

# Climate, Food, Trade

Where is the Policy Nexus?

## Tanzania



## 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 Tanzanian 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.

A good read about the three issue areas in Tanzania, the study also indicates that there exists a gap between country's trade and climate change policies. It also highlights that Tanzania has a potential to continue being the leading food producer in the EAC given the availability of ample fertile and climate-suited land but it needs to strengthen its comparative advantage in food production, particularly in the grain sector.

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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*Published by:*



International

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*In Partnership with:*



Economic and Social Research Foundation (ESRF), Tanzania

*Supported by:*



Swedish International Development Cooperation Agency (SIDA)

*Printed by:* Jaipur Printers Private Limited, Jaipur, India

*Cover Photos:* Theresa Carpenter, Supay Tzantza, Mohamed Somji

ISBN: 978-81-8257-179-2

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# Foreword

In Tanzania the link between climate, livelihood and food security is quite strong. Like elsewhere in East Africa, agriculture is mostly rain-fed, and is a form of livelihood for the majority of the population; therefore the negative effects of climate change manifested in the form of droughts and floods are a real threat. These often lead to sharp declines in agricultural output, reduced productivity and loss of employment. In turn, agricultural export earnings and losses associated with decline in rural income have resulted in the threat of food insecurity in the country. An example of these experiences were the La-Niña and El Niño events that were responsible for the severe droughts that occurred in most parts of Tanzania in 1996-1997 and 1997-1998.

For Tanzania to secure its economic and social well-being in the face of climate change, policy makers and all relevant stakeholders will be required to coordinate their efforts through multi-sectoral responses that create synergies between each other. This is where the CUTS International initiative on “Promoting Agriculture-Climate-Trade Linkages” makes an important contribution to Tanzania and the region as a whole.

This study effectively analyses the three critical issues of climate change, food security and trade, and draws out recommendations for the relevant stakeholders that will be useful in ensuring food security, adaptation to climate change, and sustainable policies to leverage trade in mitigating the negative impacts of climate change on food security. Moreover, the study will also be a basis for enhancing the capacity of relevant policy makers, technocrats, and other stakeholders in dealing with these issues.

This publication offers evidence-based policy recommendations supported by ground research, and will be critical in ensuring that the national and regional policies adopted are not only relevant, but also that they are implementable in synergy with other existing policies at the national and regional level.

CUTS International, Geneva must be applauded for this initiative that brings to the forefront, the linkages between climate change, food security and trade, facilitating a better understanding on how they interact from a country perspective. This knowledge will inform other processes, including negotiations in relevant forums at the regional and international level.



Joyce Mapunjo  
Permanent Secretary  
Ministry of Trade, Industry and Marketing



# 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.

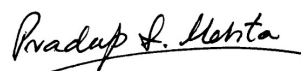
In implementing the PACT EAC project, the CUTS’ tried and tested RAN (holistic Research-Advocacy-Networking activities) model is applied. The inclusive and grassroots-linked methodology for research has facilitated sustained capacity building of stakeholders and ensured ownership of the outcomes.

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  
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# Acknowledgements

Through this acknowledgement, the research team would like to express their gratitude to all the people that have been helpful in making this research possible and worthwhile. We are thankful to the former Director Ramamurti Badrinath who initiated this project, to the current Director of CUTS International in Geneva, Rashid S. Kaukab who has provided his much appreciated guidance, and to current and former PACT EAC project management team members in Geneva, Nairobi, and Jaipur, Clement Onyango, Julian Mukiibi, Rijit Sengupta, Julien Grollier, Krista Joosep, Grace N. Muriithi, Munu M. Luther, Victor O. Ogalo, and Frederick Njehu. We are equally grateful for the direction and management provided by the Economic and Social Research Foundation (ESRF) in Tanzania.

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 Tanzania 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 Dr Abdallah Makame. 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.



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# Acronyms

ARI	Agricultural Research Institute
ASDP	Agricultural Sector Development Programme
CAMARTEC	Centre for Agricultural Mechanisation and Rural Technologies
CBD	Convention on Biological Diversity
CCIAM	Climate Change Impacts, Adaptation and Mitigation
CDM	Clean Development Mechanism
CITES	Convention on International Trade in Endangered Species
CPRC	Chronic Poverty Research Centre
CSOs	Civil Society Organisations
CSR	Corporate Social Responsibility
DNA	Designated National Authority
DoE	Department of Environment
EAC	East African Community
EADB	East African Development Bank
EIS	Environmental Impact Statements
ESRF	Economic and Social Research Foundation
FELISA	Farming for Energy, for better Livelihoods in Southern Africa
GCCA	Global Climate Change Alliance
GDP	Gross Domestic Product
HI	Herfindahl Index
ICI	International Climate Initiative
IIDS	Integrated Industrial Development Strategy
IPM	Integrated Pest Management
LDCF	Least Developed Countries Trust Fund
LGAs	Local Government Authorities
MAFC	Ministry of Agriculture, Food Security and Cooperatives
MIT	Ministry of Industry and Trade
MLFD	Ministry of Livestock and Fisheries Development
NAP	National Action Programme
NAPA	National Adaptation Programme of Action
NBF	National Biosafety Framework
NBSAP	National Biodiversity Strategy and Action Plan

NEAP	National Environmental Action Plan
NEMC	National Environmental Management Council
NRG	National Reference Group
NSGRP	National Strategy for Growth and Reduction of Poverty
PDD	Project Development Documents
POPs	Persistent Organic Pollutants
PPP	Public-Private Partnership
RCCP	Regional Climate Change Programme
REDD	Reducing Emissions from Deforestation and Forest Degradation
RGoZ	Revolutionary Government of Zanzibar
SADC	Southern African Development Community
SCCF	Special Climate Change Fund
SIDO	Small Industries Development Organisation
SUA	Sokoine University of Agriculture
TANTRADE	Tanzania Trade Development Authority
TaTEDO	Traditional Energy Development and Environment Organisation
TCCIA	Tanzania Chamber of Commerce, Industry and Agriculture
TFCG	Tanzania Forests Conservation Groups
TIRDO	Tanzania Industrial Research and Development Organisation
TMEA	Trademark East Africa
TNRF	Tanzania Natural Resources Forum
TRA	Tanzania Revenue Authority
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
URT	United Republic of Tanzania
VETA	Vocational Education and Training Authority
VPO	The Vice President's Office
WCST	Wildlife Conservation Society of Tanzania

## Chapter 1

# Introduction

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Tanzania's economy depends on the agricultural sector which provides 35 percent of the country's exports and employs approximately 75 percent of the entire country's population (United Republic of Tanzania, 2008). As a result, Tanzania highly depends on the sector for growth. However, the sector's contribution to the country's GDP is only 25.3 percent (United Republic of Tanzania, 2011). High contribution to exports and employment and lower contribution to the country's GDP is argued to be primarily because of high dependence on weather conditions by farmers. Weather conditions have proved to be changing drastically each year and as a result, affecting productivity and production in this sector. This situation is further expected to worsen, and this is a case not only for Tanzania, but also for the rest of the East African countries. As a result, low agricultural production heavily affects food security. This situation is built upon the direct interaction between agriculture (food security) and climate change conditions. With low production levels and food insecurity conditions, the agricultural sector suffers from the absence of tradable products.

The above concept builds the essence of this study which aims at filling the existing current knowledge gaps related to the linkages of three main concepts which are trade, climate change and food security, so as to promote effective policy creation in the East African countries as well as in the EAC Secretariat. In addition to this, the study aims to analyse and present the following:

- Tanzania's policy framework which is relevant to the food security-climate

change-trade linkages with their overall interactions;

- The regional and international policy framework relevant to the food security-climate change-trade linkages and their implications for Tanzania's policy framework;
- The negative and positive impacts created by climate change in agriculture and overall food security, and how these impacts can be addressed through trade; and
- The identified elements for viable solutions so as to combat climate change causing food insecurity conditions when employing trade.

### 1.1. Objectives of the Study

Specifically, the study aims at:

- Identifying the negative and positive elements of climate change that hamper or enhance food security in Tanzania;
- Identifying the negative and positive elements of trade in goods and services that hamper or enhance adaptation to climate change;
- Identifying the positive linkages where trade can minimise the negative impacts of climate change on food security;
- Analysing interactions of food security-climate change-trade policies currently in place in the EAC countries and to help further develop and implement relevant short and long-term policies by the EAC Secretariat;
- Increasing the current understanding and capacity of a wide spectrum of stakeholders

on food security-climate change-trade linkages; and

- Suggesting policy recommendations that help adapt and mitigate climate change induced challenges (in the context of food security conditions) through trade.

## 1.2. Methodology

The study has applied an inclusive and outcome-based methodology in gathering information and in analysing the linkages on food security, climate change and trade issues within Tanzania and at the regional level. Both secondary and primary data have been employed in coming up with the draft; whereas:

Primary data has been collected through interactions and critical involvement of identified relevant stakeholders who are in the country's National Reference Group (NRG). These stakeholders represent all relevant sectors such as the Ministry of Industry and Trade (MIT); Ministry of Agriculture, Food Security and Cooperatives (MAFSC); Ministry of East African Cooperation (MEAC); Ministry of Water (MoW); Ministry of Foreign Affairs and Inter-cooperation (MFAIC); The Vice President's Office Department of Environment (VPO-DoE) which is the United Nations Framework Convention on Climate Change (UNFCCC) national focal point; Tanzania Meteorological Agency (TMA); Tanzania Chamber of Commerce, Industry and Agriculture (TCCIA); East African Development Bank (EADB); Tanzania Trade Development Authority (TANTRADE); development partners such as the World Bank, United Nation Development Programme (UNDP) and OXFAM; as well as local unions for traders and the media. Annex 1 gives an overview of the economic, social and trade profile of all stakeholders with reference to climate change and food security.

In addition, policy documents, strategy documents as well as the action plan documents on food security, trade and climate change have been revised. Other reports include: Agriculture and Rural Development Policy for the East African Community; Agriculture and Rural

Development Strategy for the East African Community (EAC); East African Community (EAC) Food Security Action Plan (2011–2015); EAC Industrialisation Policy and Strategy (which is in the final stages); and the Customs Union Protocol and Common Market Protocol.

Also important to mention are the Tanzania national policy frameworks such as Small and Medium Enterprise Development Policy–2002; and The Comprehensive Africa Agriculture Development Programme CAADP in Tanzania: Brochure No. 1. Other reports by different scholars have as well been referred to so as to address some of the identified gaps, while coming up with an effective framework to be adopted to effectively address the missing linkages between food security, climate change and trade.

In the second phase of the study, the research team included the primary data which was obtained through interviewing a set of stakeholders, as well as through a set of questionnaires to relevant identified stakeholders.<sup>1</sup> This was done as per the study requirement.

## Chapter 2

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

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### 2.1. Climate Change

The climate in Tanzania is predominantly tropical, with bi-modal and uni-modal rainfall patterns (United Republic of Tanzania, 2004). Bi modal rainfall is experienced in the Lake Zone regions (Kagera, Kigoma, Mwanza) northern highlands regions (Kilimanjaro, Arusha, Manyara) and north-eastern coastal regions (Tanga, Morogoro). Long rains begin from March to May and on average rainfall ranges between 300 mm and 600 mm. The short rains occur during September to December and range between 200 mm and 500 mm. Uni-modal areas receive rains from November to April, ranging between 500 mm and 1,000 mm and cover most of the country (central regions of Dodoma and Singida; southern regions of Lindi and Mtwara; south western regions of Iringa, Mbeya, Ruvuma and Rukwa; and western regions of Tabora, Shinyanga and Kigoma).

#### 2.1.1 Causes and Effects of Climate Change in Tanzania

##### a) Causes

According to the Intergovernmental Panel on Climate Change (IPCC 2011), climate change is caused by emissions of greenhouse gases, mainly carbon dioxide, methane, and nitrogen oxides, from anthropogenic sources including agriculture, energy, transport, and industrial sectors. Natural systems known to contribute to atmospheric greenhouse gases include volcanic eruptions, earthquakes, and cosmic processes. Other factors include ocean currents, earth orbital changes and solar variations.

The predicted potential long term uncertainties and impacts of climate change in Tanzania are as follows:

- Changes in air and ocean currents for example La-Niña and El Niño events that were responsible for the severe droughts that occurred in most parts of Tanzania in 1996-1997 and 1997-1998;
- Declining levels of fresh water resources for human and animal consumption, agriculture and livestock development and industrial activities;
- Declining crop yields and increasing food insecurity;
- Increased spreading of pests and diseases among livestock, wildlife and crops through climate sensitive vector and water borne diseases such as dysentery, bilharzias, cholera and typhoid in areas where they were unknown affecting human health;
- Invasion of invasive species. Plant pests, malaria and rift valley fever are spreading to various areas because of rise in average ambient temperatures;
- Increased salinity that is already observed in various coastal agro-ecological zones;
- Rising sea levels and submerging of low lying coastal islands;
- Coral bleaching;
- Enhanced human and species migration leading to displacement of people and disruption of ecosystems and other important natural habitats;
- Natural resource based conflict amongst communities due to declined water and

pastures for example in Mbeya and other regions; and

- Potential mass extinction of certain species in fragile ecosystems.

Nonetheless, climate change presents some opportunities including an opportunity for agricultural, processing and manufacturing industries to transition from existing technologies to new efficient technologies. There is also the opportunity for the flow of investment from developed countries to Tanzania. Existing industries also get the opportunity to promote capacity building to ensure that they are able to survive the challenges of climate change. Other positive impacts under climate change are, for example, that the production of crops such as coffee and cotton is projected to increase with temperature. The implication for adaptation therefore may be to not only cushion adverse impacts, but also to harness positive opportunities.

#### *b) Negative and Positive Impacts of Climate Change*

In the last four decades, climate change has become an overriding development challenge especially in the northern and central semi-arid areas of Tanzania (Bamwenda, 2008). Considering the impacts that climate change poses to livelihoods, agricultural, socio-economic growth, and policy choices for development, climate change has become a major topic on the national agenda. The citizens are concerned that challenges associated with climate change cut across all development efforts put forth by the communities and the government. This may threaten the achievement of national development initiatives such as the NSGRP I & II (famously known as MKUKUTA I & II); Millennium Development Goals; Vision 2025; and most specifically the initiatives, strategies, and plans related to eliminating food and nutrition insecurity, poverty, and promoting sustainable development such as the Tanzania's Five Year Development Plan 2011-2012 to 2015-2016; and Long Term Perspective Plan 2011-2012 to 2025-2026.

Currently, there is an ongoing debate across the spectrum of the Tanzanian society (scientists, policymakers and the general public) on the degree of climate change impacts, how they relate to poverty, and measures that may be appropriate for mitigation and adaptation to the changing climate. In principle, most citizens agree that people must acquire understanding of climate change and be prepared to live in a climatic environment that may be more erratic than the present.

At the regional level, severe droughts, floods and indeed extreme weather events associated with climatic variability phenomenon of El Niño Southern Oscillation (ENSO) are occurring with greater frequency and intensity. This is worsening the state of food security and threatening all the other drivers of economic development. Since these effects are trans-boundary, efforts are being made to develop integrated, harmonised, multi-sectoral, and collective measures for responding to climate change developments in the region and to harness any potential opportunities posed by climate change within the principle of sustainable development. In this regard, a collective East African Climate Change Policy has been developed.

Evidence from the field survey reveals that indeed climate change has resulted into not only a notable negative, but also positive change. For example, about twenty five years in the past, the temperature in Njombe region would reach 10<sup>0</sup> C and below. Most of the tropical borne insects, bacteria and diseases were not familiar. Diseases like malaria were not common. Today, the temperature in Njombe district is completely different. Temperatures are very high compared to the temperature levels people used to experience 20-25 years in the past. The outcome of changing climate in Njombe is diverse because both positive as well as negative consequences are evident. On the positive side, a number of new crops which respond better to tropical weather such as watermelon, pineapples, flowers, mangoes and avocados are now produced in large quantities. This is a new source

Figure 1: The Environment During Dry Season



of income to farmers which has a positive implication to food security in Njombe and the country as a whole.

Malaria transmission in the cool highlands is controlled by climatic conditions. Cold weather slows and even stops parasite development in mosquitoes, whereas unusually warm weather accelerates parasite development in mosquitoes. Heavy rainfall creates mosquito breeding habitats that increase the number of adult mosquitoes leading to increased transmission. Warm conditions followed by heavy rainfall are highly predictive of malaria epidemics where no malaria control conditions are in place.

Climate change has completely altered the weather and climate patterns, particularly rainfall intensity, rainfall distribution, temperature and humidity to the extent of increasing mosquitoes breeding and therefore malaria transmission and epidemics. Unlike in the past, mosquitoes have gradually been breeding in the uplands where malaria is subsequently a common disease.

