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Climate change response actions the adverse effects of climate change on the Widikum community in Cameroon

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General Note
Article is recommended to print as color version in recycled paper. *Save Plants, Save Climate*.

ABSTRACT

In Cameroon generally and particularly in the Widikum area, rural farmers are central to agricultural production and therefore the foundation for household food security. The recent events of floods and landslides that have occurred in this area in addition acid rains and plant pathologies have already had a great toll on the effort of these farmers. The absence of figures on agricultural production actually does not help further in finding a solution. This is even worse with the insufficiency and inadequacy of

agricultural extension in the area. The absence of weather stations in the area simply implies that the rural farmers have been left to the mercy of nature in their role as food producers. This research has been some form of evaluation of the situation of climate change and it adverse effects on the Widikum community which this study covered. To analysis the situation, this research applied the participatory methods with the local community. Several participatory activities were carried out such as; mobilization workshops, diagnosis workshop, interviews, guided site visits and mapping. After careful analysis and discussion; seasonal differences, climatic hazards such as frequency of floods and landslides, vulnerable elements exposed to hazards such as food production, food security, agricultural areas, livelihoods and agricultural risks were identified as the main problems to be solved or concerns to be managed. The coping mechenisms and Practices implemented by the rural farmers and local population to solve these problems were discussed and adopted. Also, the Adaptive strategies proposed by the project researchers and experts were discussed and adopted. The major setback of this research project was that implementation and follow up of the adaptation measures was not done since the project lasted just for ten months.

Keywords: Climatic hazards, participatory diagnosis, Food production and security, adaptation, farming and farmers

Abbreviation: NTFP - Non Timber Forest Products

1. INTRODUCTION

Climate is the primary determinant of agricultural productivity. Given the fundamental role of agriculture in human welfare, concern has been expressed by scientists and others regarding the potential effects of climate change on agricultural productivity (Jones et al, 2002, Hammer et al. 2002, Hansen 2002). Interest in this issue has motivated a substantial body of research on climate change and agriculture over the past decade. With the increasing uncertainty in climate and weather projections, the effect of climate change over global food security is feared to be devastating on highly vulnerable regions, such as Africa (Washington & Downing 1999, Dilley 2000). Much of the discourse on food security is focused on expanding production. Natural systems which help regulate climatic conditions will have to pay the price for expansion. Emphasis should not therefore only be place on expansion but also on preparedness to climate change effects; thus several scenarios have to be built in response to the kinds and level of vulnerability. The main stakeholders in this line of production have to be alerted and prepared for any eventuality.

The debate on climate change has only recently begun to take into account issues related to human response or adaptation (Smithers and Smit 1977), and the present agenda for research on climate change is still not devoted much attention to the question of adaptation (Wilbanks and Kates 1999). The word "adaptation" figures prominently in titles of some major publications (e.g., Watson et al 1996), but not found their contents. There is thus a grave mismatch between the knowledge that is needed to act locally and what is currently being done globally to generate knowledge about climate change, its impacts, and responses to concerns…, (Wilbanks and Kates 1999: 616). Limits to our current levels of adaptation to existing climatic variation are demonstrated by the impacts and costs to society associated with events such as floods, ice storms, droughts, and hurricanes. All societies have to face extremes events, and societies and economies evolve with the fluctuations of their climatic environment. Probably the largest body of literature on how societies deal with climate change is in the fields of history and archaeology.

Although history is instructive, there is also a need to carry out place-specific analyses of adaptation to climate change in the present-day world. This is because the inevitable surprises of climate change will unfold on a regional and local stage where adaptive response becomes central (Holling 1997). Understanding the dynamic interaction between nature and society requires case studies situated in particular places and cultures. The outcome of stresses such as climate change may be addressed by integrated place-based models that employ semi quantitative representations of entire classes of dynamic behavior (Friibergh Workshop on Sustainability Science 2002). Research of this type must be created through a process by which researchers and local stakeholders interact to define important questions, relevant evidence, and convincing forms of arguments.

Failure to account for human adaptations, either in the form of short-term changes in consumption and production practices or long-term technological changes, will overestimate the potential damage from climate change and underestimate its potential benefits.

In Cameroon generally and particularly in the Widikum area, the local farmers are central to agricultural production and

therefore the foundation for household food security. In the event of climate change, food security in this area is highly jeopardized and this vital role played by these local farmers is undermined. The very difficult nature of the terrain coupled with the denseness of the hydrological network renders agricultural production and expansion difficult and demanding in investment.

