



# Seventh African Development Forum

*Acting on Climate Change for Sustainable  
Development in Africa*

## Climate Change, Agriculture and Food Security

*Issues Paper #2*

ADF VII • 10 - 15 October 2010 • United Nations Conference Centre • Addis Ababa, Ethiopia



African Union



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## I. Overview

1. Climate change poses important challenges for agriculture and food security in Africa. It directly affects food production through changes in agro-ecological conditions and indirectly affects growth and distribution of incomes, and thereby, the demand for agricultural produce. Therefore, a paradigm shift at all levels is needed. This means that agriculture and food security should be at the heart of sustainable development and poverty- eradication efforts, as well as those related to lower-carbon, climate-resilient growth.

2. **Farming:** This is the backbone of the rural economy, occupying some 60 per cent of the African population. Agricultural products constitute 50 per cent of total exports and 20 per cent of continental GDP. Seasonal production, however, is mostly from rain-fed cultivation, and is already highly dependent on climate variability leading to chronic food insecurity in many countries and constraining agro-industries and trade. With insufficient production to cover growing national needs, and limited food trade exchanges particularly at regional level, many countries are highly dependent on food imports and are vulnerable to the vagaries of global trade. As a consequence of these underlying weaknesses, there will be multiple and complex impacts on the sector from climate change. The overall effects are likely to be harsh, especially if global warming exceeds 2°celcius.

3. **Mitigation:** While agriculture is a significant contributor of greenhouse gas emissions, which will need mitigating, it also provides opportunities for significant carbon storage, for example, in tree crops and in soils. In fact, the global sequestration potential through increasing organic soil carbon via improved agricultural practices is estimated to be 1 to 6 gigatonnes of carbon per year. In a 'Green Economy' with a low-carbon development pathway, there are new opportunities for carbon lock-up from changing crops, land-use and cultivation practices. Trading these would help diversify rural incomes and finance adaptation practices.

4. **Neglect:** While agriculture is critically important to Africa, it often lacks priority and funding. Complex issues that constrain development, such as land tenure, have not been completely resolved. Furthermore, some agricultural production, such as subsistence agriculture and pastoralism, are excluded from many calculations of Gross Domestic Product (GDP) and, as such, may be undervalued. With climate change, agriculture will become an even more pivotal sector and improving food security absolutely vital for so many people. Achieving this - with all the uncertainties of climate change - is a formidable challenge.

5. Some of the many issues to be addressed include:

- a) Impact of climate variability on food security
- b) Declining agricultural productivity - both in Africa and worldwide
- c) Insufficient water supply to stabilize production through irrigation
- d) Impacts on livestock and fisheries
- e) Sustaining rural livelihoods
- f) Green agriculture for mitigation, adaptation and development
- g) Shifting agricultural zones and associated land tenure issues, and
- h) Financing for climate-change adaptation and mitigation specific to the agriculture sector.

## II. Main Issues

### A. Greater climate variability

6. This will make food production and prices more volatile and threaten food security. Many rural communities in Africa are already chronically vulnerable to food scarcity due to existing climate variability. One of the first expressions of a changing climate is an increase in variability, with extreme events becoming more severe and occurring more often. Furthermore, climate change is expected to impact the timing of precipitation, which may lead to disconnects in the timing of seasonal cues for planting, harvesting, etc. This means more floods, droughts, heat-waves, storms, etc. and all the associated influences that these could have on rain-fed agricultural production systems.

7. There could be a surge of new crop pests and diseases. The net result would be greater variability in yields from year-to-year with concomitant volatility in food prices – both at local and global scales. This is particularly threatening for countries in Africa that are already in food-deficit situations. Without appropriate measures, food insecurity will worsen significantly. The recent rise in food insecurity is a clear indicator of a more hostile climate. World Food Programme (WFP) reports that, for the first time in human history, the number of hungry people worldwide will exceed a billion in 2010. *African nations make up 36 of the 50 nations whose food supplies are most at risk.*

### B. Declining agricultural productivity in a warmer world - Africa and global

8. The 2008 International Assessment of Agriculture concluded that unchecked climate change will make it increasingly difficult to feed a growing population, and before the end of the century, the world will not be able to support the present population without radical change. By that point, global food production will need to have increased by 70 per cent to meet the increasing demand from an ever greater number of people. Africa's population is projected to double by 2050, to about 2 billion. More than 60 per cent of global population growth between 2008 and 2100 will be in Sub-Saharan Africa (SSA). Climate change therefore represents a serious external shock which could challenge the future food security of many millions of Africans.

9. Although agricultural productivity may increase initially at high altitudes and latitudes, this will be offset by diminishing productivity elsewhere. One scenario (of many) showed that cereal production in Africa could halve by 2050. In fact, a warming of 1 to 2° celsius is expected to decrease agricultural yields in arid, semi-arid and tropical regions. Agro-ecological zones may shift in ways difficult to predict: some traditional practices will become less relevant and more on-farm research and extension support will become necessary. The drying of the Sahel is one example of a change that has already been observed with negative consequences for traditional pastoral livelihoods.