About 80 percent of the population of Njombe lives in the highlands between 1,600 and 2,700 metres above the sea level, where malaria epidemic is a climate-related emerging hazard that urgently calls for measures to reduce its negative health impacts. In Njombe, malaria is currently accounting for higher proportion of outpatient attendance and admissions to health facilities, and is among the top threatening causes of death in children under five.

In addition, among the observed effects of climate change in the central part of Tanzania (Dodoma region), according to all respondents interviewed, unpredictable/irregular patterns of rainfall were viewed as one of the major effects. This situation has actually been occurring for the past ten years. This has made it impossible for farmers to harvest enough quantity of crops as rains come late during the seasons, last for very few weeks and stop. In this case, these rains leave crops half grown and once the long dry season sets in, these crops dry out. As a protection against erratic rainfall and inaccurate predictions, villagers look at a certain tree known in their native language as *Mgani* once the tree starts blooming with flowers and they become green they know the rains are about to come. These trees are strictly prohibited to be cut by any person. Drought is also a very serious effect to most of the people both in urban and rural areas. In many cases, people in Dodoma depend on food support from the government.

Drought has occurred eight times in the area since 2000. Figure 1 shows the real situation during drought and/or dry season. All the trees dry up, yet community members continue harvesting firewood.

In Arusha, declining immunity of livestock and contraction of diseases from wildlife to cattle for example from wild beast in the Komoloniki forest reserve to cattle in the neighbouring Monduli homesteads is another common concern related to climate change. In addition, climate

change impacts many others. One interesting example is businesses are stricken by impacts of climate change such that retail selling of sugar is no longer by kilogrammes but by spoons in Ngarashi chini village in Monduli. On the other hand, businesses are struck positively when new opportunities of buying commodities at extremely low prices occur, like buying cattle during drought seasons.

Most small to medium enterprises do not see a direct link between their businesses and climate change, at least not in the short term. The major challenge facing the private sector is the inadequate financial position of private entities, which makes it difficult to implement programmes, strategies, action plans such as NAPA, or to procure new technologies, and to introduce new practices to respond to the new demands of climate change. The on-going economic downturn has also affected the financial base of the public budget and industries, thereby weakening their ability to contribute meaningfully to solving problems associated with climate change.

The business environment in Tanzania is yet to be optimal, and this sometimes makes it relatively expensive to work within. This takes away much of the profits that should have accrued to industries to place them in a better position to help in the mitigation measures against climate change, for example to reduce the potential future supply side constraints resulting from the climate change such as drought and floods caused by weather volatility, and to introduce eco-balance environmental accounting, environmental priority strategies (EPS) for product design, cleaner production, and environmental eco-labelling.

Furthermore, globalisation and competition have also affected the financial basis of local industries thereby reducing their revenue streams and preventing their expansion, ability to adopt modern technology, and to exercise their corporate responsibility through investment in environmental projects (CSR).

Most large scale industries are aware that they must adopt new technology to comply with government's environmental regulations and NAPA guidelines in order to survive. However, new technology costs money, and if the cost of new technology consumes their profits, their survival will also be threatened.

### 2.1.2 The National Policy Framework of Climate Change

Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). It is distinct from natural climate variability in that it exists because of human activities that have altered the composition of the earth's atmosphere. Climate change can lead to things such as desertification, more intense storms, and rising sea levels, changing the physical face of the earth and the pattern of our everyday lives. In view of the above, Tanzania government and communities are reviewing or formulating new climate change related policies, laws, regulations, strategies, and programmes to cope with and address existing and future climate change effects in specific socio-economic areas.

Tanzania does not have a climate change policy. Nonetheless, climate change issues are included in sectoral policies and strategies in environment, water, land, forestry, energy, transport, agriculture, livestock, fisheries, health, and disaster risk management, among others. Most of these policies do not explicitly mention climate change, but they comprise various coping strategies and mitigation and adaptation measures for given sectors. The following are examples of selected policies and initiatives:

#### *a) The National Environmental Policy (1997)*

The objectives of the policy include ensuring sustainability, security and equitable use of resources to meet the basic needs of the present and future generations without degrading the environment or risking health or safety. It also focuses on prevention of degradation of land, water, vegetation and air, which are important constituents of life. Furthermore, it underscores



the need for promotion and application of environmentally friendly processing technologies, such as recycling, re-use and safe waste disposal. The policy highlights the need for conservation and enhancement of biological diversity of unique ecosystems of Tanzania, improvement of the conditions and productivity of degraded areas in both urban and rural settlements, raising awareness about the relationship between environment and development, and promoting individual and community participation in environmental action.

The policy provides a framework for formulation of plans, programmes and guidelines for the climate change related mitigation and adaptation strategies, such as industries to look for new cleaner raw materials and technologies and enhancement in eco-efficiency of processes that will reduce emissions.

#### *b) National Forest Policy (1998)*

The Forest Policy provides a framework for management of the country's 33 million ha of forests and woodlands for sustainable and progressive development and prevention of deforestation through encroachment and over utilisation of forest reserves. This includes clearing for human settlements and agriculture expansion, overgrazing, uncontrolled wildfires, charcoal and fuel wood production, shifting cultivation and illegal logging that consume about 130,000 ha to 500,000 ha per annum (Kaoneka, 1990). The other key policy areas that are important for climate change mitigation and adaptation are conservation of the country's ecosystem and biological diversity (tree planting initiatives), water catchments and soil fertility conservation.

Recently, the policy has had some success stories through the Participatory Forest Management (PFM).<sup>2</sup> Implementation of PFM in some districts of Tanzania has resulted in the following benefits: decreased illegal harvesting of forest resources, encroachment, fire incidences, and decreased unregulated activities such as charcoal burning and timber harvesting. Other benefits are improved biodiversity, increased number of species (both flora and fauna), increased stocking,

increased area of forest reserves by 2.05 million hectares and improved water flow from water sources or streams (Hamza and Kimwer, 2007).

#### *c) The Tanzania Agriculture and Livestock Policy (1997) under review to National Agricultural Policy (2012)*

It provides the policy direction for agricultural development. The ultimate goal of the policy is promoting increased production and productivity of agricultural produce, agro-processing, raise agro-exports and increase farmer incomes, in order to promote food security so as to accelerate the attainment of national development goals and initiatives. The focus of the policy is to modernise and commercialise agriculture, facilitate input and output supply chains, provide support and capacity building to develop national crop production and marketing chains, making market systems work better for the welfare of rural producers, and to facilitate wealth creation.

A climate related strong focus is put on promoting an optimal balance between the utilisation of our resources for agricultural development and growth and the protection of natural resources for the benefit of the well-being and health of plants, livestock and humans. In addition, research on the impact of climate change effects on food production, diseases, water systems and resilience against droughts and floods is prioritised. Research focus is also on developing and adopting more efficient technologies and practices for agriculture, and soil and water management.

In terms of uncertainties of the weather, the policy calls for creative adaptation in the field of technology, behaviour change (such as planning of planting), adoption and increasing use of rain harvesting and small scale irrigation methods. Others are planting trees around farms to prevent crops and plants from failing when there are storms, and also to act as carbon sinks.

#### *d) Agenda 21 for Sustainable Development*

Tanzania is a signatory to Agenda 21 (outcome of the UN Conference on Environment and Development 1992) that address, among other things, the impact of human activities on the

environment. There are several regulations, guidelines, programmes in the country aimed at enabling the country to have sustainable development (social, economic and environmental). Sustainable, agricultural and industrial productions are among the key aspects of Agenda 21, which ought to be taken into consideration during food production and sub-sector developments.

Agenda 21 requires agriculture to increase production on land already in use and by avoiding further encroachment on land that is only marginally suitable for cultivation. Agenda 21 requires major adjustments to be made in agricultural, environmental and macroeconomic policy at both national and international level, in developed as well as developing countries to create the conditions for sustainable agriculture and rural development.

*e) Integrated Industrial Development Strategy (IIDS) 2025*

The strategy recognises the industry's contribution to human development and employment creation for economic transformation and sustainable economic growth. These are critical to the enhancement of the drive towards commercialisation and industrialisation. It focuses on improvement of wealth due to the central role the industry sector can play in the post-harvest systems, processing, value addition and production of diversified products for the local, regional, and international markets. The policy also recognises the positive impacts under climate change, such as the need for retooling and transformation of carbon intensive industries, application of cleaner and energy efficient technologies and processes, reduction of by products and waste, and recycling.

*f) Water Policy of 2002*

It recognises the fact that Tanzania's productive, health, and livestock sectors are at risk in part because of the unpredictability of rainfall and the subsequent poor supply of potable water. The water policy endeavours to ameliorate this problem by explicitly recognising the role that prudent water allocation efficiency and use,

water efficient technologies, water harvesting and conservation, and irrigated agriculture can play in adaptation systems. Since most of the areas are becoming water deficient due to drought and inadequate discharge to aquifers, this policy will be instrumental in setting up and policing water rights, water usage quantities, and development of irrigation systems.

*g) The Tanzania Poverty Reduction Strategy (MKUKUTA II)*

MKUKUTA II integrates environmental factors of vulnerability and proposes a number of operational objectives to address them. Several findings of the National Action Plan on Climate Change (NAPA) vulnerability studies, as well as some of the more relevant NAPA priority projects were integrated in MKUKUTA II. Some stakeholders are of the opinion that research needs to be conducted on the new thinking about potential governance mechanisms that could support long term adaptation, mainstreaming climate change into development planning and on links between poverty reduction priorities, such as food security and climate change, the latter which is one of the objectives of this study.

*h) National Action Plan on Climate Change (2007)*

The Tanzania's National Action Plan on Climate Change (NAPA) preparation involved the participation of many stakeholders using participatory approaches to ensure that the devised national plans and strategies are integrated into the document, and to ensure that the proposed activities will be implemented and adopted by target vulnerable communities. The NAPA was launched in 2007.

The overall goal of NAPA was to identify immediate and urgent climate change adaptation actions that are robust enough to lead to long term sustainable development in a changing climate. It also identified climate change adaptation activities that most effectively reduce the risks that the changing climate poses to sustainable development.

The NAPA framework was formulated in line with the Environmental Management Act 2004,

to complement other existing national programmes; to give due consideration to project activities that will enhance sustainable development; to suit sound environmental management and the needs of Tanzanians to combat local and global impacts of climate change; to take into consideration the feasibility and implementation costs, based on past and ongoing projects, strategies and plans; and to allow for the implementation of the activities by the public and private sectors as well as NGOs, CBOs, individuals and other institutions.

NAPA is linked with other national development policies, goals, objectives, plans, strategies and Programmes (the National Strategy for Growth and Reduction of Poverty, National Environmental Policy (NEP) of 1997, and Vision 2025 among others) and supports/complements strategies and programmes of other multilateral environmental agreements that Tanzania is party to. These include: the United Nations Framework Convention on Climate Change (UNFCCC), United Nations Convention to Combat Desertification (UNCCD), the Convention on Biological Diversity (CBD), Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, Vienna Convention on the Protection of Ozone Layer and Montréal Protocol on Substances that Deplete the Ozone layer, among others.

The main objectives of the NAPA are country specific and address concerns related to protection of life and livelihoods of people, infrastructure, biodiversity and environment; mainstream adaptation into national and sectoral development initiatives; increase public awareness of climate change impacts and adaptation activities; assist communities to improve and sustain human and technological capacity for environmentally sustainable use of natural resources; complement national and community development activities which are hampered by adverse effects of climate change; and to create long term sustainable livelihoods and development activities at both community and national levels in changing climatic conditions.

The NAPA programmes have various time frames:

- **Short term programme (year 1-2):** In the beginning, efforts should be undertaken to raise awareness of possible impacts stemming from climate change on various socio-economic activities. The overall aim of these efforts would be to explore possibilities of how current activities or sectoral plans could complement climate change mitigation options. Besides, there is need to analyse the effects of governmental macroeconomic policies in relation to climate change.
- **Medium term Programme (year 2-5):** In the medium term, projects already internalising climate change aspects, especially those reducing GHG emissions, should be supported. Support will either be sought from internal sources such as the government budget or from external sources. In addition, climate change aspects would be included into the educational curriculum, preferably starting at secondary school level. Also, the government would start introducing environmental economic instruments such as fiscal measures (pollution taxes, input taxes, product taxes, import tariffs, royalties, land user taxes, tax differentiation, among others), property rights (ownership right, user right, and development rights), and performance bonds (land reclamation bond, waste delivery bond, environmental performance bond, among others) as incentives to increase environmental conservation.
- **Long term programme (year 10-20):** In the long term, large projects in the energy and transport sector would be undertaken. In addition, adaptation measures to cope with a rising sea level and its adverse effects on coastal infrastructure would be implemented. The National Climate Change Steering Committee (NCCSC) and National Climate Change Technical Committee (NCCTC) are in place to oversee the implementation of the NAPA.

The NAPA stakeholders have developed implementation measures and started the execution processes, while others are still mobilising resources for moving from assessments to implementation. Recently, the government has increased efforts towards effective coordination among the various national and international partners to fast-track the implementation process. Currently, the focus is on devising a comprehensive implementation strategy for the NAPA; developing mechanisms for long term replication of the NAPA projects and for monitoring results; increasing awareness among politicians, senior officials and the general public; and raising the efficiency of project management practices, including financial management.

*i) National Climate Change Strategy and Action Plan*

The national climate change strategy and action plan is still being formulated. A team of multi-disciplinary experts has been chosen for that task to ensure a wider participation and that the plan reflects the true challenges the country is and will be facing and to devise feasible strategies to address such challenges while contributing to a greener economic growth.

*j) Other National Plans of Relevance to Climate Change*

Tanzania has put in place a number of environmental plans which intend to increase its ability to cope with environmental problems as well as with additional risks posed by climate change. A typical example is the National Environmental Action Plan (NEAP).

The NEAP was developed and launched in December 1997 with the aim of incorporating environmental concerns into national planning and development, and providing a framework for mainstreaming environmental considerations into the decision making processes in Tanzania. NEAP identified six priority environmental concerns, namely land degradation; lack of accessible, good quality water for both urban and rural inhabitants; pollution; loss of wildlife habitats; deterioration of marine and freshwater systems; and deforestation. Though NEAP does not pay explicit attention to climate change, the

primary environmental issues brought forward include many of the concerns that would be addressed by no-regrets climate change adaptation measures. Specifically, the NEAP highlights the importance of integrating environmental management into several sectoral programmes and policies.

### **2.1.3 Climate Finance**

Finance, technology and capacity development are essential to provide sustainable environments, reduce the impacts of climate change, make progress towards a low carbon economy, increase efficiency and productivity in agriculture, transport and communication and manufacturing, and develop cleaner and affordable energy sources. Most of the public and local level climate change initiatives are funded from the public budget either at national level or through government departments, agencies, parastatals, research and development institutions, and district development projects funds. Most NGOs dealing with climate change are funded by foreign sources, through existing development agencies/organisations or through UN agencies. Most local non-governmental environmental organisations echo their frustrations over slow progress and the desire for more funding for climate change programmes and projects. The faith based organisations dealing with climate change are funded through the contributions of individuals in their community.

Recently, there have been some pledges by developed countries to finance climate change activities in developing countries, including Tanzania, targeting mainly capacity building and institutional linking of science and addressing vulnerability. This includes The Green Climate Fund adopted in Cancun, The Copenhagen Accord (of US\$100bn per year by 2020 for developing countries), and other bilateral and multilateral pledges. The African Union called upon for US\$67bn per annum to fund climate change adaptation and mitigation in Africa. However, in most cases, the pledges are not met.

In some instances, there are barriers to accessing these funds due to lack of comprehensive knowledge on climate change and inadequate

skills to identify, design, develop, and appraise specific projects and to develop project proposals. Another cited reason is the lack of reliable institutions and structures in place to make the links between climate change vulnerability, adaptation and mitigation, to provide sound financial management, and to support project implementation and delivery. Sometimes, such capacity gaps make a case for medium to large scale funding to be difficult.

Nonetheless, some Tanzanian climate change stakeholders have recognised climate change as an issue and have started building capacities and institutional arrangements, developed quality project proposals and have successfully secured funding, especially in the adaptation area and CDM.

The current Tanzania's strategy is geared towards the Public-Private Partnership (PPP) in which the government engages the private sector and other non-government actors in low carbon and clean development projects in the context of Nationally Appropriate Mitigation Actions and other mechanisms as may be feasible. Other options to address climate change challenges are done by integrating climate change in the development process and poverty eradication actions. These include protecting catchments, promoting diversified livelihoods, expanding water resources and access to water, increasing irrigation, and protecting coastal zones. These undertakings are being financed from the government budget.

Recently, some Tanzania institutions have accessed funding to raise awareness, capacity building, identify vulnerabilities, and design and implement mitigation and adaptation options. At present, Tanzania is benefiting from the following funds: UNFCCC, special climate fund, the adaptation fund and numerous bilateral relationships, such as with Norway on Reducing Emissions from Deforestation and Forest Degradation (REDD), World Bank and East African Development Bank (EADB). Other completed or on-going programmes and funding are discussed in Annex 2.

