

Climate, Food, Trade

Where is the Policy Nexus?

Rwanda



About the Book

The East African Community has seen climate change, through the increasing intensity and frequency of extreme weather events, altering its agricultural and trade patterns that play a crucial role in ensuring food security for millions of East Africans. This trend shows the complex interrelationship existing between trade, climate change and food security; a three-dimensional relationship that seems to lack representation in the various policies addressing these issues. Yet, the absence of such important policy linkages, coherence and coordination might cause additional large-scale hunger in the region. Harnessing the potential of trade and putting in place appropriate policies to ensure affordable food for millions of people in the face of climate change has therefore become the need of the hour.

This research study, undertaken by a multi-disciplinary team of three Rwandan experts, aims to fill the current knowledge gaps on this three-dimensional relationship and to provide recommendations for more holistic policy responses to the challenge of climate-related hunger, including through trade. To do so, the authors reviewed the existing literature and relevant policies in place in all three areas of food security, trade and climate change, before examining existing and missing links between them. This work was supported by field visits and interviews of relevant stakeholders who helped understand the actual situation at the grassroots level.

As in other parts of the EAC, in Rwanda, climate change is altering agriculture and trade patterns since most agriculture in Rwanda is weather and rainfall reliant. But initiatives, such as crop intensification and assignment of suitable crop-ecological zones programmes have already helped the country improve on food security when trading these crops between zones. The study strongly suggests a shift towards more sustainable agricultural practices in Rwanda, taking into account climate-friendly production and energy generation, water management, and organic farming initiatives to address food security concerns.

This research study was undertaken as part of CUTS International Geneva's "Promoting Agriculture-Climate-Trade Linkages in the East African Community" (PACT EAC) project, under which it will carry out a number of networking, training and advocacy activities. The study itself immensely benefitted from the insights of a variety of stakeholders from the government, farmer, academic, media and civil society representatives through dialogues and other activities of the PACT EAC project.

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Ph: +41.22.734.6080 | Fax: +41.22.734.3914

Email: geneva@cuts.org | Web: www.cuts-geneva.org

Authors:

Alphonse Mutabazi

John Bosco Kanyangoga

Tenge Ngoga

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Foreword

Rwanda has vigorously embarked on implementing policies geared towards attaining its vision of becoming a middle-income nation in which its people are healthier, educated and more prosperous. It is indeed becoming a success story of development in the region and Africa. The relative success owes partly to regional integration and more active participation in the multilateral trading system, where the country has registered impressive export growth led by trade in tea, coffee and horticulture. Favourable climatic conditions and the generally fertile soils allow cultivation of a wide range of crops. Initiatives such as the crop intensification programme that commenced in 2007 have resulted in diversified and increased production of major food crops that include maize, rice, banana (cooking, beer and fruit), Irish potato, sweet potato, cassava, sorghum and beans.

However, these relative achievements have not been without challenges, chief among which is climate change and its resulting impacts that threaten the food security of the country. Farming and agricultural practices in the country are still largely dependent on climatic conditions and in Rwanda like elsewhere, extreme weather events continue to occur. Drought and erratic rainfall affect 60 to 90 percent households particularly in the districts of Bugesera, Nyaza, Gisara, Huye, Rusizi-Nyamasheke, and others, which has resulted in less production of staple food, leading to sharp increase in prices that make food unaffordable to the majority.

This study that was conducted under the CUTS International, Geneva initiative of PACT EAC, examines the linkages between climate change, food security, and trade and how they interact in Rwanda. The study will be a basis for all relevant stakeholders to develop and implement holistic responses to the challenges of climate change and the resulting threat to food security, through trade. It comes up with important recommendations for various stakeholders that will have to be considered in order for the country to stay on course in attaining its vision of a middle-income country in the foreseeable future.

I take this opportunity to sincerely express my gratitude to CUTS International, Geneva for initiating this novel and yet timely project aimed at redressing the effects of climate change on food security in Rwanda. I am also glad to have participated in some of the project activities such as the first and second National Reference Group meetings in 2012 that were hosted by ACORD Rwanda, and where a wide spectrum of stakeholders were in attendance from Rwanda and the region. I trust that the findings in this study will contribute immensely to the national, regional and international efforts to address climate change, food security and trade challenges.



Robert SSALI
Commissioner
National Law Reform Commission
Kigali, Rwanda

Preface

The importance of tackling the impacts of climate change on food security cannot be overstated, and here the role that trade can play in redressing these impacts becomes critical. With this in mind, CUTS International, Geneva, with funding support from the Swedish International Development Cooperation Agency (SIDA), conceived the project “Promoting Climate Change-Food Security-Trade linkages in the East African Community” (PACT EAC).

This 3-year project was launched on 1 October 2011 and builds on CUTS’ previous work in Africa including in the five EAC member countries of Burundi, Kenya, Rwanda, Tanzania, and Uganda. Among previous projects that were successfully implemented issues, such as, inclusiveness in trade policy formulation and implementation; trade and food security; equitable agriculture development; and inclusive regional integration processes were addressed.

PACT EAC seeks to attain the following objectives:

- Identify the negative and positive elements of climate change that hamper or enhance food security in the project countries
- Identify the negative and positive elements of trade in goods and services that hamper or enhance adaptation to climate change
- Identify the positive linkages where trade can minimise the negative impacts of climate change on food security
- Investigate interactions of climate change-trade-food security policies with a view to further develop and implement relevant short and long term holistic policies at the national and regional level
- Increase understanding and capacity of a wide spectrum of stakeholders on these issues, and
- Arrive at policy recommendations that will lead to adaptation and mitigation of climate change caused challenges through trade.

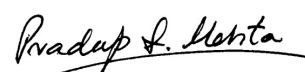
In implementing the PACT EAC project, the CUTS’ tried and tested RAN (holistic Research-Advocacy-Networking activities) model is applied. The inclusive and grassroots-linked methodology for research has facilitated sustained capacity building of stakeholders and ensured ownership of the outcomes.

The five country research studies under this project have been undertaken by teams of country experts in the three areas of climate change, food security, and trade. In fact this was the first time that the experts from the three areas came together to undertake these studies. Creating sustainable capacities of local researchers has been the leitmotif of CUTS working philosophy; thus creating stronger local ownership.

The research process commenced with desktop research, outcomes of which were presented at National Reference Group (NRG) meetings, which brought together all the relevant stakeholders including policy makers, academics, farmers' representatives, CSOs, media, among others. Thereafter field research was undertaken and incorporated into revised and complete drafts that were presented and discussed at the second NRG meetings, as well as at a Regional Meeting held in Kigali, Rwanda. The regional meeting brought together both national and regional stakeholders including high level participation by the EAC Secretariat. In addition, the drafts of research studies were reviewed by the members of the PACT EAC Project Advisory Committee, external country reviewers, and CUTS team. These processes have greatly enriched the research studies and ensured both national and regional ownership as well as high quality.

I trust that through these studies policy makers at the national and regional level will be better prepared in formulating targeted and holistic policies to tackle climate change impacts on the region's food security, particularly through trade. I am also confident this research will generate the necessary awareness among critical stakeholders on the linkages between climate change, food security, and trade thus facilitating them in undertaking their respective tasks.

I take this opportunity to thank all those who are associated with this very important project including the funding partner Swedish International Development Cooperation Agency, country researchers, partner organizations in the project countries, and members of the Project Advisory Committee (PAC) and National Reference Groups (NRGs). I am also thankful to my colleagues in CUTS Jaipur, Geneva and Nairobi for successfully organising the research component. I am sure they will continue with the same zeal and commitment to implement all project activities.



Pradeep S Mehta
Secretary General CUTS
Jaipur, India

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We are also thankful to the experts, colleagues, and friends that have contributed to the success of this study. In particular we would like to acknowledge the PACT EAC project National Reference Group members in Rwanda for providing comments during various phases of the study as well as the Project Advisory Committee members Jamie Morrison, Peter Kiuluku, Christophe Bouvier, Ambassador Joakim Reiter, Moses Marwa, Timothy Wesonga, and Dr Matern Lumbanga.

The study has also benefitted from the valuable editorial assistance by interns Emma Syrat and Hannah Cho; editorial work by Purity Njeru and peer-review by Prudence Sebahizi. We thank Manbar Khadka and Suresh P Singh (colleagues at CUTS Centre for International Trade, Economics & Environment) for providing valuable inputs to the study; and CUTS International Publications Team at Jaipur for carrying out the process of editing, formatting and printing.

Note on Authors

Alphonse Mutabazia is a climate change specialist with 15 years of experience in research, project management and policy formulation. He has proven knowledge in climate forecasting and modeling. He holds a master of science in engineering, with a focus on meteorological engineering from the Russian State Hydro-meteorological Institute. Mutabazia has served as a climate change manager and specialist with the Rwanda Environment Management Authority and has been responsible for directing numerous climate change adaptation programmes and assessments. As the head of forecasting for Meteo Rwanda, he led efforts in data analysis, weather forecasting and climate predictions. He has also worked with a number of other organisations in both Rwanda and the East Africa region on climate change issues including Climate Prediction and Application Centre in Nairobi, World Meteorological Organisation, United Nations Environment Programme and the East African Community, among others. He is fluent in Kinyarwanda, English, and French and has advanced knowledge of Russian.

John Bosco Kanyangoga is a Rwandan lawyer and independent consultant specialising in trade policy issues, and has a Masters' Degree in International Transactions and Comparative Law from the University of San Francisco, School of Law, California, USA in 2004. He also earned his Bachelor of Laws Degree from the National University of Rwanda in 2000. John Bosco is a Founding Partner of Trade and Development Links, a Consultancy Firm based in Rwanda that focuses on Policy Analysis, especially in trade related areas. Prior to this, he served in the Rwandan government as a Trade Policy Expert in the Ministry of Finance and Economic Planning as well as in the Private Sector where he served as Director of Trade and Policy Advocacy for the Rwandan Private Sector Federation. He has been involved in a number of policy related studies and regional integration issues. He was one of the key Rwandan negotiators that negotiated for Rwanda's accession to the EAC and has continued to be a member of the national negotiating team that is currently negotiating the COMESA-EAC-SADC Tripartite FTA and the EAC-EU EPA negotiations.

Ngoga Tenge Gislain is a Scientist working with the Rwanda Agriculture Board (RAB) and currently head of Agro meteorological Programme. He has an MSc in Geo-Information Science and Earth Observation with a specialisation in Advanced Use of Remote Sensing in Water Resource Management, Irrigation and Drainage from the International Institute of Geo-Information Science and Earth Observation in the Netherlands. He has over 10 years of experience working for various climate change projects.

Acronyms

ACP	African Caribbean and Pacific
ACORD	Agency for Cooperation and Research in Development
AGF	Agriculture Guarantee Fund
AR4	Fourth Assessment Report
ARDP	Agriculture and Rural Development Policy
CBD	Convention on Biological Diversity
CCIO	Climate Change and International Obligations
CFSVA	Comprehensive Food Security and Vulnerability Analysis
CH ₄	Methane
CIF	Cost, Insurance and Freight
CIP	Crop Intensification Programme
CO ₂	Carbon Dioxide
COP	Conference of the Parties
CPAF	Common Performance Assessment Framework
CSOs	Civil Society Organisations
DFID	Department for International Development
DRC	Democratic Republic of Congo
DTIS	Diagnostic Trade Integrated Study
EAC	East African Community
EDPRS	Economic Development and Poverty Reduction Strategy
EDS	Enquête Démographique et de la Santé
EICV3	Third Integrated Household Living Conditions Survey
ENR	Energy and Resources
EU	European Union
FOB	Freight on Board
GDP	Gross Domestic Product
Gg CO ₂ eq	Equivalent CO ₂ in Gigagram
GHG	Green House Gas
GNP	Gross National Product
GoR	Government of Rwanda
IITA	International Institute for Tropical Agriculture
ICT	Information and Communication Technology
ICTSD	International Centre for Trade and Sustainable Development
IEC	International Environmental Convention

IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
MDG	Millennium Development Goal
MEA	Ministry of External Affairs
MEA	Multilateral Environmental Agreement
MINAGRI	Ministry of Agriculture and Animal Resources
MINICOM	Ministry of Commerce, Industry, Investment Promotion, Tourism and Cooperatives
MININFRA	Ministry of Infrastructure
MINITERE	Ministry of Lands, Environment, Forestry, Water and Mines
MT	Metric Tonnes
NAP	National Action Plan
NAPA	National Plan of Action
NAEB	National Agricultural Export Board
NBSAP	National Biodiversity Strategy and Action Plan
NES	National Export Development Strategy
NGO	Non-Governmental Organisation
NISR	National Institute of Statistics Rwanda
NO ₂	Nitrous Oxygen
PSTA	Strategic Plan for the Transformation of Agriculture
RAB	Rwanda Agriculture Board
REMA	Rwanda Environment Management Authority
RIF	Rural Investment Facility
SIDA	Swedish International Development Cooperation Agency
SME	Small and Medium Sized Enterprises
SoE	State of Environment
TAR	Third Assessment Report
TVET	Technical and Vocational Education and Training
UNCDD	United Nations Convention to Combat Desertification and Drought
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WTO	World Trade Organisation

Executive Summary

This report presents an analysis of linkages of trade policies with food security and climate change in Rwanda. It is structured in four chapters. Chapter one provides an introduction and methodology of the study. Chapter two gives a situation analysis of climate change and related policy framework in Rwanda and in the EAC region. It also relates the commitment of Rwanda in the international protocol, trade and food security overviews. Chapter three details the linkages of trade, climate change and food security, while chapter four draws the conclusion and provides the way forward. The recommendations from this study will be a basis for awareness raising, capacity building and networking of multistakeholders in a bid to arrive at the requisite policies.

In Rwanda, climate change is altering agricultural and trade patterns by increasing the intensity and frequency of extreme weather events. This has an impact on season's disturbances that often mislead farmers' behaviour like planting dates, dry spells and management practices. Therefore, lower yields, increase of crop diseases, reduction of water resources and flooding make the population food insecure.

As climate change is anticipated to increase the incidence of food insecurity in Rwanda, trade has the potential to counter this effect by delivering agricultural goods to regions experiencing a decline in productivity. The adaptive capacity of rural population may be increased by developing technologies at various levels of the value chain of different commodities and develop the small and medium industry that creates more off-farmers employment in Rwanda.

Food security in Rwanda is negatively affected by several factors among which is the lack of agriculture insurance, high transportation costs, low diversification of export products, high taxes and trade deficit. The Rwandan high trade deficit affects general population income, reduces government annual tax incomes, which in turn contributes to vulnerability of the population to climate change and reduces budgeting capacity of the government to intervene in climate change resilience capacity activities for citizens.

Rwanda has policies and strategies which are positively contributing to agricultural productivity, enhanced trade and addressing climate change. However, there is a need to improve road networks and food commodity markets as an incentive for agriculture productivity and enhanced trade. Good policies and strategies, as well as improved infrastructure, favour the reduced greenhouse gas emissions and resilience to climate change in Rwanda.

The trade of food and agricultural products can contribute to both climate change adaptation and mitigation, and trade measures will likely be used by policy makers to encourage mitigation. It has been argued that, in this context of climate change and agriculture, it is imperative to identify and implement both correct international climate change and agricultural trade rules.

Rwanda still heavily depends on the agricultural sector and the increased trade opportunities would empower its economic growth. There is need at policy level to integrate and synergise the trade

policy to climate change, food security and disaster management programmes; and to create a vulnerability reduction strategy based on the national poverty reduction strategies and other government policies. Also, investing in road network and market infrastructure, erosion control, agricultural production and processing, diversifying the small and medium industry for off-farms employment is necessary.

It is recommended that the national stakeholders that include government policy makers, private sector, farmers, development partners and civil society organisations (CSOs) play their roles effectively, making this linkage functional. For example, the policy makers must ensure the EAC summit decisions on agriculture are implemented, that is, 10 percent budget allocation and the private sector should be supported to play their rightful roles including, adopting clean energy in agro-processing plants, improving the supply chain and storage facilities and for farmers to improve farming methods, among others.

The EAC Secretariat should elaborate the regional policy that addresses the linkages between trade, climate change and food security. This may have the potential to raise the international financial capabilities to address the issues of climate change that affect trade and food security in the region.

Chapter 1

Introduction

Climate change has become the main domain of focus for many scientists, professionals, politicians, non-governmental organisations (NGOs) as well as civil societies in the recent years. The current global warming and related climate change is a serious problem that demands attention by all countries in the world. The cause of global warming, as recognised by scientists and also the world community at large, is the high concentration of greenhouse gases (GHGs), which include carbon dioxide, methane, nitrous oxygen and others in the atmosphere, most of them emitted by human activities, such as industrialisation, energy use and deforestation (Mutabazi, 2011).

Climate change is altering cropping and overall agricultural and trade patterns by increasing the intensity and frequency of extreme weather events in the East African Community (EAC) countries. Such alterations are causing wide fluctuations in crop production and productivity. It has caught people off-guard, as there is a complete lack of awareness on how to cope with this unexpected development. If this continues in the future, and if people are not equipped with the know-how to deal with such change, it might cause additional large-scale hunger in the region.

The two main challenges in dealing with climate change are therefore mitigation (the reduction in emissions through, for example, more GHG/carbon neutral production systems) and adaptation (reducing the effects of climate change on people's livelihoods and creating more resilient production systems). Whilst the role in mitigation in Africa is limited, as the continent does not contribute a large share to global emissions, there is an urgent need for adaptation

measures, as the effects of climate change are already being felt in Africa. Emissions from Africa represent only 3.3 percent of the global CO₂ emissions in 2010.¹

Considering that trade can play an important role in dealing with the adverse impacts of climate change, it is imperative to develop an understanding of climate change, food security and trade interactions, and build the capacity of all relevant stakeholders to develop and implement holistic responses in the context of relevant international regimes, particularly those related to trade and climate change.