10. Reliable agricultural production needs a stable environment. The combination of greater climatic variability with a systematic-warming trend is threatening for both food security and agricultural exports. Climate-risk management tools for developing greater resilience include improved early-warning systems and index insurance, which inform, prevent, reduce and spread risks so that farmers and related commerce and industries are not impoverished by one bad season. Markets and food trade within Africa may be strengthened further if WFP continues its policy of sourcing food aid from within the continent.

### **C. Competition for water**

11. This has led to insufficient irrigated food production. Africa only obtains about 10 per cent of its food production from irrigated lands – mainly in North Africa, where water is increasingly scarce. Some 95 per cent of total cropland in SSA is rain-fed. Augmenting irrigation to levels typical in Asia is desirable, but the International Water Management Institute's (IWMI) assessment of water for irrigation in Africa finds an upper limit of about 15 per cent. Water is scarce and becoming more scarce in many places. Agriculture is currently the biggest user of water (about 70 per cent). Demand from other 'high-value' users is growing, so greater efficiency in current irrigation is important.

### **D. Impact on livestock**

12. Animals produce greenhouse gases too, especially when raised intensively. As the climate changes, there will inevitably be impacts on livestock-based systems from, for instance, increased heat stress, pests and diseases. At the same time, demand for meat and other products is growing rapidly – an opportunity. The challenge is to manage the livestock sector, through adaptive strategies that simultaneously mitigate emissions, reduce environmental impacts and do not consume grains. Animals raised extensively by pastoralists contribute less per head to global warming. Where traditional varieties are used, the animals tend to be more resilient to the negative impacts of climate change. On the other hand, they contribute to global warming through land degradation where mal-adapted policies and perverse incentives prevent sustainable pastoralism.

### **E. Impact on fisheries**

13. These include:
- a) Problems with capture fisheries will be exacerbated
  - b) Fisheries depletion is already widely evident because of over-exploitation
  - c) Coastal and estuarine habitat destruction will be exacerbated by sea-level rise
  - d) Pollution from industry and habitation into rivers, lakes and coast is increasing, and
  - e) Some marine species are already migrating pole-wards, for cooler waters.
14. It is important that there be greater coherence in actions between Integrated Coastal Zone Management (ICZM) and Integrated Water Resource Management (IWRM).

### **F. Sustaining rural livelihoods in the face of climate change**

15. The vulnerabilities of the rural poor to climate change should be addressed. The success of sustainable rural development depends on the development and implementation of comprehensive adaptation strategies for dealing with climate change, drought, land degradation and natural disasters. A significant proportion of the United Nations Framework Convention on Climate Change (UNFCCC) adaptation funding should be used for sustaining rural livelihoods impacted by these changes.

## G. Green agriculture for mitigation, adaptation and development

16. Some agricultural practices can cause significant emission of greenhouse gases. For instance, land clearance with fire, irrigated rice practices, and artificial fertilizer usage. To mitigate these emissions and adapt agriculture to a changing climate would entail profound changes, such as a green transformation with widespread moves towards more sustainable land and water management. For example, minimum tillage cultivation could be applied in greater harmony with the natural environment. With regards to adaptation, there is an urgent need to develop crops that are more resilient to drought, heat, and pest infestations. In order to find these genetic keys, scientists need to explore the wild relatives of common crops. For this reason, it is important to maintain traditional plant varieties. In fact, adaptation linked to agricultural biodiversity is expected to avoid 10 to 15 per cent of the projected reductions in yield under changing climatic conditions.

17. **NEPAD-CAADP:** In 2003, the African Heads of State adopted the *Comprehensive African Agriculture Development program (CAADP) as a framework to accelerate agricultural and rural development in Africa*. CAADP seeks greater economic growth through agriculture-led development, which should help eliminate hunger, reduce poverty and enhance food security and nutrition as well as growth in exports. In practice, CAADP is assisting countries towards fundamental reform of their whole agricultural sector, while adhering to the 'green' principles of Sustainable Land and Water Management (SLWM) with a goal to invest at least 10 per cent of national budgets in the sector.

18. The CAADP strategy addresses (a) institutional issues, (b) policy issues, (c) development and deployment of technologies, (d) knowledge management and capacity-building, and (e) investments and financing. It includes sustainable natural resource management, climate risk management and combating land degradation and desertification. SLWM plays a key role in the complementary goals of agricultural production and a healthy environment.

19. In 2009, the Heads of State urged the African Union Commission (AUC) and the New Partnership for Africa's Development (NEPAD) to (a) develop an African agricultural-based climate change mitigation and adaptation framework, (b) advance the recognition and integration of carbon sequestration on agricultural landscapes and carbon financing in global climate-change mitigation and adaptation measures, and (c) establish an inter-ministerial mechanism bringing together Ministries of Agriculture, Environment, and Water to advance an inter-sectoral approach in addressing the climate change agenda.