#### 2.1.4 Research and Development Funding

There are research programmes being funded jointly by the government in collaboration with development partners. These include:

*a) Climate Change Impacts, Adaptation and Mitigation (CCIAM) Programme in Tanzania*

This research is carried out at Sokoine University of Agriculture (SUA) in Morogoro, Tanzania. The research component has the following specific objectives which are translated into thematic areas: (i) development of appropriate climate change mitigation and adaptation strategies in forestry, other land uses, ecosystems and biodiversity management; (ii) assessment of climate change impacts and vulnerability on ecosystem services and livelihoods under REDD initiatives; and (iii) policy and legal framework analysis of climate change adaptation and mitigation with emphasis on economic efficiency, ecological effectiveness and wider political legitimacy.

*b) Resilient Agro-landscapes to Climate Change in Tanzania (The ReACCT-Project)*

The ReACCT project started in May 2008 in Morogoro (Tscherning *et al*; 2008). The project aims at assessing the regional impacts of climate change on agro-landscapes and environment in Tanzania (Morogoro) as well as identifying adaptation strategies for small scale agriculture. Assessments of related land use sectors, such as forest, hydrology, nature conservation and biodiversity, are considered and importantly they involve local partners and farmers. Driven by regional climate change scenarios, integrated agro-ecosystem models are used to assess combined climate change and management effects on crop production, water resources and soil fertility. These agro-ecosystem models are linked closely to hydrological models. Complementarily, stakeholders develop options of management practices in potential future agro-landscapes based on the same regional climate change scenarios.

COSMO-Climate Limited-area Modelling (CCLM) has produced first promising climate scenarios for Tanzania. Historical vegetation

maps of Tanzania have been identified and are currently being evaluated to create a local database of occurring tree species. Readiness for adoption of the recommended species, adapted to the relevant climate scenarios, will be explored among smallholder farmers by socioeconomic surveys. Participative research activities started in the Ngerengere catchment, which was also chosen for the hydrological modelling exercises. Trial sites for field experiments in three regions are identified and sensor installation are expected to be put in place soon. Together with scientists from national research institutes and Sokoine University of Agriculture (SUA), appropriate crops and varieties for the field experiments are selected. Supplementary irrigation and water use efficiency experiments with maize will be undertaken.

*c) Research in Agricultural Research Institutes (ARI)*

Over years, the agricultural research institutes (ARI) in the Ministry of Agriculture and Food Security have been conducting climate change related research with notable success stories (Myaka, 2011). This includes: development of high yielding market class bean varieties with desirable agronomic and organoleptic characteristics including tolerance/resistance to major pests and diseases. Further research work includes: a) to incorporate drought tolerance, disease and pest resistance into promising maize and bean cultivars; b) to develop environmentally friendly maize and bean varieties through breeding; c) to multiply and maintain breeder seed of beans; d) to evaluate for yield promising lines and advanced crosses and release promising lines/cultivars; e) to develop and introduce environmentally friendly agronomic packages for bean production; f) to develop, evaluate and promote effective and environmentally friendly Integrated Pest Management (IPM) strategies against pests such as bruchids and white flies; g) to develop, test, and evaluate the efficacy of eco-friendly fertilisers, pesticides, fungicides, herbicides, and acaricides; h) to develop and introduce environmental friendly weed management packages in specific locations; g) to develop improved crop varieties that are drought tolerant, high yielding and tolerant to abiotic

stresses and to multiply and maintain breeder seeds; i) to conduct soil fertility surveys; j) to conduct research on water harvest technologies and introduce technologies in semi-arid areas; and k) to evaluate multipurpose trees for fuel wood and green manuring maize farming systems.

### **2.1.5 Tanzania in International Protocols on Climate Change**

Tanzania has notably ratified all conventions, agreements and treaties related to climate change and supports/complements strategies and programmes of other multilateral environmental agreements that Tanzania is party to. These include: Rio 1992, The 17<sup>th</sup> Conference of the Parties (COP17) to the United Nations Framework Convention on Climate Change (UNFCCC); the United Nations Convention to Combat Desertification (UNCCD), United Nations Framework Convention on Climate Change (UNFCCC); the Convention on Biological Diversity (CBD); Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal; Vienna Convention on the Protection of Ozone Layer and Montréal Protocol on Substances that Deplete the Ozone layer, among others. A number of strategies and action plans related to some of these conventions have been developed and mainstreamed into national initiatives and plans. These encompass the National Biodiversity Strategy and Action Plan (NBSAP), the National Action Programme (NAP), and the National Biosafety Framework (NBF). Tanzania ratified the UNFCCC in 1996 and Kyoto Protocol in 2002 as party to the Convention.

*a) The Kyoto Protocol*

Under this protocol industrialised countries and the European Union as a whole have agreed to reduce their emissions by 5 percent between 2008-2012 against their 1990 levels. Countries can achieve emissions reductions through three flexible market based mechanisms. Under the Protocol, 37 countries commit themselves to a reduction of 4 greenhouse gases emitted by them, that is carbon dioxide, methane, nitrous oxide, sulphur hexafluoride and 2 groups of gases-hydro fluorocarbons and perfluorocarbons. All member

countries have given their commitments. At negotiations, countries (including the US) collectively agreed to reduce their greenhouse gas emissions by 5.2 percent on average during the period 2008-2012.

This reduction is relative to their annual emissions in a base year, which is 1990. Since the US has not ratified the treaty, the collective emissions reduction of Kyoto countries falls from 5.2 percent to 4.2 percent in terms of the base year. Developing countries like Tanzania can participate through the Clean Development Mechanism (CDM) projects but Tanzania and Africa in general, is yet to benefit from CDM projects since as of December 2009, only about 2 percent of CDM Projects globally were in Africa. There is only 1 approved CDM project in Tanzania however, 4 are in the pipeline.

Tanzania's national level responses regarding UNFCCC and the Kyoto Protocol include:

- Submission of Tanzania's National Initial Communication to the UNFCCC in 2003. The Communication documents sources of GHG emissions in Tanzania, and strategies to mitigate and adapt to climate change for Tanzania.
- Establishment of a Designated National Authority (DNA) that will oversee implementation of climate change related activities at the national level, particularly reviewing and recommending CDM Project Development Documents (PDD) to the CDM Executive Board. The Vice President's Office (VPO) serves as the DNA.
- Preparation and submission of a National Adaptation Programme of Action (NAPA) that prioritises adaptation options in the country to reduce climate change impacts. The NAPA document was supposed to be a strategic fundraising document to access UNFCCC funding mechanisms on adaptation. However, there has been inadequate funding for adaptation at the international level since contributions to the fund by industrialised countries is voluntary. Only 1 of the 14 identified projects in the NAPA document has been implemented.

- Participation in Meetings of the Party (MoP) for the Kyoto Protocol and Conference of Parties (CoP) for the UNFCCC. Tanzania was represented by the Ministry of Environment, Vice President's Office-Department of Environment (VPO-DoE) and other stakeholders, including official observers, such as the Tanzania Natural Resources Forum (TNRF). Important milestones that Tanzania has agreed to include the Nairobi framework on vulnerability and adaptation to climate change; the Bali roadmap on Reduced Emissions from Deforestation and Forest Degradation (REDD) and the Copenhagen Accord. Following the Bali road map and in line with on-going negotiations for REDD, Tanzania has already started a process of formulating the national REDD strategy by formulating the National REDD Framework in 2009.

Indicators deriving from the Government of Tanzania's commitment to climate change agreements include: (i) number and content of related policies, strategies and acts enacted at the national level; (ii) number of climate change related projects/programmes implemented by the government, development partners and the NGOs; (iii) established government ministries, departments and agencies (MDAs) focusing on environment and climate change in particular, such as Environmental Management Units in each ministry; (iv) government budget/funding for environment and climate change activities in particular; (v) national adaptive capacity measured in terms of GDP growth, gini coefficient and other indicators of national economic development; (vi) number and content of related research reports on environment and climate change in particular, by both the government's MDAs, academic institutions, development partners, NGOs, independent researches among others; (vii) awareness among public leaders on climate change issues as indicated by frequency of reference to climate change by leaders at various levels in various fora; and (viii) mainstreaming of climate change issues within existing national policies/programmes/institutions among others.

However, these activities and indicators do not automatically translate into reduced risk and vulnerability of the country to climate change impacts. Therefore, there is need to combine these indicators with other indicators to assess impacts of the various strategies undertaken in enhancing Tanzania's capacity to respond to the climate change issue.

#### *b) Implementation Challenges for Tanzania*

The major challenges of implementing international protocols on climate change include unbalanced global environmental policies which at times are not on the list of priorities of Tanzania because they do not take onboard the socio economic conditions of the country.

Also, the conditions attached to international assistance programmes, sometimes do not provide flexibility for local adaptations. Therefore, Tanzania is trying to identify and implement those which meet its strategic priorities and facilitate its own developmental paths and at the same time, prioritising those adaptation strategies suited to its physical and socio economic conditions.

Furthermore, there are other factors that reduce the ability or willingness of people to participate in effective adaptation. For instance, most people are more concerned with their immediate lives and environment than a global threat in the future, especially those who are still preoccupied with their basic, everyday needs for survival. But in towns, there are pockets of people who are aware of the threat posed by climate change, however, their numbers are relatively small compared to the vast majority of people who are still struggling to achieve economic security for themselves. One could say it is shortsighted or it is based on rather limited rationality, but between immediate economic security and long term environmental security, concern for the former always prevail. This is not to say that the vast majority of people will remain indifferent to energy conservation and environmental protection until their economic security is achieved.

Other challenges include inadequate public preparedness (lack of clear messages for

adaptation to climate change and inability to associate disasters, natural and human-induced stresses, and other extreme events with climate change); the uncoordinated and overlapping projects leading to fatigue; lack of political commitment in certain areas; and difficulties in changing behaviour and attitudes needed for combating climate change.

Another crucial issue is the adherence to new environmental, agricultural, energy conservation, waste management, and emissions reduction standards. The revised emission standards that will be set by the government during the implementation of NAPA will indicate the direction that the industry and nation should take in the future, although such standards may put a lot of pressure on businesses and certain communities. By conforming to these standards, some entities and value chains may have to retool their dated technology and equipment, and restructure production facilities and processes to reduce energy consumption and pollution levels. In doing so, they may continue to improve their competitiveness and gradually bring themselves in line with international standards. The biggest challenge for the industry in the adoption of such technological transformation to stringent government standards that will address climate change effects is capital. The other option for non-conforming entities failing to meet the policy requirements is facing the fate of closure.

## **2.2. Trade**

### **2.2.1 Trade in Tanzania and Trade Partners**

Key drivers of growth in the short and medium term for Tanzania include private consumption, exports, tourism revenues, foreign investment and aid. And the main growth and priority sectors of the government still remain agriculture, manufacturing, tourism, mining and infrastructure. However, despite these identified priority sectors, which have been highlighted for the growth of Tanzania, the following economic activities have a significant impact on Tanzania's economy (whereas some of these priority sectors have an impact and some have a declining performance to the economy's growth rates).



They are:

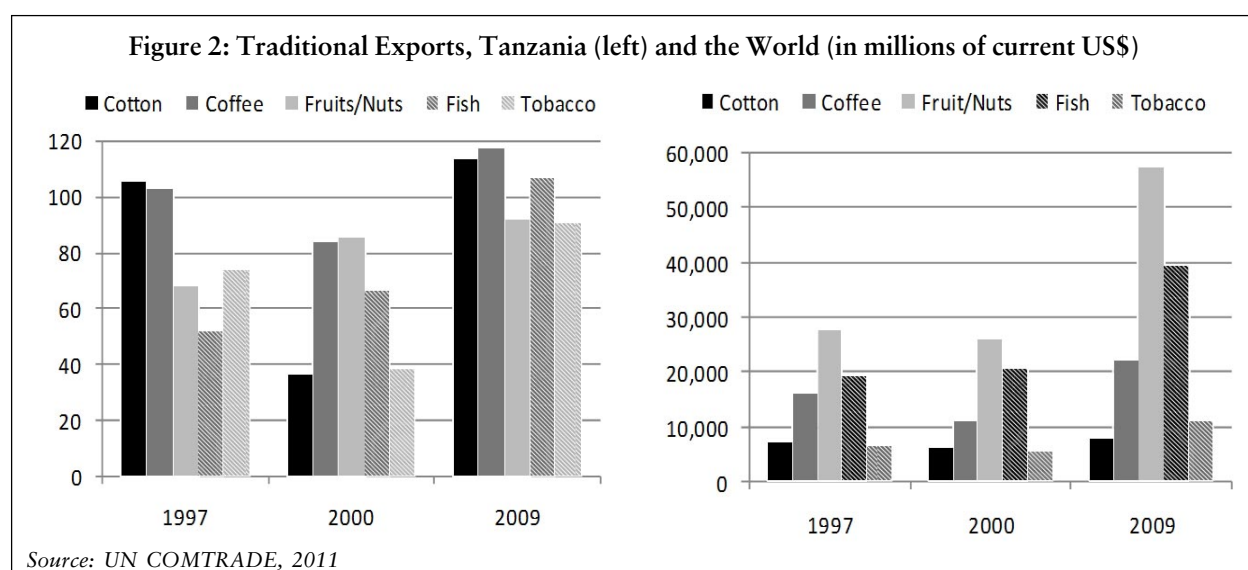
- *Agriculture economic activities:* In 2010, agriculture achieved a growth of 4.2 percent compared to 3.2 percent in 2009. This growth was a result of increased crop production due to good weather in the 2009-2010 agricultural season; improved irrigation infrastructure; government initiative on input subsidies; and an implementation of the nation's Agricultural Sector Development Programme (ASDP).
- *Fishing economic activities:* In 2010, the fishing industry grew by 1.5 percent compared to a 2.7 percent in 2009. This slowdown was caused by decreased demand for fish and fish products in the external markets; decrease in fish harvest, particularly in lakes as a result of destruction of marine ecosystems in fish hatcheries; over fishing; illegal fishing activities; and use of poor fishing gears.
- *Industry and construction activities:* In 2010, these activities grew by 8.2 percent compared to 7.0 percent in 2009. This positive growth was as a result of an improved performance in construction, water supply, and electricity and gas economic activities.
- *Manufacturing activities:* The growth rate for manufacturing sub-activities declined in 2010 to 7.9 percent from 8.0 percent in 2009. This was mainly due to the increased costs of production. However, the sub-

activities contributed approximately 9.0 percent to the nation's GDP.

- *Mining and quarrying activities:* Growth rate reached 2.7 percent in 2010 compared to 1.2 percent in 2009. This growth was attributed to increase in gold production and the rise in prices of gold in the world market (after being destabilised by the Global Financial Crisis-GFC).
- *Services activities:* The growth rate in the services activities was 8.2 percent in 2010 compared to 7.2 percent in 2009. All the services sub-economic activities increased in 2010 as a result of the recovery of activities which were affected by the GFC such as financial intermediation, hotels and restaurants, trade and repair, and transport (URT, 2011).

At the export front, the share of Tanzanian exports in world exports has increased from 0.012 percent in 1997 to 0.026 percent in 2009, thus it has more than doubled in twelve years. Despite the levels being low, the increase is notable. Tanzania's increasing market share is attributable to export growth in both the goods and the services sectors (Tanzania Private Sector Foundation-TPSF, 2011).

Tracking the share of Tanzania's top five exports, one finds that between 1997 and 2000, the share of both cotton and tobacco exports decreased. While cotton lost 0.88 percent of world market share, tobacco lost 0.39 percent. Coffee, fruits



and nuts, and fish experienced increases. Coffee performed better, with an increase of 0.12 percent, while fruits/nuts and fish realised market share gains of 0.09 and 0.06 percent, respectively. Analysing the period between 2000 and 2009, the picture is completely different. The former best performers (coffee, fruit/nuts and fish) all realised losses in world market shares, with coffee performing the worst, with a loss of 0.22 percent. Also, pearls and precious stones have been losing world market share over the last decade. Last decade's best performing export is gold, realising an increase in the share of world gold exports of 0.2 percent. The recent relatively better performance of coffee is attributable to changes in the overall amount of coffee exports in the world (Economic and Social Research Foundation-ESRF, 2011).

Assessing the Revealed Comparative Advantages (RCA) value of Tanzania's top ten exports, one will find that all of them are performing very well in the recent periods. A comparative advantage reveals the RCA<sup>3</sup> value is greater than one, and all top ten Tanzanian exports in all the reviewed years meet this requirement. In 2009, high RCAs could be exhibited by cotton (55.09), tea (44.15), tobacco (31.03) and gold (28.66). In earlier years, the leading RCAs were in tea, coffee, and gold in 2000; and cotton, tea and tobacco in 1997 (ESRF, 2011).