For this to take place, there has to be an improved awareness and understanding of the climate change, food security, and trade linkages among stakeholders at the national level, in order to adopt adequate and holistic policies and strategies. At the moment, Rwanda does not have these policies. This study examines trade, climate change and food security and maps out some way forward. It will also be a basis for awareness raising, capacity building and multi-stakeholder networking in a bid to arrive at the requisite policies.

1.1 Methodology

The methodology used in conducting this research included desktop literature review, including the analysis of all relevant policies and related documents, data collection, fact finding, field consultations that included interviews, consultations with National Reference Group (NRG) members, targeted surveys using prepared specific questionnaires as well as focus group discussions.

In addition, for the entire period of the research work, the authors kept close contact and frequent communication with Agency for Cooperation and Research in Development (ACORD) Rwanda and CUTS International for guidance to ensure the appropriate focus and quality of the final output. Moreso, the report richly benefited from the relevant feedback obtained from stakeholders that participated in the workshop discussions during the presentations, including the Regional Annual Meeting (RAM).

1.2 Economic, Social and Trade Profile

Rwanda is a small landlocked country with a land area of 26,338 km² and an altitude ranging from 1,000 to 4,500m above sea level. It has few natural resources especially minerals, compared to its neighbouring countries like Democratic Republic of Congo (DRC) and Uganda. Rwanda has an estimated population of eleven million, which is considered too high given its surface area. The resulting high population density puts strong pressure on land use and natural resources, and the necessary extension of agriculture to cater for the high population often leads to deforestation.

Rwanda is proactively driving comprehensive reform programmes. The government is committed to good governance, which is articulated in the Vision 2020² and Economic Development and Poverty Reduction Strategy (EDPRS).³ The government believes that for the country to attain economic prosperity, its citizens must be at the heart of its development agenda. The inclusiveness and ownership of the development programmes have had a positive impact on Rwanda's economic development. There is a clear vision of where Rwanda is and where it wants to be in 2020.

1.2.1 The Rwandan Economy

Rwanda is still predominantly an agriculture based economy, whereby about 80 percent of its population is employed by the agriculture sector, which accounts for about 33 percent of GDP. The service sector has registered an impressive growth trend since 2006 and it continues to surpass agriculture and manufacturing sectors in terms of its contribution to GDP, currently estimated at 47 percent. This growth in the service sector is mainly fuelled by tourism, banking and insurance, telecommunication sectors and Information and Communication Technology (ICT) related services. Industrial sector represented only 16 percent of the GDP in 2012. Table 1 shows the evolution of GDP according to key sectors and activities between 2006 and 2012.

The agriculture sector also accounts for about 80 percent of export revenues and it is dominated by traditional exports, such as coffee, tea and horticulture. The mining sector has shown encouraging results in terms of export receipts. The horticulture sector is also emerging and there are numerous initiatives to promote and add value to horticulture products. Due to the high level of export concentration in a few products, Rwanda's National Export Development Strategy (NES) aims at promoting diversification and increasing production of non-traditional exports to supplement the traditional ones.

The imports of the country are classified into four main categories: consumer goods, equipment goods, intermediate goods, and energy and lubricants. In general, consumer goods are the leading imports in the country.

About 57 percent of Rwandans, a majority being women, live in abject poverty surviving on less than US\$1 per day. In most cases, this category

Table 1: GDP by Kind of Activity (shares at current prices)

	2005	2006	2007	2008	2009	2010	2011
Agriculture	38%	38%	36%	32%	34%	32%	32%
Industry	14%	14%	14%	15%	14%	15%	16%
Services	41%	42%	45%	46%	45%	47%	46%
Adjustments	6%	6%	6%	6%	6%	6%	6%

Source: National Institute of Statistics of Rwanda, 2011

is prone to conditions where many children do not receive even basic education. The livelihoods and food security of the poor often depend directly on ecosystems and the diversity of goods and services derived from these ecosystems.

1.2.2 Rwanda's Vision 2020

Vision 2020 aims to transform the country into a middle-income nation in which its citizens will be healthier, better educated and more prosperous. To achieve this, Vision 2020 identifies six interwoven pillars of good governance, skilled human capital, a vibrant private sector, world-class physical infrastructure and modern agriculture and livestock practices, all geared towards national, regional and global markets (Table 2). At all times and in all aspects, there are a number of cross cutting issues including gender equality and sustainable environmental and natural resource management, as well as ICT.

Vision 2020 recognises the fact that even when Rwanda's agriculture is transformed into a high value, high productivity sector, that in itself will not be a satisfactory engine of growth. In this regard, it provides for an exit strategy from reliance on agriculture into secondary and tertiary sectors. The issue, however, is not simply one of a strategy based on agriculture, industry or services, but rather, identifying Rwanda's comparative advantage and concentrating strategies towards it. For instance, a number of potential opportunities have been identified, including plentiful supply of cheap labour; large multi-lingual population and strategic location as the gateway between east and central Africa, making it convenient for interlinking the region.

In terms of policy orientation, Rwanda's Vision 2020 requires that all national policies are aligned to it. Trade is encouraged, while agriculture is included from a business and trade perspective in terms of agro-business. Environmental protection is considered among the cross-cutting issues as part of sustainable development, where climate-change related policies can be linked.

1.2.3 The Rwanda Trade Policy

Rwanda's trade policy articulates the need for an environment necessary for trade to flourish. The policy aims at addressing the following constraints and issues:

- Limited production capacity, productivity and diversification in key economic sectors often curtailing Rwanda's participation in regional and global export markets;
- Underdeveloped human capital and skills in trade policy formulation, negotiations and export promotion;
- Low rate of science and technology and intellectual property development;
- Strengthening of the positive linkages between trade measures affecting exports, and the productive sectors of the country, such as industry and agriculture;
- Increasing the scope, coverage and depth of market access conditions for Rwanda in all current and potential markets; and
- Effective functioning of internal trade through a vibrant competition policy.

Going by the above provisions, Rwanda's trade policy includes elements of food security through the attention given to agriculture and enhancing the productive capacities of sectors that include agriculture. However, the policy fails to effectively link to climate change and to the adaptation and mitigation efforts.

Table 2: Pillars of the Vision 2020

Pillars of the Vision 2020	Cross-cutting areas of Vision 2020
<ol style="list-style-type: none"> 1. Good governance and a capable state 2. Human resource development and a knowledge based economy 3. A private sector led economy 4. Infrastructure development 5. Productive and market oriented agriculture 6. Regional and international economic integration with a liberal trade regime 	<ol style="list-style-type: none"> 1. Gender equality 2. Protection of environment and sustainable natural resource management 3. Science and technology, including ICT
<p><i>Source: Vision 2020</i></p>	

Chapter 2

Setting the Scene: *Climate Change, Food Security and Trade in Rwanda*

2.1 Climate Change Overview

The increasing atmospheric concentration of GHGs will have significant impacts on the earth's climate in the coming decades (Intergovernmental Panel on Climate Change-IPCC, 2007a). In the absence of mitigation measures, the global surface temperature is expected to increase by 2.8 °C on average during this century.

According to the IPCC, the subsequent global warming would alter natural climate and environmental systems, in many ways, leading to an increased frequency of extreme weather events and changes in precipitation patterns. These changes could impact socio-economic activities, with serious long-term implications for the well-being of humanity.

The impacts of climate change will be felt disproportionately strongly in Africa. The temperature rise in Africa is very likely to be higher than the global mean.⁴ This situation, coupled with the continent's limited adaptive ability, poverty and low levels of development, make Africa especially vulnerable to climate change.⁵ The case of Rwanda should be seen in this context.

2.1.1 Climate Change in Rwanda

Rwanda's CO₂ emissions were at 0.74 million tonnes at the last point of measurement (The Guardian, 2009). This amount is almost irrelevant if we consider that CO₂ emissions were 3.4 million tonnes in 2009. Rwandan emissions were less than 0.021 percent of global emissions the same year. Therefore, the country's responsibility towards global mitigation efforts is very low and the need for adaptation due to climate change is very high.

Figure 1: Rwanda's Vulnerability to Climate Change

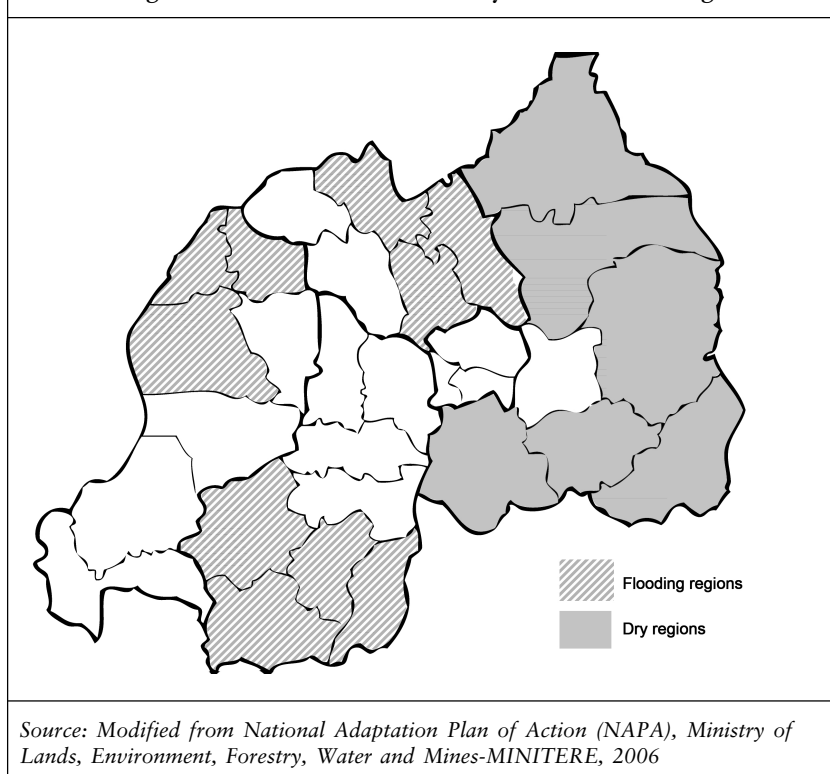
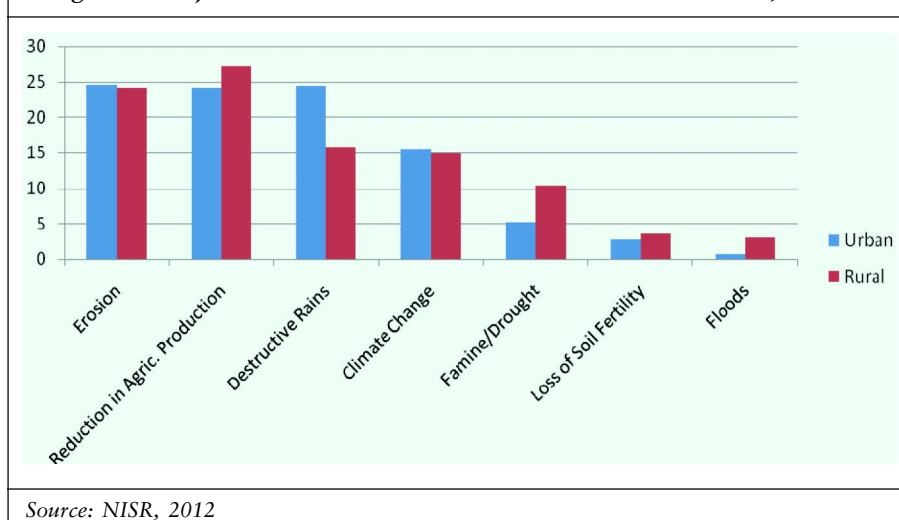


Figure 2: Major Problem Related to Environmental Destruction, EICV3



In the context of this study, from 26 July to 1 August 2012, the consulting team conducted interviews on climate change impact in Rwanda where thirteen respondents from different institutions dealing with livestock, horticulture, coffee and tea participated. The list of respondents and questionnaire are in Appendix 1.

Two main climatic scenarios can be perceived in Rwanda. The eastern and south eastern regions are most affected by prolonged drought, while the northern and western regions experience abundant rainfall that usually causes erosion, flooding and landslides (Figure 1). If not adequately addressed, these challenges will jeopardise the prospects of the agricultural sector, which will hinder the country's economic growth and development plans.

The third Integrated Household Living Conditions Survey (EICV3) published by the National Institute of Statistic Rwanda-NISR (2012) reported that one third of the households are being adversely affected by environmental problems. Rural households are more affected given their dependence on land. Urban dwellers are also affected by floods (Figure 2). In the Northern province, erosion seems to be a big problem affecting 44 percent of the population (NISR, 2012).

Changes in temperature and rainfall are expected to result in frequent storms and droughts that might adversely affect national food security programmes and the livelihoods of the majority of the country's working population dependent on agriculture (Mutabazi, 2011). The realisation of changing climate is reinforced by erratic rainfall, floods, landslides and drought.

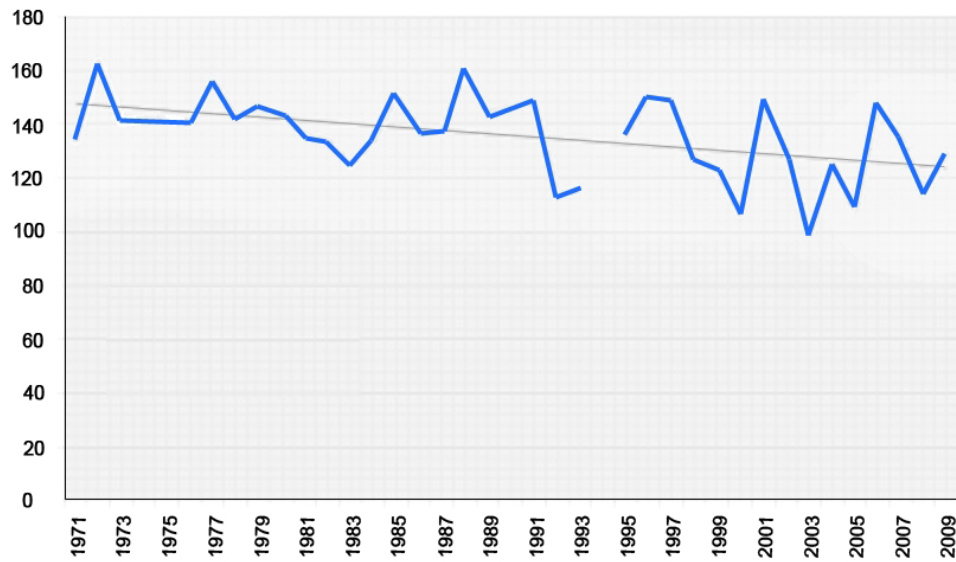
Their understanding of climate change and its effect is summarised as follows:

- Climate change is understood on the one hand as frequent drought and dry spells, and on the other hand, as poor crop yielding;
- Climate change is caused by cutting trees and increase in population;
- Effects of climate change observed in the past five years include erratic floods and drought;
- Climate change is affecting or is going to affect the country via food security through increased prices for food crops, erosion, and huge loss of arable lands;
- Planting trees is needed to reduce effects of climate change;
- Local government and central government have the main responsibility for tackling climate change;
- Forestry, tourism and food processing industries are most affected by climate change;
- Rwanda is moderately involved in international efforts and initiatives related to climate change; and
- The policy and legal instruments related to climate change are not sufficient.

a) Scenario 1: Droughts

Figure 3 shows the trend of annual total number of rainy days. On average, the annual total number of rainfall days decreased from 148 days to 124 days from 1971 to 2009.

Figure 3: Annual Number of Rainy Days at Kigali Station



Source: Mutabazi, 2010

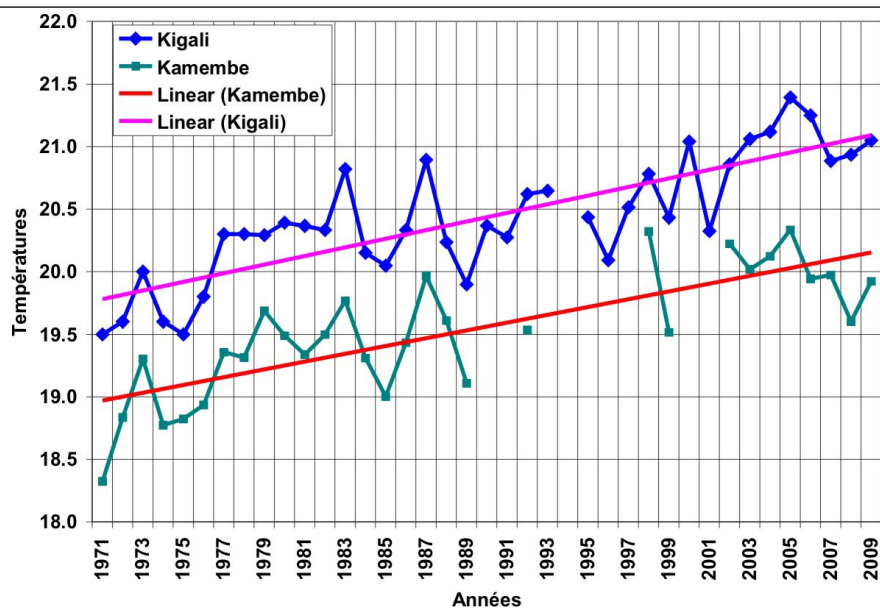
The analysis of the average annual temperatures from the Kigali Airport Station (1971-2007) located in the centre of the country and Kamembe station located in the south west shows a clear increase in temperatures. Figure 4 confirms this. For instance, in the case of Kigali airport, the average temperature was 19.8 °C in 1971 and 21.0 °C in 2009. This reveals an increase of 1.2 °C in thirty nine years (Figure 4).

