



The Voice of the Private Sector in Kenya

Climate Change and Your Business Briefing Note Series | April 2014

Climate Change and the Agriculture Sector



Agriculture, including crops and livestock, is one of the most important sectors in the Kenyan economy. It is the main source of livelihoods for the majority of Kenyan people in terms food security, economic growth, employment creation, off-farm employment and foreign exchange earnings. The sector is highly sensitive to climate change. **Agricultural businesses will need to adapt to ensure provision of adequate food for a growing population and to increase export crops to generate foreign exchange. At the same time, the sector is a large and growing greenhouse gas emitter.**

The agricultural sector accounts for just over a fifth of the GDP in Kenya, and contributes more than 50 per cent of foreign exchange earnings.¹ Sixty-five per cent of the population who live in rural areas derive their livelihood from farming and other related enterprises.²

Farming in Kenya is primarily small-scale, with 75 percent of total agricultural output produced on rain-fed agricultural lands on farms averaging 0.3 to 3 hectares in size.³ Industrial crops contribute 55 per cent of the agricultural exports. The key cash crops include tea, coffee and horticultural crops, which comprise over 90 per cent of foreign exchange earning from agricultural products.⁴

Livestock production contributes about 40 per cent of the agricultural GDP and employs about 50 per cent of the agricultural labour force.⁵

Climate change is not a remote future event for your agricultural business. The impacts of a changing climate are evident through increased droughts and floods, increased soil erosion, deforestation, loss of soil fertility and reduced productivity.⁶

Your agricultural business will need to adapt to climate change to ensure sustained production and income. In addition, you will need to reduce your greenhouse gases emissions and the overall environmental footprint of agriculture—actions that present opportunities as well as costs.

How Climate Change Impacts the Agricultural Sector

The agricultural sector is extremely vulnerable to climate change largely due to the increasing temperatures, changing rainfall patterns and extreme weather events. Some crops are expected to experience more favourable growing conditions as a result of climate change, whereas others will find future climatic conditions intolerable. For example, maize yields are likely to increase in mixed rain-fed temperate and

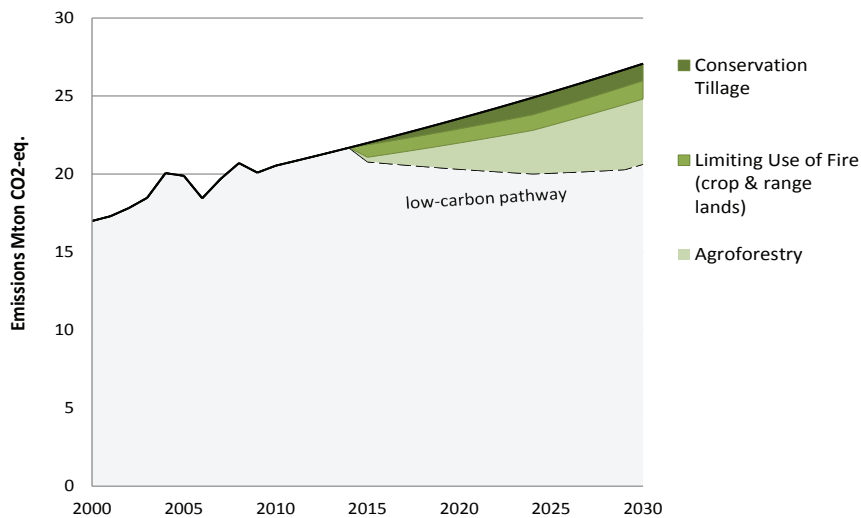
Box 1: Improving Productivity and Competitiveness of the Agriculture Sector

Disaster Preparedness and Climate Change

“There is low preparation, response capacity and coping mechanisms in the event of disasters such as droughts, floods, fires, diseases and pests. Early warning and response systems need to be strengthened; as does the provision of affordable, accessible, weather-based insurance products. The emergence of extreme weather patterns of drought and floods due to climate change is also affecting agriculture. Meanwhile the opportunities that can be tapped from carbon credit funds through the implementation of climate change is not being adequately utilized.”

