Climate Change Adaptation and Agricultural Development Planning in Kenya

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Abstract

Climate change has become a major threat to economic development in sub-Saharan Africa (SSA). Studies indicate that the impacts of climate change will significantly add to the development challenges and hamper progress to meeting Millennium Development Goals (MDGs). There is a general consensus that agriculture-based livelihood systems predominant in the region will be most affected by the increased frequency and intensity of variable weather from predicted climate change. Kenya is among SSA countries that are already experiencing the climate change phenomena. The country is particularly vulnerable owing to the fact that the economy is heavily reliant on climate sensitive sectors such as agriculture. Agricultural production is predominantly rain-fed and hence fundamentally dependent on the vagaries of weather. It is dominated by smallholder resource-poor farmers who account for 75% of the total agricultural output and provide nearly all the domestic food requirements. A baseline survey to determine the status of climate change projects undertaken in Kenya in the past five years was conducted in 2012. The study targeted key informants in academia, research and policy makers. Results indicated that 60% of climate change projects undertaken were centered on adaptation, with over 66.7% of these being in the crop and livestock subsectors. However, 50% of the respondents did not know any source of information regarding climate change adaptation, while government departments had only 8.3% of the information data bases. In the absence of relevant scientific and technical information, adaptation investment planning by policy makers will continue to be prone to uncertainty.

Key words: agriculture, climate change, development, Kenya.

Introduction

Sub-Saharan Africa (SSA), a region which had been identified by researchers as particularly vulnerable to the consequences of global climate change by mid 1990s is already experiencing the climate change phenomena (IPCC, 2007; IPCC, 2001). Extreme weather variability associated with climate change is affecting water supplies and food production in many countries. Kenya is among SSA countries that are already experiencing the climate change (CC) phenomena (Nhemachena, 2009; Thornton et al., 2009; IPCC, 2007). Agricultural production is predominantly rain-fed and hence fundamentally dependent on the vagaries of weather. It is dominated by smallholder resource-poor farmers who account for 75% of the total agricultural output and provide nearly all the domestic food requirements.

Projections indicate that Kenya’s temperatures and rainfall variability will increase by about 4°C and 20%, respectively, by 2030. The overall impacts of CC on agriculture are expected to be negative (Nelson et. al., 2010). Extreme weather variability associated with CC will affect water supplies and food security, which in turn will undermine economic development. There is a general concern that the projected impacts of CC on agriculture will significantly erode gains made to overcome poverty and food insecurity, and add to the country’s development challenges. Some of the major economic slumps in the past decades occurred during major droughts in 1984, 1999, 2008 and 2011 (GoK, 2010; 2012). Recurrent production failure since 2008 has necessitated government-sponsored food imports to address food deficits in many parts of the country. Consequently, the government has spent over Ksh.
20 billion annually to feed a population of between 3.5 to 4 million (GoK, 2009; 2012b). There is need for urgent action if Kenya is to meet its development agenda while adapting to climate change. To guide CC adaptation investment planning, it is necessary to undertake an inventory of major programmes and institutions currently engaged in CC activities, and how technical, policy and institutional interventions can enable smallholder farmers adapt to CC and variability.

Adaptation has the potential to lessen negative impacts of CC on agriculture (Hassan and Nhemia, 2008; IPCC, 2007; Adger et al., 2003). However, researchers argue that adaptation is a site-specific phenomenon and hence requires local analysis for better understanding (Hinkel, 2011; Deressa et al., 2008; Boko et al., 2007). Generally, adaptations vary according to systems in which they occur, who undertakes them, climatic shocks that cause them, their timing, functions, forms and effects. Currently, economic planning and policy decision-making have become particularly tricky for many economies in SSA due to increasing climate variability (Brown et al., 2010b). Conventional wisdom suggests that investments that reduce current impacts of climate variability are likely to be the best adaptation decisions a planner can make. It is crucial therefore that any policy decisions to support their implementation are informed by a synthesis of the best available evidence from research findings.