This temperature increase of 1.2 °C in 39 years is noteworthy as it exceeds the global warming rate estimated a 0.8 °C during the last 140 years,⁶ and in light of the internationally agreed target to keep the global rise of temperature below 2 °C.⁷ A similar situation is equally noticed at Kamembe airport station located in the south west of Rwanda.

b) Scenario 2: Floods

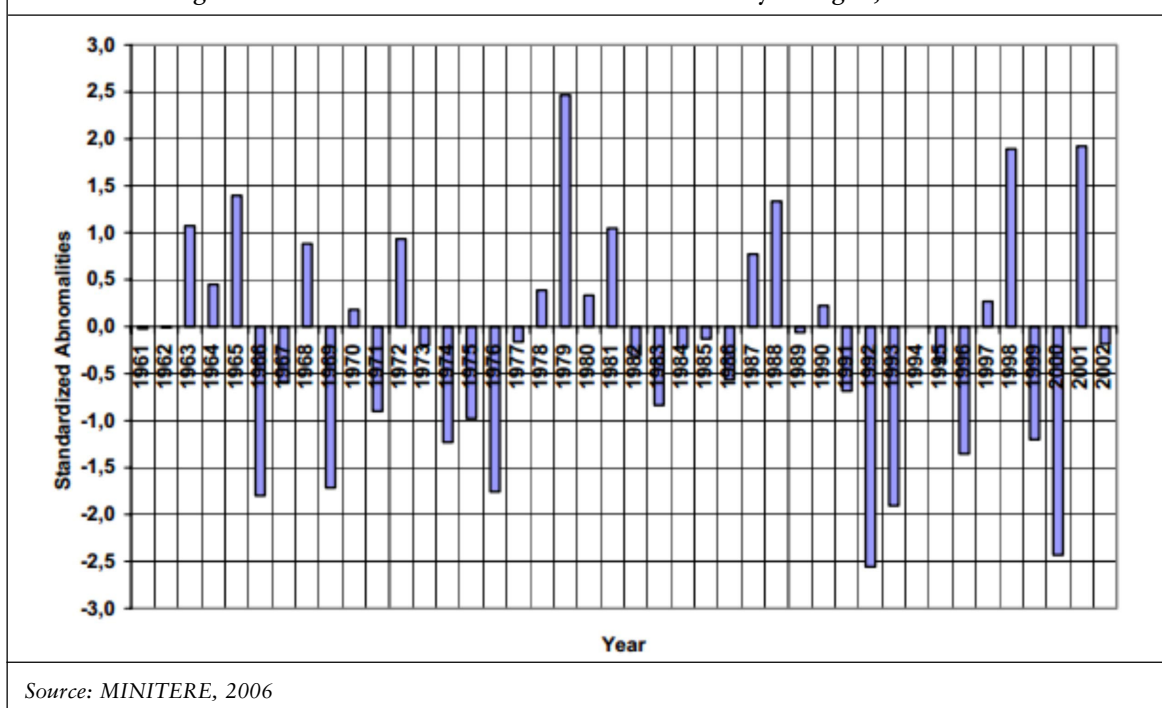
The second national communication related to climate change (REMA, 2010) observed that rainfall at Kigali meteorological station (monthly and annual) recorded during the six years is generally lower than the average of 1961 to 1990. More particularly, April, the month with the highest rainfall, had rainfall equivalent to 27

Figure 4: Variation of the Annual Average Temperature in Degrees Celsius at Kigali and Kamembe Stations



Source: Rwanda Environment Management Authority (REMA), 2010

Figure 5: Standardised Abnormalities of Pluviometry at Kigali, 1961-2002



Source: MINITERE, 2006

percent, 48 percent, 88 percent, 70 percent and 52 percent in 2000, 2001, 2002, 2003 and 2005, respectively.

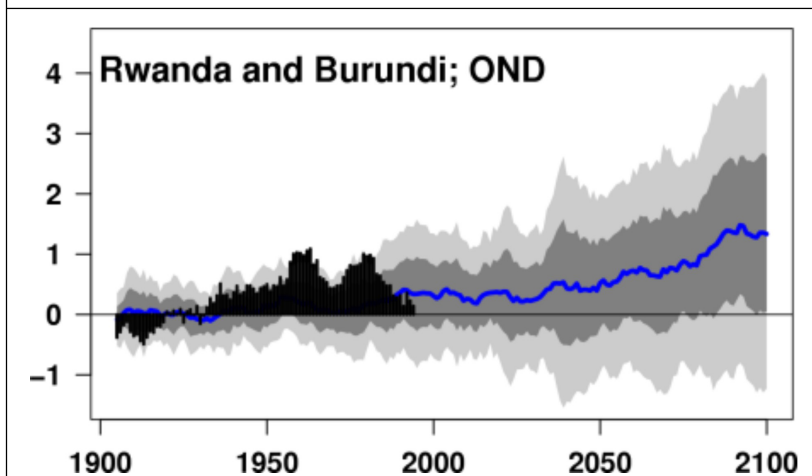
It should be mentioned, however, that the months of July, September, November and December had higher rainfall than normal, with the percentages of 1,441 percent (in 2001), 189 percent (2003), 165 percent (2006) and 153 percent (2006). In fact, the mean monthly total rainfall of July for the period 1961-1990 was 8.4 mm, however in 2001, it was 120.8 mm making 1,441 percent a long term average with the most fall taking place on one day (22 July 2001). This resulted in floods, a situation not usually observed in July, which is a dry month.

This excessive rainfall is not equally distributed across months. It may take place in less than four days and sometimes in one day, followed by floods and landslides. This is the case with heavy rains which were observed on the 3 May 2002 in Kigali city, and which resulted in heavy flooding in Nyabugogo valley. The Kanombe airport

meteorological station indicated 63.2 mm of rainfall on the night of 2 to 3 May 2002. The heavy rains that occurred in September 2007 are also worth mentioning. They affected the districts of Rubavu (Gisenyi station: 70.8 mm) and Nyabihu (particularly Bigogwe sector).

Figure 6 shows both the comparison of observed rainfall with model simulations during the preceding century (1990-2000) and anomalies in twenty-first century projections (2000-2100), for the short rains season in October, November and December in Rwanda and Burundi. The black

Figure 6: Observed and Projected Rainfall for Short Rain (October-December)



Source: Mxolis, 2010

bars display ten-year running mean in observations, the blue line a multi-model assemble mean, and the dark grey (light grey) shading shows the area of one (two) standard deviation from the mean. The figure indicates further wet conditions in the twenty-

first century, but also higher variations in the amount of rainfall. The variations in the amount of rain per day will increase in the future leading to more floods and shorter raining seasons. The incidence of floods and droughts is therefore likely to increase.

Table 3: Record of Activities Addressing Climate Change in Rwanda

Categories	Overall Objectives	Activity/Report
Political and legal frameworks	Ensure a good governance of climate change related issues	<ul style="list-style-type: none"> Organic law N°04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of environment in Rwanda Law N°16/2006 of 03/04/2006 determining the organisation, functioning and responsibilities of Rwanda Environment Management Authority In September 2009, the Cabinet meeting of ministers established the Department of Climate Change and International Obligation under Rwanda Environment Management Authority
Policies and strategies	Guide the implementation, monitoring and evaluation of existing policies as well as compliance to the different ratified Ministry of External Affairs (MEA)	<ul style="list-style-type: none"> National Climate Change Strategy (2011) Other national policies and strategies related to climate change: <ul style="list-style-type: none"> Economic Development and Poverty Reduction Strategy (EDPRS) Environment and climate change policy Agriculture policy Water policy Energy policy Forestry policy Transport policy EAC climate change policy Climate change five year strategic plan Climate change and low carbon strategy EAC climate change strategy Climate change master plan Compliance to MEAs directly tackling climate change effects: <ul style="list-style-type: none"> National Biodiversity Strategic and Action Plan (NBSAP), 2003 National Plan of Action (NAPA), 2006 National Action Plan (NAP) for combating desertification Establishment and operationalisation of Clean Development Mechanisms Designated National Authority, 2009
Communications	Help in reporting on the country's situational analysis, providing baseline status, threats, opportunities, impacts as well as strategies adopted to address climate change issue	<ul style="list-style-type: none"> 1st National Communication (recommended by UNFCCC, 2005) 2nd National Communication (recommended by UNFCCC, 2010)
Research works	Assess climate change related issues and recommend appropriate adaptation and mitigation, where possible	<ul style="list-style-type: none"> Study on economics of climate change in Rwanda (Stockholm Environment Institute) Study on climate change impacts in Bugesera district (REMA, 2009)
Guidelines	Provide the guidance on mitigation of green house gases and adaptation to climate change	<ul style="list-style-type: none"> Guideline on mitigation and adaptation in energy and infrastructures, agriculture, health and natural resources (REMA, 2011)
<i>Source: Mutabazi, 2010</i>		

2.1.2 National and Regional Climate Change Policy Frameworks

The Government of Rwanda (GoR) has undertaken a number of initiatives to address climate change challenges including the ratification of the UNFCCC in 1992, the development of a National Adaptation Action Plan (NAPA) in 2006 and the adoption of climate change and low carbon growth strategies in 2011.

However, there still remains a need to understand and assess the impacts of climate change in the country as well as the requisite solutions to tackle the challenges therein. On the positive side, development partners and non-governmental agencies are supporting the government in addressing these issues.

Rwanda has adopted principles of sustainable growth, along with climate change adaptation and mitigation as national priorities. Steps taken to address climate risk and low carbon development opportunities include national policy measures, awareness raising activities, institutional capacity building and project based activities.

Rwanda has also built strong partnerships, including local and international non-governmental organisations (NGOs), development partners (Swedish International Development Agency-SIDA), United Nations Development Programme-UNDP), United Nations Environmental Programme-UNEP), countries within the East African Community (EAC) and local and foreign research institutions. Table 3 summarises the different activities in which Rwanda has adopted in order to address climate change related issues.

2.1.3 Rwanda's Commitments to the International Protocols

Rwanda has ratified and signed more than ten international conventions and protocols related to the environment. Rwanda is also an active participant in major international multilateral conventions relating to environmental governance, most notably the Convention on Biological Diversity (CBD), the UNFCCC and the Convention to Combat Desertification and Drought (UNCDD).

As part of the implementation of the three Rio conventions, commonly referred to as multilateral environmental agreements (MEAs), the Government of Rwanda developed national strategies and action plans for each convention: the National Biodiversity Strategy and Action Plan (NBSAP) 2003, NAPA for climate change adaptation (2006/7), and National Action Plan (NAP) for combating desertification. These strategies and action plans reflect national priorities for the Energy and Resources (ENR) sector that are in line with the EDPRS priorities.

In addition, Rwanda participates in regional climate change related initiatives organised by the EAC Secretariat. Rwanda is part of the following plans, policies and fund forums: EAC climate change policy, EAC food security and climate change strategy, EAC climate change master plan, EAC climate change strategic plan and EAC climate change fund.

The EAC climate change policy aims to address the adverse impacts of climate change in the region's development. Through adaptation, the policy plans to strengthen meteorological services; increase preparedness for disaster risk management; expand the efficient use of energy resources, irrigation and livestock production; protect wildlife and key vulnerable ecosystems; improve land use, soil protection, tourism, infrastructure and human settlement; and intensify disease, vector and pest control.⁸ Along with this policy, EAC member states established a climate fund for the necessary financial resources to implement the climate change policy and the EAC climate change master and strategic plans.

These policies recognise the following principles: climate change adaptation measures are primary whilst mitigation measures are secondary; prioritisation of regions, sectors and communities more vulnerable to climate change; mainstreaming climate change issues into national development plans; adaptation should be carried out without jeopardising social and economic development; and fostering of partnerships between different stakeholders. Since these policies have only been established after 2010, their long-term impact is still to be seen.

2.2 Trade Overview

2.2.1 Trends and Flows of Main Trade Activities

Rwanda's leading export commodities are coffee, tea, tin ores, niobium and tantalum. These are mainly exported to European markets, China, South Africa, Kenya, the US, Swaziland, Thailand and Malaysia. With regards to all trade, Figures 7 and 8 provide an overview of the main import and export markets respectively. Rwanda's merchandise exports have been dominated by commodities rather than by manufacturing or processed exports.

Besides the five export champions, Rwanda also exports small amounts of hides and skins and horticultural products (such as pyrethrum), but their values from an international perspective are insignificantly low. Handicrafts, a potential area of diversification, is the least performing product, recording very minor export receipts of only US\$ 637,000 in a five-year period, where data was available. From this data, it is doubtful whether horticultural and handicrafts exports are potentially important export sectors in the immediate and medium terms (Ministry of Commerce, Industry, Investment Promotion, Tourism and Cooperatives-MINICOM, 2010). Rwanda's main commodity imports are motor vehicles, petroleum oils, computers and other machinery, electrical machinery, pharmaceutical products, iron and steel, cement, salt, animal vegetable fats and oils, clothing and other textile articles, wheat or

mesh flour, articles of iron or steel, sugar and sugar confectionery, medical appliances, plastics, paper and paperboard, cereals/maize, seeds/rice and furniture.

According to Rwanda's trade data and related statistics, it is evident that the country imports more than it exports. This has in turn created a huge trade deficit that can only be addressed by enhancing the country's exports. It should be noted that relevant national efforts and strategies, such as the National Export Strategy, are in place but the results cannot be attained overnight. All

Figure 7: Rwanda's Imports from the World

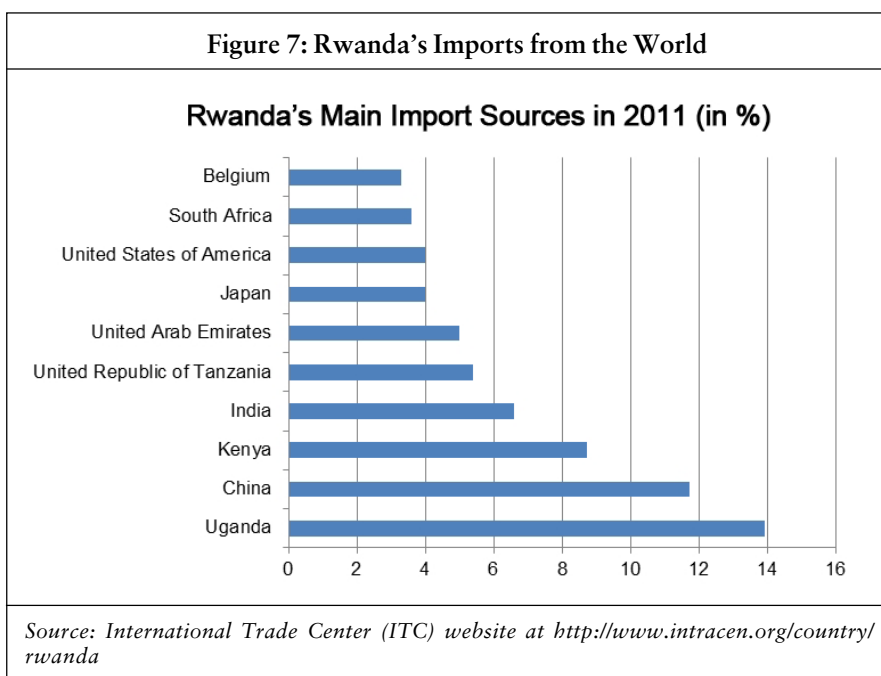
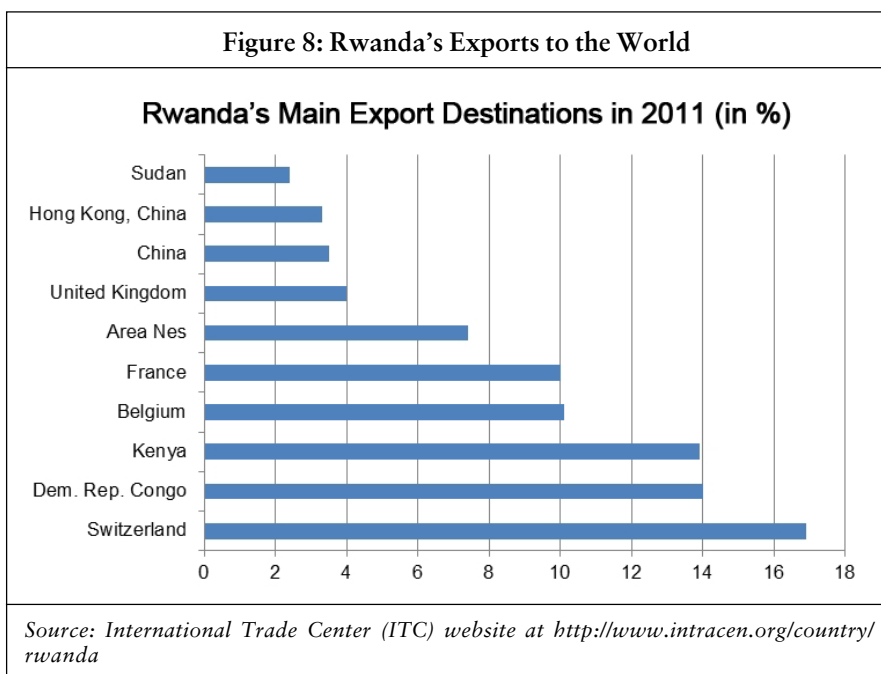


Figure 8: Rwanda's Exports to the World



in all, such efforts show the willingness at the national level to deal with Rwanda's trade deficit which could be attained in the long term, if these efforts are maintained in a sustainable manner.