KEPSA (2013), *The National Business Agenda II (2013-2018)* (Nairobi: KEPSA), page 21.

Figure 2: Low-carbon mitigation options in the agriculture sector



Source: International Institute for Sustainable Development and ASB Programme at the Tropical Forest Margins (2012). Mitigation: Chapter 3 – Agriculture. Prepared for Kenya's National Climate Change Action Plan (2013-2017).

tropical highlands by 2050, whereas the arid and semi-arid lands are projected to witness a significant decline in crop yields and livestock numbers as water resources become increasingly scarce.⁷

Climate change is real in Kenya, with negative impacts on the agricultural sector. Temperature changes have affected crop potential, an example being low temperatures causing frost in the tea estates. The livestock sector is very climate sensitive and drought has contributed to livestock morbidity and mortality.

Greater risks to your agricultural businesses are expected, as identified in Kenya's National Climate Change Action Plan (NCCAP):

- **Less days for crop growth** – Both gradual climate change and more frequent extreme events such as flooding and prolonged drought will create a decrease in reliable cropping days making crop failure more likely.
- **More droughts** – The increased frequency of droughts will cause water shortages for domestic use, crops and livestock.
- **Unpredictable climate patterns disrupt agricultural planning** – Changes in the timing of long and short rains make it difficult to plan planting and harvest times, causing lower yields and greater food insecurity. Livestock-based productivity declines because of drought are a problem in the arid and semi-arid lands.

- **Increased flooding of agricultural land** – Extreme rainfall events cause flooding of agricultural land and destruction of crops.
- **More pests** – Incremental climate change causes biodiversity loss and the emergence of new pests.⁸

A systematic risk analysis of the Kenyan agricultural sector would help to provide comprehensive information for your business planning (for more information see briefing note #2 – climate proofing your business and the report, *Tools and Planning Instruments to Assess Climate Change Impacts*, available from KEPISA). An example is the climate risk assessments undertaken as part of the NCCAP for two flagship programmes in the agricultural sector: Livestock Disease-free Zones in the ASAL regions, and ASAL (irrigation) development projects.⁹

Reducing Greenhouse Gas Emissions in the Agricultural Sector

While building climate resilience is critical, mitigation is also important because the sector is a large and growing greenhouse gas emitter. In 2010, the agricultural sector was responsible for about 30 per cent of Kenya's greenhouse gas emissions, with about 90 per cent of those emissions generated by the livestock sector. Priority areas for low-carbon development identified in the NCCAP – agroforestry, conservation tillage and limiting the use of fire on crop and rangelands – are identified in the wedge diagram in Figure 2.¹⁰

Box 3: Kenya Agricultural Carbon Project

The Kenya Agricultural Carbon Project, supported by the BioCarbon Fund and SCC-VI Agroforestry, is the first project in Africa to sell soil carbon credits on the voluntary market. The project, located in Kisumu and Kitae, has benefited 60,000 smallholder farmers on 45,000 hectares. These farmers have improved farming practices through integrated water management, sustainable intensification, integrated soil fertility management, improved weather information, agroforestry, and better land-use planning. The project has contributed to:

- Mitigation – carbon uptake through soil sequestration and agroforestry; the project will generate 1.2 million tonnes of carbon dioxide equivalent with a direct benefit to communities of US\$ 350,000.
- Adaptation – increased variety of food crops, and better water harvesting and retention.
- Food Security – increased crop yields through productivity-enhancing practices and technologies.

Lessons from the project indicate that revenues to farmers from increased productivity are the most important economic outcome of the project. Financial benefits from carbon market revenues are expected to be only a small proportion of the benefits of increased crop yields, and the carbon revenues will not deliver substantial cash benefits to individual farmers. Monitoring and measuring carbon is very costly, and grant funding supports the costs associated with monitoring in the project.