**Materials and methods**

A baseline survey was undertaken to determine the current status of CC projects (CCPs) that have been undertaken in Kenya in the past five years. The survey was conducted at the headquarters of the Government Ministries of Agriculture, Livestock and Water based in Nairobi, and in selected public universities. Universities surveyed were; University of Nairobi, Moi University, Maseno University, Kenyatta University, Jomo Kenyatta University of Agriculture and Technology and Masinde Muliro University of Science and Technology. Literature was approached through a systematic survey of these three key stakeholder groups, viz; Academia, Research Institutions and Policy planners. About 90 respondents drawn from each of these groups were interviewed using open-ended questionnaires. Data were coded, entered, cleaned and analyzed using SPSS computer program. Results were first analyzed along three broad thematic areas; Adaptation, Mitigation and Capacity Building. These were further analyzed on the basis of four productive sectors; Agriculture (crops), Livestock, Environment (natural resources) and Water Resources. It was agreed by expert opinion and consensus that these four be adopted for analysis at local level as they were the most sensitive to climate change. To separate livestock from agriculture, the agricultural sector was left to crops only. In-depth analysis was then undertaken to evaluate responses on a series of attributes. These results are presented in the subsequent section.
Results
The survey results indicated that 60% of CCPs implemented in Kenya during the past five years were on adaptation. Capacity building and mitigation accounted for 23% and 17%, respectively, as shown in Figure 1.

![Figure 1: Projects addressing selected climate change thematic areas (n=263)](image)

Further, the analysis revealed that agriculture and livestock sectors combined accounted for most of CCPs (63.1%) compared with environment and water resources sectors, which accounted for 19.8% and 17.1% of the projects, respectively, during the same period (Figure 2).

![Figure 2: Projects addressing selected productive sectors (n=263)](image)

With regard to perceptions about negative impacts of CC on agriculture, the greatest impacts were on crop yield losses at 18% and water resources at 12.5%. Pest and disease incidences (11%) and environmental and land degradation (8%) ranked third and fourth. Loss of livelihoods (5.5%) and increased risk of conflict over scarce resources (4%) were also of concern. Secondary stresses of deteriorating human health were perceived by 1.4% of the respondents (Figure 3).
Transforming rural livelihoods in Africa: How can land and water management contribute to enhanced food security and address climate change adaptation and mitigation?


In spite of the fact that information and data management has been identified as one of the main challenges limiting climate change adaptation and mitigation in many SSA countries, the analysis revealed that 50% of the respondents did not know any source of information regarding climate change adaptation. Government departments which are actively involved in policy formulation and development planning have only 8.3% of the information data bases compared to the CGIAR and International Research Centres which have 16.7%. From the baseline study responses, currently known data bases for climate change adaptation and development planning are limited and scattered among different stakeholders (Figure 4).

Figure 3: Climate change impacts on agriculture in Kenya

Figure 4: Known databases for CC adaptation and development planning
Results from the study show that utilization of climate information to inform policy decisions in all areas was below the 10% mark (Figure 5).

![Figure 5: Utilization of information in decision-making processes](image)

On the use of research recommendations by decision makers, the study revealed that most efforts were geared towards adaptation (Figure 6).

![Figure 6: Utilization of recommendations to inform policy](image)

**Discussion**

CC is expected to have a direct impact on crop and livestock productivity and indirect impacts on prices of food and income from agricultural production, both at the farm and country level. In the crop sub-sector, temperature increases occasioned by climate change are expected to reduce yield of desirable crops and encourage proliferation of weeds and pests. The anticipated greater variation in precipitation will increase likelihood of crop failures in the short-term and lead to production decline in the long-run. CC is also expected to transform ecosystem biodiversity in terms of soils and land species.
pests and diseases and vegetation cover and thus further modify agricultural output. The resultant changes in agricultural production will ultimately impact food prices, thus affecting food access by vulnerable populations. Higher food prices occasioned by production failure offer mixed fortunes for resource-poor farmers. While they may benefit from higher output prices, for those who spend a substantial proportion of their incomes on food purchases, higher prices imply threats to household consumption (Karugia et al., 2011). Households, as an adaptation strategy, may sell off productive assets to purchase food (World Bank, 2011; Cooper et al., 2008; IFPRI, 2007). Such adaptation strategies have serious welfare consequences and serve to compromise future production.