2.2.2 Contribution of Various Sectors to Trade
Exports of goods and services amounted to 13.4 percent of GDP in 2011, with imports reaching 32.5 percent of GDP as a result of rising fuel prices and increased local demand for intermediate industrial goods. Trade in services has shown a moderate deficit in comparison to trade in goods, with tourism being Rwanda's major foreign exchange earner at US\$252mn in 2011. Outflows of US\$608mn were comprised predominantly of freight and other transportation services.

Export of goods grew sharply in 2011, rising by 52 percent from the previous year. This compares to an average rate of 12.9 percent between 2007 and 2010. With the global economic crisis adversely affecting trade of coffee and minerals in 2009 and 2010, a strong recovery has been witnessed with minerals in particular driving growth. Mineral exports alone rose from US\$96mn in 2010 (including re-exports) to US\$165mn in 2011 (Figure 9).

The trade deficit in 2011 stood at US\$1.22bn, equivalent to 19.1 percent of the GDP (Figure 10). However, this is an improvement from 2010, where the deficit was 20.6 percent of the GDP. Informal cross border trade is becoming increasingly significant, with exports totalling

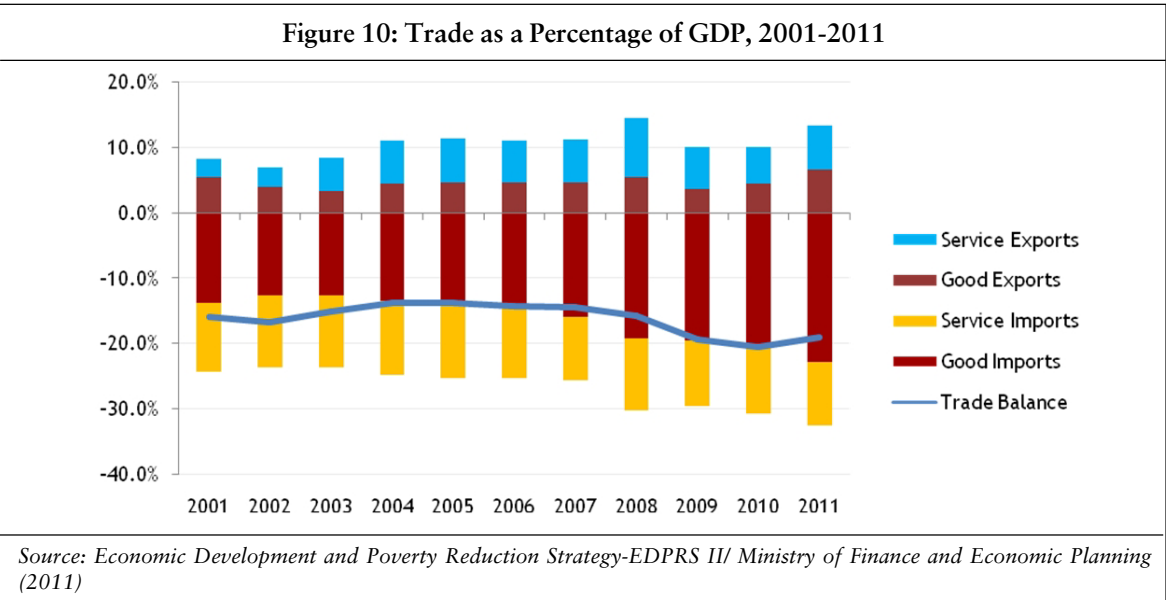
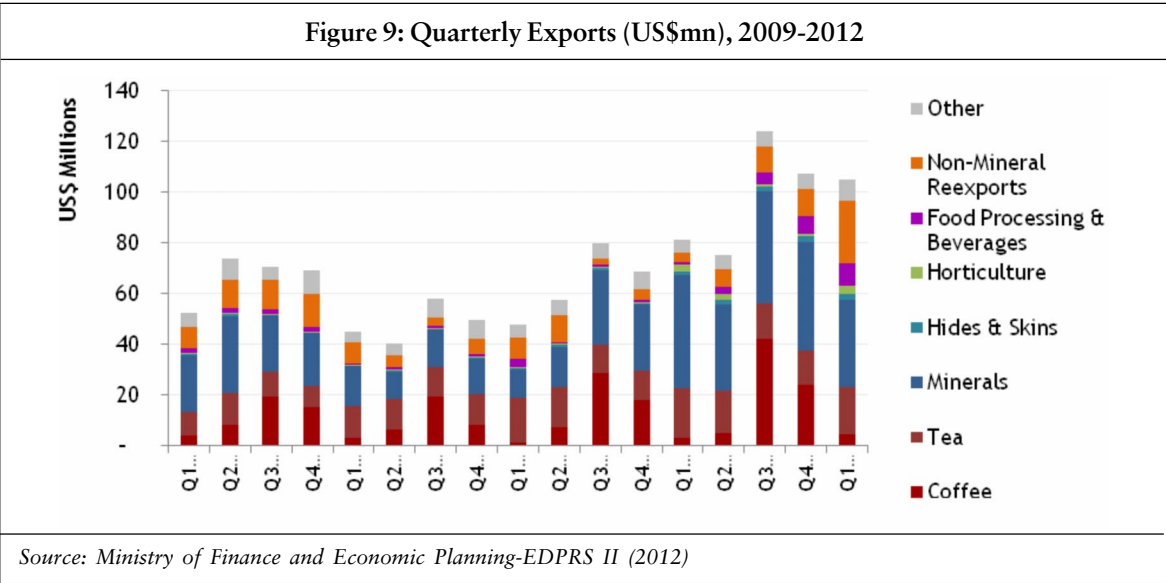
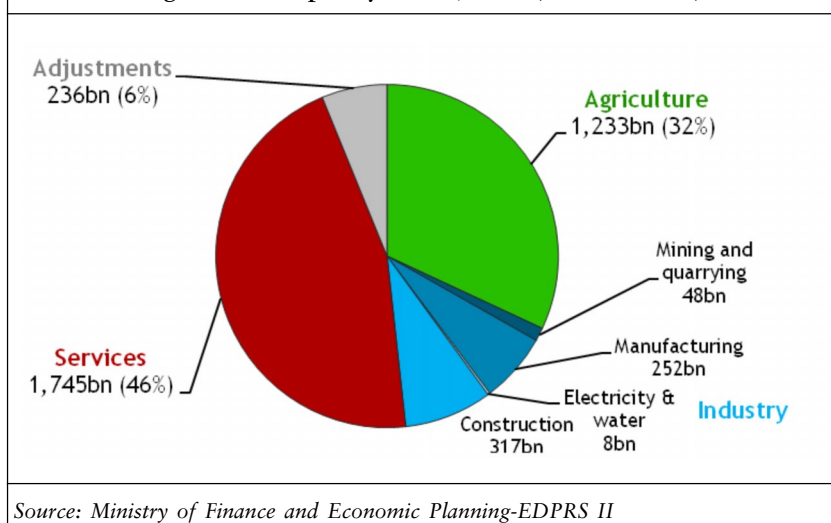


Figure 11: Output by Sector, 2011 (current RWF)



Source: Ministry of Finance and Economic Planning-EDPRS II

development of this sector as well as food security. Mining is also highlighted as having potential for exports like coltan, tin and wolfram. In terms of non-traditional and manufactured exports, pyrethrum, essential oils, handicrafts/ home décor, silk and leather are being targeted for exports.⁹ Government has also identified tourism, business process outsourcing and ICT as service sectors that have a potential to grow.

US\$72mn in 2011, and imports US\$23mn. Food products and livestock comprise the majority of informal cross-border trade, with DR Congo dominating this type of trade.

In Figure 11, services remain the dominant sector in the Rwandan formal economy at 46 percent, with agriculture contributing 32 percent and industry at 16 percent. The industrial sector (worth RWF 625 billion in 2011) is composed primarily of the construction sub-sector (RWF 317 billion) and manufacturing (RWF 252 billion). The manufacturing sector is concentrated in agro-processing, particularly food (RWF 109 billion), beverages and tobacco (RWF 64 billion).

2.2.3 Trade Concentration and Diversification

An increased and diversified export base is a key objective for the Government of Rwanda. It needs to be supported through the development of trade agreements and by the alignment of trade policy, industrial policy, private sector development, and export and investment promotion, to support priority sectors.

Within agriculture and agro processing, organic cotton and a wide range of horticultural products – including flowers, fruits and vegetables, juices, jams and oils – are identified as having potential for higher exports. However, it is important to bear in mind that potential disruptions in the availability of inputs for the agro-processing sector due to climate change may affect further

2.2.4 Value Addition in Main Trade Activities

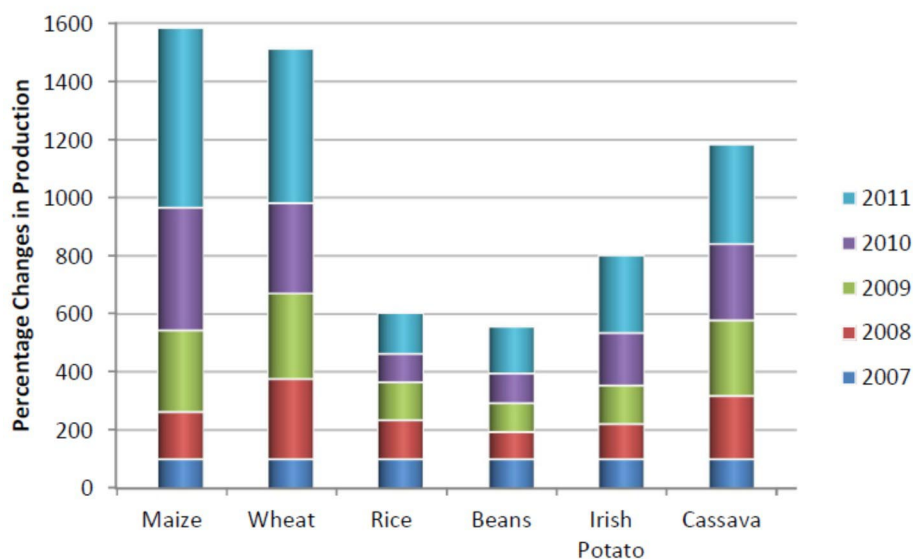
The government promotes agribusiness and higher value addition activities in export crops such as tea, coffee and horticulture, and major food crops, such as maize, rice, cassava and dairy products. In doing this, the value chain approach is implemented and cross-cutting support such as rural finance, infrastructure and marketing are provided accordingly.

There is a national post-harvest staple crop strategy policy framework that assists with strengthening the harvesting, post-harvest handling, trade, storage, and marketing within staple crop value chains in Rwanda, in an effort to improve markets and linkages for farmers, and reduce post-harvest losses.¹⁰

For the future, the further development of local organics agriculture could be considered, especially in the context of climate change adaptation. Techniques used in organic agriculture, such as the avoidance of chemical inputs reduce soil degradation and erosion, making production systems more sustainable and resilient.

Promotion of non-traditional exports, such as organic products, essential oils and skins under sustainable criteria are attractive and of interest to consumers. They could benefit from existing capacity building programmes such as the UNCTAD's BioTrade Initiative.¹¹

Figure 12: Increments (%) in Production of Food Crops under the CIP



Note: Levels were normalised to production in the base year of 2007

2.3 Food Security Overview

2.3.1 State and Trends of National Food Security

In September 2007, the GoR adopted the Crop Intensification Programme (CIP), which aims at increasing agricultural productivity under the Strategic Plan for the Transformation of Agriculture in Rwanda (PSTA) II covering the period from 2009-2012. This flagship programme is implemented by Ministry of Agriculture and Animal Resources (MINAGRI) to attain and avail adequate food crop production across the country. Cultivation of food crops has predominantly been undertaken by smallholder farmers for subsistence living. As a result, the on-farm productivity levels have been very low in Rwanda.

The low agricultural productivity is mainly attributed to the low use of inputs. In a vicious cycle, the low productivity continues to prevent farmers from using the inputs, as many farmers barely produce sufficient food to feed their families with no surplus, and therefore have no income with which to purchase yield-enhancing inputs. The CIP addresses this by undertaking a multi-pronged approach that includes facilitating inputs (improved seeds and fertilisers), consolidating land use, providing extension services, and improving post-harvest handling and storage mechanisms.

a) Impact of Crop Intensification Programme Measures

According to Rwanda Ministry of Agriculture, the production of maize and wheat has increased six-fold and Irish potatoes and cassava have tripled. The production of rice and beans has increased by 30 percent in the past four years. Efficiency gains made from the programme therefore led to a substantive increase in production levels (Figure 12). This, however, has to be seen strongly in the light of price hikes of staples in the global food market during the 2007-2008 food market crisis, where the price of rice, wheat and other staple foods increased drastically, thereby creating a potential incentive for production increases on the part of producers.

Given that most of the agricultural inputs are imported and the transport costs to remote areas of the country are high, their inputs prices were quite high and unaffordable to majority of smallholder farmers. The government with the assistance of development partners overcame this hurdle through bulk procurement of improved seeds and fertilisers from neighbouring countries. This was distributed to farmers through a network of public and private partnerships (PPPs). In addition, the CIP took a 'supply-push'

approach whereby the government supplies the inputs and the farmers are persuaded to use them.

As a result, the consolidated use of land area under these crops has increased from 28,788 ha in 2007 to 254,000 ha in 2010. The percentage share of different prioritised crops under consolidation is shown in Figure 13. It is important to note that the consolidation of land use area has resulted in increases of productivity without expanding the total area under cultivation of crops (Figure 14). To some extent, these trends clearly demonstrate that the CIP has

succeeded in raising the productivity levels and farm outputs.

In Figure 13, A stands for the first agriculture season that commences in September and ends in January (short rains).

2.3.2 Contribution of Various Crops, Staples and Sources in the Dietary Needs of the Country

The favourable climatic conditions and the generally fertile soils allow cultivation of a wide range of crops in Rwanda. As already indicated, major food crops include maize, rice, bananas (cooking, beer and fruit), Irish potatoes, sweet

potatoes, cassava, sorghum and beans. Vegetables such as onions, cabbages, dodo, gourds and eggplants are also widely grown. Cash crops such as coffee, tea and sugarcane are grown on commercial scales for exports and domestic consumption in Rwanda.

Over the past ten years, there have been significant shifts in staple crop production areas as shown in Figure 15. Beans, which occupied the largest area under production, are the only staple crop that has remained relatively stable at around 330,000 ha. In comparison, sorghum area has decreased by more than 20 percent. Maize area is the most significant with a more than 300 percent increase in area under production. The wheat area has increased significantly, almost by 600 percent, but the relative areas remain appropriately modest given production potential and markets. The largest shifts occurred after the CIP programme's inception in 2007. Since then, they have been mostly driven by the programme and not as a response to any particular new or emerging market development.