Europe is currently the main export market for Tanzania, with Switzerland as the lead export destination for more than half of Tanzania's exports to Europe. However, exports to the EU recorded a major decline from 21 percent in 2006

Table 1: Contribution to GDP (sectors and sub-sectors), 2000 – 2009

	Growth rates (%)		Sector shares (% of GDP)		Contribution to growth (%)	
	2000-05	2006-09	2000-05	2006-09	2000-05	2006-09
<b>AGRICULTURE, HUNTING, FORESTRY &amp; FISHING</b>	<b>4.7</b>	<b>4.0</b>	<b>32.2</b>	<b>28.6</b>	<b>1.52</b>	<b>1.15</b>
Crops	5.1	4.3	22.5	20.3	1.15	0.87
Livestock	3.4	2.8	5.3	4.4	0.18	0.12
Hunting & forestry	3.5	3.6	2.7	2.2	0.09	0.08
Fishing	5.4	4.6	1.8	1.7	0.10	0.08
<b>INDUSTRY &amp; CONSTRUCTION</b>	<b>8.5</b>	<b>8.8</b>	<b>19.4</b>	<b>21.7</b>	<b>1.64</b>	<b>1.91</b>
Mining & quarrying	15.7	9.2	1.9	2.7	0.30	0.25
Manufacturing	7.1	8.9	9.0	9.6	0.64	0.86
Electricity, gas	6.6	6.4	2.3	2.2	0.15	0.14
Water supply	3.9	5.8	0.5	0.5	0.02	0.03
Construction	9.4	9.5	5.7	6.8	0.54	0.64
<b>SERVICES</b>	<b>7.0</b>	<b>7.9</b>	<b>48.4</b>	<b>49.7</b>	<b>3.40</b>	<b>3.95</b>
Trade and repairs	6.9	8.7	13.9	14.4	0.96	1.25
Hotels and restaurants	4.4	4.7	2.9	2.6	0.13	0.12
Transport	5.8	6.3	5.7	5.5	0.33	0.34
Communications	11.6	20.1	1.3	2.0	0.15	0.40
Financial intermediation	8.0	10.6	1.7	1.9	0.13	0.20
Real estate and business services	5.9	7.1	11.0	10.8	0.65	0.77
Public administration	10.7	7.2	7.4	8.4	0.79	0.61
Education	5.8	5.7	2.1	2.0	0.13	0.11
Health	7.2	8.2	1.4	1.5	0.10	0.12
Other social and personal services	2.7	3.2	0.9	0.8	0.02	0.02
<b>GDP</b>	<b>6.6</b>	<b>7.0</b>	<b>100.0</b>	<b>100.0</b>	<b>6.56</b>	<b>7.00</b>

Source: Tanzania Private Sector Foundation-TPSF, 2011

to 12 percent in 2010. Asia is the second largest export destination, with exports to China having increased from 8 percent of total exports in 2006 to 16 percent in 2010, making China the second most important export market for Tanzania in 2010 (TMEA, 2011).

According to the East African Business Report (2011), Tanzania’s trade with other EAC partners has also been growing significantly at an average rate of 19.6 percent between 2000 and 2007, with Kenya and Burundi as the major export markets. This increase has mainly been due to the lower tariffs arising from the implementation of the EAC customs union. Tanzania’s export to the EAC region, in 2010, nearly doubled to US\$450mn from US\$263mn in 2009, equivalent to approximately 71 percent. This depicts significant benefits to Tanzania’s exporters from the EAC region, though there is still need for Tanzania to deepen regional integration through removal of trade barriers and lowering transportation costs. Due to the situations of political unrest in the Middle East, Tanzania’s exports to this market have declined from 8 percent in 2009 to 2 percent by 2010. These changes in Tanzania’s trade patterns reflect a clear shift in its direction of trade from Europe to the African and Asian markets. In 2010, Tanzania’s 11 percent of its total exports were channelled to South Africa; 8 percent to Kenya; 4 percent to the Democratic Republic of Congo and an overall 24 percent share to African markets.

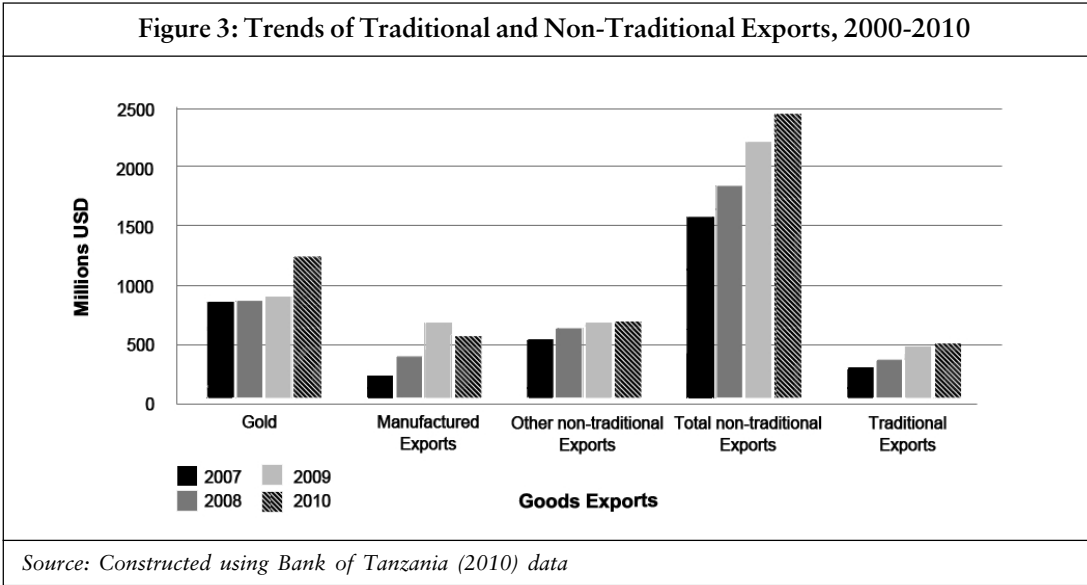
**2.2.2 Contribution of Various Sectors to Tanzania’s Economy**

Tanzania’s production structure changed in recent times, with agriculture accounting for approximately 29 percent of GDP (compared to 33 percent of GDP-value added some ten years earlier), and is the second most important sector of the economy after services (with approximately 50 percent of contribution to the GDP).

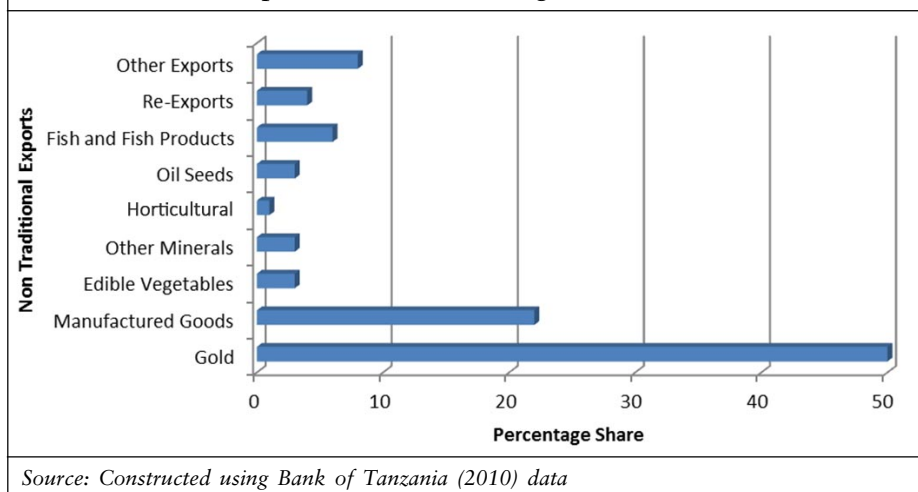
In terms of sector growth, Tanzania’s industry and construction sector has registered rapid growth with an average growth rate of 8.8 percent in 2009; followed by the services sector which by 2009 had registered a 7.9 percent growth rate. Overall, however, the industry and construction sector contributes the least to overall GDP growth of Tanzania and the current main driver of GDP growth is the services sector (Table 1).

**2.2.3 Tanzania’s Diversification of Exports**

Tanzania’s exports have gone through a considerable diversification process over the last twenty years. The United Nations Commodity Trade Database (UN COMTRADE, 2011) data suggest that the share of top five exports have decreased from 67.4 percent in 1997 to 57.3 percent in 2009, implying a broadening of the range of exported products. Also, the Herfindahl Index (HI) of exports suggests that exports are not very concentrated, remaining around 0.1 for the period under review.



**Figure 4: Contribution to Total Non-Traditional Exports for the Year Ending March 2010**



Source: Constructed using Bank of Tanzania (2010) data

Diversification takes place mainly towards non-traditional exports which comprise nine major products namely: gold, manufactured goods, fish and fish products, vegetables, oil seed and horticultural products. Others are re-exports of other minerals. There has been some growth in non-traditional crops over the last ten years, despite the fall in some export crops, notably traditional crops. Other well performing non-traditional export crops are paddy, tomatoes, maize, cassava and oilseeds (groundnut and sesame), spices (such as vanilla, cardamom, paprika, pepper and ginger). There are also horticulture and floriculture products. Most of the non-traditional crops are grown by the poor. However, there are some of them such as flowers, fruits, spices, and peas which are grown by rich farmers mainly for export markets.

There are several factors driving diversification process in Tanzania. On the one hand, the availability of natural resources and in particular the discovery of gold and other minerals, has contributed to the diversification during the last decade. However, some of the diversification and the expansion of the exporting sector in general are also likely to be attributed to the reduction of trade barriers. Regional integration agreements such as the Southern African Development Community (SADC) and the East African Community (EAC), as well as the removal of requirements for export registration, licensing, surrender of proceeds, and the

elimination of most commodity export taxes, were important steps to facilitate export diversification.<sup>4</sup> Furthermore, Tanzania has a duty-free, quota-free market access to the European Union under Everything But Arms (EBA), US under African Growth and Opportunity Act (AGOA), and preferential access to China.

#### 2.2.4 Degree of Value Addition in Main Trade Activities

This chapter addresses the trend in livestock sector. The growth rate of livestock sub-activities increased to 3.4 percent in 2010, compared to a 2.3 percent in 2009. This increase has mainly been possible due to the availability of adequate pasture and an increase in livestock extension services.

##### a) Livestock and Related Products

Tanzania is composed of different agro-climatological zones; arid, semi-arid, sub humid, humid and the highlands. Out of the 95.5 million ha of land that Tanzania is endowed with, about 50 million ha of rangelands are suitable for livestock grazing and only 24 million ha are currently utilised. The country's livestock sector mainly concentrates on beef, cattle, small ruminants, poultry, dairy cattle, goats as well as pigs (Table 2).

Tanzania has ten small and medium scale meat processing establishments found in Dar es Salaam, Iringa, Arusha, Coast, Rukwa, Morogoro and Ruvuma. In addition, there are three functioning modern abattoirs in Arusha, Sumbawanga and Dodoma which, however, are not sufficient to supply quality meat to niche markets such as supermarkets and hotels within and outside the country.

Table 2: Production and consumption of livestock and poultry products, 2005– 2009								
	Unit	2005	2006	2007	2008	2009	% change over 2008	Average % annual increase (2005-2009)
Human population in million	Persons	36.2	37.5	38.3	39.3	40	1.8	2.5
<b>Products</b>								
<b>Meat:</b>								
Beef	Tonnes	210,370	180,629	218,976	225,178	243,943	8.3	4.6
Lamb	Tonnes	78,579	80,936	81,173	82,884	86,634	4.5	2.5
Pork	Tonnes	29,925	31,721	33,307	36,000	38,180	6.1	6.3
Chicken	Tonnes	69,420	77,280	77,250	78,168	80,916	3.5	4.0
Total	Tonnes	388,294	370,566	410,706	422,230	449,673	6.5	5.3
Per capita consumption	Kgs per year	11	10	11	11	12	9.1	
<b>Milk</b>								
Traditional cattle	Ltrs ('000)	920,000	941,815	945,524	980,000	997,261	1.8	2.0
Dairy cattle	Ltrs ('000)	466,400	470,971	475,681	520,000	652,596	25.5	9.2
Total	Ltrs ('000)	1,386,400	1,412,786	1,421,205	1,500,000	1,649,857	10.0	4.5
Per capita consumption	Ltrs per year	38	40	41	42	43	2.4	
Chicken eggs	No. ('000)	2,145,000	2,230,900	2,690,000	2,806,350	2,917,875	4.0	8.2
Per capita consumption		53	64	64	52	75	4.2	9.4
<b>Hides and skins</b>								
Cattle	No. ('000)	1,660	1,980	2,500	1,650	1,500	-9.1	0.6
Goats	No. ('000)	1,400	1,520	1,900	2,700	2,400	-11.1	16.1
Sheep	No. ('000)	950	1,200	1,500	1,250	650	-48.0	-3.3
Total	No. ('000)	4,010	4,700	5,900	5,600	4,550	-18.8	4.7

Source: Tanzania's Ministry of Livestock and Fisheries Development-MLFD, 2011

The poultry industry is still at its infant stage with most of it being sold alive. Tanzania has got only four poultry processing plants existing namely, Mkuza Chicks Limited (16,000 chickens per day), Mbarali NAFCO farm in Mbeya (1,500 chickens per day), Inter-Chick Co. Ltd (Dar-es-Salaam) with capacity to process 3,000 chickens per day and Tanzania Pride Meat Co. in Morogoro, which has the capacity to slaughter and process 1,500 chickens per day. The total poultry meat production stood at 80,910 tonnes in 2009-2010, marking a 16.5 percent increase from 69,420 tonnes in 2005-2006.

Tanzania has witnessed an increase in milk processed per day from 56,580 ltrs in 2006-2007 to 105,380 ltrs or a total of 38.5 million ltrs in 2009 (URT, 2010). This has been attributed to the establishment of 40 small and medium scale dairy plants out of 48, with a total processing

capacity of 394,600 ltrs per day. Despite such big processing capacity, there are still a lot of questions to be asked on why these industries do not fully utilise their resources. Due to this, the sector experiences a demand supply gap that is filled by imports of about 15-20 million ltrs of Liquid Milk Equivalent (LME) per annum that is worth around US\$5mn.

### 2.3. Food Security

National food insecurity has been a major economic and nutritional problem in Tanzania. It has severely affected prospects for high growth and poverty reduction. Food security is identified as one of the six pre-requisites and key macroeconomic interventions critical for attainment of macroeconomic stability in Tanzania according to the Tanzania Five Years Development Plan, 2011-2012 to 2015-2016.

Others include prioritisation of public expenditure in favour of drivers of growth (energy, infrastructure, human and skills development, technology and agriculture); promoting value addition in key production activities; expanding the revenue base (tax and non-tax); utilising PPP arrangements; as well as ensuring debt sustainability.

Food insecurity is manifested in different forms, mainly geographically, seasonally and at household level (URT, 2010). Reviews of studies indicate that Tanzania has cyclical food insecurity after every four years, while other cross section studies indicate year to year pockets of food insecurity around the country. This happens even when the countrywide Self-Sufficiency Ratio (SSR) is positive, which in 2009-2010 was 112 in terms of cereals and non-cereals. Babati district for instance, has greater potential to feed itself through irrigation but was hit by drought in 2009, which led to food insecurity. Household food insecurity in Tanzania is the most prevalent and very latent at macro level. It is mostly caused by a vicious cycle of low inputs use, low productivity, and post-harvest loss, lack of surplus and low market prices. For a period of time, causes and effects of national and household food insecurity are unchanged due to ad hoc interventionist measures, a significant reason being lack of consistent funding of critical infrastructures such as markets and roads. Other causes diagnosed were underutilisation of water and land resources, low processing, uncoordinated disaster management, and export banning which is a disincentive to future

investment in production and processing of food crops.