Sources: Kenya Agricultural Carbon Project (2011, March 9), "Kenya Agricultural Carbon Project", presented at Climate Change and Sustainable Lands Use Management, Tokyo, Japan. Retrieved from http://www.maff.go.jp/primaff/meeting/kaisai/pdf/0309_3.pdf; and Wekasa, A. (2011, 13th October), Personal interview.



Your agricultural business can reduce emissions in various ways:

- **Waste streams of agribusiness** can be a valuable resource with mitigation benefits. Biogas can be generated from animal waste and agricultural residues (such as rice husks, fruit wastes and straw). Composting and organic matter can fertilize soil and improve crop yields.
- **Biofuels** can be created from a variety of oils derived from oilseeds, cellulosic materials and animal fats
- **Transport and energy efficiency** can reduce both emissions and costs.
- **Water management** can be improved through water harvesting and drip irrigation options.
- **Improved land management farming techniques** – such as conservation tillage, crop rotation, improved fallow, organic fertilizer and compost management – can increase the carbon content of soils.
- **Agroforestry** can increase the amount of carbon sequestered on farms.

Livestock also plays an important role in mitigation, being a major source of methane emissions. Technical and management options – such as different animal feeding systems, manure management and management of feed crop production – can reduce greenhouse gas emissions from livestock and generate co-benefits such as greater productivity, renewable energy and soil fertility improvements. But cost implications, lack of technical knowledge and the development of systems that work in pastoralist systems are challenges.

Kenya will need increased fertilizer and other inputs to meet food security needs and to expand crop production for export markets, and could experience increased agricultural emissions as a result. Importantly, the NCCAP indicates that Kenya will not adopt measures to reduce greenhouse gas emissions if they threaten the country's ability to feed its population or reduce export earnings. The emphasis in the agricultural sector should be on increasing productivity as greenhouse gas efficiently as possible, recognizing the critical importance of food production.

The potential for the carbon market to support emission reductions in the agricultural sector is currently limited given the weak state of the carbon market (see briefing note #4 - Climate Finance for more details). In addition, soil carbon sequestration is very complex, diverse and volatile – and difficult to measure. The first African project (see Box 2) to sell voluntary soil carbon credits identified barriers including: difficulties in establishing a baseline due to the lack of information, a high level of uncertainty in greenhouse gas emissions estimates, lack of monitoring methodologies, and the high costs associated with measurement and monitoring.

Climate Change and Your Agricultural Business: What can you do?

Many climate smart agricultural practices build climate resilience while also reducing emissions and improving productivity. Adaptation should be your priority with the intent of protecting your bottom line, while undertaking these adaptation actions in as low carbon a manner as possible.

Assess the expected impacts of climate change on your business. Understand how climate change is expected to affect your region and what risks this poses for your crop and livestock growth and production. Understanding climate impacts is a first step and a climate risk assessment can help you improve planning and decision-making. A climate risk assessment can look at:

- Physical risks – to crops and livestock, to farm production processes such as irrigation systems, and accelerated deterioration of buildings (including greenhouses) and equipment.
- Business and regulatory risks – such as changes in insurance coverage.
- Market risks – changes in international competitiveness (see Briefing Note #9 for a discussion of food miles and carbon labeling).

KEPSA can assist you by providing a list of publically available climate risk assessment tools (see *Tools and Planning Instruments to Assess Climate Change Impacts*).

- **Take action to adapt to the expected changes.** Building climate resilience depends on your location and the nature of your agricultural business, and can include:
 - Ensuring your buildings and infrastructure can cope with heavier downpours.
 - Considering crop diversification, new crop varieties and improved water management.
 - Introducing climate smart production practices where appropriate and cost-effective, such as conservation tillage, drip irrigation, agroforestry and smaller herd sizes.
- **Take action to reduce greenhouse gas emissions in your business.** You can implement low-carbon actions, including:
 - Considering climate smart agricultural practices to increase carbon uptake, such as conservation tillage and increasing the number of trees on your farm.
 - Improving on-farm energy efficiency by using fuel-efficient tractors and energy efficient light bulbs, and servicing equipment to ensure it is running efficiently.
 - Exploring renewable energy sources to power your facilities, including using waste to produce a supply of renewable energy.