While overall production numbers (area, yield and production) are

Figure 13: Recent Trends in Consolidation of Land Use Areas Under Cultivation of Priority Crops in the Short Rains Season (September to January) from 2007 to 2011

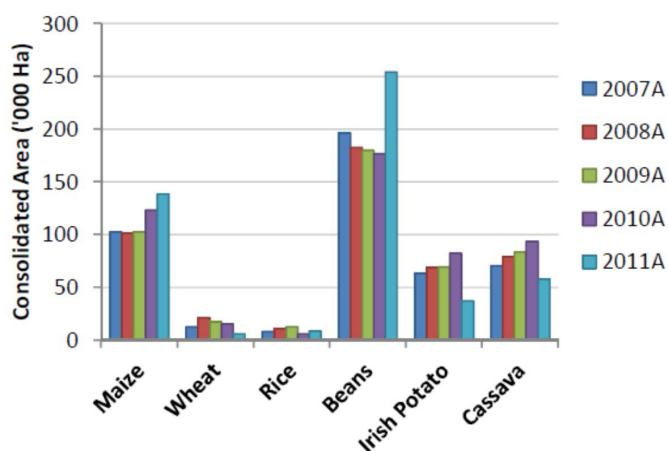
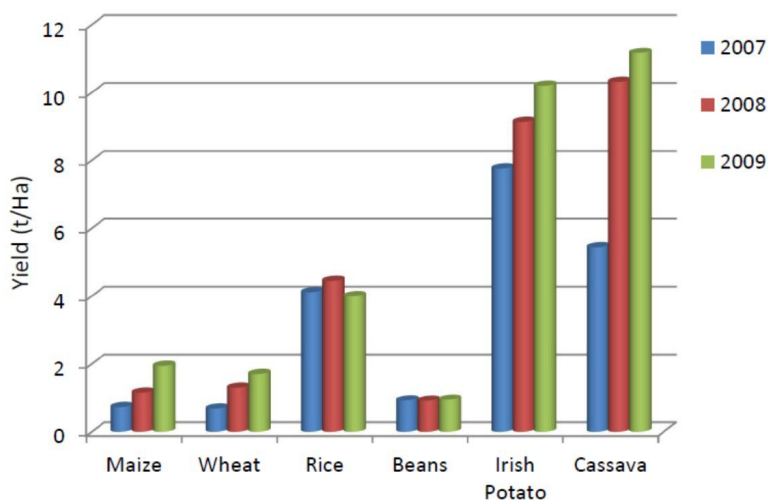
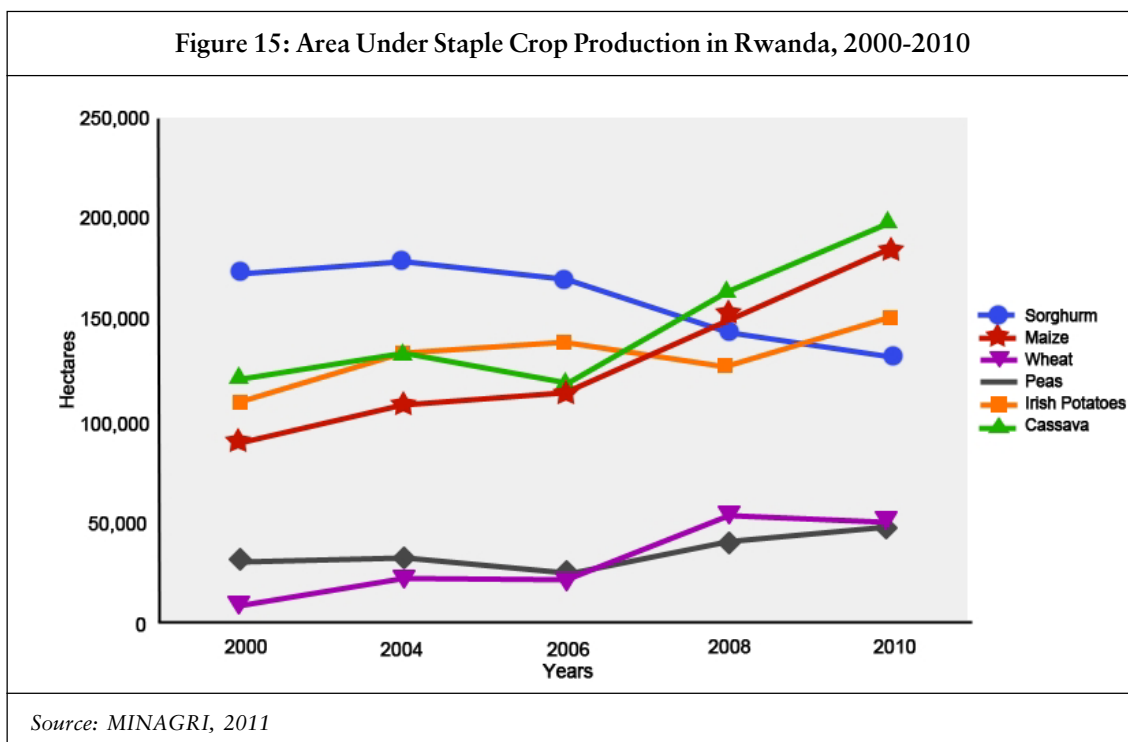


Figure 14: Changes in on-Farm Productivity of Major Crops in Response to the use of Distributed Inputs (Improved Seeds/Planting Materials and/or Fertilisers)

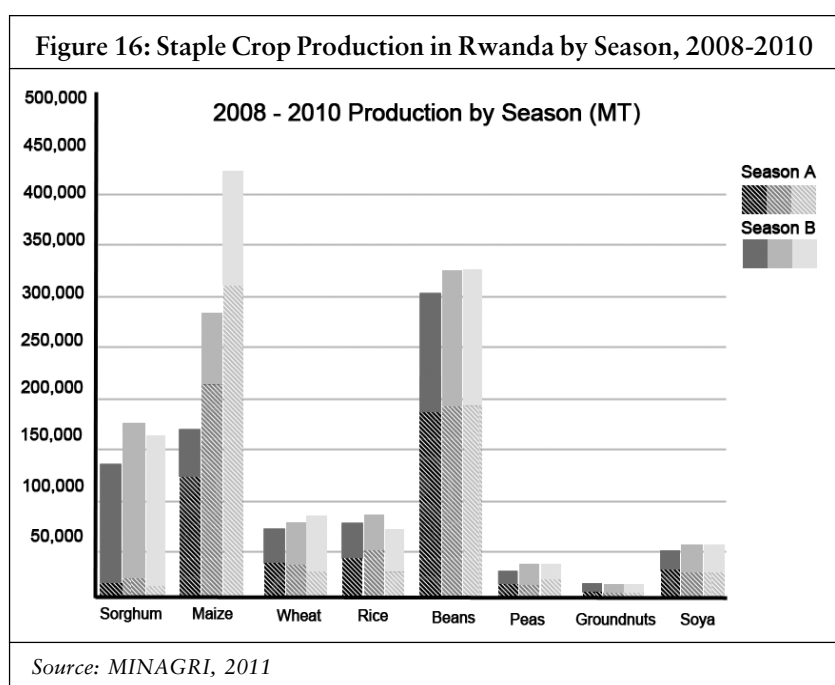


Source: Kathiresan, 2011



useful, the more interesting post-harvest view within the Rwanda context is production over the course of any one year. Rwanda is relatively unique in that there are at least two main staple seasons (Season A and Season B, with a third season, C available in the marshlands).¹² Some crops have significant or equal second harvests (Figure 16).

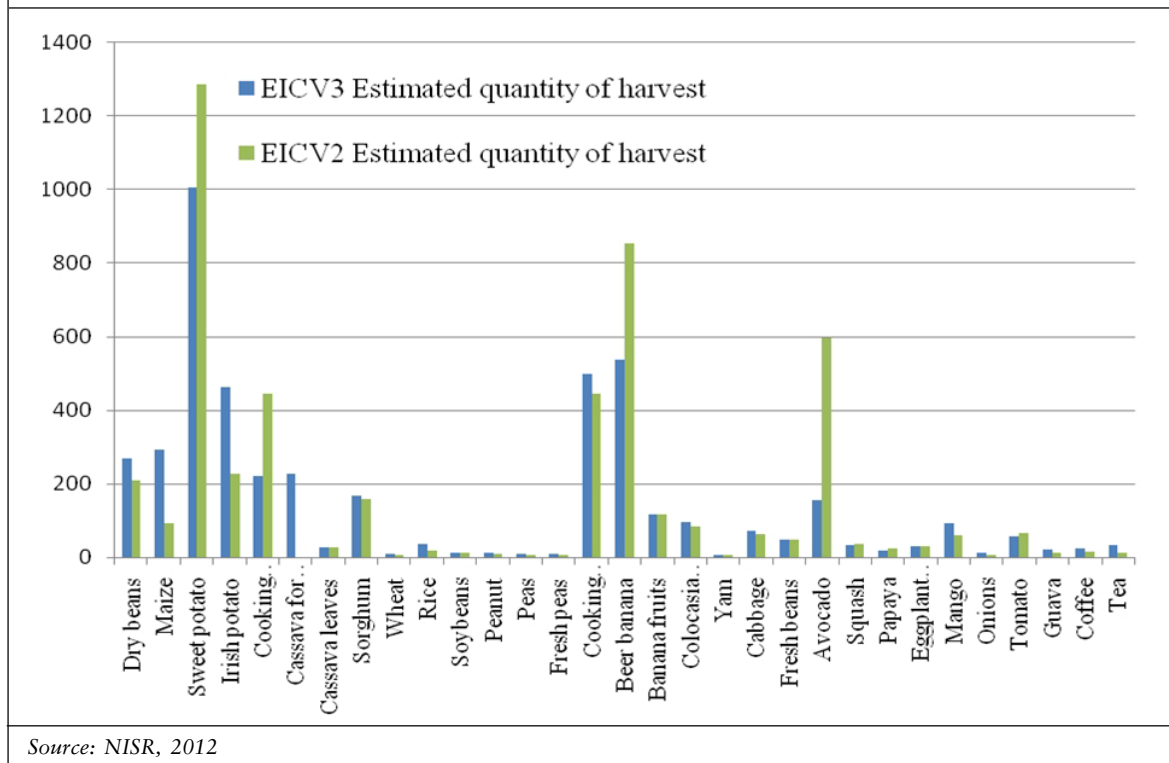
Figure 17 estimates the production quantities for staple crops of selected fruits and vegetables, coffee and tea. With the exception of sweet potatoes, beer bananas and avocados, the data suggests that the quantities produced of all main staple crops have increased between survey rounds. This trend is roughly in line with that evidenced in Ministry of Agriculture data (NISR, 2012).



a) Crop Sales

For both small-and large-scale crops, the EICV3 survey asked cultivating households to state the principal markets for the crops they sold over the last twelve months. The data suggests that for all types of crops, ‘traders in the market’ are most likely to buy the crops, especially staple crops. Purchases in the field tend to occur most often for fruits and vegetables, while commercial companies and cooperatives are notable for buying export crops.

Figure 17: Estimated Production Values in Metric Tonnes (MT) '000s



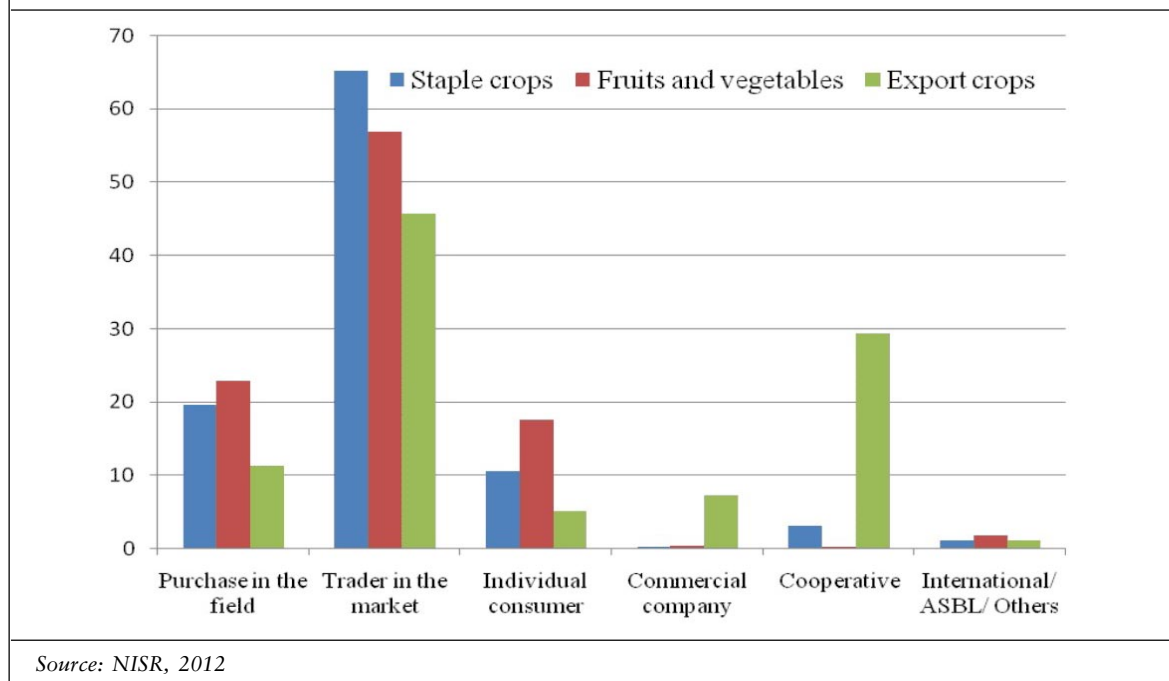
Source: NISR, 2012

Looking at staple and export crops on an individual basis, individual consumers are notable for buying sweet potatoes, bananas and cassava for cooking, whilst rice and coffee are popular with cooperatives (Figure 18).

2.3.3 Determinants of Food Security for Various Sub-groups of the Population

In a theoretical perspective, availability, accessibility and stability in food supply are the three most important determinants of food security. While availability flows from local production and existing supply chains in a

Figure 18: Principal Market for Sold Crops, by Crop Type



Source: NISR, 2012

country, accessibility flows are from ownership of food items or sufficient purchasing power. Stability relates to the need to ensure a constant supply of food in order to respond to present and future needs of the population.

In today's world, even in the absence of local availability, accessibility to food can be ensured if people have sufficient income and purchasing power. Accessibility can also be ensured through government initiatives on promotion of food security and competitiveness in the agricultural sector in a country as it has been the case of Rwanda. It also implies having capacity to stock surpluses, hedge agricultural risks, be able to process a significant share of the local production and develop local distribution channels. The Rwandan Vision 2020 acknowledges that the most important challenge regarding Rwanda's agricultural development is not land size, but low productivity associated with traditional peasant-based subsistence farming.

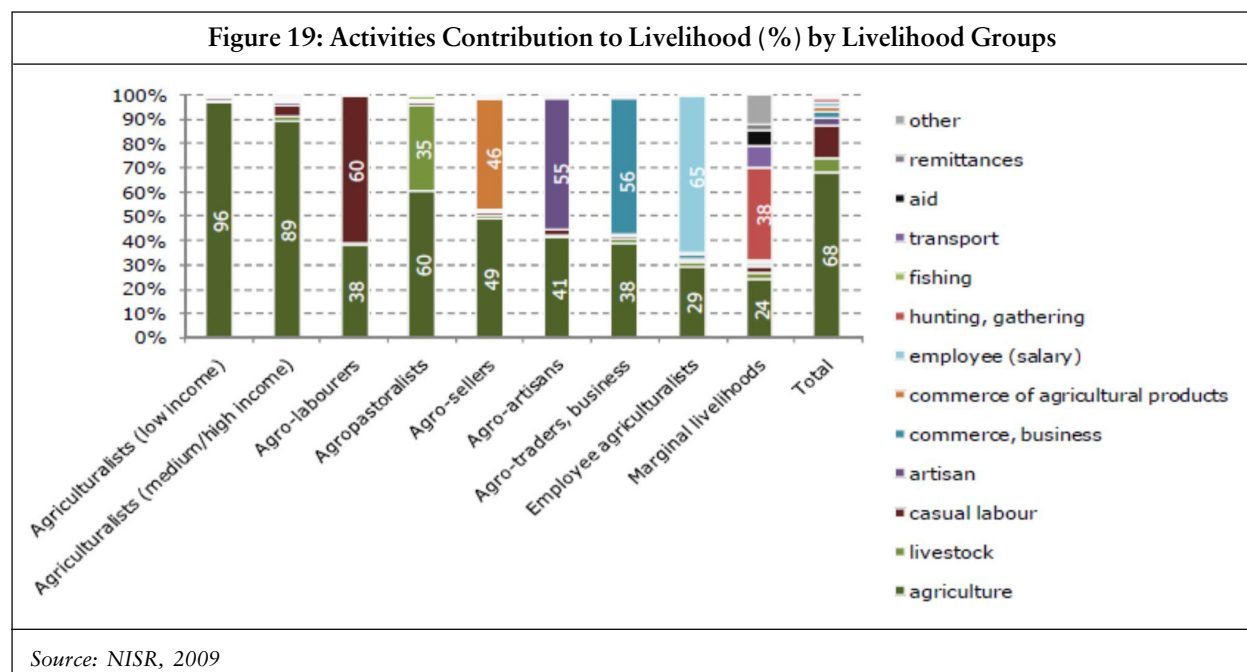
With regard to food security, three livelihood profile groups were identified as being vulnerable: agriculturalists with low income, agro-labourers and marginal livelihoods (Figure 19). The largest absolute number of households where food security is threatened is found among agriculturalists with low income. This group

depends nearly uniquely on agriculture to sustain their livelihood and income. Moreover, their diversity of agricultural production is low.

The agro-labourer livelihood profile group consists of households depending on labour (manual and seasonal, paid in cash or kind) and agriculture. They have limited access to land and also have a low diversity in agricultural production. The third most vulnerable group consists of households characterised by different livelihood activities with a limited role in agriculture. Such marginal activities include assistance, hunting/gathering, transport and other unspecified activities. It is a small group with a minor proportion to the total population, but particularly important, given their vulnerability to food insecurity and poverty.

2.3.4 Value Addition in National Food Sectors

The success of the CIP led to the increase in crop yields and resulted in unanticipated surpluses in key staple grains and cereals. To better address the issues of post-harvest loss resulting from the lack of capacity in handling and storage, MINAGRI formed the post-harvest task force in 2009. The task force aims to maximise net profits for smallholder farmers and reduce food insecurity by strengthening staple crop value chains and reducing post-harvest losses.



In order to effectively address post-harvest losses, a cross ministerial coordination facility was put in place under the 2010-2011 Common Performance Assessment Framework (CPAF) that has adopted the development and validation of national post-harvest strategy.

In early 2011, MINAGRI's post-harvest task force, in conjunction with all relevant stakeholders, created a national strategy and five-year action plan to address sector-wide post-harvest loss issues. Also, in March 2011, the agriculture sector working group approved the national post-harvest staple crop strategy and action plan to more effectively address issues of post-harvest staple crop loss via coordination of efforts by several ministries and agencies.

2.3.5 Food Processing in Rwanda

Depending on the stages, processing can be classified into primary and secondary. In primary processing, the valuable part of the harvested produce is not changed, for instance with the seed. In secondary processing, the form of the produce is changed as is the case for flour and paste. While the primary processing activities can be organised near the farm in rural areas, the secondary processing is often done on a larger scale on the farm.

