



Policy Brief: Opportunities and Challenges for Climate-Smart Agriculture in Africa

Key Messages

- Food security, poverty and climate change are closely linked and should not be considered separately
- Without strong adaptation measures, and financing to support them, poverty alleviation and food security goals will not be reached
- Adaptation measures not only enhance food security but can potentially contribute to reducing greenhouse gas emissions from agriculture
- Climate-smart agriculture offers triple wins for food security, adaptation and mitigation
- COP 17 in Durban offers a unique opportunity for Africa to shape the global climate agenda and establish an agriculture work program that is informed by science and covers adaptation and mitigation
- Climate-smart agriculture needs heightened attention in African policy processes and strategies, from national to regional levels
- Early action is needed to identify and scale up best practice, to build capacity and experience, and to help clarify future choices
- Considerable public and private finance will be needed to rapidly implement climate-smart agriculture

African Agriculture under a Changing Climate

Agriculture is the economic foundation of many Sub-Saharan Africa (SSA) countries, employing about 60 percent of the workforce and contributing an average of 30 percent of gross domestic product.¹ For the poorest people, GDP growth originating in agriculture is about four times more effective in raising incomes of extremely poor people than GDP growth originating outside the sector.² Yet agricultural growth rates for SSA declined in the 2000s³ and food insecurity remains a concern, with malnourishment only dropping from 34 to 30 percent in two decades.⁴ Various projections suggest that food production must increase 70–100 percent by 2050 to meet the demands of a world with 9 billion people and changing diets.⁵ In SSA this will require considerable investments in agricultural development —research, institutional support and infrastructural development.⁶

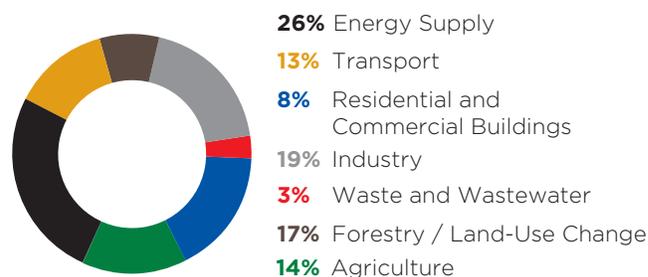
Food security, poverty and climate change are closely linked and should not be considered separately

Ensuring food security under a changing climate is one of the major challenges of our era. African agriculture is highly vulnerable to climate change.⁷ Even using optimistic lower-end projections of temperature rise, climate change may reduce crop yields by 10–20 percent by the 2050s, with more severe losses in some regions.⁸ World food prices for some of the main grain crops are likely to rise sharply in the first half of the 21st century, unlike the price declines witnessed in the 20th century.⁹ Projections of price rises range from about 30 percent for rice to over 100 percent for maize, with about half or more than half of this rise due to climate change. Under a pessimistic high-end projection of temperature rise, the impacts on productivity and prices are even greater.

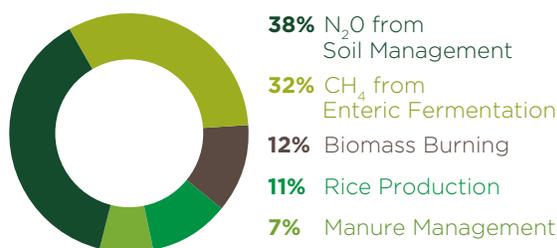
Increasing frequencies of heat stress, drought and flooding events, not factored into the projections mentioned above, will result in yet further deleterious effects on productivity. It is likely that price and yield volatility will continue to rise as extreme weather continues. Climate change will also impact on agriculture through effects on pests and disease. These interactions are complex and as yet the full implications in terms of productivity are uncertain.¹⁰

For Africa to achieve its development goals, climate change adaptation is a priority. There is an urgent need for immediate support to Africa's implementa-

Greenhouse Gas Emissions by Sector



Emissions in the Agriculture Sector



Source: IPCC 2007; Smith et al. 2007.

tion of adaptation measures that enhance agriculture and peoples' resilience for increased food security.

