptation process

I. Introduction

In the Sahel region, climate is one of the main factors that put at risk, in a recurring way, food security. It affects food availability and food accessibility by its variability and extreme events such as droughts, floods and heat waves. There is indeed in this region a good correlation between the years of poor rainfall and years of food crises. The years 1973, 1985, 1996, 1998, 2001, 2005, and 2010 that have been years of droughts and also years of food crises or famine in some areas or the whole of the Sahel region (Nicholson, 2010; CILSS, 2004; JANIN, 2010) illustrate this correlation.

The climate-related risks for food security could increase in the future because of climate change that could alter rainfall patterns, increase the frequency and the intensity of climate shocks and induce transformations of ecosystems (IPCC, 2007a). According to the latest report of the Intergovernmental Panel on Climate Change, some impacts of climate change on food security in Africa could be (IPCC, 2007b): by 2020, in some countries, yields from rain-fed agriculture could be reduced by up to 50%, and by 2080, an increase of 5 to 8% of arid and semi-arid land in Africa is projected under a range of climate scenarios.

For the Sahel region, the expected impacts of climate change on food security require to design and implement, without delay, adaptation processes. However, these processes will produce the desired effects in terms of increasing resilience to climate risks, if they are governed by relevant models of intervention.

This working paper proposes a scheme of intervention for increasing the resilience of food security to climate change in one of the Sahel countries, Burkina Faso. It includes perceptions and solutions of the main institutional actors of food security sector in response to climate change, and has three components which are an institutional leadership, a process of climate risk management and a set of indicators that are progress markers.

II. Methodology

1. Framework for information collection

Perceptions and solutions of the main institutional actors of food security sector in response to climate change have been collected through a specific framework that is described in the table (I). It focuses on the dimensions of food security which are: availability (local food production, food imports and aid, food stocks), accessibility (physical access and economic access to food) and the stability of supply (infrastructure performance, climate stability, political and social stability).

Table (I) : Framework for information collection
A.Perception of current climate impacts on food security in Burkina Faso
Notification: Food security is divided into three (3) components that are: availability, accessibility and stability of supply
Q1.According to your institution, what are the three (3) most significant climate risks for food security in Burkina Faso?
Climate risk 1:
Climate risk 2:
Climate risk 3:
Q2. According to your institution, what are the impacts of the three (3) climate risks identified below on food security in Burkina Faso?
Impacts of climate risk 1 on:
availability :
accessibility :
Stability of supply :
Impacts of climate risk 2 on:
availability:
accessibility:

Stability of supply :
Impacts of climate risk 3 on:
availability :
accessibility:
Stability of supply
B. options for current climate risks management
Q3. According to your institution, what are prevention, response and recovery measures to be implemented to mitigate the impacts of climate risks on food security in Burkina Faso?
Prevention measures:
Response measures :
Recovery measures:
C. Perceptions of challenges related to climate change for food security in Burkina Faso
To assess the expected impacts of climate change on food security in Burkina Faso, three (3) scenarios of climate change have been proposed. These are:
Scenario S1 : a general , profound and negative changes in climate ;
Scenario S2 : changes in climate characterized by a significant increase in temperature, frequency and intensity of climate shocks, and a degradation of ecosystems.
Scenarios S3 : changes in climate characterized by climate conditions globally favorable in terms of precipitation.
Q4. According to your instittion, what could be the impacts of future climate on food security in Burkina Faso, under the scenarios described below?
Expected impacts of climate change, under the scenario S1, on:
Availability :
Accessibility :
Stability of supply:
Expected impacts of climate change, under the scenarios S2, on :
Availability:
Accessibility:
Stability of supply:
Expected impacts of climate change, under the scenario S3; on :
Availability:
Accessibility :
Stability of supply:
Q5. According to your institution, what could be the strategies of adaption to implement to address the projected impacts of future climate on food security in Burkina Faso?
Set of adaptation strategies ,in response to climate change , under the scenario S1 :
Set of adaptation strategies, in response to climate change, under the scenario S2 :
Set of adaptation strategies in response to climate change, under the scenario S3

2. ClimProspect Model

The intervention scheme for increasing the resilience of food security to climate that has been designed is based on the ClimProspect model from the “Institut d’Application et de Vulgarisation en Sciences (www.iavs.info)”. It is a model for planning responses to current and future climate risks. It has three basic dimensions, as shown in figure (1):

- an institutional leadership for managing the adaptation process ;
- a process of adaption to climate change, which is a process of climate risks management, divided into several phases;
- a set of indicators to measure the progresses achieved in terms of increasing the resilience to climate risks;