Industrial processing of some crops is well established in Rwanda. Tea (OCIRTHE), coffee (OCIRCAFE), rice (ICM, Cooperatives), maize (MINIMEX) and wheat are the major crops that are processed on a commercial scale. In addition, a significant number of women in the South province are engaged in the commercial processing of soya beans.

Chapter 3

Missing Links, Real Impacts *Interface between Climate Change, Food Security and Trade*

3.1 Climate Change Food Security Linkages

3.1.1 Impact of Climate Change on Food Security

The Rwandan agriculture sector is highly vulnerable to the increased frequency, severity and unpredictability of extreme weather-related changes and events caused by climate change. Significant variations in amount of rain and their concentration over shorter periods are becoming a trend with time, leading to shorter but more intense rainy seasons. More specifically, floods and droughts are causing significant environmental impacts on and reducing agricultural productivity.

a) The Impact of Droughts

The disturbance of the rainy season often misleads farmers on planting dates. As a result, they cultivate late with the risk of an early onset of the dry season before the harvest, leading to lower yields and reduction of water irrigation, hence a possibility of food insecurity. Besides increases in temperatures as the ones seen in Rwanda (about 1.2 °C), there is an intensification of crop diseases and a positive environment for pests, parasites and fungi affecting more crops during the dry periods.

For example, in the south east of the country, droughts have become a major factor of food insecurity. The decline in annual rainfall as well as prolonged and cyclical droughts leads to food insecurity and displacement of communities.

The NISR in collaboration with the MINAGRI, conducted sample surveys at a periodical interval to determine the nutritional status of the population (5 years for EICV and 2 years for *Enquete Démographique et de Santé-”EDS”* (Demographic Health Survey). The survey conducted in 2009 by the *Comprehensive Food Security and Vulnerability Analysis* (CFSVA) states that 21.5 percent of Rwandan households were vulnerable to food insecurity due to lack of food crops and adequate proteins, against 34.6 percent in 2006. Women in reproductive age (15-49 years) and children under five were the most affected at 7 percent and 4.6 percent respectively, and the underweight representing 15.8 percent.

Droughts and erratic rainfall affected 60-90 percent of households, particularly in the districts of Bugesera, Nyanza, Gisagara, Huye, Rusizi-Nyamasheke, causing rising prices of staple foods. Among these vulnerable communities, geographic disparities exist in light of changing conditions related to climate change. During the first survey on food security in 2006, food shortages severely affected 2 out of the 13 natural regions of Rwanda, which are:

- The Eastern Plateau with 5 percent of the affected population experiencing rainfall of approximately 53.3 percent of the average annual rainfall in normal times;
- The region of Bugesera with 4.8 percent of the affected population experiencing 30 percent of the average annual rainfall in normal times.

b) The Impact of Floods

In recent years, it has been noticed that there is a shift in growing seasons A (September-November) and B (March-May). The short dry season (mid-December to mid-February) seems to disappear as indicated by the continuity of rain until the first ten days of May. This causes a longer season A and delays in the initiations of Season B, affecting traditional cultivation periods.

Floods have been experienced in the north-west and caused losses in food production and displacement of human lives, leaving people homeless and without food. The observed floods in the marshes of the Nyabarongo and Akanyaru rivers during the months of April-May destroyed crops. Floods in marshy areas also affect the possibility of cultivating them, therefore affecting availability of alternative marsh crops between rainy seasons. Additionally, extreme rains have produced landslides, erosion of soils and the impossibility of planting until excess water has been drained and absorbed. Figure 20 shows the evidence of erosion occurring in previously cultivated land.

The 2010 assessment on cooperation framework on climate change¹³ presents a significant level of vulnerability and food insecurity with respect to three regions, namely the Congo-Nile crest, the eastern edge of Lake Kivu and the south-east. This is explained by the fact that the western region and the Congo Nile crest have

experienced extreme rainfall causing soil erosion and floods that have had a negative and more significant impact than in other regions. These regions are usually characterised by degraded soil due to constant erosion accentuated during abnormal rainy seasons. Continuous soil degradation makes replanting and overall agriculture sustainability even more difficult. Productivity of soils is also reduced. This situation calls for the introduction of drainage systems in key cultivated areas as well as consideration for the introduction of soil preservation practices such as the use of terraces.

3.1.2 Impact of Food Systems on Climate Change

Rwanda has about 1.4 million ha of arable land, of which 60-70 percent (840,000 ha) are cultivated during season A and B. In 2009, the population engaged in agriculture was 80 percent (MINAGRI, 2011).

Due to the high population density in Rwanda, land is insufficient. Soil fertility has been deteriorating due to the demographic pressure on lands, while the use of organic and non-organic inputs remains very low. In addition, substantial parts of lands in Rwanda are exposed to soil erosion, given the mountainous relief of the country with steep slopes. The over exploitation of the land coupled with poor agricultural practices have exacerbated soil erosion and the resulting climatic changes in the country.

Figure 20: Erosion Phenomena in Cultivated Lands



Source: MINITERE, 2005

In order to redress the above situation, efforts need to be deployed to improve current agricultural practices to make them more sustainable and resilient. These practices could include improving irrigation and drainage systems, introducing rain harvesting in dry areas, expanding the use of organic fertilisers and biological pest controls, exploring options for

Cereals	248,072	277,557	311,484	344,211	342,009
Leguminous plants	344,691	406,204	444,541	405,945	467,181
Roots and tubers	401,853	425,429	442,869	426,379	435,874
Bananas	400,570	360,470	358,418	361,251	351,958
Fruits and vegetables	183,74	41,696	58,225	81,777	83,959
Total	1,413,560	1,511,352	1,615,538	1,619,563	1,680,981
Coffee				33,000	
Tea			9,588	11,750	12,306
Pyrethrum			3,191	3,191	

Source: United Nations Framework Convention on Climate Change (UNFCCC), 2012

crops, shifting and building terraces in areas vulnerable to climate change. In sum, there is need to explore practices that allow improvements in productivity but also preserve the natural endowments. Many of the crops already produced in Rwanda benefit from those practices. Table 4 indicates areas occupied by main crops.

Additionally, efforts have also been geared towards reducing the population dependency on agriculture as the main source of livelihood by promoting other sectors such as industry and services.

From the foregoing, the impact of food systems on climate change in Rwanda can be summarised as follows (UNFCCC, 2012):

- Overexploitation of land due to the high density of the population is linked to the reduction of vegetation and forestry (release of the carbon sequestered by vegetation and forestry); on the other hand, this is also one of the causes of soil erosion (agriculture practice in sloppy hills and mountains where agronomic techniques of soil protection are not applied);
- Crop intensification with use of inorganic fertilisers is linked with the emission of nitrous oxide (NO₂) in the atmosphere. This is one of the direct gases which contribute to global warming potential, 310 times more than carbon dioxide (CO₂).
- Farming and zero grazing techniques with better manure management is linked with enhanced resilience to climate change and

reduced methane (CH₄) emissions in atmosphere;

- Practice and intensify agro-forestry linked with enhanced CO₂ sequestration, soil protection (adaptation to climate change) and improvement of livelihood (adaptation to climate change).

Additionally, Rwanda's NAPA (2006) also points out some of the potential solutions needed to better adapt current agriculture practices to climate change including:

- Improve the management of water resources, such as irrigation and drainage systems, as well as rain harvesting;
- Promote non-rain fed agriculture and expand irrigation systems;
- Introduce species resistant to drought in arid and semi arid zones;
- Improve the adaptation capacity of farmers and pastoralists to climate change through setting up agro-sylvo-pastoral systems adapted to real land vocation;
- Promote veterinary and phytosanitary services;
- Protect basin sides in mountainous zones; and
- Reinforce early warning and rapid intervention systems.

3.1.3 Addressing National Food Security Concerns in Response to Climate Change

Rwanda formulated its initial national communication regarding food security concerns in response to climate change in 2005, the National Adaptation Programme of Action

(NAPA) in 2006, the second national communication in 2011 and recently the climate change strategy and low carbon growth. Besides these initiatives, Rwanda will participate in EAC's implementation of climate change policy, food security and climate change strategy and climate change master plan.

In order to address national food security concerns resulting from climate change challenges, Rwanda created a Department of Climate Change and International Obligations (CCIO) under REMA. This department deals with all climate change issues including those related to food security.

3.2 Trade Climate Change Linkages

3.2.1 Conceptual Framework of the Trade and Climate Change Relationship

The linkages between trade and climate change reside in the importance of greenhouse gases emitted during the overall imports of equipment, consumer and intermediate goods, and energy and lubricants. This consists of increased imports of machines and equipments, like automatic information processing machines, power generators, as well as the electric devices. The more energy-efficient the machinery imported or locally produced, the less the amount of emissions generated. Also, in terms of energy inputs, natural gas and biofuels are preferable alternatives to other fuels with higher levels of emissions.

Climate change can also affect exports. Rwandan exports are dominated by coffee, tea and some minerals and depend on climatic conditions that are beyond the country's control. Coffee exports have been long considered a success story of Rwanda. However, why has coffee been so suitable and profitable in Rwanda even when facing effects of climate change?

a) Case Study of Rwandan Coffee and Climate Change

Coffee, as the main export product in Rwanda, recorded a total export value of US\$70.3mn¹⁴ in 2012, down from US\$74.2mn in 2011.¹⁵ Rwanda's elevation and soil establish excellent growing conditions for Arabica coffee—'higher

end,' than Robusta coffee and is more resistant to disease. Currently, about 98 percent of all the coffee produced in Rwanda is Arabica.¹⁶ Most of Rwandan coffee qualifies as specialty coffee. This generates more price stability and usually higher prices.¹⁷

More than 10 percent of Rwanda coffee is now fully washed.¹⁸ Washing 'locks in' the quality, allowing the sale at specialty coffee quality. Furthermore, 2 percent of coffee is sold in the so-called 'value added form' (roasted and packaged). This is a very profitable activity, as revenues in roasted coffee have increased by 300 percent from 2009 to 2010.¹⁹

Investments in the past have yielded some results, for example the number of coffee washing stations in the key coffee producing districts increasing from 6 in 2002 to 107 in 2012 nationally.²⁰ The current National Coffee Strategy identifies the following investment needs: investment in cherry production, management of coffee washing stations, building capacity of exporters, infrastructure expansion and improved research and development within coffee sector. The Rural Investment Facility (RIF) and the Agriculture Guarantee Fund (AGF) are available for investment in the coffee sector. The RIF is a grant programme worth US\$10mn. The AGF is designed to reduce the lender's risk in case of insufficient collateral on the part of the borrower. By 2010, 47 percent of AGF had gone into coffee investment.

It is important to note that coffee, while drought-resistant, is not fully drought-proof. This allows, in principle, for more stability in output in a climate change context. Further, coffee has long yields, the average economic age of plants is 30-40 years that brings some level of resilience. It is often intercropped with food crops such as corn, beans or rice in the first few years, as farmers become familiar with the plants' requirements. This acts as a risk reduction in terms of food security.

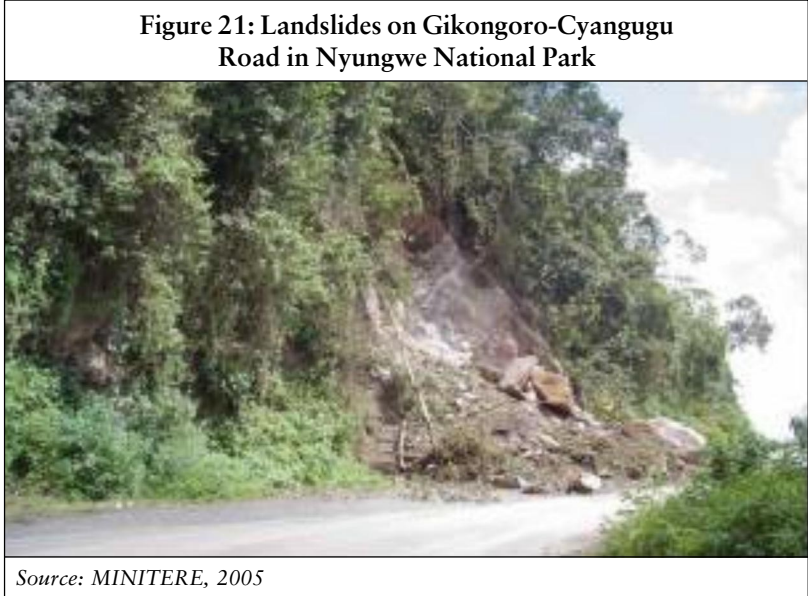
Extended dry seasons in certain areas of Rwanda have put pressure on production levels and decreasing yields are starting to be observed. For

example, yields went down by 18 percent from 2009 to 2010.²¹ Rising temperatures will lead to lower altitude limits for growing coffee. This is especially the case for Arabica coffee, where a predicted increase in temperature of 2 °C would render entire cultivation areas unsuitable.²²

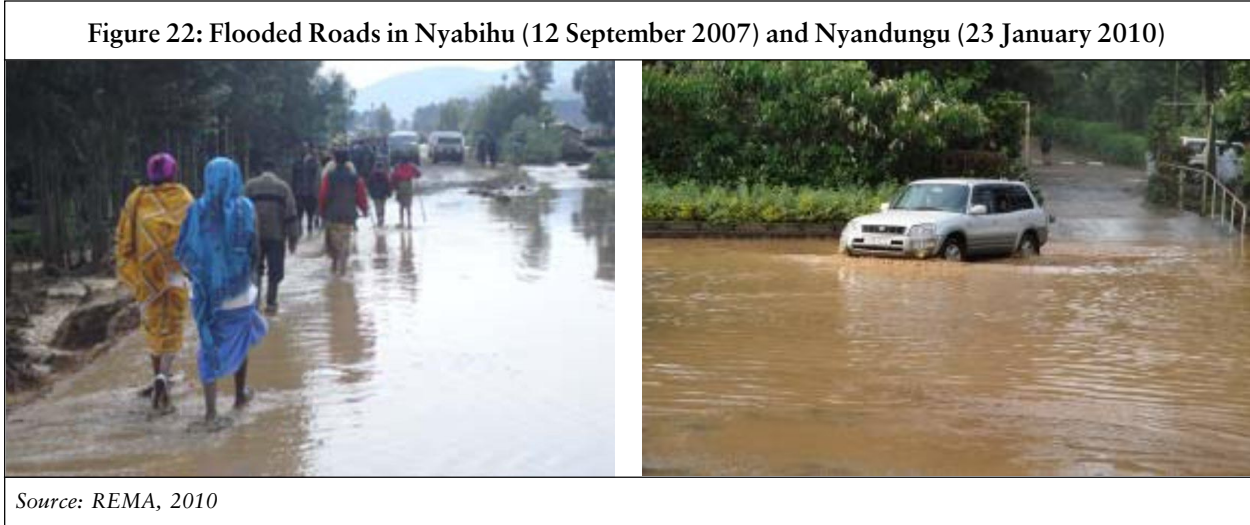
Nevertheless, it has been indicated that growing coffee and plantain/bananas could help reduce the effects of climate change on coffee. The beneficial effects are i) the provision of shadow to coffee plants; ii) the reduction in temperate and drought problems; iii) the production diversification that generates up to 50 percent higher incomes for farmers; and iv) subsequently the improvement of food security.²³ Some diseases have been found to decrease when the two are grown together.²⁴

3.2.2 Trade and the Impact of Climate Change on Infrastructure

In terms of infrastructure, a good and extended road or train transport network ensures low food prices and a faster and more efficient distribution system that can respond to changes in demand and supply. Effects of climate change on road infrastructure can increase costs in transport and create disruptions in the supply of both inputs and outputs. Heavy rainfall has been responsible for landslides that damage road infrastructures in Rwanda. A recent sector survey found that only 45 percent of the Rwanda’s paved national road network was in good condition, while only around 10 percent of earth national and 10 percent of district roads were in good condition (Ministry of Trade and Industry, 2010). Roads are therefore a heavy constraint on trade and commerce within Rwanda (Figures 21 and 22).



Apart from the road transport, Rwanda has also air and maritime transports. The air traffic is mainly dominated by four air companies. Maritime transport is mainly practiced on Lake Kivu. The project on railway construction co-shared with Tanzania and Burundi is in the final stage and will be implemented very soon. If this project consolidates, it could be an important driver for trade in the region and allow faster and



more reliable import and export activities of agricultural products.

In order to guarantee and expand current crop stoking capacity and competitiveness, the crop intensification programme is developing the infrastructure needed for post-harvesting food storage and crop irrigation. Currently, about 1,000 hermetic storage cocoons were constructed in the country, including those located in the free trade zone in Gasabo district. About forty valley dams and water resource reservoirs have been constructed for crops irrigation as a response to frequent drought periods in the Eastern region (Rwanda Agriculture Board-RAB, 2011).

3.2.3 Climate Change Policy and their Implication on Trade and Agriculture Competitiveness in Rwanda

Despite the challenges posed by the global depression, Rwanda's economic performance in the medium term exhibits some degree of resilience, as the country maintains its strong record on sound macro-economic management, adequately implements its ICT policy, and effectively implements the Economic Development and Poverty Reduction Strategy (EDPRS). These help to attract additional investments, thereby expanding employment, which in turn contributes to reducing the number of people directly dependent on agriculture, with positive outcomes on the environment.

Notable progress has already been made in integrating environment and climate change into the EDPRS and some of the District Development Plans. Through the cleaner production programme, a number of industries are appreciating the mutual benefits of cleaner production to both the environment and the business bottom line (profit).