In 2012 there were very heavy rains floods and landslides in Widikum which destroyed farms houses and hindered circulation of goods and people. The absence of weather stations in the area simply implies that the rural farmers have been left to the mercy of nature in their role as food producers. Distortions in weather parameters due to climate change have had serious consequences over the last decade on farming activities in the study area. The un predictable nature of the rainy and dry seasons which determine the start and end of farming seasons have caused immeasurable loses to the rural farmers. Rains have either come earlier than expected and caused farm preparations to start late or have come too late and gone too early causing crops to be planted late and harvested prematurely. The Dry seasons have been earlier and drier causing shortages in water availability for farms.

Acid Rains destroyed Colocassia in these areas in 2010 and caused a lot of hunger due to the lack of this tuber thus adding pain to the sours of these rural farmers who toiled to invest humanly, financially and materially in the hope of having good yields to help them support their families. This research has been some form of evaluation of the situation of climate change in the Widikum area which this study covered.

In this project, we identify effects of climate change and also analyzed the adaptive capacity of the Widikum community to deal with climate change. One component of this adaptive capacity is the immediate response to change; we identify these responses as coping strategies. A second component is the long-term response to change; we identify these responses as adaptation strategies.

The term “adaptive” is simply any response that increases a community probability of survival. We distinguish between coping mechanisms and adaptation strategies in accordance with the terminology commonly used in anthropology (McCay 1978) and the development literature (Davies 1993, Singh and Titi 1994). Coping mechanisms are the bundle of short-term responses to situation that threaten livelihood systems, and they often take the form of emergency responses in abnormal seasons or years. Adaption strategies, on the other hand, are the ways in which individuals, households, and communities change their productive activities and modify local rules and institutions to secure livelihoods. The two kinds of responses may overlap across the temporal scale, and coping mechanisms may develop into adaption strategies over time. Coping mechanisms are more likely to emerge at the level of individual and household and at smaller spatial scales, whereas adaptation strategies, which are related to variables such as cultural values that, change more slowly, are more likely to emerge at large spatial scales.

The Widikum Areas is located in the North West Region of The English Speaking Cameroon. It is a subdivision with agriculture as its main activity. The landscape of this area slants from the highlands ranges of the North Western Region to the gentle sloping down to the South West Region. This area feeds an important portion of the populations of Cameroon and Nigeria both in farm crops and non timber forest products. It is also an important stock for wildlife which provides rural households with animal protein.

2. MATERIALS AND METHODS

In this project, we illustrate a method of carrying out place- and culture-specific research into climate change by means of participatory methodologies and a way of using resilience thinking to explore the issue of adaptation to climate change. We investigate how a small community deals with the adverse effect of climate change and we also seek to generate insight for the use of coping strategies and adaptation strategies to build adaptive capacity.

The present study examines the role that participatory methods can play in climate application efforts, in particularly communities. This study was carried out in a targeted community vulnerable to climate variability. The project worked mostly with small-scale crop producers hereafter referred to as “farmers”. The participatory method entails some degree of farmer involvement and mutual interaction between farmers and scientists. The participatory research method seeks to change rather than to study social behavior. The approach was first developed in the 1980s in the context of farming systems research to increase technology adoption by involving farmers in developing and testing innovations (Chambers et al. 1989, Chamber 1994, Okali et al. 1994, Scoones &Thomson 1994, Martin & Sherington 1977). It was subsequently embraced by development agencies as a way of eliciting community participation in project design and evaluation, to make projects more responsive to local needs and priorities. Hence, a vast repertoire of instruments, such as matrixes, mapping, activity calendars, visual aids, group exercises, etc was assembled under the rubrics of farmers-participatory research, participatory rural appraisal, participatory learning and action, etc (McCracken et al. 1988, Chamber 1992, 1994, Slocum et l. 1995). Several of these tools and techniques have been used in studies and reviewed.

Following the initial enthusiasm for participatory approaches to research and development, the last 10 yr have generated a greater awareness of the limitations of such approaches, (Mosse 1995, Richard 1995, Nelson & Wright 1996, Peters 1996, Guijt &

Kaul Shah 1998, Cornwall 2000, Brock & McGee 2002, Cornwall & Pratt 2003, Mosse 2005). In some cases, shortcomings stem from how these methods are applied. Participatory rural appraisals enable the collection of large amount of community level information in a relatively short time. However, in the context of highly constrained project timeframes, the approach is sometimes reduced to the deployment of a battery of techniques by teams of hurried consultants.

