

(b) Establish appropriate mechanisms to ensure safer movement of propagules of vegetatively propagated crops from one country to another within the regions.

(c) Reinforce the agricultural extension systems throughout the region, bringing in civil society, to be aware of possible threats of epidemics.

(d) Support research to investigate cultural practices such as changes in the dates of planting, length of growing seasons, sensitivity to increased droughts, flooding, periodic water logging, increased temperature, salinity, acidity and aluminium toxicity which negatively affect crop performance.

Livestock and Pastoralism Adaptation

(a) Invest in research and communication to improve understanding of the complex relationship between livestock, pastoralism and climate change.

(e) Build capacity of livestock extension agents through community-based and participatory processes whilst promoting collaborative research into endogenous and exogenous adaptation options.

Fisheries Adaptation

(a) Strengthen regional governance of the fishery industry to reduce over-harvest in the region.

(b) Protect ecosystems from degradation and pollution.

(c) End environmentally harmful subsidies made in the fisheries sector.

(d) Extend rights-based management systems.

(e) Restore and protect mangroves and coral reefs, which will contribute to carbon dioxide absorption, coastal protection, fisheries and livelihoods.

Cross cutting recommendations

(a) Build capacities and infrastructure for improved climate forecasting and warning and increase awareness of climate change and its consequences.

(b) Strengthen human capital through basic education and public awareness and disseminate information widely on adaptation options.

(c) Treat climate change adaptation as a generic capacity rather than once specific only to climate change, and focus on building adaptive capacities among all stakeholders, deploying the preferred response measures and creating an enabling environment to implement these measures.

(b) Communicate clearly with stakeholders, and the public, on how climate change will affect all sectors in the short-term and in the long-term.

Recommended Reading

FAO (2010) Climate-Smart Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation, Rome, Italy: Food and Agriculture Organization

IDRC/DFID (2007) Increasing Expertise in Africa to Deal with the Challenges of Climate Change, Ottawa, Canada and London, UK: International Development Research Centre and Department for International Development

IPCC (2001) Climate Change 2001: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge, UK: Cambridge University Press

IPCC (2007) Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge, UK: Cambridge University Press

UNDP (2010b) Project – Cameroon: Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa, New York, NY: United Nations Development Programme

UNEP (2008) In Dead Water: Merging of Climate Change with Pollution, Over-Harvest, and Infestations in the World's Fishing Grounds, Arendal, Norway: United Nations Environment Programme GRID-Arendal / http://www.unep.org/pdf/InDeadWater_LR.pdf [accessed 28 November 2011]



Enabling research-to-policy dialogue for adaptation to climate change in Africa

Research and Policies for Climate Change Adaptation in the Central Africa Agriculture Sector

Context and Importance of Climate Change in Central Africa Agriculture



Agriculture in Central Africa is primarily rain-fed, and the onset of rainfall and precipitation levels have become highly variable, with some parts of the region experiencing decreases in annual rainfall that have made it impossible for farmers to be aware of when to plant or where to graze.

Wildlife species migrate southward in search of water. Massive floods resulting in soil erosion in dry areas with fewer months of rainfall have made matters worse. New diseases have emerged and minor diseases have developed highly virulent

strains. Crop farming, fisheries, aquaculture, livestock and pastoralism are rapidly changing in response to climate change. Some growers have been forced to adopt new and less preferred crop and animal species or breeds as they discover declining yields of their main crops or animals.

Deforestation is being enhanced by extensive agriculture to increase agricultural production, resulting in massive loss of biodiversity, depletion of water resources and extensive environmental degradation. Studies have shown that climate change is the result of human activity in the countries of the Congo Basin which rely heavily on agricultural production. (Gockowski and Sonwa 2010; Sonwa et al. 2009; Ickowitz 2006; Nolte et al. 2001; Gockowski et al. 1998; Kotto-Same et al. 1997).

Farmers of the sub-region agree that among the roots and tubers, cassava (the basis of the diets of most populations) is the hardest hit, and its field yields and disease resistance have been most affected by climate change. High yielding cassava varieties which were yielding upwards of 35t/ha under on-farm conditions have seen their yields reduced to a bare 15t/ha. New diseases like the cassava root rot have developed in synergy with root insects such



as the African root and tuber scale (*Stictococcus vayssierei*). African cassava mosaic disease, endemic in the region, has developed more virulent strains such as the Ugandan variant. At the same time, a minor cocoyam leaf spot (caused by *Phytophthora colocasiae*) has turned into a yield devastating blight for the crop. The severity of maize and sorghum *Striga* has made these crops less productive in the north, leading scientists to produce extra-early maize and sorghum varieties to curb hunger in that agro-ecological zone. In the forest region, plantain fungal diseases have increased in severity because of increasingly heavy precipitation in that ecozone. Maize has been seen to be the most vulnerable cereal, followed by rain-fed rice. Groundnut and common bean are the grain legumes most affected by a changing climate in the sub-region. All these have seen substantial losses to agricultural production.

The challenge in the Central African region is how to strike a balance between increasing food production to ensure food security and alleviate poverty, and at the same time reduce GHG emissions and the resulting climate change. To adapt to climate change, choices will have to be made on intensifying agriculture on already exploited land (to avoid further deforestation) and rational use of fertilisers (mainly organic) to maintain productivity on existing exploited lands.

It is therefore critical that Governments of Central African countries adopt policies which are informed by existing corpus knowledge on climate change, climate variability and climate change impacts. Results generated by scientific research will enable the respective sectors to build resilience against climate change and climate variability through adequate adaptation strategies and contribute to mitigation of climate change impacts through the use of improved and innovative technologies and management practices. There is need to support research in the region to enable farmers to adopt measures and strategies for adaptation of their agriculture to these climate-induced changes.