Without strong adaptation measures, and the financing to support them, poverty alleviation and food security goals will not be reached

While agriculture is the sector most vulnerable to climate change, it is also a major cause of climate change, directly accounting for about 14 percent of global greenhouse gas (GHG) emissions, and indirectly much more as agriculture is also the main driver of deforestation and land-use change responsible for another 17 percent of global emissions.¹¹ Even if emissions in all other sectors were eliminated by 2050, growth in agricultural emissions in a business-as-usual world with a near doubling in food production would perpetuate climate change.

Agriculture can contribute to mitigation¹² in three ways:

- Avoiding further deforestation and conversion of grasslands and wetlands
- Increasing the storage of carbon in vegetation and soil
- Reducing current, and avoiding future, increases in emissions from nitrous oxide (from fertiliser use and soil organic matter breakdown) and from methane (from livestock production and rice cultivation).

Climate-smart agriculture seeks to increase productivity in an environmentally and socially sustainable way, strengthen farmers' resilience to climate change, and reduce agriculture's contribution to climate change by reducing greenhouse gas emissions and increasing carbon storage on farmland. Climate-smart agriculture includes proven practical techniques — such as mulching, intercropping, conservation agriculture, crop rotation, integrated crop-livestock management, agroforestry, improved grazing, and improved water management — but also innovative practices such as better weather forecasting, early warning systems and risk insurance. It is about getting existing technologies off the shelf and into the hands of farmers and developing new technologies such as drought or flood tolerant crops to meet the demands of the changing climate. It is also about creating and enabling policy environment for adaptation.

Agriculture has much to contribute to a low emissions development strategy. In many countries it is agriculture—not industry or transport—that provides a high mitigation potential. For example 75 percent of Ethiopia's estimated economic mitigation potential is in agriculture and forestry.¹³ About half of the 47 countries that have submitted Nationally Appropriate Mitigation Action (NAMAs) have included agriculture-related actions.¹⁴

Any serious effort to reduce GHG emissions must include agriculture

Climate-Smart Agriculture as Part of the Solution

Food security, poverty and climate change are closely linked and should not be considered separately. Major productivity gains are possible in Africa given the large gaps between current yields and the yields that are possible with improved inputs and management while also promoting low GHG emission options.¹⁵

In countries where the economy is heavily based on agriculture, development of the agricultural sector is the most efficient poverty reduction measure. Yet agricultural expansion for food production and economic development which comes at the expense of soil, water, biodiversity or forests, conflicts with other global and national goals, and often compromises production and development in the longer term.

Climate-smart agriculture includes proven practical techniques and approaches that can help achieve a triple win for food security, adaptation and mitigation.¹⁶ For example, by increasing the organic content of the soil through conservation tillage, its water holding capacity increases, making yields more resilient and reducing erosion. Promoting soil carbon capture also helps mitigate climate change. Another example is integrated soil fertility management that can lower fertiliser costs, increase soil carbon and improve yields. If yields through such practices increase and are more stable and this results in improved farm incomes, then the adaptive capacity of farmers is also enhanced.

Climate-smart agriculture gives attention to landscape approaches, for example, integrated planning of land, agriculture, forests, fisheries and water to ensure synergies are captured. Such approaches are essential if emissions from land cover change and deforestation are to be reduced, and are also indispensable given greater land and water scarcity and the need to balance food, energy and climate considerations. Landscape approaches will also be a cornerstone of successful implementation of REDD+ given the need to balance forestry and agriculture objectives.¹⁷

Climate-smart agriculture fully incorporates attention to climate risk management. In many regions, agriculture is an extremely risky business, and climate change will exacerbate this.

In Africa alone, 650 million people are dependent on rain-fed agriculture in fragile environments that are vulnerable to water scarcity and environmental degradation.

These areas are also susceptible to the negative impact of climate-related disasters such as droughts, floods and erratic weather patterns. Under climate change, the combination of long-term degradation and sudden onset of weather shocks affect food security among the most vulnerable communities. Risk-prone farmers are less likely to invest in novel agricultural practices for fear that a season of bad weather could wipe out their investment.

Sustainable intensification seeks to increase yield per unit of land to meet today's needs without exceeding current resources or reducing the resources needed for the future.

Carbon sequestration is the process by which atmospheric carbon dioxide is taken up by plants through photosynthesis and stored as carbon in biomass and soils.