Community Specific Model

The Widikum community of the North West region of Cameroon has similar characteristic like most rural community found in the less developed countries especially those in Africa. These communities mostly depend on agriculture for their livelihood.

Understanding the dynamic interaction between nature and society requires case studies situation in particular places and culture. The adverse affects of climate change was addressed by integrating community-specific models that employ semi quantitative representations of entire classes of dynamic behavior. This project created a process by which researchers and local stakeholders interact to define important questions, relevant evidence, and convincing forms of argument. We saw that local observations and knowledge were essential for comprehending the effects of climate change in this community.

The project design was based on participatory methodologies which were intended to facilitate collaboration and provide that most accurate reflection of observations and perspective (Ford 1999). The methods used were drawn on a series of techniques developed by the project members and also on established approaches such as Participatory Rural Appraisal. The research process was inclusive, i.e. open to participation by all; all the elders were included, and gender representation was balanced.

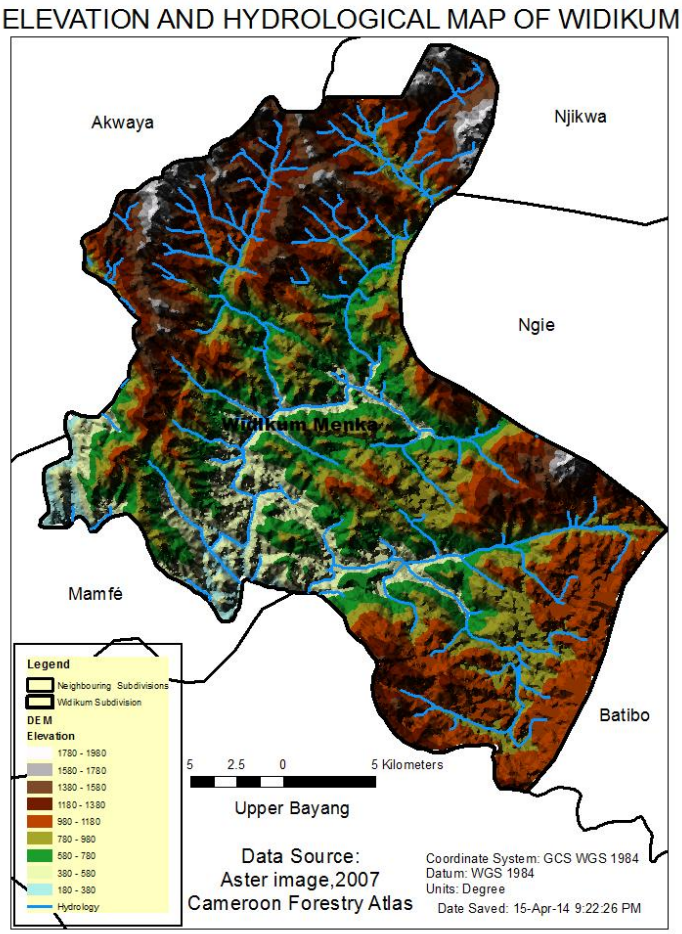

Figure 1

Digital Elevation Model (DEM) for the Widikum area showing the hydrological network and drainage pattern. This also gives a three

dimensional view of the terrain and depicts the vulnerability of area to climate change scenario.

One of the key features of the project was the initial planning workshop, in which the people of Widikum were asked to tell the researchers what they considered important. The priority issues, research questions, maps presentation and interpretation, and overall process for the project were defined in partnership with the project personnel and the community. Maps were made from data collected from the interactive forestry atlas of Cameroon aster images of 2007 and landsat images of 2013 (Fig 1 1nd 2). These maps were presented during the participatory meetings to the community for the identification of settlements, rivers, hills and slopes. These identified areas together with data from site visit helped the researchers in their proposed adaptation measures in this study.