### 2.3.1 State of National Food Security and Trends

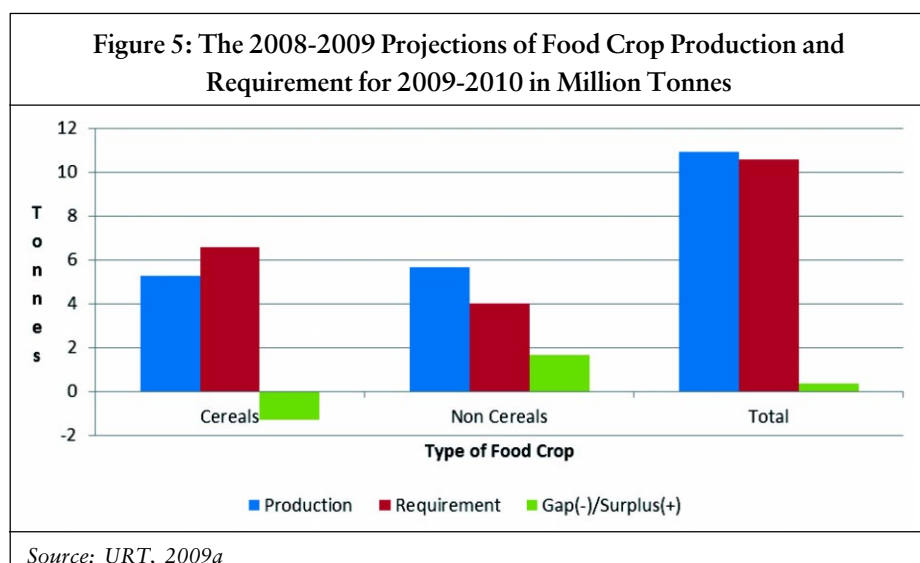
Tanzania is not a famine-prone country judging from its potentiality to produce food. The country is able to produce enough food to meet the prevailing demand and export some surpluses when there is adequate rainfall and other requisites. During good seasons, food insecurity becomes mainly a result of problems associated with transportation and/or distribution to enable the needy people to access the available food. For example in 2002 season, Tanzania exported 151,291 tonnes of maize; 38,222 tonnes of beans; 3,354 tonnes of rice; 29,287 tonnes of wheat (URT, 2004), while during the year ending April 2010, 12 percent of the total non-traditional exports was contributed by food products namely edible vegetables (3 percent), horticultural products (1 percent), oil seeds (3 percent), fish and fish products (5 percent). However, in cases of drought, floods or other natural disasters, the country experiences serious shortage of food due to low production and inadequate storage capability, leading to destruction of the stored food. Consequently, availability as well as accessibility to food is seriously affected.

The National Food Security Division of the Ministry of Agriculture, Food Security and Cooperatives carried out a regular preliminary food crop production forecast survey to ascertain food crop status for 2008-2009 and 2009-2010 and the corresponding availability for 2009-2010

**Table 3: The 2008-2009 and 2009-2010 National Level Preliminary Food Crop Production vs Requirement and Gap/Surplus Analysis for 2009-2010 and 2010-2011, Respectively (in tonnes)**

	Cereals	Non cereals	Total
<b>2008-09</b>			
Production	5,265,309	5,656,227	10,921,536
Requirement	6,578,508	3,999,688	10,578,196
Gap(-)/Surplus(+)	-1,313,199	1,656,539	343,340
<b>2009/10</b>			
Production	7,033,498	5,938,721	12,972,220
Requirement	7,238,319	4,293,898	11,532,217
Gap(-)/Surplus(+)	-204,821	1,644,824	1,440,003

Source: URT, 2009a and URT, 2010a



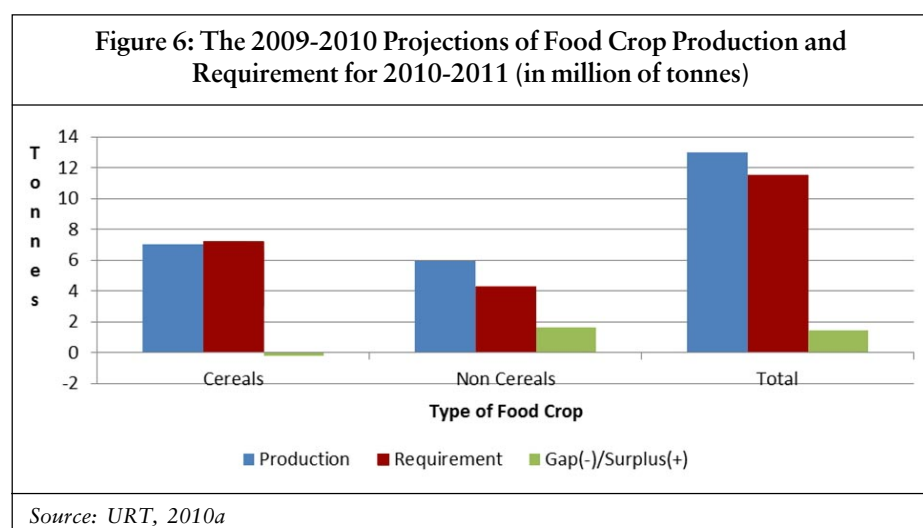
and 2010-2011. A gap/surplus analysis for the respective years was also undertaken. Note that these were the last two surveys carried out by the time this report was prepared. Table 3 presents the findings of the analysis (Figures 5 and 6). As can be depicted from the table, the food crop production for 2008-2009 was 10,921,536 tonnes grain equivalent, while food requirement forecast for 2009-2010 was 10,578,196 tonnes which translates to a food surplus of 343,340 tonnes. However, in terms of cereals and non-cereals, a shortage amounting to 1,313,199 tonnes (20 percent of the total cereal requirement) and surplus amounting to 1,656,539 tonnes (42 percent of the total cereal requirement) respectively, were expected. The net food situation using the 2008-2009 production is such that food self-sufficiency ratio of 103 percent or a surplus of 343,340 tonnes was attained.

The status of production of food crops in 2008-2009 reveals that out of 21 regions in Tanzania mainland, 10 are deficit regions with Self Sufficiency Ratio (SSR) of less than 100 percent; 4 are self-sufficient regions with SSR between 100 and 120 percent; while 7 are surplus regions with

SSR greater than 120 percent. Based on the above findings, it can be said that 48 percent of the country's mainland is food deficit, while 19 percent is self-sufficient and 33 percent is food surplus. The deficit regions are mainly located in the northern part of the country; and the self-sufficient regions are mainly the centrally located regions; while the

surplus regions are mainly located in the southern part of the country. The northern and central parts of the country are most likely to face climate change stressors and where the environment is most sensitive to them. The northern and central agro-ecological zones are the ones that are mostly affected by climate change effects and impacts. This is obviously a major explanation for the food deficits in the area.

Likewise, the food crop production for 2009-2010 was 12,972,220 tonnes grain equivalent, while food requirement projection for 2010-2011 was 11,532,217 tonnes, which translates to a food surplus of 1,440,003 tonnes. In terms of cereals and non-cereals, a shortage amounting to 204,821 tonnes (3 percent of the total cereal requirement), and surplus amounting to



1,644,824 tonnes (38 percent of the total cereal requirement) respectively, were recorded (Table 3). The net food situation using the 2009-2010 production is such that food SSR of 112 percent or a surplus of 1,440,003 tonnes was attained.

The status of food crop production in 2009-2010 reveals that there were 15 food surplus regions in the country, while deficit status was detected in 6 regions namely: Dar es Salaam (5 percent), Arusha (89 percent), Shinyanga (98 percent), Dodoma (98 percent), Mara (99 percent), Mwanza (99 percent). The 15 regions with a positive SSR status are categorised into 8 self-sufficient regions with SSR level of 101-116 percent and 7 surplus regions with SSR levels of 122-153 percent.

It should be noted however that within each category of food status, there are exceptions. For example, within food deficit areas there are some pockets which are food surplus and vice versa. In the southern part of Tanzania (Rukwa, Ruvuma, Mbeya and Iringa regions) for example, there are some cases where the normal pattern is to have one meal a day; while in other areas the normal pattern is to have two meals a day, though a few richer people often manage three

meals. Note that, two meals a day does not necessarily mean hunger and/or food insecurity if the meals are nutritious. There is a big difference between meals which include proteins and vegetables as well as staples, and those which only include staples. In this sense, the number of meals a day (the question asked by most surveys including the 2007 Household Budget Survey) may be less important than the quality of the meal.<sup>5</sup>

Experience from the southern regions food deficit pockets show that nutritional standards are not primary concerns of most households, but rather quantity of food. Two meals a day appears to be a normal and/or common practice in most parts of Tanzania, despite the fact that three meals a day would be preferred. It is a typical village lifestyle that breakfast is either not important or it comes after farm work.

Food insecurity has also been exacerbated by a traditional exploitative lending system in most farming communities of Tanzania, such as the coffee growing regions of Mbeya and Ruvuma among others (Kessy, 2006). In Ruvuma region, Mbinga district for example, the system is locally known as Magoma–Masomba. Poor farmers in

**Table 4: Categories and Causes of Food Insecurity in Tanzania**

S.No.	Category of food security	Causes of food insecurity
1	General causes affecting food availability	Overdependence on rain fed agriculture; inadequate extension agents; low R&D expenditure; lack of farmers education; inadequate transportation infrastructure and high costs; inadequate storage facilities Pre and post-harvest losses; low application of productivity enhancing factors such as fertiliser, improved seeds, mechanical inputs, irrigation infrastructure Poverty Inadequate knowledge on food management
2	General causes affecting stability of accessibility	Inadequate employment and income generating opportunities; poorly developed infrastructure such as roads and storage facilities Culture and traditions; and poor governance
3	General causes affecting food utilisation	Poor health facilities and sanitary conditions Diseases Inadequate knowledge on food preparation, balanced diet and relationship between food and health Reliance on a narrow range of food crops as staple Low level of education Heavy workload

*Source: Extracted from URT, 2004*



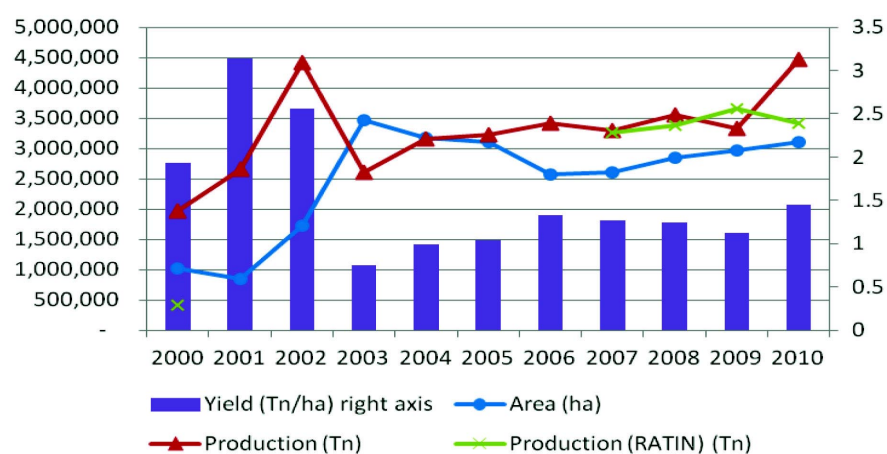
need of cash, farm inputs or livestock borrow from a few rich people who take advantage of the desperate farmers to charge (impose) abnormally high interest rates. This practice is further enriching those that are well-off, while impoverishing the poor. The lending is normally done when there is food shortage, during input application and during coffee buying off-season

when the poor hardly have food and money (between December and June). Just after harvesting and during coffee selling season, normally between July and November, even before the prices for crop products are good, the better-off people harvest from the worse-off what they had lent to them.

This practice creates a vicious circle of poverty among worse-off villagers. First, they borrow cash to solve their social and economic problems, such as taking their sick relatives to hospital, getting food, or starting petty trade. Then, when it comes to repaying the loans in cash or in kind, normally just after they harvest, they have to pay about three times what they borrowed. The poor may remain with too little food to eat until the next harvest, before which they are compelled to borrow again. If a borrower fails to repay in time, some of his/her assets are confiscated or he/she is arraigned in the primary court. This sometimes results in imprisonment. The system has a serious implication in terms of food security.

A comprehensive presentation of the causes of food insecurity in Tanzania has been made by the National Food Security Policy (URT, 2004).<sup>6</sup> Causes of food insecurity in Tanzania are many, and they are grouped into general causes affecting food availability, stability, accessibility and utilisation.

Figure 7: Main Production Figures for Maize in Tanzania (2000-2010)



Source: FAOSTAT and RATIN food balance sheets

Generally, food insecurity is the outcome of the poor performance of the major food crop productivity enhancing factors such as use of fertiliser, improved seeds, mechanical inputs, water for irrigation, poor governance, extension agents, research and development, farmers' education or training. Other factors related to health of the people and a poorly developed infrastructure are the road network, storage infrastructure (silos), ICT, macroeconomic policies, HIV and AIDS, labour shortage, financial services and transportation.

### 2.3.2 Contribution of Various Crops and Sources to Dietary Needs

Tanzania grows a range of food crops. These crops can be categorised into two broad groups, namely traditional food crops and non-traditional food crops. Traditional food crops include maize, paddy, beans, cassava, millet and sorghum, while non-traditional food crops include most of the horticultural food crops such as vegetables and fruits. Owing to their importance and high consumption share for the local population, this section will deal with maize and rice only.

#### a) Maize

Production trend, area under crop and yields for maize in Tanzania for the period 2000-2010 are presented in Figure 7. As it can be noted from the figure, maize production was highest in 2002 with nearly 3.5 million tonnes and has since then

stabilised at around 2.5 million tonnes per annum. With exception of the period 2000 to 2003, area under maize is also more or less stable around 2.0 million ha per annum, while yields fluctuate between 1 and 1.5 tonnes per ha down from an average of nearly 2.5 tonnes during the first three years.

Focusing on the period 2005-2010, maize production accounted for more than 70 percent of the cereal produced in the country. On the basis of the reports by the Ministry of Agriculture, Food Security and Cooperatives (MAFC), more than 20 regions in Tanzania are producing maize annually, mainly white type. The southern regions of Iringa, Rukwa, Ruvuma and Mbeya account for more than 35 percent of the total annual maize production. Surplus production is reported in the southern highlands, while there are deficits in the northern highlands, Dar es Salaam, and central regions. The improvement in the surplus producing areas is a result of the National Maize Project (1974-1979) which provided subsidised agricultural inputs to high potential areas until 1983. Most of these inputs were

distributed in the southern highlands and Arusha region, mostly for maize production. Mbeya and Iringa are the largest producers and account for almost a quarter of the country's maize production. At present, 65 percent of approximately 3 million households in Tanzania grow maize, mainly poor smallholder farmers (average 1.2 ha) who rely on traditional methods of cultivation under a rain-fed regime (ESRF, 2010a).

According to FAOSTAT commodity balances (Table 5), produced maize in Tanzania goes mainly to food consumption with an average waste of 10 percent. Feed represents 17 percent of total maize production. In view of this, maize food availability per capita has been decreasing steadily

Figure 8: Maize Imports and Exports in Tanzania, 2000-2009

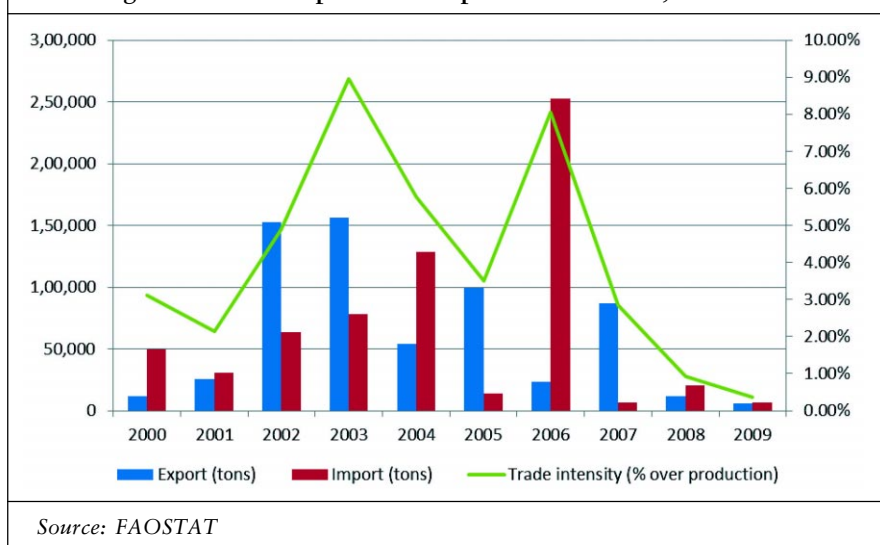
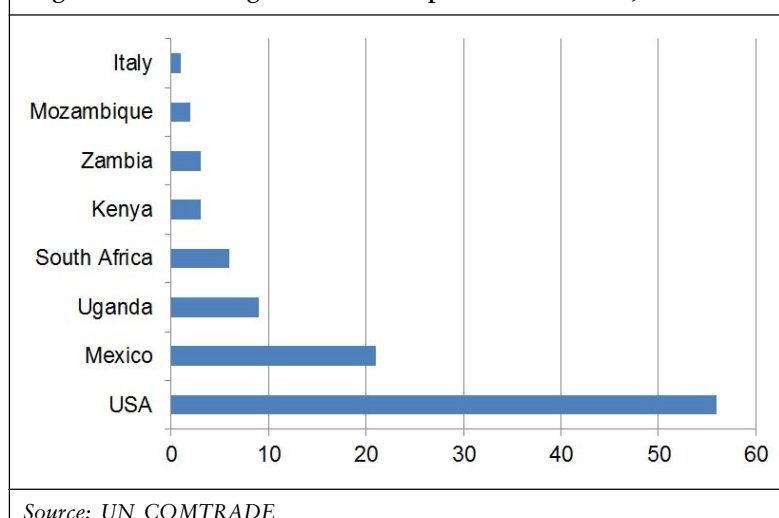


Table 5: Maize Commodity Balance for Tanzania (MT), 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Production (I)	1,965,400	2,652,810	4,408,420	2,613,970	4,651,370	3,131,610	3,423,020	3,659,000
Import Quantity (II)	66,976	94,314	94,704	87,791	221,364	57,128	304,275	19,211
Stock Variation (III)	630,000	-110,000	-800,000	840,000	-1,250,000	500,000	30,000	135,000
Export Quantity (IV)	17,365	29,151	168,588	168,662	53,872	102,639	23,791	88,033
Domestic Supply Quantity (V: I+II+III-IV)	2,645,011	2,607,973	3,534,536	3,373,099	3,568,862	3,586,099	3,733,504	3,725,178
Feed (VI)	100,000	110,000	550,000	540,000	650,000	820,000	870,000	800,000
Seed (VII)	16,919	34,364	69,251	63,461	62,192	60,000	62,000	62,000
Waste (VIII)	143,989	163,186	375,714	275,189	572,941	422,990	423,900	424,499
Processing (IX)	12,189	12,019	12,427	12,386	16,348	12,048	17,569	17,656
Food (X: V-VI-VII-VIII-IX)	2,365,872	2,284,233	2,521,069	2,472,688	2,258,139	2,263,759	2,351,885	2,411,005
Other Util	6,042	4,172	6,075	9,375	9,242	7,302	8,149	10,018

Source: FAOSTAT

**Figure 9: Main Origin of Maize Imports in Tanzania, 2005-2010**



since 2,000 from 70 kg per person per year to 60 kg per person per year in 2007 due to mainly increased use of maize for feed. Note that, the available food stocks have been increasing from year 2000 to year 2007. However, due to population increase over time, the maize food availability per capita has tended to decrease revealing the worsening status of food security in the country.