Nevertheless, the direct fact of climate change and business linking cleaner production is through Clean Development Mechanisms (CDM) under the UNFCCC, which involves the carbon market. The Government of Rwanda ratified the Kyoto Protocol in 2003 (Law No. 36/2003 of 29 December 2003) and the Cabinet

meeting of January 13, 2007 approved the Presidential Order authorising the final approval of the Protocol. Currently, Rwanda has 22 CDM projects and 10 of them are directly business oriented.

Most of the CDM projects implemented in Rwanda are related to the replacement of inefficient cooking stoves, water purification and electric lighting machinery against more energy efficient and less carbon intensive devices (Appendix 2). This change in the cooking, water purification and lighting methods has important implications for livelihoods, health and energy savings but little on addressing food security or reforestation issues. There are no CDM projects related to sustainable agriculture, forest certification or reforestation in Rwanda so far.

In general, the CDM has been successful in financing some types of agricultural projects, including those that capture methane or use agricultural by-products as an energy source.²⁵ About 17 percent of all CDM worldwide projects are classified as agricultural and land-use forestry projects, a category that includes mixed-use agro-forestry projects and other projects that restore agricultural land.²⁶ This type of projects closely link mitigation in agriculture with competitiveness, since most agricultural land-use opportunities are in developing countries, where agriculture is an important source of income for the poor.²⁷ Additionally, projects that sequester carbon in soils assist in addressing soil degradation and infertility, which are some of the causes for low agricultural productivity in Africa.

While the use of the CDM for improving agricultural practices is relatively low, it will be beneficial to explore within the Rwanda and EAC strategies, options to take advantage of potential opportunities to attract investment in extensive agriculture/land use projects that introduce sustainable practices and incorporate neighbouring forest management components. For example, it is well known that coffee culture has significant synergies with local forest management as tree shadows provide protection to coffee plants and the soil.

Multilateral agencies and bilateral donors could be quite receptive in supporting technically and financially these types of initiatives. In this regard, it is worth mentioning that the CDM under the Kyoto Protocol provides special and differentiated treatment for LDCs although, to date, very few LDCs have been able to take advantage of this.

3.2.4 Interaction between Climate Change and Trade Policies in Rwanda

The imperative of developing environmentally friendly policies necessitates that development policies contribute to sustainable practices that protect the environment. As Rwanda is at present highly dependent on agriculture for exports, livelihoods and economic development, there is need for trade policy to mainstream measures that maximise opportunities and minimise costs arising from the interface between trade, environment and sustainable development.

The need to focus on sustainable agriculture production, including organic agriculture, is one option. The global market for organic food and beverage products reached US\$60bn in 2010, representing more than three-fold expansion from 2000 levels,²⁸ indicating significant space for continuous growth. Rwanda has dedicated about 13,356 ha to organic agriculture and has 2,556 organic producers.²⁹ Rwanda has demonstrated production and export capacity in organic coffee, tea, apple bananas, vegetables, chillies, passion fruit juices and geranium oils.³⁰ This capacity needs to be expanded and consolidated. Additionally, organic agriculture practices are key in assisting in the preservation of soil, reducing the use of chemical inputs and can, depending on the case, contribute to carbon sequestration.

3.3 Food Security Trade Linkages

3.3.1 Relationship between Trade and Food Security in Rwanda

As food security becomes a global problem, trade policies at national and international levels have an increasingly important role to play. Since Rwanda relies greatly on trade for some varieties of food supplies, such as rice, sugar and wheat

flour, it requires international trade enhanced by liberalisation agreements to promote economic growth, more employment and high incomes, which eventually may give households a greater capacity to access food. A global campaign is required to call on the need to grow food under sustainable conditions using organic inputs. Organic farming offers multidimensional advantages of creating large-scale employment opportunities as part of facilitating the rural population to eradicate poverty, and diversifying the economy besides earning foreign exchange. Developing agriculture is perhaps the only way to ensure and sustain food security in Rwanda and worldwide.

The staple food availability is very much secured through trade in Rwanda. As the crop intensification programme policy has assigned crops to suitable agro-ecological zones, the regional exchange of food crops improves significantly the availability of food and food security of Rwanda. For example, potatoes are cultivated in northern Rwanda and transported in all the provinces including Kigali city, the same for cassava which is mostly cultivated in the southern and eastern Rwanda, and banana in the eastern and western Rwanda.

With regard to importation of food commodities from neighbouring countries, Rwanda imports palm oil from Burundi; rice, sugar and wheat flour from Tanzania; banana, milk and corn from Uganda; and industrial food from Kenya. Promoting the integration of agro industrial value chains in the region could facilitate the product transformation, value addition and the absorption of surpluses.

3.3.2 Implications of Multilateral and Regional Trade Policies on Food Security in Rwanda

The EAC Agriculture and Rural Development Policy (EAC-ARDP) recognises the importance of eliminating hunger and ensuring sustainable food security within the region as a necessary first step towards poverty eradication and consequently, a stimulus for rational agricultural development and realisation of the aspirations of the treaty establishing the EAC.³¹ However, before and since the signing of the treaty, the

ability of the partner states to achieve individual and collective durable food security status has been elusive. This has been further compounded by the negative impacts of climate change.

The overall objective of the EAC treaty regarding cooperation in agriculture and rural development is the achievement of food security and rational agricultural production.³² Furthermore, the EAC-ARDP aims at attaining food security through increased agricultural production, processing, storage and marketing.

The EAC treaty obliges the partner states to take into account related issues. Article 105 of the treaty for the establishment of the EAC obligates partner states to cooperate in the agriculture sector, to achieve food security and rational agricultural production including crops, livestock and fisheries within the technology development and demand-driven studies, especially for climate change adaptation. To further show commitment at the regional level, the EAC Heads of State in their declaration of the 12th summit on food security and climate change endorsed the establishment of the EAC climate change fund to specifically support adaptation and mitigation activities, including supporting research institutions of excellence in the area of technical cooperation.

Translating the regional policies in line with national policies in the EAC is crucial. In this light, Rwanda as part of the EAC is committed to these shared commitments. Though much is yet to be done with regards to the policy framework, both the required political will and policy understanding are present.

3.4 Enhancing Trade-Food Security-Climate Change Linkages

Like elsewhere in the EAC, climate change in Rwanda is altering agricultural and trade patterns by increasing the intensity and frequency of extreme weather events. This might cause food insecurity and eventually additional large scale hunger in the country. Harnessing the potential of trade and putting in place appropriate policies to ensure affordable food is very crucial. In this

light, there is an urgent need to develop an understanding of how climate change, food security, and trade interact and build the capacity of all relevant stakeholders to develop and implement appropriate holistic responses.

Climate change is anticipated to increase incidence of food insecurity around the world, but trade has the potential to help counteract this effect by delivering agricultural goods to areas experiencing a decline in productivity. Climate change is expected to increase the likelihood of extreme weather effects and contribute to long term changes in temperature and precipitation. It can also reduce the fertility and productivity of soils due to erosion and degradation. Pests and plant diseases may also become more present as the temperature increases.

Given agriculture's reliance on the weather and rainfall, the agricultural sector will be seriously impacted by climate change. The sector is also a significant contributor of green house gases and will need to play a role in mitigating climate change. At the same time, due to increased demands by population growth in developing countries, the sector will require more than double of agricultural production by 2050.³³

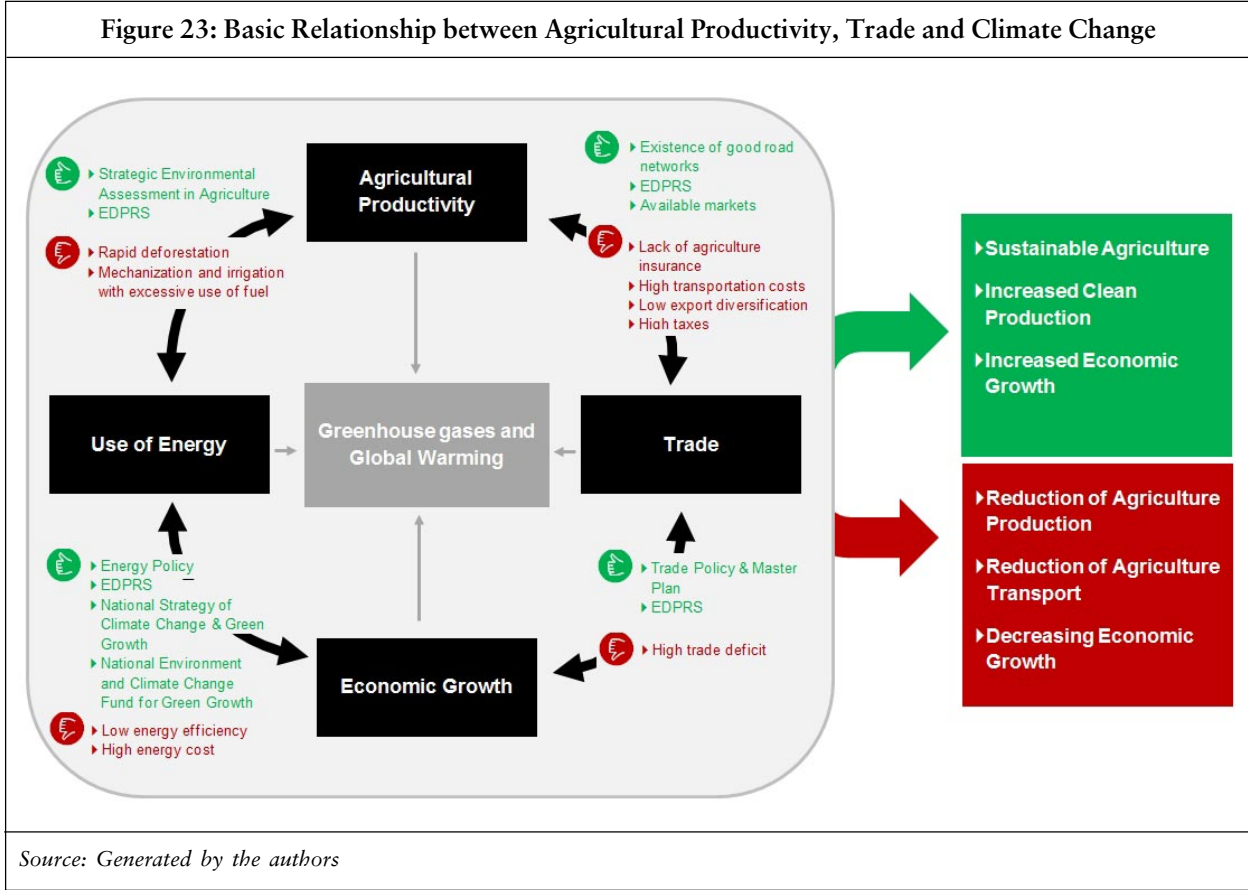
Given these challenges, global food security requires substantial investments in competitiveness, resilience and adaptation efforts directed towards the agricultural sector. Emphasis must be placed on strengthening adaptive capacities in developing countries, with an eye towards promoting socio-economic development and food security.

In its notable reports and publications on these issues, the International Centre for Trade and Sustainable Development (ICTSD) has recommended to policy makers and emphasised that an open and equitable agricultural trade system is necessary to address both climate change and food security concerns.

During the interviews conducted between 26 July to 1 August 2012, respondents provided their view and understanding of linkages between

trade, food security and climate change. According to the respondents, the related policies and regulatory frameworks or lead institutions are mainly focusing on supporting agricultural cooperatives and community based organisations on one hand, and to build capacity and promote farmers interested in developing business on the other hand. Enhancing agricultural productivity, reforestation and erosion control were highlighted as activities or programmes which could better address the mitigation of the effects of climate change on food security and enhance trade.

Figure 23 shows the basic relationship between agricultural productivity, trade and climate change and how they interact on energy use and economic growth. This figure shows positive and negative factors that affect this relationship, leading to the conclusion that there is need for model shifting. A shift that will rely more on sustainable agricultural practices, clean production and energy generation and increase economic growth that would allow reinvestment in the internalisation of environmental cost, address food security concerns and reduce poverty.



Chapter 4

The Way Forward

4.1 Conclusion

According to the UN reports and related literature, climate change will impact agricultural production and productivity around the world and the agricultural sector will have to adapt if countries hope to achieve global food security. Indeed, food security features prominently in the UNFCCC (2012), which calls for stabilisation of GHG concentrations in the atmosphere to be ‘achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner’ (UNFCCC, 2012).

Agriculture, which is a significant emitter of GHG emissions, can play an important role in climate change mitigation, but it is not yet clear how the sector will be included in a new international climate change regime. The trade of food and agricultural products can contribute to both climate change adaptation and mitigation, and trade measures will most likely be used by policy makers to encourage mitigation. It has been argued that in this context of climate change and agriculture, it is imperative to identify and implement both correct international climate change and agricultural trade rules.

An undistorted trading system will level the international playing field and facilitate increased investment in the agricultural sectors, many of which have suffered from decades of neglect. Increased trade opportunities for poor countries still heavily depend on their agricultural sectors, hence increased economic growth.

To emphasise the important role of trade, the World Trade Organisation (WTO) Director-General, Pascal Lamy, has rightly called for an international consensus on the relationship between international trade and climate change rules, without which, disparate national actions are unlikely to meet their objectives- in either the climate change or the trade arena. However, there are additional issues to consider with regard to agricultural products, since there is a separate WTO agreement on agriculture. In particular, questions are likely to arise on how payments made to encourage agricultural producers to mitigate or adapt to climate change are to be classified. Will these fit into the ‘green box’ category of minimally or non-trade distorting support? What if they emanate from private markets established under cap-and-trade regimes?

All in all, it is important to note that the agricultural sector faces significant challenges including climate change and the need to double agricultural production by the year 2050. Given these challenges, policy coherence between international climate change and trade rules is vital.

4.2 Recommendations

4.2.1 National Level

At a policy level, there is a need to integrate food security, nutrition and disaster management programmes with the national poverty reduction programme to create a vulnerability reduction strategy.

The analysis of the 2009 Comprehensive Food Security and Vulnerability Analysis (CFSVA) and nutrition survey data indicate links between four components that need to be addressed with a broad multi-sector approach that is investment in infrastructure, agricultural productivity and diversity, and service sector, especially education and health.

Shift in agricultural practices needs also to be a central part of a future strategy. As mentioned in this report, organic agriculture practices, use of organic inputs, availability of resilient seeds and plants, crops shifting and terrace agriculture can contribute to reduction of the impact on soil and improve the resilience of the agricultural sector.

Additional investment in agriculture infrastructure (irrigation and stock facilities), water management (for harvesting and drainage), road infrastructure maintenance, hedge risk schemes and insurance, and the introduction of climate change readiness systems will reduce impact of climate change over food security and trade.

Innovation and dissemination of new technologies will be important for both adaptation and mitigation. Public as well as private research will be required to ensure that this can take place, especially given developing countries' limited capacity to fund new research in this area. At the same time, existing tools and knowledge can already be employed and should be encouraged via concerted extension services. An improved policy framework is required to provide incentives for mitigation in the agricultural sector, in particular for developing countries where agricultural GHG emissions are the highest.

4.2.2 National Stakeholders

The national stakeholders include government policy makers, private sector, farmers, development partners and civil society organisations among others. The national stakeholders in their respective mandate have a crucial role to play with regard to ensuring appropriate policies and their implementation.

In this respect, the following should be attended to by the national stakeholders:

- Adopting the widespread use of appropriate green energy technology;
- Improved and more sustainable farming methods;
- Enhance education on sustainable agriculture;
- Explore potential synergies between organic agriculture and climate change friendly practices;
- Introduce plants and animal species that are resilient to water scarcity;
- Expand and maintain agriculture, water management and road infrastructure;
- Implementing EAC summit decisions on agriculture, i.e. 10 percent budget allocation;
- Introduce clean energy sources in agro-processing plants;
- Facilitate cross border trade of food stuff in a timely manner, especially perishables;
- Improve the supply chain and storage facilities;
- Encourage mechanisation and adoption of modern methods of farming; and
- Enhance public private dialogue to find solutions including mitigation measures.

4.2.3 EAC Secretariat

Currently, there is no regional policy at the EAC level that addresses the linkages between trade, climate change, and food security in an inclusive manner. This kind of regional policy is very important as it could assist stakeholders in terms of policy guidance and be seen as a coordination tool.

In this respect and in an effort to build an inclusive understanding and eventually formulate the relevant policies, the EAC Secretariat should coordinate the partner states in addressing the following key issues, among others:

- Improve the understanding of climate change, food security, and trade linkages among stakeholders to enable holistic policy responses at the national and regional levels;
- Build multi-stakeholder networks to facilitate development and implementation

of holistic policy responses in consultation and collaboration with the relevant stakeholders within the partner states and the region;

- Develop the capacity of stakeholders to devise and implement holistic policies in the context of relevant international trade and climate change regimes;
- Enable the integration of regional agro-processing business and coordinate the use of agricultural surpluses;
- Facilitate and support the partner states to implement the relevant Summits' decisions that have been passed;
- Prepare a list of agricultural inputs and environmental goods and services of interest for EAC countries whose trade needs to be facilitated/liberalised at the regional and multilateral level;
- Make use of flexibilities and seize investment opportunities derived from the CDM for agricultural and land use and forestry projects; and
- Create a unit to coordinate responses to significant climate change events that can affect the population, food security and infrastructure.

- The development of carbon footprint research in Rwanda, targeting the level of the GHG emitted for agricultural products in the market.