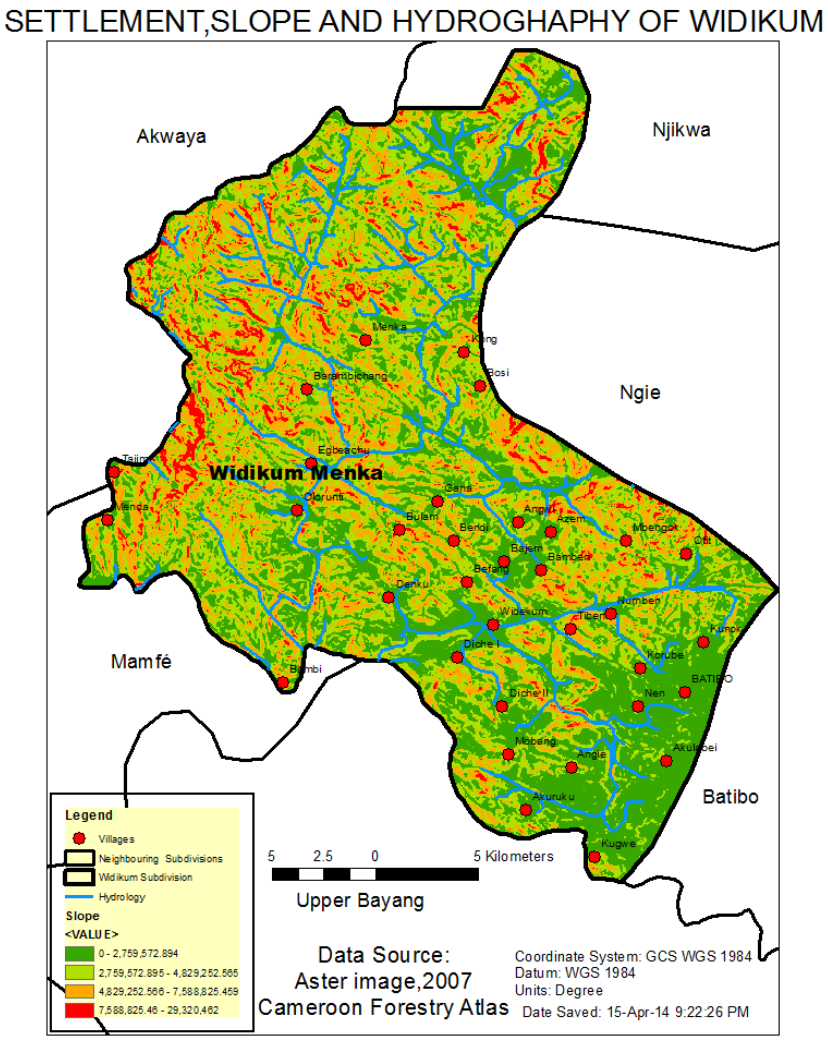

Figure 2

Settlement pattern of the area show that most of the villages are concentrated down south on the gentler slopes.

Interviews allowed people to explain their more detailed observations and to interact with experts from different fields of study (Ford 1999). Face to face interviews were conducted at household levels using random sampling, women groups and some influential persons were also interviewed in the community to collect information on their views on climate change, food security,

farm practices, farming calendars, income generation and household management.

Considering the project as a participatory research, some of its most relevant features were the planning workshops in which we; (i) record the rural farmers perceptions of climate variability and change; (ii) identify issues and problems affecting farmers in the face of climate variability and change; (iii) describe who is vulnerable and establish the causes; (iv) identify adaptation options used by different farmers during the landslide and flood years.

These participatory workshops were also helpful in designing relevant and clear questions for the farmers and questionnaire survey that were implemented to study in more detail the above mentioned key issues.

Key discussions during workshops (Participatory diagnosis)

A diagnostic was carried out to identify the main problems to be solved or concerns to be managed. The following problems were identified;

1. Seasonal differences were determined from changed of farming calendar, the start and end of farming seasons which has been modified by the rural farmers showing that rains have either come earlier than expected or late.
2. Climatic hazards such as frequency of floods and landslides were based on knowledge of past events by the local population.
3. Vulnerability identifies the elements exposed to hazards that may be adversely affected, such as food production, food security, agricultural areas and livelihoods.
4. Agricultural risks were determined through the combined analysis of potential hazards and existing conditions of vulnerability.