Climate risk management includes improving the national meteorological services to provide better weather forecasts that reach farmers; enhanced early warning systems; crop and livestock insurance so farmers are protected against losses; contingency planning, contingent financing, and social protection; and technologies and practices that can deal with extreme conditions. By combining different risk management approaches, it is possible to shift from managing disasters to managing risks in a cost-effective manner.

Climate-smart agriculture offers triple wins for food security, adaptation and mitigation

Agriculture in the Climate Negotiations

The United Nations Framework Convention on Climate Change (UNFCCC) places a high priority on agriculture. Article 2 of the treaty states that the “stabilization of greenhouse gas concentrations should be achieved within a time-frame sufficientto ensure that food production is not threatened.....” It is thus surprising that a detailed treatment of agriculture has yet to enter any of the Agreements. The negotiating text proposing an agriculture work program under the Subsidiary Body for Scientific and Technological Advice (SBSTA), was already available for COP 15 in Copenhagen but has yet to be adopted.

Addressing agriculture is critical to achieving global climate change goals, both in terms of adaptation and mitigation. Agriculture will be significantly impacted by climate change, and is crucial for global food security, rural development and poverty alleviation. It can also contribute significantly to meeting mitigation targets. Food security, adaptation and mitigation can and should be dealt with in an integrated manner — thus the need to incorporate agriculture in future climate change agreements.

COP 17 in Durban offers a unique opportunity for Africa to shape the global climate agenda, and establish an agriculture work program that is informed by science and covers adaptation and mitigation

Key deliverables for COP 17 include:

- An agriculture work program under SBSTA that covers both adaptation and mitigation. It should be informed by science to enhance the role of agriculture in achieving synergies between adaptation, mitigation and food security

- Text that makes crops and pasture eligible under the Clean Development Mechanism (CDM) of the Kyoto Protocol

Placing agriculture in a global agreement would help provide a policy framework for fully incorporating agriculture into adaptation and mitigation strategies. Further work on numerous technical issues (e.g. monitoring methods, identification of new technologies and approaches) and institutional issues (e.g. how to make sure benefits reach poor farmers) would be stimulated by such an agreement.

Strategies and Incentives for Climate-Smart Agriculture in African Policy Processes

While the UNFCCC can establish the international policy framework for how agriculture is incorporated into future climate agreements, much policy development has to occur in national, regional and continental policy arenas. NEPAD¹⁸'s Comprehensive Africa Agriculture Development Program (CAADP) is the key arena for ensuring that climate change is mainstreamed into agricultural development. At the national level, adaptation plans and mitigation strategies (including those related to reducing emissions from deforestation and forest degradation, and enhancing forest stocks in developing countries— REDD+) are being prepared. However, as noted in a recent analysis of country REDD+ readiness proposals, the proposed strategies and actions for agriculture remain very general.¹⁹ Strategies to achieve REDD+ and to fully incorporate agricultural adaptation and mitigation into climate change strategies need more tangible, detailed measures that build on existing efforts and are calibrated to local conditions.

Farmers need policies that remove obstacles to implementing climate-smart agriculture, and create synergies with alternative technologies and practices. Policies and strategies should recognize and support proven technologies for carbon sequestration, like mulching, intercropping and agroforestry. Considerable policy support and capacity enhancement is needed for climate risk management including insurance and safety nets, as well as improved access to weather information adapted to farmers' needs. Ways and opportunities need to be found that strengthen synergies in the implementation of climate-smart agriculture and food security programs and initiatives.

Climate-smart agriculture needs heightened attention in African policy processes and strategies, from national to regional levels

Early Action in Climate-Smart Agriculture

Africa stands to benefit from climate-smart agriculture because of the high vulnerability of rural populations to climate change and dependence on agriculture for a majority of livelihoods. As a result, Africa is leading the way in putting this issue on the global political agenda and focusing on early action ahead of an emerging international consensus.²⁰ Some 50 million people in Africa are highly vulnerable to a 5 percent decrease in the length of the growing period²¹ – this illustrates the gains that can be achieved through early action.