20. **Carbon-trading:** There are significant new opportunities in the Green Economy for absorbing carbon from the air, and simultaneously generating green products. Changing agricultural practices and improving land use in Africa's vast dryland areas is considered to be one of the cost effective ways of reducing atmospheric greenhouse gases. The restoration of degraded cropland soils can also increase soil carbon-storage and crop yields, while contributing to the conservation of agricultural biodiversity, including soil biodiversity. There is potential for global agreements to permit new 'crops and products' by tapping into new sources of funding through carbon trading and Reducing Emissions from Deforestation and Forest Degradation (REDD).

21. For example, research is currently underway to see if degraded lands could be managed sustainably for production of bio-fuel and bio-char (biological charcoal), while contributing to traditional grazing activities. Such actions could be a real winner, providing (a) enhanced rural income, (b) less carbon in the atmosphere, (c) fossil fuel substitution, and (d) improved ecosystem functioning. There is risk, however, that bio-fuel production will compete with food crops, displace food production to other



areas causing conflicts over land use, exacerbate water shortages, or cause more land-clearance emissions.

22. Furthermore, given current carbon prices and certification requirements, it is unlikely that payments will be sufficiently profitable on a small scale. It will require either institutional strengthening to facilitate payments to collections of small farmers or the limiting of mitigation payment benefits to large agricultural producers.

### III. Conclusion

23. Success in meeting the challenges of climate change to agriculture and food security will require a comprehensive approach of technical, institutional and financial innovations, so that both adaptation and mitigation strategies are consistent with efforts to safeguard food security, maintain ecosystem services, provide carbon sequestration and reduce emissions.

24. **Agriculture in Africa:** The sector is likely to be severely impacted by climate change, and cannot continue in its present unsustainable way. The agricultural sector needs reform to attain much greater harmony with the natural and human environment. This is in tune with the principles of a Green Economy, and the ongoing *Comprehensive Africa Agricultural Development Programme* (CAADP) agricultural reform process.

25. **Sectoral synergies:** There is potential to pursue several critical development objectives synergistically through promotion of CAADP SLWM strategies in Africa - helping to mitigate and adapt to climate change, while reducing land degradation, conserving biodiversity, combating poverty and food insecurity, and making best use of limited water supplies. Such radical change, however, will require limitless political will, major investment, improved infrastructure, institutions from different sectors working together in harmony, and much improved rural communications.

### IV. Key questions

#### A. Supporting change

26. These will include:
- a) A Green Economy could be of great benefit to much of African agriculture, but can existing institutions manage the demands for 'greening' agriculture?
  - b) Is agricultural infrastructure sufficient?
  - c) Can research/extension services enable farmers to cope with increased climate variability through modern risk-management tools such as index insurance and other formal insurance schemes?
  - d) How will Africa finance all the necessary changes?

## **B. Future food security**

27. These will include:

- a) Can Africa manage to feed its rapidly growing population with anticipated long-term decline in agricultural productivity in a warmer world?
- b) How can the CAADP process be accelerated?
- c) Should family planning programmes be expanded to mitigate future suffering in a world that cannot feed itself?

## **C. New Opportunities**

28. These will include:

- a) How might bio-fuel and bio-char be developed to help sustain rural livelihoods, while avoiding negative impacts on the environment, food security and water availability?
- b) Will the major opportunities for carbon sequestration and mitigating emissions through improved agricultural practices raise rural incomes? Will they reduce agricultural productivity further? Will they exacerbate overall food insecurity?
- c) Will the African export market for extensively raised animals grow, as emission-intensive production declines elsewhere?
- d) How can African aquaculture be developed to replace declining capture fisheries?
- e) Are incentives sufficient to involve the commercial sector in green agriculture?
- f) Are there opportunities for African countries to participate in global carbon markets through the agriculture sector, and what is the prospect for financing for climate change mitigation and adaptation, specific to the agriculture sector?

## **D. International purchase of local land for agriculture purposes**

29. These will include:

- a) Will there be increased demand for land in Africa to grow food commercially for export as global food prices rise?
- b) Do such practices provide an opportunity for technology transfer (adoption and adaptation) and demonstration of new processes in climate risk management? Or are there risks from extra commercial pressure on land and water?

## **E. Financing the Green Revolution**

30. These will include:

- a) How might recommendations from the Addis Conference on Climate Agriculture and Food Security be strengthened to advance the eligibility of agricultural mitigation practices for funding in the UNFCCC process?
- b) How long and what will it take for African countries to launch carbon markets that would benefit green agriculture over and above emission reductions and associated costs?
- c) Are there any best practices in the region other than carbon taxation on fossil fuels and vehicular levies?