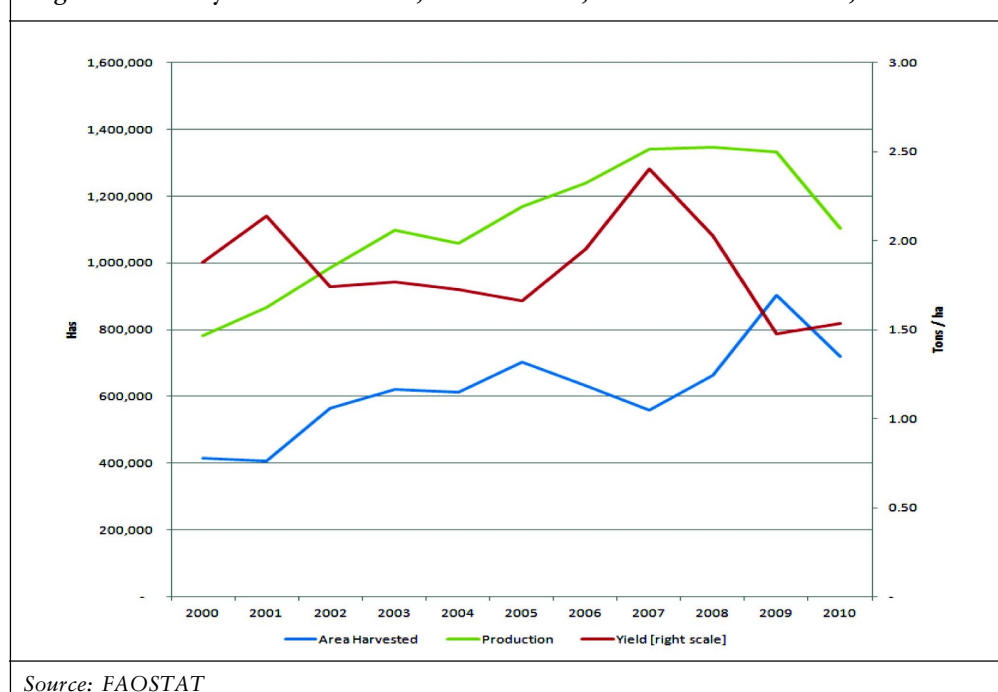
Maize is the main staple food and is consumed by majority of the households in both rural and urban areas. Maize seed usually is processed into flour and mixed with water to make porridge or

*ugali* (stiff porridge). Maize consumption is also accelerated by introduction of school feeding programme whereby maize porridge or stiff porridge is the largest portion of the meal offered to primary school students. The school meal programme offers three types of meals from morning to evening. Apparently, the programme covered more than 1,064 primary schools in the entire country.

During the period from 2000 to 2009, trade intensity averaged 4 percent although there has been a decreasing trend since 2006, thus making trade very thin (Figure 8).<sup>7</sup>

Two major trading partners in maize accounted for over 75 percent of the total imports of maize during the period 2005-2010, that is the USA with a share of 55 percent in total maize imports and Mexico with 21 percent share. Only a small proportion is imported from the partner states of the EAC (12 percent from Uganda and Kenya). As far as exports are concerned, nearly 45 percent of these go to Kenya, and altogether over 55 percent to EAC countries.

**Figure 10: Paddy Rice Production, Area Harvested, and Yield in Tanzania, 2000-2010**



Crops	2002	2003	2004	2005	2006	2007	Average
Cassava	196.77	215.28	172.76	216.06	215.69	234.89	208.575
Maize	627.03	598.81	532.22	519.02	524.31	522.39	553.9633
Rice	179.04	203.69	206.02	207.01	211.1	194.39	200.2083
Wheat	92.42	80.21	95.4	108.91	111.69	123.34	101.995
Sorghum	50.27	34.77	60.11	65.45	62.28	84.67	59.59167
Sweet Potatoes	79.93	34.36	98.88	90.63	86.97	80.03	78.46667
Plantains	29.78	27.22	27.73	27.38	26.62	25.88	27.435
Potatoes	16.09	15.17	28.5	27.71	23.79	22.87	22.355
Average total	158.9163	151.1888	152.7025	157.7713	157.8063	161.0575	156.5737

Source: FAOSTAT

### b) Paddy

Production of rice in Tanzania has been increasing since 2000 (Figure 10). This positive trend has mainly been possible due to expansion in total land under paddy rather than increases in yield, with the exception of 2005 to 2007, when the up scaling of a fertilizer subsidy programme (National Agriculture Input Voucher Scheme-NAIVS) raised yields and production significantly. This growth in yields eventually decreased and total area allocated to rice production once again increased towards the end of the 2007 season. This change was as a result of the decision of many cotton producers to switch from growing cotton to rice production, after experiencing significant losses due to declining world prices. Inadequate land suitable for rice production and knowledge among this new group of producers explains the substantial decline in yields and stagnant growth in rice production that occurred between 2007 and 2009, even while the fertiliser subsidy programme was still in place. In 2010, total rice production fell as yields recovered only slightly and land allocated to rice production dropped to an average figure for the decade.

In the East African context, Tanzania's rice yields are in the low range and are exceeded by those in Rwanda, Kenya and Burundi. Tanzanian rice yields are comparable to those in Uganda or Malawi, but higher than in Mozambique and Zambia (ESRF, 2012b). Note that from 2007, yields in Tanzania have been decreasing in comparison to an overall increase in the other countries in the region. This is mainly attributed

to low adoption of productivity enhancing farm inputs and technologies. In addition, a significant number of farmers still rely on rainfall and traditional seed varieties.

Most of this production is taking place in small village level with traditional irrigation system. Nearly half of the production is concentrated in the regions of Morogoro, Shinyanga, Tabora, Mwanza and Mbeya. Virtually all rice (nearly 99 percent) is grown by smallholder farmers using traditional seed varieties, although some of them are part of large scale rice irrigation schemes that were formerly state managed farms (Minot, 2010 in ESRF 2012b). The trends in paddy production are presented in figure 10. As can be depicted from this figure, production trend has been increasing from 2005 to 2007, but declined marginally in 2008 before picking up again in 2009. The sharp increase in 2009 was attributed to the National Agriculture Input Voucher Scheme (NAIVS), which aimed at increasing access by smallholder farmers to fertiliser and improved seeds.

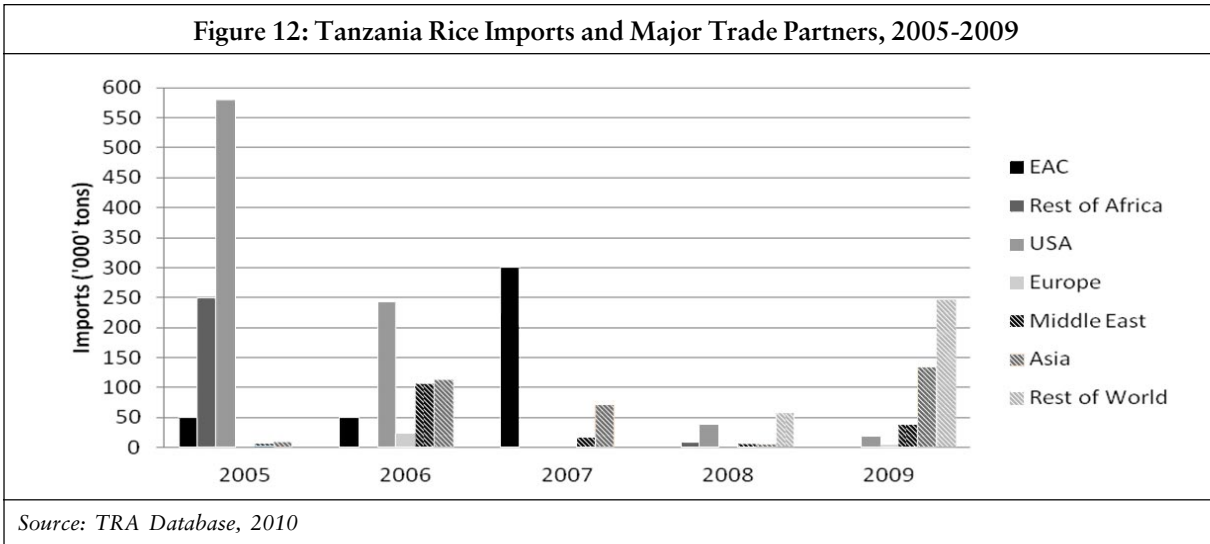
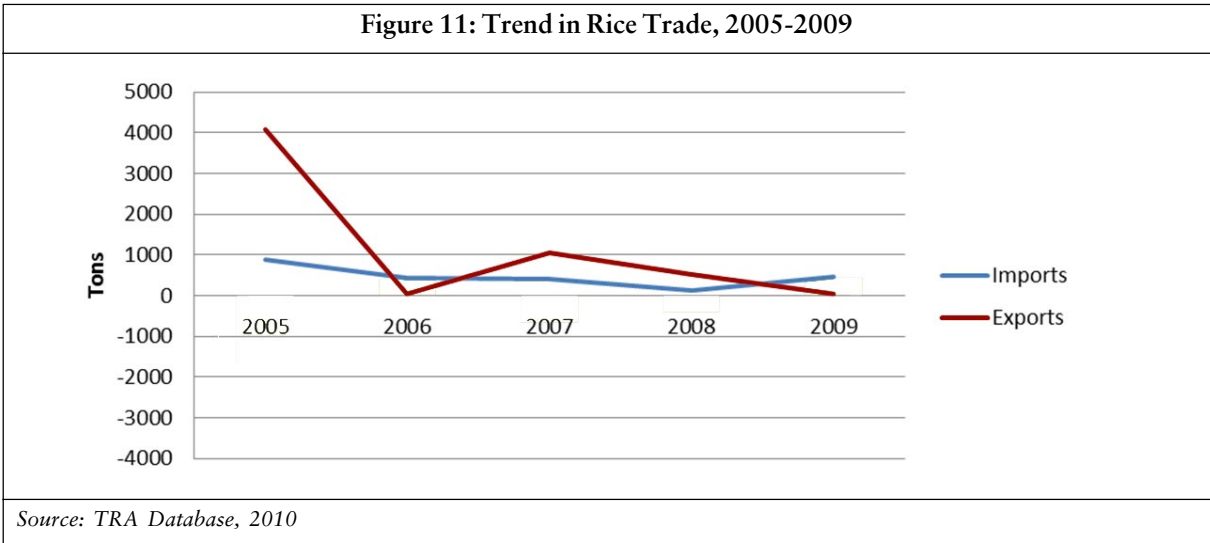
Overall, rice is the third most important crop in terms of quantity consumed in Tanzania (Table 7). The average consumption of rice from 2002 to 2007 is 200 kcal/capita/day compared to 553 kcal/capita/day of maize and 208 kcal/capita/day of cassava. Rice is more important in the diets of high and middle income consumers in urban and rural areas. According to ESRF (2012b) national consumption of rice (based upon a population of forty one million) is 657,000 MT or 81 percent of average production. Rice

consumption in both rural and urban areas is income elastic and it is a preferred cuisine for many households during festival season or social functions. Increased per capita rice consumption has been stimulating both domestic production and increased rice import bills (Minot, 2010 in ESRF 2012b).

The average totals for the eight crops in table seven which range from 151 to 161 kcal/capita/day is a clear indication that the country as a whole is food insecure, as the total calorie intake is less than 1,500 which is a minimum requirement. Overtime, the calorie intake in Tanzania has generally been improving gradually from 159 kcal/capita/day in 2002 to 161 kcal/capita/day, despite the fact that initially between 2002 and 2003 it went down from 159 to 151 Kcal/capita/day.

Tanzania is both an importer and exporter of rice. According to Tanzania Revenue Authority (TRA) data between 2005 and 2009, Tanzania was a net exporter of rice for three years in five years (Figure 11). In case of imports, the US and Kenya accounted for about 53 percent of total rice imports by Tanzania between 2005 and 2009; with the USA having a share of 38 percent followed by Kenya (15 percent). Egypt is another major exporter of rice to Tanzania with a share of 10.9 percent. Imported rice is generally considered inferior to local rice by consumers, thus selling at low prices compared to domestic rice. Domestic rice market is also protected by import tariff of about 75 percent for rice imported from high producing countries in Asia.

In January 2010, Thai A1 Super rice low-quality rice could be imported at a CIF price of US\$ 445/



MT, compared to domestic rice selling in Dar es Salaam at US\$ 750/MT for low grade and US\$970/MT for best quality rice. In a price-sensitive market, local rice would lose out to the imported rice, were it not for the 75 percent duty imposed on imported rice. The import duty raises the price of Thai A1 Super to US\$756/MT and allows the local product to compete. This means that domestic prices are less subject to volatility compared to world prices, but more vulnerable to variation in domestic production.

In the same period, Tanzania share of rice exports to East Africa market was larger than other markets with Kenya being the leading export destination followed by Uganda. Success for Tanzania rice to penetrate East Africa market is accorded to the implementation of Customs Union Market Protocol of the East African Community (EAC), which became effective in July 2011. However, smooth trade between East Africa economies is hampered by the existence of non-tariff barriers to trade and poor trade facilitation infrastructures at border points.

The *ad hoc* food export ban by Tanzanian government, which has been applied during food shortage periods, has increasingly affected flow of food commodities from EAC countries. In 2008 and 2009, Tanzania did not import rice from EAC countries because of bad weather in the region. As a result, most of the rice imports to Tanzania were from the rest of the world.

### 2.3.3. Determinants of Food Security

Food security is determined by a diversity of factors (URT, 2004). These factors range from those affecting production to those affecting consumption and utilisation of food by the body. Most of the determinants such as production, marketing, sanitation, purchasing power, international trade policies, food storage facilities among others, are governed or guided by specific sectoral policies. At household level, subsistence

crop production and household purchasing power are also the important determinants of food security. At this level, the intra-household food distribution among the members is also an important factor.

The achievement of the goal of food security in all countries and for all categories of the population therefore depends mainly on three broad determinants: food availability and stability of supply, economic and social accessibility to food, and food intake and utilisation.

#### a) Food Availability and Stability

The first broad determinant which affects food security is its availability and stability of supply. Food availability and stability depends on local production, ability to import and the efficiency of the distribution systems. Food production in Tanzania faces several problems. The analysis of production performance reveals that production of most of food crops is far below potential levels. Main factors contributing to low production and productivity are: recurrent droughts, which have recently increased both in frequency and severity, low input use including lack of improved planting material for example seeds and inadequate use of fertilizers and pesticides; limited knowledge and therefore low absorption of improved production technology, weak support services (research, extension and credit); degradation of natural resources; and low productivity of labour (RGoZ, 2010 and ESRF, 2010).