Regional Policies related to Climate Change Adaptation in Central Africa

At a meeting of the Assembly of the African Union in Addis Ababa (Ethiopia) (29-30 January

2007), all the governments in Central Africa were urged to integrate climate change considerations into development strategies and programmes at national and regional levels and to implement the Plan of Action on Climate Change and Development in Africa. Many countries in the region are lagging behind in official climate change policies. The Conference of African Ministers of the Environment (ACMEN), in the second Assembly of the African Union at Maputo in July 2003, prepared and adopted a plan of action for the NEPAD environment initiative which included early warning systems for natural disasters, identification of climate-vulnerable ecosystems and regions and regional and sectoral development of adaptation strategies. The Lake Chad Basin Commission (LCBC) which is made up of Cameroon, CAR, Chad, Niger and Nigeria, has as its main mission to provide policy in the management and exploitation of the Lake Chad Basin. It has developed strong policies to support better understanding of the contribution of fisheries to local, national and regional economies, including the sector's contributions to food, nutrition and livelihood security. There are national policies on climate change in the Central Africa countries but national governments should make a greater commitment to prioritize climate change adaptation in their political and economic agendas, to facilitate allocation of adequate funds for implementation of climate change adaptation strategies.

For example in Gabon's agriculture and food security policies are geared toward enhancing food security and protecting coastal areas for increased fish production, and the country is well aware of the implications of climate change. However, there appears to be no specific climate change policies related to agriculture, nor agricultural sector policies with anything to say about climate change. Also in The Republic of Congo: No specific policies are available on agriculture and adaptation in the Republic of Congo. However, as a member of COMIFAC, Congo Republic will also benefit from the current project on Climate Change Scenarios for the Congo Basin. Existing policy texts are weakly applied and agricultural university institutions did not take into account issues of climate change. Human capacity development for research teams and basic infrastructure development, for climate forecasting and drought research, are weak and improvements are urgently

required to guide work on agro-climatic data collection on climate change, as well as plant resistance to climate-induced drought in some areas of the country.

Key research findings to be considered for informed decision making in Climate Change Adaptation in Central Africa

Research on climate change adaptation is scanty in Central Africa region, but hopefully many ongoing regional projects will generate valuable information on climate change in agriculture and thus contribute towards adaptation to climate change in the region. A recent study (see Tingem et al. 2008), showed substantial yield increases for bambara groundnut, soybean and groundnut, and little or no changes in maize and sorghum yields, according to the climate scenario and the agricultural region in Cameroon. The yields of maize and sorghum are expected to decrease by 14.6 and 39.9 percent, respectively, across the whole country. These results also show that the effect of temperature patterns on climate change is much more important than that of precipitation.

However, not all of the changes will be negative. As sea levels rise, flooding of low lying areas and salinisation of groundwater and soil will create ideal conditions for aquaculture in many areas (MAB 2009), while simultaneously rendering them unsuitable for regular agriculture. Other benefits of rising water temperatures and sea levels include reduced cold water mortality of valuable fish and expansion of areas suitable for brackish or saltwater aquaculture such as shrimp and mudcrab (WorldFish Center 2007). Likewise, increasing investment in water storage infrastructure such as dams, on-farm ponds and irrigation systems to retain reduced levels of precipitation and buffer variability in supply will create many potential sites for aquaculture production (MAB 2009). In currently cooler areas, such as those at higher altitudes or in more northerly latitudes, rising temperatures may result in increased growth rates and food conversion efficiencies, longer growing seasons, reduced cold water mortality and expansion of areas suitable for aquaculture (Brander 2007; IPCC 2007).

Examples of local adaptation are the N'Dama cattle in Central Africa, the West African dwarf goats

and the Djallonke sheep and goats of Central Africa, which were bred in the tsetse-infested humid and subhumid zones of West and Central Africa. These breeds have demonstrated resistance in the tsetse infested zones of West and Central Africa where trypanosomiasis is prevalent (Bosso 2006). These breeds have a proven ability to survive, reproduce and remain productive without recourse to drugs. The raising of these indigenous, trypanotolerant livestock is one approach to control disease, reducing the risk of inducing drug resistance in trypanosome strains.

Scientists at the International Livestock Research Institute (ILRI) are conducting analytical and diagnostic studies; identifying hotspots of climate change and vulnerability; conducting vulnerability assessment to identify intervention options; exploiting climate change scenarios; and assessing ex-ante adaptive responses and impacts on livestock communities and ecosystems. They also test the feasibility of promising adaptation options; support the design and formulation of adaptation strategies; assess feasibility of index-based livestock insurance for large populations facing covariate risks linked to climate change; and identify institutional arrangements to deliver livestock insurance products to the poor, particularly women (Ayantunde et al. 2008).

Policy Options for consideration in the Central Africa Region

Central African countries are aware of climate change and that climate change impacts are important to sustainably improve agricultural production and productivity. Considerable research effort is needed in climate change adaptation in the Central African region. Central Africa countries have adopted national policies on climate change, but national governments should make a greater commitment to prioritize climate change adaptation in their political and economic agendas, to facilitate allocation of adequate funds for implementation of climate change adaptation strategies. Closing the gaps in research and policies will need the following considerations:

Crop farming adaptation

(a) Central African countries should allocate adequate resources and investments in genetic enhancement research to develop crop genotypes that are adapted to harsh climates.