4.3 Areas for Further Research

Future studies should be oriented towards the sector research that addresses trade development for adaptation and resilience on the identified country vulnerabilities caused by climate change. They are:

- Agriculture technology that addresses climate change issues like promotion of irrigation infrastructure in eastern Rwanda, flood management and erosion control in the north, western and southern Rwanda and mitigation of GHG emission;
- Explore the impact of climate change over key export agricultural products, such as coffee, tea and horticulture and propose mitigation and adaptation measures;
- Research on the development of small and medium enterprises for the development of off-farm employment; and

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Glossary

Policy: The word “policy” is not a tightly defined concept but a highly flexible one, used in different ways on different occasions. Webster’s dictionary has a number of closely related definitions. They are:

- A definite course or method of action selected (by government, institution, group or individual) from among alternatives and in the light of given conditions to guide and, usually, to determine present and future decisions;
- A specific decision or set of decisions designed to carry out such a course of action;
- Such a specific decision or set of decisions together with the related actions designed to implement them;
- A projected programme consisting of desired objectives and the means to achieve them; and
- In Rwanda, all government policies are channelled through (i) Rwanda Vision 2020 and (ii) Rwanda Economic Development and Poverty Reduction Strategy.

Trade: Trade usually refers to the sale and distribution of goods and services across international borders. There are many different ways of doing this, but there must be a commercial element for transaction to qualify as trade.

In most countries, it represents a significant part of Gross Domestic Product (GDP). While international trade has been present throughout much of history, its economic, social, and political importance has increased in recent centuries, mainly because of industrialisation, advanced transportation, globalisation, multinational corporations and outsourcing expertise or technology. In fact, it is probably the increasing prevalence of international trade that is usually meant by the term “globalisation”.

Food Security: Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.³⁴ In this light, the World Food Summit of 1996 defined food security as existing ‘when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life.’ Commonly, the concept of food security is defined as including both physical and economic access to food that meets people’s dietary needs as well as their food preferences.

The UK Department for International Development (1999) defined food security as an outcome of the livelihood strategies adopted by a household. It includes activities required for a means of living. The livelihood strategies are based upon the assets or capital available to the household, which include its human, social, natural, physical and financial resources. A livelihood strategy is sustainable when ‘it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.’

Climate Change: Recent testimony on climate change in Rwanda indicates that:

- Temperature increased with a high frequency of warm days exceeding 30 °C, this is likely to increase malaria and other diseases related to warm weather;
- The number of annual rainy days decreased and this is likely to impact negatively on agricultural productivity as crops require a given quantity of water within the given number of days;
- At the same time, the frequency and intensity of rainfall increased with daily rainfall quantity sometimes exceeding the total monthly rainfall, this leads to floods and soil erosion; and
- The number of dry spells during the rainy season increased affecting the performance of crops.

In most cases, the country is experiencing late onset of rainfall and/or early rainfall cessation during rainy season and this is adversely affecting agriculture productivity.

Mitigation: The Rwanda Second National Communication³⁵ related to the climate change plan identifies two most polluting sectors, which are: agriculture with 78 percent of total aggregated emissions (3,909; 9 equivalent CO₂ in Gigagram (Gg CO₂eq)) followed by energy with 17.8 percent (891,3 Gg CO₂eq). This report recommends mitigation interventions. By undertaking mitigation interventions, Rwanda will be contributing towards the achievement of article 2 of the United Nations Conference on Climate Change (UNFCCC)³⁶ established in 1992. It will also benefit through cleaner energy, energy saving, and reforestation.

Adaptation: With topographic features of mountains and hills, Rwanda known as the ‘Country of One Thousand Hills’ has a young, high density and growing population distributed in all eco-regions including areas vulnerable to extreme climatic events such as floods and droughts. Adapting to or coping with climate change is of utmost importance in order to ensure that socioeconomic and environmental systems can function and develop. Adaptation is crucial because climate change is already observed in Rwanda after 1990s and will continue to occur regardless of future greenhouse gas emissions reduction measures.

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31. Ibid
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33. FAO: 'Global agriculture toward 2050', Rome, 2009.
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36. To achieve, in accordance with the relevant provisions of the convention, stabilisation of greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a timeframe sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

Appendix 1

Questionnaire

Guidelines for Key Informants

Identification of respondent

1. Name of the respondent (*optional*) _____
 - a) Contact:
 - b) Designation/Occupation:
 - c) Organisation/Institution:
 - d) Age:
 - e) Sex: Male: Female:
 - f) Intellectual levels : Primary Secondary University
 - g) Province/District/Sector:

Part I: Climate Change

1. What is your understanding of climate change (pick max 2)?
 - a) Frequent drought and dry spells; b) Flooding due to heavy rainfall; c) Poor crop yields ; d) Decrease of the forest cover with population growth; Others (Specify)
2. What do you think causes climate change (pick max 2)?
 - a) Cuttings trees with the growth of population b) Green house gases emission in atmosphere from human activities in different sectors c) Water and air pollution d) Others (specify)
3. What effects of climate change have you observed in the past 5 years?
(1= High; 2= Moderate; 3= Low)?

Consequences of Climate Change	1	2	3
a) Erratic floods (including flash floods)			
b) Drought and dry spells			
c) Spread of diseases			
d) Migration of humans and animals			
e) Changes in bio-diversity- Fauna and Flora			
f) Others			

4. How do you think climate change is affecting or is going to affect the country via the following avenues?

Food Security

- a) Frequent and long dry spells b) Flooded rice schemes c) Erosion and huge losses of arable land
d) Increase crop yields gaps and animals losses e) Increases prices of food crops f) Others (specify)

Trade

- a) Increase of green house gases emission (from the increased economic activity resulting from free trade and transportation services)
b) Improve mitigation and adaptation to CC (increase the availability of goods, services and technology for improving energy efficiency)
c) Profit led food availability and access (producers, dealers and suppliers of food commodities are motivated by profit making to stay in business)
d) Other (Specify)

5. What do you think need to be done to reduce the effects of climate change?

- a) Plant trees b) Promote irrigated agriculture in drought prone areas c) Promote technologies less emitting in agriculture, energy and transport sectors d) Intensify agriculture e) Promote erosion control activities f) Others (specify)

6. Who do you think should have the main responsibility for tackling climate change? (Please tick only one) a) International organisations (like the UN) b) National government local government c) Businesses and industries d) Non-governmental organisations e) The general public f) Others (Specify)

7. In your opinion, to what extent are the following sectors affected by climate change? Key: 1 = Least, 2 = Little, 3 = Moderate, 4 = Great, and 5 = Very Great.

Economic Sectors	1	2	3	4	5
i) Agriculture					
ii) Fisheries					
iii) Forestry					
iv) Tourism					
v) Trade					
vi) Food manufacturing industry					
vii) Others (specify)					

8. To what extent do you think the country is actively involved in international efforts and initiatives related to climate change? Key: 1= Least, 2= Little, 3= Moderate, 4= Great, and 5= Very Great.

Economic Sectors	1	2	3	4	5
i) The Kyoto Protocol					
ii) United Nations Framework Convention on Climate Change (UNFCCC)					
iii) Emission trading systems					
iv) National platforms					
v) International strategy for disaster reduction					
vi) Trade					
vii) Food manufacturing industry					
viii) Others (specify)					

9. In your opinion, what are the challenges/gaps faced with respect to addressing the impact of climate change in your sector?

Name of sector _____

Issue	Challenges and Gaps	Proposed Solutions
Policy and legal		
Institutional		
Technological capacity		
Human resource capacity		
Financial resources/Funding		

PART II: THE LINKAGES: CLIMATE CHANGE, FOOD SECURITY AND TRADE

2A: LINKAGES BETWEEN CLIMATE CHANGE FOOD SECURITIES

1. What is your organisation's mandate with respect to the following (tick as may be appropriate for you)
 - a. Food security and climate change?
 - b. Trade and food security?
 - c. Climate change and trade?

2. What are your policies and regulatory frameworks and what is the role of your organisation, with respect to the above mentioned issues?

3. What activities/programmes is your organisation carrying out to mitigate the effects of climate change on food security and/or trade?

4. What is the source of funding for the above activities?

5. Is there sufficient funding for the above-mentioned programmes/activities?

6. In your opinion, what are the gaps/challenges faced to the above mentioned issues?

Issue	Challenges and Gaps	Proposed Solutions
Policy and legal		
Institutional		
Technological capacity		
Human resource capacity		
Financial resources/Funding		

7. In your opinion what legal, regulatory or policy measures need to be put in place with regards to the above issues?

8. Conclusion? Recommendations? Are there any relevant documents you have that we can refer to?

2B: LINKAGES BETWEEN CLIMATE CHANGE AND TRADE

Sectors

- a) Tourism
- b) Livestock
- c) Horticulture
- d) Crop
- e) Coffee/tea
- f) Other (specify):

1. Which one of the sectors above does your organisation deal in?

2. What is your organisation's mandate with respect to climate change and/or trade?

3. Do you agree/disagree that climate change has had an impact on the sector?

4. In what ways do you think climate change has affected the sector?

5. What impact trends have you observed in your sector that is related to climate change?

6. What measures has your organisation taken to deal with the above impacts of climate change?

7. What are the cost implications of implementing these measures? What are the sources of funding?

8. Does your organisation/institution have enough resources to implement these measures?

9. What successes have you had in tackling the issues?

10. In your opinion, what are the challenges/gaps faced with respect to addressing the impact of climate change in your sector?

Issue	Challenges and Gaps	Proposed Solutions
Policy and Legal		
Institutional		
Technological capacity		
Human resource capacity		
Financial resources/Funding		

List of respondents/institutions

1. **Eugene Rwibasira**
Executive Secretary
Rwanda Development Organisation (RDO)
Tel: +250788301740
rwibasirae@yahoo.com
2. **Innocent Benineza**
DUHAMIC ADRI
Executive Secretary
E-mail: duhamic@rwanda1.com
3. **Musabimana Patrice**
Head of FoodSecurity Department
ARDI (Association Rwandaise pour développement intégré)
Southern province
Rwanda
Tel: +250788612242
4. **Semakuza Aloys**
Coordinator
BAIR (Bureau d'appui aux initiatives Rurales)
Kigali Rwanda
Tel: +250788414527
5. **Nizeyimana Eric**
Enterprise URWIBUTSO – NYIRANGARAMA
Northern province-Rulindo
Tel +250785820638
Email:nizeric8@yahoo.fr
6. **Rwanda Farmers chamber**
Private Sector Federation
7. **Alexis Kabayiza**
Tel. 0788403472
Email: akabayiza@gmail.com
Private researcher/lecturer at National university of Rwanda
8. **Emmanuel Nshimiyimana**
Kigali city, Kicukiro, Kagarama
P.O. Box 4632
9. **Kantarama Cesarie**
Farmer
East African farmer Federation
Southern province
Muhanga
10. **National Agriculture Export Board (NAEB)**
Horticulture Production support officer
Tel: 250788612631
11. **Rwanda Farmers federation**
Executive Secretary
Tel +250788423047
Email: gafarangajo@yahoo.fr
Northern province, Musanze
12. **Plateforme de la societe civile**
Kigali, Gasabo, Kacyiru
13. **Richard Munyerango**
Managing Director
Gako organic farming Centre
Tel: +250788306668
Email: gaftc2008@yahoo.com

Appendix 2

Rwanda CDM project information/ as per September 2012

No.	Project Name	Project Participants	Expected carbon credits, CERs (tCO ₂ e/year)	Project Summary
1.	Nuru design lighting programme	NURU East Africa	Depends on roll out plan/each sold lamp will reduce 0.5 tonnes per year	Replacement of fossil fuel (kerosene) by a LED lights charged by a stationary bicycle. The project scope is the whole country with a target on rural communities. The project started with Bugesera district.
2.	Improved cook stove programme for Rwanda	Atmosfair GmbH	60,771	This project is commonly known as SAVE80 cook stove, a state of the art technology for efficient stove. It is a portable stove made of stainless steel, developed and prefabricated by a German manufacturer and assembled locally by Energie Domestique Ltd (ENEDOM) to create employment.
3.	Efficient cook stove programme for Rwanda(PoA)	CO ₂ Balance UK Ltd	3 tonnes CO ₂ e/ stove/year	Distribution of efficient cook stoves. It is a PoA.
4.	Standard bank efficient lighting programme of activities –Botswana, Kenya, Nigeria, Rwanda, South Africa, Uganda and Zimbabwe	Standard Bank of South Africa	Unknown	The project intends to propose efficient light system to big office buildings and commercial buildings (use of economic lamps monitored by an automated installation).
5.	Project to replace fossil fuel based lighting with solar LED lamps in East Africa (programme of activities)	Tough Staff Stuff International, Ltd	0.08Tco ₂ e per lamp (maximum not exceed 60,000tco ₂ per year)	The project is aiming at replacing fossil fuel based lighting with solar LED lamps
6.	Programme of activities of heat retention cookers for LDCs	Natural Balance International Ltd	28,512 tco ₂ /year	The project aims to establish a regular use of Heat Retention Cookers (HRCs), with the trade name Wonderbag.
7.	Improved cook stove for East Africa(PoA)	Uganda Carbon Bureau	Unknown	It is a CDM PoA whose objective is to disseminate improved cook stove across East Africa.

Contd...

No.	Project Name	Project Participants	Expected carbon credits, CERs (tCO ₂ e/year)	Project Summary
8.	Paradigm Rwanda healthy cook stoves and water treatment project	The Paradigm project	Average of 40,000 tco ₂ /year	The paradigm project intends to promote the sale of improved energy saving wood stoves, charcoal stoves and water treatment devices. (The implementing entity in Rwanda i)
9.	Share the light	Flexiway Solar Solutions Pty Ltd	Maximum 60,000 tco ₂ p/ year	The project is going to replace kerosene lamps with affordable solar powered LED lights.
10.	DelAgua Public Health Programme	DelAgua Health and Development	11,638 tco ₂ /year	Dissemination of improved cook stoves and water purification filters.
11.	Impact Carbon Safe Water Access Programme	Impact Carbon	annual average 13,895 Tco ₂ .	Dissemination of water purification filters
<i>Source: Rwanda Designated National Authority - http://www.rema.gov.rw/dna/</i>				

Appendix 3

Scenario descriptions are based on those in the IPCC Assessment Report 4

The A1 scenarios are of a more integrated world. The A1 family of scenarios is characterised by:

- Rapid economic growth.
- A global population that reaches 9 billion in 2050 and then gradually declines.
- The quick spread of new and efficient technologies.
- A convergent world-income and way of life converge between regions. Extensive social and cultural interactions worldwide.

There are subsets to the A1 family based on their technological emphasis:

- A1FI - An emphasis on fossil-fuels.
- A1B - A balanced emphasis on all energy sources.
- A1T - Emphasis on non-fossil energy sources.

The A2 scenarios are of a more divided world. The A2 family of scenarios is characterised by:

- A world of independently operating and self-reliant nations.
- Continuously increasing population.
- Regionally oriented economic development.
- Slower and more fragmented technological changes and improvements to per capita income.

The B1 scenarios are of a world more integrated and ecologically friendly. B1 scenarios are characterised by:

- Rapid economic growth as in A1, but with rapid changes towards a service and information economy.
- Population rising to 9 billion in 2050 and then declining as in A1.
- Reductions in material intensity and the introduction of clean and resource efficient technologies.
- An emphasis on global solutions to economic, social and environmental stability.

The B2 scenarios are of a world more divided, but more ecologically friendly. The B2 scenarios are characterised by:

- Continuously increasing population, but at a slower rate than in A2.
- Emphasis on local rather than global solutions to economic, social and environmental stability.
- Intermediate levels of economic development.
- Less rapid and more fragmented technological change than in A1 and B1.

PACT EAC Project and CUTS International

In East Africa, where about 40 million people are undernourished, food security is further challenged by extreme weather conditions. In the next decades, the situation is expected to aggravate as climate change worsens in a region where as much as 80 percent of people rely on agriculture for their living. If sub-Saharan Africa is not to become the home of an additional 600 million hungry people, early action and adoption of sound and coherent policies, and harnessing the potential role of trade is a must. From October 2011 to September 2014, with funding support from the Swedish International Development Cooperation Agency (SIDA), CUTS International, Geneva and its partners in each East African Community (EAC) partner state will contribute to this process through a project entitled "Promoting Agriculture-Climate-Trade Linkages in the East African Community" (PACT EAC).

The PACT EAC project focuses on human and institutional capacity building of East African Community (EAC) stakeholders to take better advantage of trade for their food security, growth and development, particularly in the context of climate change. The two-tiered project focuses on issues related to trade-climate change-food security linkages in the EAC and on enhanced participation of the EAC WTO negotiators in the WTO discussions and negotiations in Geneva. Through research-based advocacy, training, networking and by linking grassroots with Geneva, the project is in a position to assist EAC stakeholders in better understanding and dealing with the critical challenges regarding the interlinking of the three issues.

CUTS International, Geneva, as part of the CUTS family of organisations, represents a pro-trade, pro-equity southern NGO voice in the multilateral, regional, and national processes on trade, development and related issues. It aims to contribute to the achievement of development and poverty reduction through trade in its economic, environmental, social and political dimensions. Prior to the PACT EAC project, and in collaboration with CUTS Nairobi and Lusaka offices, CUTS International, Geneva has implemented several projects in the East African Community.

<http://www.cuts-geneva.org/pactec>



CUTS
International

CUTS International, Geneva

37-39, Rue de Vermont, 1202 Geneva, Switzerland

Ph: +41.22.734.6080, Fax:+41.22.734.3914

Email: geneva@cuts.org, Web: <http://www.cuts-geneva.org>