Figure 13: Livestock Population: 2001-2010 (millions)

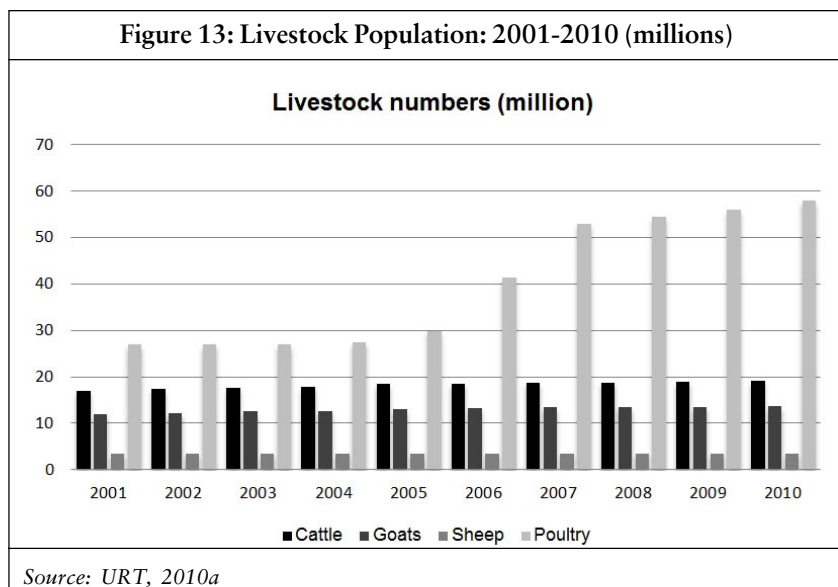


Figure 14: Healthy Livestock in Kagera Region, Tanzania



Source: *Investment Profile for Kagera, 2010*

Other determining factors include high post-harvest losses, limited smallholder's adaptation of improved farming practices, and inadequate capital investments for farm improvements. Given the seasonality in crop production and persistent climate change, investment in expansion of land under irrigated agriculture and water harvesting techniques would be the most reasonable option for stable and higher agricultural productivity. The potential exists to increase both small holder and large scale irrigation.

Although the livestock sector contributes very little to the national income, its performance is encouraging. Livestock population has been increasing over the years despite the fact that since the last livestock census in 1984, there has been no other census conducted (Figure 13).

Overtime, production growth rates have shown a positive trend. However, productivity per head has remained very low. This is attributed among others to inadequate provision of animal health and management services such as availability of quality and affordable animal feeds; an outdated and weak regulatory framework; a poor genetic potential of livestock breeds; weak linkages between producers and markets; and inadequate number of qualified technical personnel, equipment and lack of research facilities. Despite these constraints, the country has significant potential for market-led commercialisation of the livestock sub-sector, driven by domestic urban demand.

#### *b) Economic and Social Accessibility to Food*

The second factor which determines food security is its economic and social accessibility. Apart from the persistent problem of distribution, accessibility to food in Tanzania is also constrained by the inability to buy or produce due to low income generated by most households in the country. The current reform period (liberalisation and privatisation) has witnessed emerging income differentials among Tanzanians; the country has both rich people though in minority, and poor who are in majority. There is also a growing army of urban unemployed, and uncertainty prevails for the smallholder peasants. The poor and unemployed face major problems of food access and remain the most vulnerable to hunger and malnutrition. As the economy becomes more market-oriented, some ways of targeting assistance to such vulnerable groups will have to be found.

For most of the households in Tanzania, food security is achieved through a great expense, in that they use large proportion of their total incomes and/or resources for food. Such households are highly vulnerable or they are at a high risk of becoming food insecure compared to the household using smaller proportion of their incomes (resources) to achieve the same goal. It should also be noted that when there is food shortage, households tend to make more efficient decisions on food purchases and utilisation than when there is food surplus. Poor households who depend on food crops for their income are at greater risk of food insecurity than

those who have alternative sources of income. These are the ones experiencing higher mortality and malnutrition compared to richer households.

#### *c) Food Intake and Utilisation*

This is the third determinant of food security. Five factors determining the adequacy of food intake are: breast feeding in young children, the number of meals per day, the amount of food per meal, the energy and nutrient density of the food consumed, and food safety and utilisation by the body of the energy and other nutrients.

For infant children, breast feeding in the rural areas still remains the traditional form of feeding in Tanzania. It is important that mothers abide to this requirement. Even after the introduction of complementary foods, breast milk continues to play an important role in the child's nutrition. When properly administered, breast feeding can provide up to three quarters of a child's energy and protein needs and a significant portion of these nutrients for some months beyond. Children breast-feeding up to 18 months of age are better nourished than those not breast feeding (Tanzania Food and Nutrition Centre-TFNC).

Eating frequencies in Tanzania are low, on average 2 or 3 times per day (Shephard *et al.*, 2011). The more normal pattern, though, is to have 2 meals a day, and richer people often manage 3. As indicated above, two meals a day do not necessarily mean hunger, if the meals are nutritious. In urban families, snacks may be consumed, but this is rare in rural families. Because of their dietary requirement, children unlike adults need to eat more frequently, in order to meet their daily energy needs. The feeding frequencies for children in Tanzania is low, averaging about only twice per day. Also the amount of food per meal in relation to what the child can eat is low.

#### *d) International Trade*

Governments are committed to achieving world food security, as witnessed by the declaration of the G8 in Aquila and the declaration of the World Food Summit. There is an international consensus on four actions to achieve this, namely:

- Supporting investment in agriculture in developing countries;
- Supporting research and development in order to improve agricultural production;
- Encouraging land-use governance which is responsible and sustainable, providing a framework in which investments should be made;
- Addressing the issue of the volatility of agricultural and primary product markets.

The World Trade Organisation (WTO) is able to deal with food-security agenda through different ways. For example, there are several articles in the WTO which could be built upon, they include Article XX. h and Article XXXVIII on international commodity agreements, Article 12 of the GATT on export restrictions, and Annex 2 of the Agreement on Agriculture on holding food security stocks.

There is a need for greater coherence among the different institutions involved in the global governance of agriculture. We probably need an international Agricultural Stability Forum.

#### **2.3.4 Value Addition in the National Food Sectors**

Agro-processing and value addition are important activities for agricultural development and poverty reduction. The level of agro-processing infrastructure in Tanzania is very low. As a result, Tanzania is exporting unprocessed agriculture and livestock products, while existing agro-processing industry cannot meet domestic demand. The low capacity in agro-processing is one of the main reasons for high post-harvest losses, occurring equally in crop husbandry, animal husbandry as well as fisheries.

It is currently estimated that 30 percent and 70 percent of output of cereals, and fruits and vegetables, respectively, is lost after the post-harvest due to inadequate agro-processing facilities. Agro-processing activities can generate additional income and employment in rural areas. They also have strong forward linkages. Agro-processing will also add value to the export of agricultural products, thus enabling the country to earn more foreign exchange.



While there have been noticeable investments in processing of livestock products, low investments especially in dairy industries, the rural road network and poor conditions of the existing infrastructure remain the main factors limiting further development of the livestock processing industry.

More funding for investment in physical infrastructure, such as feeder roads and electricity in rural areas, will be needed in order to attract private investment in agro-processing activities. Some value addition that can take place

at the level of the farm will require better adapted extension services as well as farmers training. Lack of value addition is a major bottleneck to smallholders from getting higher prices from their efforts. The problem is directly linked with extension service delivery, where value addition is usually not part of extension staff curriculum, hence not included in the extension package delivered to the farmers. Extension approaches are skewed towards increasing production and less on assisting farmers to achieve basic value addition at farm level.

**Box 1: Case Study of Successful Food Processing Plant in Tanzania: BAKHRESA group**

Bakhresa group is one of the leading industrial houses in Tanzania and East Africa. This group was established in a humble manner with a small restaurant in the Port City of Dar es Salaam, Tanzania, in mid 1970s. The group has now emerged as a respected business group in the country as well as the Eastern African region. Bakhresa Group has its operations spread in different countries including Tanzania, Zanzibar, Uganda, Kenya, Malawi, Zambia, Mozambique, DRC and most recently Rwanda and Burundi. Plans are in place to spread to other countries.

The group now boasts of a turnover of more than US\$300mn and is a proud employer of more than two thousand employees associated directly. There are several companies under its umbrella and have investments mainly in food and beverage sector, packaging, logistics and real estate. Food products from the company include grain flour (maize flour brand and wheat flour brand); and bakery (biscuits over twenty flavours, bread and cakes). Other food products are ice cream with over 25 flavours in various sizes; fruit juices with over 5 flavours in various sizes; and bottled water in sizes varying from 350 ml to 12 litre bottle.

Apart from food products, Bakhresa Group also provides other services such as specialty packing, petroleum, recycling, logistics and transport, telecommunications as well as real estate services. Bakhresa Group has also created a wide network of micro and small-scale processors who sell their raw materials to Bakhresa. The group has therefore created a reliable and stable market for many micro and small-scale processors in the country. There are allegations however that since Bakhresa is almost a monopoly, there is a tendency to suppress producer prices and dictate terms, thus making it difficult for micro and small scale food processors to compete in the market.

## Chapter 3

# Missing Links, Real Impacts

## *Interface between Climate Change, Food Security and Trade*

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### 3.1. Climate Change and Food Security

Tanzania has 44 million ha of arable land with a wide agro-ecological base. There are nine major agro-ecological zones supporting diverse farming systems from the coastal plains to the highlands of northern and southern plains. Despite the availability of land and a number of abundant water bodies including lakes and rivers, Tanzania's agricultural productivity is still low by international standards. The agricultural production systems are dominated by small scale subsistence farming with less than 10 ha accounting for 80 percent, while medium (10–100 ha) and large scale farming (more than 100 ha) account for 15 and 5 percent respectively.

#### 3.1.1 National Food Security Challenges Related to Climate Change

According to recent preliminary official estimates from a National Sample Census of Agriculture and Livestock Report of 2011, agriculture accounts for about 25 percent of country's GDP; 30 percent of exports; employs about 76 percent of the country's workforce, of which most live in rural areas and their main pre-occupation is agriculture.

Events that have occurred in the food sub-sector in Tanzania in the last three decades indicate that there is a correlation between the bio-physical variations originating from climate change effects and socio-economic variations taking place in food supply chains. The areas suitable for food production, water levels and soil fertility,

salinity levels, planting seasons, the length of growing seasons and productivities, have been fluctuating with an overall downward trend due to variations in rainfall patterns and incidences of drought in semi-arid areas that were not seen before 1960s (Bamwenda, 2008). Such changes in turn affect the food security systems, and community and family income, and recently the trade in food products in the region. Until now, the observed impacts have been negative, with increasing vulnerabilities and suffering to people and livestock.

Responses from the field survey are testimony to this assertion. Unlike in the past, over time water resource in Njombe region has been in short supply mainly because of increasing agricultural activities taking place around water sources and sloppy land. Water drainage has been disrupted and water for domestic use as well as for irrigation is currently scarce. Most of the wetlands (*vinyungu*), which were very rich in agriculture in the past, have dried up due to intensive agriculture activities taking place in such areas, where the wetland water is used excessively for irrigation.

Linogoka village in Njombe district council and Mkolongo village in Makambako town council are good examples of some communities in Njombe region, where wetlands have completely dried up following intensive use of water from the wetland for irrigation. Kibena Tea Estate for example is said to be responsible for the

disappearance of wetlands in Linogoka village. Production of horticulture crops such as vegetables and fruits has therefore been adversely affected.

Likewise, changes in climate variability in Njombe region have been significant for agricultural as well as the health conditions in the area. The poor have particularly been sensitive to changes in the agriculture and health conditions because majority of the poor rely either directly or indirectly on agriculture for their livelihood, and because given their low-income levels, they are more vulnerable to epidemics such as malaria.

The past 20 to 25 years, Njombe region was cloudy with continuous precipitation beyond the rainy season. Rainfall was reliable and its distribution was suitable and appropriate for agriculture. Sunshine was not a common phenomenon. Today the situation has changed completely. Precipitation and fog is short term and sunshine as well as clear cloud is becoming dominant. The temperature has changed, it is now warmer than before. Following intensive and growing deforestation in the country, there is very limited rainfall. Rainfall distribution and intensity has changed completely which affects crop production and therefore food security status.

Among the areas affected by drought in Njombe district, due to shortage of rainfall, include Saja, Wanging'ombe and Ilembula wards. Deforestation is partly an outcome of bush fire, where fire is caused by economic activities performed by people like bee keeping and honey harvesting in the effort to diversify. In some cases, irresponsible individuals through cooking in the bush and throwing burning cigarette pieces haphazardly have deliberately caused fire.

The following are some success stories in Arusha region in tackling climate change effects on food systems and trade of food products: (i) raising potted tree seedlings for sale; (ii) changing feeding habits for example switching from maize to sorghum (drought resistant crop); and (iii) assisting in securing alternative sources of energy,

for instance solar and biogas. This can be facilitated through access to credit to the communities or joint partnerships with the government or development partners.

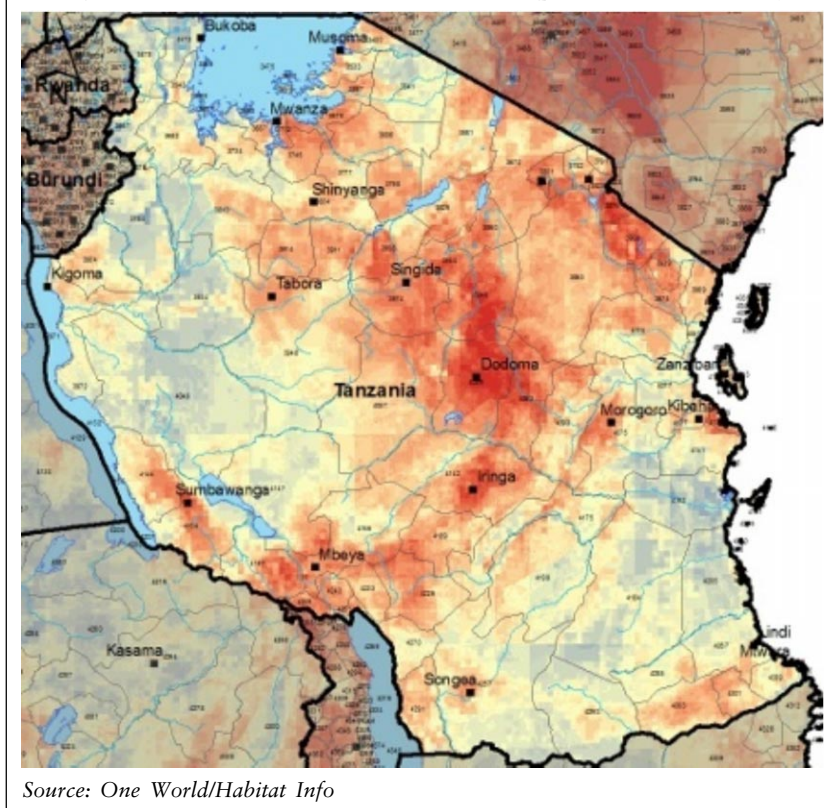
Figure 15 shows climate related potential problem areas in Tanzania. This map was derived from the Regional Climate Change Programme's Current Risk and Vulnerability Hotspot Analysis. In this map, red areas represent areas where people are most likely to face climate change stressors and where the environment is most sensitive to them, while the blue areas define centres of resilience. As seen, the northern and central agro-ecological zones are the ones that are going to be mostly affected by climate change effects and impacts. The major concern is that these effects are going to extend to major grain producing regions of the southern highlands agro-ecological areas.

In a stakeholder survey conducted in the Iringa and Mbeya belt (producing about 25 percent of national total maize production), the farmers are of the view that their areas have been experiencing shifting rainfall seasons, significant warming in comparison to forty years ago, maize and tea yields and outputs fluctuations, and slowed increase of total beans and Irish potatoes output due to late or inadequate rains (Bamwenda and Roshan, 2012).

For example, the La-Niña event of 1996-1997 and 1997-1998 El Niño event that were responsible for the severe drought that occurred in most parts of Tanzania resulted in the yield fall in maize in Mbeya by 47 percent and Iringa by 30 percent, and a decline of 18.8 percent at the national level. This led to deficit of maize in Tanzania, leading to a national food crisis (given that maize is the main staple food in Tanzania) and importation of about one million tonnes of maize for the two seasons (Bamwenda, 2008, MAFC Statistics Unit, 2008).

Erratic rains also resulted in the fall in maize yields in Mbeya from 2.29 tonnes/ha in 2001-2002 to 1.24 tonnes/ha in 2002-03. The yield, however, rose again to 1.80 tonnes/ha when rainfall normalised in 2003-2004. A similar trend

Figure 15: Problem Areas in Tanzania: Exposure and Sensitivity



average yields of between 1.2–2 tonnes per ha, generating 4-5 million tonnes per annum. About 85 percent of Tanzania’s population depends on it as an income generating commodity. It is estimated that the annual per capita consumption of maize in Tanzania is over 115 kg; national consumption is projected to be 3-4 million tonnes per year (MAFC Statistics Unit, 2012).