Conceptualizing change

- *Responding To Change: Coping Mechanisms implemented by the rural farmer and local population discussed:*
  1. Diversification of food crops
  2. New tubers like cassava and sweet potatoes cultivated in the area have come to substitute for the lapses in food availability.
  3. Slopes cultivation
  4. Stabilizations of soils and improvement on soil fertility by increasing soil humus from the grass cut on farms.
  5. Movements inward to acquire virgin arable lands.
  6. Migration to other areas

- *Long-Term Response Options: Adaptive Strategies Proposed by the project researchers discussed:*
  1. Alert the community on some of the effects of climate change by showing them pictures and posters of effected communities.
  2. Arrange meeting with agricultural extension workers to encourage the rural farmer to start using modern farming techniques and high yield seeds
  3. Encourage the farmers to benefit from fertilizers and high yield seeds distributed by the Ministry of Agriculture by them coming together to form Common Initial Groups
  4. Alternative food source such as rice
  5. Less cultivation and settlement on flood plains and landslide prone areas
  6. Encourage the school children especially the girls to develop interest in science subjects in order to understand the causes of our changing climate.
  7. Identification of potential risk zones by presenting a slope maps of the study area

3. RESULTS

3.1. Vulnerability to climate variability

A conceptual framework to define vulnerability to climate variability and change was developed combining local farmers and expert empirical knowledge. Food production, agricultural areas and livelihoods were the main elements identified as the existing systems exposed to different climatic hazards such as floods and landslides.

Adaptation measures were suggested and the farmers, local leaders, researchers and experts after careful analysis and discussion adopted the following; (Table 1).

Table 1

Farmers identified adaptation options to climate change and variability in widikum area

Climate exposure	Impacted	Adaptation options	Groups
Seasonal variability	Food production, food security	Change of planting months, crop diversification, planting non traditional crops	Farmers, researchers, local leaders
Settlement on flood plains	Humans, properties, livelihood	Identification of potential risk zones and flood plains	Researchers, experts, community
Cultivation on flood plain	Agricultural areas, agricultural products	Avoid cultivation on flood plain during the rainy season, cultivation of vegetable only during dry season	Farmers, researchers and experts
Cultivation on landslide prone areas	Agricultural area, agricultural products, food security	Less Cultivation on these areas, application of traditional erosion prevention techniques	Farmers, researcher,

3.2. Seasonal Differences

The results of this study showed that the farmers are gradually adapting to seasonal differences caused by climate change although most of them are not really aware of the causes of these changes. They have change the planting months of some crops and are gradually diverting to the planting of other crops which were not at first traditional (Table 2). Some of them have turn to the planting of Non-Timber Forest Products (NTFP) which was at first collected from natural environments

Table 2

Local names of crops and wild food plants in Widikum area

Cash crops	Food crops tubers	non tubers	NTFP	Fruits
Oil palms	Achu coco	Plantains	Njansang	Mangoes
Raffia palms	Igbo coco	Bananas	Bush onion	pears
cocoa	Yellow yam	White beans	Black pepper	pawpaw
Coffee	White yam	Red beans	Bitter kola	Pineapples
	Sweet yam	Black beans	Kola nuts	Orange
	Macabo coco	Groundnuts	Money kola	Coconuts
	Calabar yam	Maize	Ndong ndong	Guava
	Cassava	Vegetables	Bush mango	

3.3. Climate change perception

Climate change/variability is perceived here as "the changing of time" or rather "The change of the world". No particular local explanation exists for this phenomenon than the belief that it is a natural process without any further consequences than that there are more rains as perceived by the younger generation of women who have known, the rainy season to end in October and suddenly see it extending further into mid December or the older women who observe that there are longer rains though not very

certain if it is more intense. The mid generation of women perceives rains as being increasingly important too and underline the perplexity of determining quantities and also the exact periods of peaks in rains. All generation of women seem to agree that temperatures are increasing even with increased rains.

3.4. Economic factors

Limited access to fertilizer was the main economic factors constraining crop production. Insufficient food for household consumption and also for the market. Encourage the farmers to benefit from fertilizers and high yield seeds distributed by the Ministry of Agriculture by them coming together to form Common Initial Groups. Collective farming action (i.e.workingingroups) was suggested as a potential tactical adaptation option not only to access farms materials but also to acquire fertilizer in time at a reduced cost. Collective acquisition of fertilizers reduces transaction costs because farmers share the cost of transport and buy fertilizer at whole sale price.

3.5. Migration

There is a downward movement of people towards the lower lands of manyu and Akwaya in search of virgin arable lands. Migrating is a solution to the widikum people that in a long run may become a problem for those in Manyu and Akwaya as there will be competition for land and resources that will lead to conflicts.