Early action is needed to identify and scale up best practice, to build capacity and experience, and to help clarify future choices

Early action for climate-smart agriculture should involve:

- Rapidly scaling up good management practices and technologies (including, for example, attention to soil carbon sequestration); investing in human and social capital to enhance the adaptive capacity of vulnerable communities; climate risk management options; and investment in landscape approaches that build synergies and manage trade-offs among different land uses
- Strategy and policy development, and enhancing institutional arrangements (e.g. for better integration between forestry and agricultural departments)
- Taking stock of existing good practices (including traditional practices), demonstrating the economic feasibility of these practices in different locales, and identifying what is needed to maintain and expand them
- Creating learning hubs, regional platforms and other awareness-building and technical support mechanisms to increase innovation and adoption of practices
- Testing monitoring, reporting and verification (MRV) methods for agriculture
- Piloting and scaling up market-based mechanisms for mitigation

Early action is needed to improve the viability, scope and accessibility of agricultural options for climate change adaptation and mitigation.²² Early adoption and action will expand the evidence base for relevant practices. Early action can also offer opportunities for

confidence, capacity and experience building. Learning-by-doing can help countries clarify their choices and sharpen their capacities and skills for long-term action, while negotiations continue in the context of the Convention.

A crucial component of early action is enhancing knowledge sharing and developing capacity. We need to create, designate or integrate national and regional knowledge networks or platforms for the identification and dissemination of climate-smart agricultural practices and technologies.²²

There are a large number of technologies and practices “on the shelf” but the scale and speed of climate change requires considerable investment in filling knowledge gaps and in research. This includes the development of decision-support tools to prioritize adaptation and mitigation actions and investments, and further work on institutions and incentives that work for farmers (e.g. payments for environmental services such as soil carbon sequestration). Continued research attention is needed to produce more with less, i.e. increasing productivity while reducing the ecological footprint of agriculture.

Financing Climate-Smart Agriculture

New funds have been developed to increase food security, to respond to the food price crisis, to promote climate-resilient development, to reduce deforestation and forest degradation, or to support climate adaptation and mitigation more generally. In addition, the volume of finance associated with carbon markets is expanding rapidly.²³ While a number of existing financing mechanisms have been instrumental in supporting climate change mitigation and adaptation, the Food and Agriculture Organization of the United Nations has indicated that the main mechanisms have generally not enabled agriculture to contribute fully to adaptation and mitigation efforts.²⁴ The challenge for countries is to bring different funding mechanisms together so as to invest at the scale needed to achieve the goals of climate-smart agriculture. Practices that are profitable and self-sustaining in the long-run may need upfront finance to get off the ground. Capacity needs to be strengthened to enable African countries to access these existing and emerging climate finance mechanisms. There is also scope for the redirection of agricultural finance in developed and developing countries as well as development finance.

Considerable finance will be needed to rapidly implement climate-smart agriculture

Patterns of public support which focus on research, investments in soil and water conservation, social protection and safety nets to enhance human capital and technology and value chain development are more effective, benefit more farmers and are more sustainable in the long run than price support.²³ In China for example, investments in watershed management through public work programs based on food assistance have enabled impressive productivity increases. In Burkina Faso, investments in soil and water management from diverse stakeholders have powered what has been termed a “farming miracle.”²⁵ Participatory approaches directly involving farmers in decision-making generally work best. A key lesson is that the quality of public expenditure is as important as its quantity in facilitating private farmer investment in climate-smart agriculture.

The international community needs to demonstrate commitment to the multiple agendas of food security, adaptation and mitigation by stepping up investment support to climate-smart agriculture, in particular the scaling up of best practices and technologies as part of early actions.

Conclusion

Climate-smart agriculture offers some unique opportunities to tackle food security, adaptation and mitigation objectives. African countries will particularly benefit from climate-smart agriculture given the central role of agriculture as a means to poverty alleviation and the major negative impacts that climate change is likely to have on the African continent. COP17 in Durban offers an exceptional chance for Africa to shape the global climate negotiations. Early action in climate-smart agriculture, while the global negotiations continue, is essential to build capacity, experience and guide future choices.

“Millions of hungry and starving individuals have their hopes vested in us. Despite our serious global challenges, we still have hope. We need your support to elevate agriculture to achieve global climate change goals and the triple win of enhanced agricultural productivity and incomes, climate resilience and carbon sequestration. It is vital to include agriculture, food security and land in the climate change negotiations.”

Tina Joemat-Pettersson, Minister: Agriculture, Forestry and Fisheries, South Africa.

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