Overall, food security in the rural areas of the country where agricultural production activities are concentrated is already under considerable stress as a result of various factors such as rapid population increase, declining land sizes and degradation of the natural resource base. The predicted impacts of CC, therefore, are likely to exacerbate these stresses even further. Over the last three decades, frequency of droughts and floods has increased resulting in crop failures and loss of livestock with negative implications for food security and economic development (Ngigi, 2009). Impacts of CC are further compounded by local environmental degradation caused by illegal encroachments into forests and riparian areas, deforestation, overgrazing by livestock and cultivation in fragile ecosystems including wetlands and water catchment areas. This may partly be attributed to the increased demand for food against diminishing land sizes, which is driving expansion of agricultural activities without necessary productivity growth. This is consistent with what previous studies have predicted for SSA (Boko et al., 2007; Parry et al., 2007; Vanacker et al., 2005; Jones and Thornton, 2003).

Adaptation by the agricultural sector has the potential to buffer other sectors of the economy from the negative impacts of CC. However, results from the study indicated that utilization of CC information to inform policy decision-making was negligible. A possible explanation to this could be the lack of relevant information which limits policy insights in identification of target variables to enhance the use of adaptation measures in agricultural production. Although the national government is tasked with the role of formulating policy to mitigate CC risks, implementation of relevant adaptation action plans relating to agriculture and food security is generally lacking (Nzuma et al., 2010). A major constraint has been inadequate resources for climate change adaptation work due to low prioritization in the national budget.

The role of information and knowledge as a component of any climate-informed policy and practice can help reduce the burden of CC risk and contribute to adaptation. However, constraints associated with mandates, priorities and capacities often restrict flow of information and oblige potential users to get by without it. Analyses undertaken in Africa revealed that climate data is little used for development processes due to weaknesses in demand and supply of relevant information (UNECA, 2009). A possible explanation could be the limited interactions between researchers, policy makers and development institutions which impede communication and subsequent utilization of research outputs. In Kenya, information sharing protocols have not been developed and existing information sharing platforms are not fully exploited, hence hindering wider dissemination of research findings. The low understanding of CC issues by policy makers limits scaling up of promising interventions to enhance the adaptation process.

Conclusion

Kenya’s ability to adapt to CC is compounded by many factors including poverty, weak institutions, poor infrastructure, lack of information and poor access to financial resources. Other constraints include low awareness levels, knowledge and personnel with relevant skills, and poor coordination across departments. Also important is the fact that most populations vulnerable to climate risks are often socially and politically marginalized, and therefore unable to influence government to work in their interest.
There is a need to avert risks posed by CC and variability through adoption of robust adaptation strategies as a means of mitigating severe food insecurity in the country. However, current policies have not adequately factored in CC adaptation and mitigation strategies to ensure a climate-resilient economy. The recent development of the National Climate Change Response Strategy to strengthen and focus nationwide actions towards CC adaptation and mitigation is therefore a positive step towards achieving the goal of CC adaptation planning. Emphasis is on the most vulnerable sectors of the economy such as agriculture, water, forestry and physical infrastructure for quick and immediate action.

However, specific efforts are required to prioritize incentives for CC adaptation and mitigation activities in agricultural livelihood zones across the country. To facilitate adaptation, the Government needs to integrate CC issues into development planning and policy making. The agricultural sector must be prioritized in terms of resource allocation. Further, the Government needs to formulate development policies that are locally relevant and globally consistent. Such effective policies can only be developed if impacts of CC on critical sectors of the economy and natural resources are assessed.

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**References**