3.6. Alternative food sources

There is a gradual drift towards rice consumption as an alternative food source. But the rice has to be bought at even higher price value than the cultivated crops. New feeding habits are growing and dependence could lead to a further crisis in the future for this is not a rice producing community.

3.7. Develop interest in sciences

The students present during the meetings were encouraged to develop interest in the sciences. They were motivated by the presentation of the slope and elevation maps of their villages showing settlements, rivers, flood and landslide prone areas. They promised to study Geography and also the new Geographic Information System (GIS) Technology used in producing maps.

4. DISCUSSION

In many communities, resilience has been a natural, evolving process for absorbing shocks and adjusting to changes that impact people's livelihoods (Pandey et al., 2003). Numerous case studies on impact of climate change on indigenous people have been documented. However, it is clear that because communities have different endowments and climate sensitivities, adaptation options should be tailored to specific community. The truth is that most indigenous people especially farmers are aware of the increasing rate of hazards in their community even if they do not relate it directly to climate change. Most are unaware of the increased dangers resulting from global warming. The climate change agenda is therefore something that is most likely to be''broughtin''through the advocacy of the outside agencies.

Climate change awareness and preparedness is much needed in Widikum because agricultural production remains their main source of income. Adaptation of this sector to the adverse effects of climate change will be imperative to protect the livelihoods of this community and to ensure food security. Adaptation can greatly reduce vulnerability to climate change by making rural communities better able to adjust to climate change and variability, moderating potential damages, and helping them cope with adverse consequences (IPCC, 2001). A better understanding of how farmers' perceive climate change, ongoing adaptation measures, and the factors influencing the decision to adapt farming practices is needed to craft policies and programs aimed at promoting successful adaptation of the agricultural sector. Adaptation will require the involvement of multiple stakeholders, including policymakers, extension agents, NGOs, researchers, communities, and farmers.

The concerptual framework of this research has shown that each indigenous community has developed specialized adaptation strategies in solving the adverse effects of our changing climate (Table 1). This result is very interesting because policy makers have the tendency to globalised adaptation strategies or sometimes try to apply what has been tested somewhere else without doing a community base study. Climate change adaptation plan or strategy should always involve the community concern. The combined community-based framework for climate change adaptation articulates local and global knowledge, linking community knowledge

with external scientific information and approaches. The process resulted in a combination of short-term solutions such as appropriate cropping patterns and land use, with longer-term solutions using external knowledge such as identifying previously unknown suitable crops or crops grown locally (Kelman et al., 2009).

This research has shown that indigenous peoples cultivate an enormous diversity of traditional crop varieties using a variety of effective traditional practices (Table 2). One of the lessons learned from this study is that indigenous knowledge, however useful it may be, cannot by itself reduce local populations' vulnerability to climate change. The implementation of their local knowledge is fraught with many problems, including poor access to scientific innovations and information on climate change, low social capital (which is an obstacle to collective action), and the lack of an institutional framework to support reflection and action on climate change adaptation. Therefore research and action programs need to be established by governments to support communities in increasing the effectiveness of their adaptation strategies.

Understanding risk is a vital part of policy formulation, planning and decision making. The assessment of threats to agriculture or 'agricultural risks' is a necessary first step in designing effective risk reduction measures for food security. Hazard, vulnerability and risk assessments or mapping are some of the practical tools that have been developed and applied in many countries as the basis for planning appropriate risk reduction policies and practices.

5. CONCLUSION

This research has been some form of evaluation of the situation of climate change and it adverse effects on the Widikum community which this study covered. The study therefore has helped in setting groundwork for further work in the area. It identified the two main climatic hazards to be floods and landslides. It also identifies the elements exposed to be adversely affected as food production, food security, agricultural areas and livelihoods. In addition it examined adaptation options to climate change and variability in widikum area. Finally, it shows the gaps in climate and weather information that is completely inexistent together with the weakness of agricultural extension and how disconnected it was with the principal supposed beneficiaries and its inadequacy in supporting climate change activities towards guaranteeing food production and food security.

Setbacks

- It was difficult to estimate yields in the area in terms of quantities. The Agric office holds no records of agricultural productivity in the area. This made it impossible to get quantitative and even accurate qualitative data concerning agricultural production.
- There was no local observatory on climate change, to provide meteorological information that can help communities adjust their farming schedules.
- Seasonal differences and all other information used in this research was based on the community "know how".
- The research project was just for ten months and so implementation and follow up of the researchers proposed adaptation measures was not done.

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