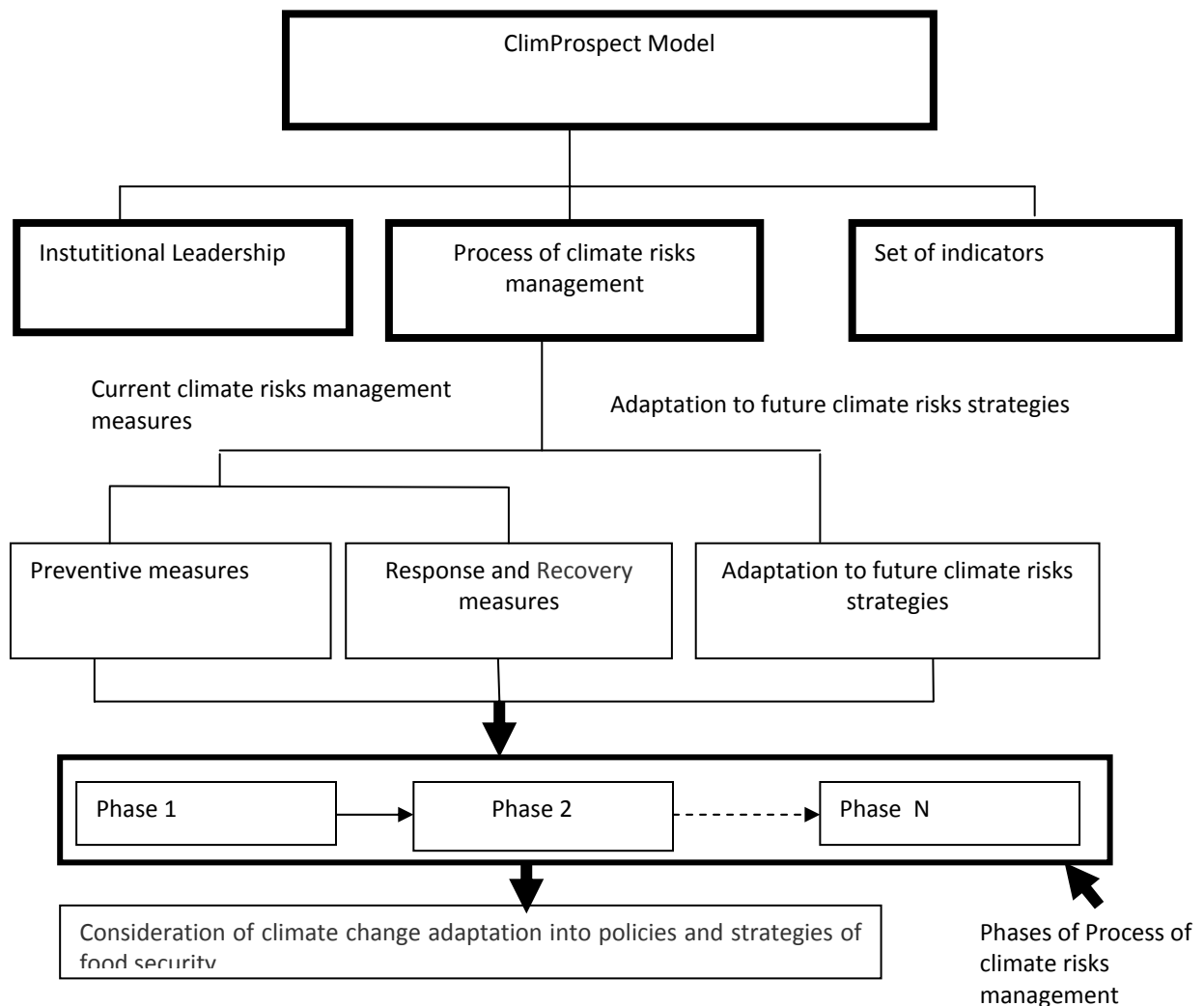


Figure (1): Description of the ClimProspect model

III. Perceptions and solutions of actors of food security sector

About twenty institutions, which intervene in the elaboration of the policies and the strategies of food security or which influence these policies and strategies, informed the framework of collection of the information. Among these actors, the priority has been given to the structures of the Ministry in charge of the food security and quite particularly to the Executive Secretariat of the National Council for Food Security (SE-CNSA).

1. Perceptions of the current vulnerability of food security to climate risks

For the actors of the food security sector, the most significant three (03) current climate risks for food security are droughts, floods and heat waves. Droughts are perceived as the most significant risk and the availability is the most vulnerable component of food security to climate risks.

The perceived impacts of climate risks on food security are listed in Table (II). These impacts include a decrease in the availability of local agricultural production, additional difficulties for physical access to food and a decline in nutritional quality.

Table (II) : Perceived impacts of climate risks on food security	
Climate risks	Impacts of climate risks on food security
Droughts	A decrease in the availability of local agricultural production; a decline in affordability to food; a deterioration of market supply in local agricultural production and an increase in malnutrition
Floods	A decrease in the availability of local agricultural production; difficulties for physical accessibility to food and a deterioration of market supply, loss of food stocks, destruction of production facilities (dams, dikes) and soil erosion
Heat waves	A decline in the availability of local farming productions and a decline in the nutritional quality of food.

To mitigate the impacts of climate risks on food security, the actors of food security sector have identified prevention, response and recovery measures that are described in the table (III).