- **Measure the carbon footprint of main export crops**, and establish how they fare against international carbon emissions standards. This would help to identify Kenyan exports that can be marketed as climate-friendly and create a positive image for identified products (see Briefing Note #8 – Climate Change and Trade for a discussion of food miles and actions taken by the flower sector).

Acknowledgements

This briefing note was written by Deborah Murphy and Melissa Harris (International Institute for Sustainable Development). The authors thank Victor Ogalo, Kenya Private Sector Alliance, Maliza van Eeden and Margaret Kamau, Climate and Development Knowledge Network, and Tom Owino, ClimateCare, for providing useful comments.

For further information, please contact Victor Ogalo, KEPSA (vogalo@kepsa.or.ke), or Deborah Murphy, IISD (dmurphy@iisd.ca). Information about KEPSA and its work can be found at www.kepsa.or.ke. Information about IISD and its work can be found at www.iisd.org.

References

1. Kenya National Bureau of Statistics (2013), Kenya Facts and Figures 2012 (Nairobi: Kenyan National Bureau of Statistics), page 32.
2. The informal sector in Kenya is quite large and accounts for more than 34 per cent of GDP. Thus agriculture accounts for 60 per cent of total employment, when both the formal and informal sectors are considered. Government of Kenya (2011), Medium-Term Expenditure Framework 2011/12 – 2013/14, Report for the Agriculture and Rural Development Sector (Nairobi: Government of Kenya).
3. Government of Kenya. 2010. Agricultural Sector Development Strategy 2010-2020. Nairobi: Ministry of Agriculture.
4. Kenya National Bureau of Statistics (2013).
5. Government of Kenya (2010), Agricultural Sector Development Strategy, 2010-2020 (Nairobi: Ministry of Agriculture).
6. Government of Kenya (2013), Adaptation Technical Analysis Report, developed by the LTS International and Acclimatise for the National Climate Change Action Plan.
7. Thornton, P.K., Jones, P.G., Alagarswamy, G. and Andresen, J. (2009), Spatial variation of crop yield response to climate change in East Africa. Global Environmental Change 19, pages 54–65, in Government of Kenya (2013), page 43
8. Government of Kenya (2013).
9. International Institute for Sustainable Development and ClimateCare (2013), Climate Risk Assessment of Kenya's Flagship Projects, prepared for Kenya's National Climate Change Action Plan, http://www.kccap.info/index.php?option=com_phocadownload&view=category&id=34&Itemid=38.
10. Government of Kenya (2013), Mitigation, Chapter 3: Agriculture, developed by the International Institute for Sustainable Development and the ASB Programme at the World Agroforestry Centre for the National Climate Change Action Plan.



This document is an output from a project funded by the UK Department for International Development (DFID) and the Netherlands Directorate-General for International Cooperation (DGIS) for the benefit of developing countries. However, the views expressed and information contained in it are not necessarily those of or endorsed by DFID, DGIS or the entities managing the delivery of the Climate and Development Knowledge Network*, which can accept no responsibility or liability for such views, completeness or accuracy of the information or for any reliance placed on them.

© 2014, All rights reserved

The Climate and Development Knowledge Network ("CDKN") is a project funded by the UK Department for International Development (DFID) and the Netherlands Directorate-General for International Cooperation (DGIS) and is led and administered by PricewaterhouseCoopers LLP. Management of the delivery of CDKN is undertaken by PricewaterhouseCoopers LLP and an alliance of organisations including Fundacion Futuro Latinoamericano, INTRAC, LEAD International, the Overseas Development and SouthSouthNorth.

(T) +254 20 2730371 | 2 | 2727936 | 883
info@kepsa.or.ke | www.kepsa.or.ke

The Kenya Private Sector Alliance (KEPSA)
 Shelter Afrique Building, 5th Floor, Mamlaka Road
 P.O. Box 3556-00100 Nairobi Kenya