Table (III) : Measures for climate risks management	
Climate risks management measures	Description of measures
Prevention	Water control through irrigation schemes; promotion of an intensive and low - natural resources agriculture; Improved weather forecasting and the use of traditional weather forecasting ; facilitating access to production factors (land, inputs, agricultural credit); development of roads and storage facilities and processing; consideration of climate risks in food security policies; Rehabilitation of degraded lands; a strengthening of the national system of food security, harmonization of national and regional early warning systems (EWS), a clarification of land tenure.
Response	Plans of crisis communication; strengthening and harmonization of emergency mechanisms; implementation of operations « Food for Work » and works with high intensity of labor in rural areas; promotion of the practice of counter- season cultivation.
Recovery	Facilitation of the access of populations to production factors; clarification of the land regime; extension of adapted varieties and technological innovations; a promotion of techniques of water conservation and soils' restoration

2. Perception of the future vulnerability of food security

The expected impacts of climate change, under the three (3) scenarios, as perceived by the actors of food security sector, are listed in the table (IV). Some of these impacts are a decline in the local agricultural production, famines, food crises more frequent and more severe.

	Scenario S1	Scenario S2	Scenario S3
Expected impacts	A decline in the agricultural productions , an alteration of the living conditions of rural populations; high mortality; an intensification of competition for natural resources; migration of populations.	Strong fluctuations of local agricultural production; recurrent food crises; degradation of ecosystems; increase in rural poverty	Favorable environmental conditions for the agricultural production

The strategies of adaptation to climate change identified by the actors of food security sectors are practically similar to measures retained for the management of current climate risks. Moreover, a promotion of the agricultural entrepreneurship is prescribed in the case of a future climate of type S3.

Globally, food security actors believe that, with changes in climate, Burkina Faso will experience a profound alteration of food security conditions. However, the adaptation strategies suggested by these actors do not illustrate the extent of the danger that climate change poses for food security. In the context of the Sahel region, the efforts for the construction of a food security resilient to climate risks should be essentially oriented towards the promotion of resilient agriculture models to climate risks. Those are mainly agriculture models which are able to anticipate climate risks and mobilize technological innovations required for addressing this risks (BADOLO, 2011).

IV. Scheme of intervention for increasing the resilience of food security

An intervention scheme for increasing the resilience of food security to current and future climate risks in Burkina Faso has been developed. Its three components are:

- **Institutional leadership:** the institution which could, in accordance with its current attributions, ensure the management of an adaptation process of food security to climate change is the Executive Secretariat of the National Council of Food Security (SE-CNSA);
- **Climate risks management process:** a process of climate risk management structured in three phases. The table (V) provides a description of each of these phases.

Phases of the climate risks management process	Set of climate risks management measures
Phase I	Intensifying the functional literacy in rural areas ; strengthening the land security ;taking into account the risks related to climate change into the agricultural policies ;improving the meteorological forecasts and strengthening the early warning systems ; promoting the water control for the agricultural development ;facilitating the access to factors of production ; implement recovery programs of degraded lands; strengthening mechanisms for emergency relief, promote the diversification of agricultural production, strengthening mechanisms for agricultural extension; promoting the agricultural productions of counter-season ; promoting the development of markets for the agricultural products.
Phase II	Develop technical agricultural education; implement programs of scientific research and technological innovation; design and implement recovery mechanisms for the agricultural sector (agricultural credit, weather insurance); develop and improve storage

	facilities; promote a culture of savings in rural areas.
Phase III	Create agricultural universities; implement policies to open up agricultural areas; development of modern, responsive and efficient technologies for the conservation of soil and water; increase the capacity of processing and preservation of agricultural production; promote the development of markets for agricultural products.

- **Set of indicators:** the table (VI) describes indicators that could be used to monitor the adaptation of food security to climate change. Those indicators are related to specific adaptation strategies.

Table (VI) : Set of indicators		
Adaptation to climate risks strategies	Output indicators	Outcome Indicators
Water control (dams, development of shoals)	Additional number of dams constructed from a base year	Significant increase in the agricultural production under water control from a base year
Scientific research and technological innovation	Number of research and technological innovation programs implemented from a base year	Significant reduction of the agricultural production fluctuation related to climate shocks from a base year.
Facilitating the access to drivers of production (credits, fertilizers, lands)	Number of micro credit institutions for the agricultural sector created from a base year	reduction of food insecurity in rural areas
Development of early warning systems	Number of warning systems function created from a base year.	Significant reduction in agricultural production losses caused by climatic shocks.
Development of road , stocking and processing infrastructures	Number of food stocks and food industry created from a base year.	Reducing dependence on foreign food aid
Taking into account the risks related to climate changes into the agricultural policies	Percentage of projects and food security programs explicitly incorporating climate risks from a base year.	Increase in the resilience of food security to climate.

V. Conclusion

The intervention scheme proposed in this paper may serve as a tool for dialogue on the adaptation of food security to climate change in Burkina Faso. The involvement of the major institutional actors of food security sector in its design is likely to facilitate its appropriation and adjustment. For the other countries of the Sahel region the methodology of this paper could be used to design adaptation to climate change processes which are in line with the local realities.

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