Rice is another important grain consumed particularly in the urban and rice growing rural areas. Annual paddy production is about 0.89 million tonnes. Rice and wheat consumption are more important in the diets of high income consumers in urban areas, partly due to the fact that they are more

in yields was observed for the Iringa region (315,420 tonnes harvested over 121,300 ha in 2000/2001 and only 265,950 tonnes over 253,900 ha in 2002-2003. These observations are also reflected in the variation of agricultural and GDP growth in Figure 16.

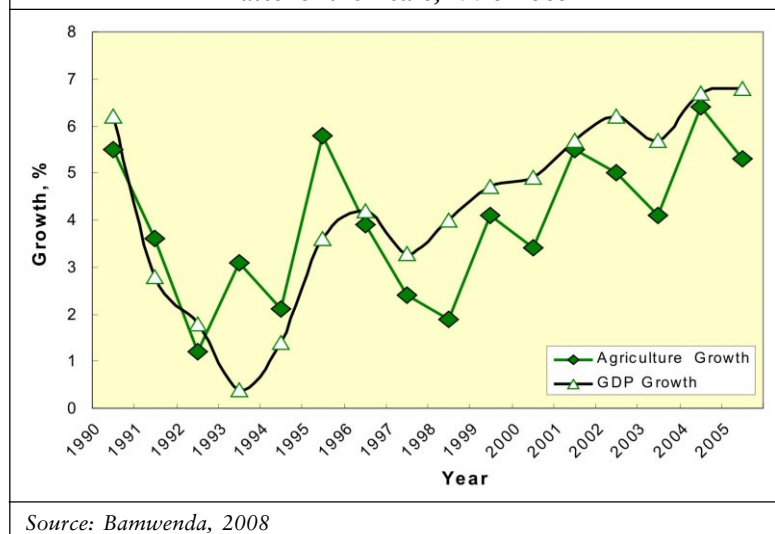
Maize, cassava, potatoes, and sorghum are important staples in both urban and rural areas. Maize is the staple food of 28 million people in Tanzania (Marketing Development Bureau, 1997).

In the last decade, maize in particular has shown a steady growth rate of 2.5 percent per annum and through the year 2010, at a population growth of rate of 2.8 percent. Food self-sufficiency analysis at a national level shows that production in the past few financial years have never experienced any major deficit though some years record greater production than requirements and in extreme circumstances, a slight deficit is also recorded. About 2 million ha of maize are planted per year in Tanzania with

expensive sources of calories than maize and cassava. Small quantities of maize were imported in some years in the past to supplement the local production, whereas significant quantities of rice and wheat are imported every year, about 50,000 tonnes each. In summary, the yields and volumes, to a large extent, depend on the quantities and distribution of rainfall.

The Municipal Nutritionist gave a very thorough explanation on spread and increase of diseases as a result of climate change. She, including other respondents, declares that spread of diseases is also a serious effect of climate change. However, she stated that stunted growth in Dodoma is at 56.6 percent of all births in the region, the second from the bottom in the country after Lindi region. This is caused by improper infant feeding done by many mothers during the first 1,000 days since the zygote is formed inside a mother’s womb. Moreover, other respondents said that there were serious cases of coughs, extreme diarrhoea, eye diseases only to mention a few.

**Figure 16: The Agriculture and GDP Growth Rates for the Years, 1990-2005**



Therefore, fluctuations of food production with weather phenomena such as La-Niña and El Niño events may distort food markets, affect the food security, income for farmers, and revenue streams and growth of food supply chain actors. A typical example is that it makes it difficult for farmers, suppliers and buyers to make predictions and plan accordingly.

### 3.1.2 Impact of the Present Tanzania Food Systems on Climate Change

Food production in Tanzania, which is largely limited to small scale family farming on 1-3 ha, is one of the most sensitive sectors to climate change. Food production, especially grain, tubers, pulses, and banana production, is directly related to household and social stability and well-being. The varying rainfall trends affect most of Tanzania's major crops because of the pre-existing water shortage, varying growth and output fluctuation (Bamwenda and Roshan, 2011). Over the past 20 years, most parts of Tanzania have shown signs of significant rainfall variations that resulted in fluctuating food production. From 1970 to 2010, the southern, western, lake zone and north eastern regions have seen an overall increase of total food output due to lower variations in the rainfall with time. The north, and central regions, which are increasingly becoming semi-arid, have experienced slowed increase of total grain output and have seen even greater negative effect on food production caused by the rainfall conditions due to climate change.

According to the current potential of Tanzania's agricultural production, it is estimated that food production will have to meet current demand of 10-15 million tonnes as the population peaks at fifty million people in 2020, but climate change may increase the difficulties of achieving this goal. Climate change has brought additional pressure on Tanzania's agriculture and food production. It is estimated that if the current pattern of agricultural production remains unchanged, passively and fully accepting the adverse effects of climate change, then in 2050, Tanzania will face a short supply of food to feed its ninety million people, which will pose serious challenges to the sustainable development of the country.

Food production activities in Tanzania impact on climate by mainly changing the atmosphere's composition and the land surface. The present food systems that impact on climate change are:

- Change in land use for example from dense forest cover to scanty/periodic agricultural establishments, that is shifting cultivation and slash and burn practices for clearing vegetation adding carbon dioxide and nitrous oxide to the atmosphere;
- Potential additional deforestation may result from the shift from mixed cropping to mono-cropping by clearing trees that absorb carbon dioxide (CO<sub>2</sub>) for establishing large scale grain farms in growth corridors. Forests absorb about 20 percent of the total CO<sub>2</sub> produced globally. So any cutting of trees undoubtedly leads to accumulation of CO<sub>2</sub> in the sky. On the other hand, CO<sub>2</sub> trapped by forests is utilised during photosynthesis, and the other is locked in stems, logs, twigs and foliage;
- Tanzania has 19.1 million cattle, 13.6 million goats, 3.6 million sheep, 1.2 million pigs, and 30 million chicken (Ministry of Livestock and Fisheries Development, 2011). Livestock emit methane gas, a greenhouse gas;

- Overgrazing;
- Migrating pastoralists clearing vegetation in new settlements to control tsetse flies;
- Burning fossil fuels such as wood fuel, oil and coal and natural gas in the near future, to supply energy to run engines for transport, and processing facilities, food industries, and to generate power adding carbon dioxide and absorptive particulates (soot);
- Expansion of rice cultivation generating methane;
- Food production near water catchment areas; and
- Land clearing to create new farm settlements.

All these activities emit carbon dioxide, methane, and nitrous oxide the most important greenhouse gases. However, its magnitude is insignificant when compared to developed economies' emissions. Therefore, there is need to change and improve agricultural practices to reduce emissions of greenhouse gases and build up soil carbon.

### 3.1.3 Impacts of Droughts on Livestock Numbers in Tanzania: Case of Longido District

Like countries in the Horn of Africa, Tanzania has been facing a persistent and prolonged drought. In the northeast where most of the livestock keepers are traditional nomadic herdsman, there has been extreme drought for several years. According to Trias (2011), an NGO which has been supporting pastoralist in the area in cooperation with local initiatives, pastoralists in the northeast of Tanzania have lost 62 percent of their livestock during the past few years due to the prolonged drought. Longido district is one of the hard hit areas with losses of up to 80 percent in some villages. In 2010, not a single drop of rain fell. Livestock is by far the most important asset of the majority of the people, especially in the northern hemisphere of Tanzania where livestock keeping is an important economic activity. The vast importance of livestock breeding makes the population highly vulnerable, due to the fact that livestock keeping stands to be the only income generating economic activity. Pastoralists in Tanzania have

subsequently been encouraged to tap as many different income sources as possible (diversification).

The responses to the advocacy and encouragement to diversify show that these days the herdsman sell their livestock in Longido in order to buy food, such as corn and grain, with the proceeds and store it. They use the stored produce to support themselves, but they also sell it when market prices are favourable. With the proceeds, they can eventually buy new livestock when the drought is over. The storing of food, which is somewhat against the traditions of the nomadic people, helps them get through periods of drought (Trias, 2011). Another challenge brought about by prolonged drought in Longido is the lack of water for man and livestock. Indigenous people in this area subsequently build little reservoirs to store water. An old pipeline system which has been under repair transports water from the mountains to the various villages in order to secure a constant supply of water, for both the population and the livestock.

To support the people in Longido district, Trias has also developed a sophisticated early warning system which gathers climate-related information throughout the year, with the aid of modern scientific and indigenous indicators. With the system's readings, both the herdsman and the government can take timely measures to prevent the worst consequences of drought in the area. The NGO is also developing a plan with the Maasai and the government to use the land resources in a more sustainable way by, for example, protecting water sources, forests, grazing areas, agricultural areas, and areas reserved for tourism and living. These initiatives are part of a broad strategy to reduce the drought's impact in the future and to enable the Maasai to better arm themselves against drought.

### 3.1.4 The Climate Change-Food Security Policy Interface

Climate change poses a serious risk to on-going poverty reduction efforts and threatens to reverse decades of development efforts. It affects different sectors at different levels and is thus poised to undermine national efforts to attain

both the national objectives as well as Millennium Development Goals (MDGs) including food security. The impacts of climate change are, and will continue to be, more pronounced in poor countries (Stern, 2009 and URT, 2007a), even though these countries have contributed the least to the problem and are the ones least able to cope with the impacts.

Changes in climate variability are likely to be particularly significant for agricultural as well as the health sector. The poor are particularly sensitive to changes in the agriculture and health operations and performance because the majority of the poor rely either directly or indirectly on agriculture for their livelihood, and because given their low income levels, they are more vulnerable to drought and therefore hunger.

Following all these challenges, the government and its development partners have scaled up attention on environmental problems, among others. A number of measures have been taken afterwards in response to environmental threats. The National Adaptation Plan for Action (NAPA) has been formulated and adopted where it clearly recognises that Tanzania's economic base is dependent on the use of natural resources, rain fed agriculture and biomass for household energy.

The NAPA document also points out that climate change adaptation in the agriculture sector has huge potentials for avoiding food shortage in the country (URT, 2007a). Due to the recognition of the seriousness of the impacts posed by climate change, the government initially identified 72 project activities of which 11 were agricultural. It is therefore evident that NAPA can make a huge difference to effectively address food security issues in the country.

Recently, The Tanzania National Business Council (TNBC), under its Chairman, and President of the United Republic of Tanzania deliberated on the policies and strategies for the transformation of Tanzania's agriculture under the theme '*Kilimo Kwanza*'<sup>8</sup> and its implementation. It was resolved that the government, in collaboration with the private

sector embarks on *Kilimo Kwanza's* Tanzania Green Revolution to transform its agriculture into a modern and commercial sector. This resolution is meant to compliment the Agricultural Sector Development Programme (ASDP), which is being implemented by the government by collaborating closely with the private sector in realising the goals and targets set in the Agricultural Sector Development Programme (ASDP), which largely include food security. *Kilimo Kwanza* is another national policy framework that provides an opportunity in addressing most of the challenges related to food security in Tanzania.

A number of other national policy frameworks provide opportunities to effectively address food security issues in Tanzania. They include, the Agricultural and Livestock Policy 1997; National Health Policy (NHP) 1990; National Environmental Policy 1997; Tourism Policy and Regulatory Framework 1999; and the Wildlife Policy 1998. Others are Forest Policy and Regulatory Framework 1998; National Water Policy (NAWAP) 2002; Water Sector Development Strategy; and the Water Sector Development Programme.

One of the key problems is the fact that there is a huge gap or mismatch between what is stated in the government official documents such as government policies, strategies, legislations or regulations, on one side, and the practice on the ground. For example, the agricultural market liberalisation policy states very clearly that the government will gradually withdraw from the direct participation in productive activities and service provisions. It will remain as a regulator mainly focusing on policies and monitoring. It is now a facilitator who is also entrusted to ensure a fair game in the economy. The private sector is now mandated to take a leading role in such critical activities. The government has the obligation to make interventions whenever unfair games or distortions occur.

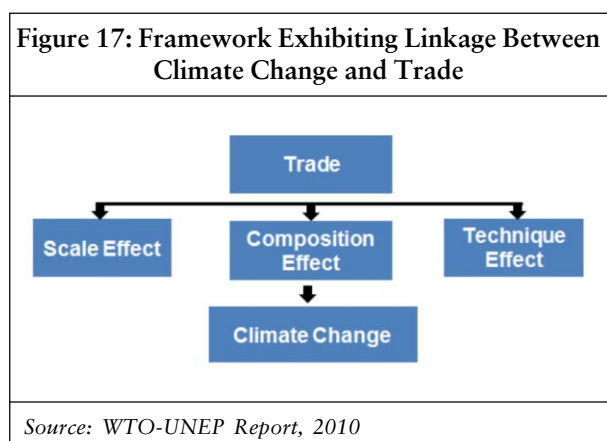
However, in practice, the situation is different. The roles assigned to both private players and the government are missing, and in some areas they are far below the prevailing demand, which

has tended to affect the sector negatively. Most of the periphery agricultural producers are not served by farm inputs and marketing under the current marketing policy. This is only one example. However, there are many other examples that can validate the claim. It should therefore be noted that this is a serious mismatch which needs urgent attention and intervention if food security is to be addressed adequately in Tanzania.

### 3.2. Trade and Climate Change

Tanzania's Trade Policy came into effect as of 2003, whereas policy regarding adaptation to climate change came into force as of 2007. This implies an existing gap in terms of the two components, that is Tanzania's trade policy and the country's strategies for improving trade are not directly linked to the climate change issues which, as a result, leave aside an important component which has a great impact on the trading issues within and outside the country. In order to address the climate change issues effectively, trade and investment opportunities must be channelled towards innovations and technologies that are friendly to climate change.

Considering the time gap between trade and climate change policies, Figure 17 can lead to a framework to be observed to realise an effective control on climate change conditions, while at the same time improving on the trade issues within the country.



The conceptual framework shows how climate change can affect the levels of trade in Tanzania as well as in any other country. Through trade expansion that the world has experienced in the

past few years, developing countries' participation in international trade has increased to 34 percent of merchandised trade, double of their share in 1960s. In this respect, such expansion of trade, results in three impacts that directly affect climate change aspects:

- The *scale effect* is simply a result of expansion of economic activities due to trade opening and its effect on green gas emissions. The increased level of economic activities would thus require greater use of energy, which in the end leads to higher greenhouse gas emissions.
- The *composition effect* is the way a country changes its production as a result of trade openings. In most cases, this effect results to the pollution heaven hypothesis whereby high emission industries relocate to countries with less harsh emission regulation policies.
- The *technique effect* originates from the improvements made in the methods of producing goods and services.

Considering the three types of effects, effective policies addressing trade and climate change issues have to take into consideration all the three possible effects. Mitigation measures and strategies which need to be adopted should find a balance between these effects and the crucial issues around trade and climate change.

#### 3.2.1 Climate Change Impacts on Trade Flows and Stocks of Maize in Tanzania

Kenya's staple crop is maize and is consumed by 90 percent Kenyans. In the year 2001/2002, there was inadequate and erratic rainfall in central and south eastern Kenya. This led to late start of the season, and there was below normal production of maize in Kenya, resulting to a high demand for maize and beans for local consumption and milling. On the other hand, in that season, there was adequate rainfall in major maize producing regions of southern and southern highlands of Tanzania, and Tanzania produced more than enough maize and beans to meet the demand of its people and had surplus.

Maize from southern regions of Tanzania started to flow into Kenya and attracted better prices



than in Tanzania. Cross border trade of maize and flow of beans into the Kenyan market flourished. At the same period, Tanzania started to face declining stocks and food crop deficit of about 350,000 tonnes in the central, northern and some eastern regions due to extended droughts, and the government started putting in place measures to control food shortages including a ban on export of unprocessed grains. Even with the ban, maize trade to Kenya increased due to the inability of government to monitor the long border. With intensification of road blocks monitoring, trade shifted from official border posts to many informal channels, and trading costs increased due to facilitation costs and use of low tonnage trucks. Nonetheless, returns to trade were still attractive even after covering these costs.

Maize from southern, central and northern regions of Tunduma, Mbeya, Iringa, Arusha, Kibaigwa continued to flow into Kenya at a rate of 880-1,000 tonnes a day, through Kilimanjaro and Tanga regions. Maize was also flowing out through north western Mara region. The wholesale price of maize in Mbeya was around Tsh 9500/120 kg/bag. However, high demand in Kenya inflated prices in markets on either side of the Kenya/Tanzania border to above Tsh 20,000/bag, attracting increasing quantities of Zambian and Malawian maize through Tunduma into southern Tanzania.

As for beans, they flowed from Arusha, Singida, Kibaigwa and Mbeya reaching Nairobi at Ksh 2,500/90 kg bag and Ksh 1,950/90 kg bag in Mombasa. Beans from the north western region of Kagera region reached Busia and Kisumu.

Of interest is the fact that even trans-boundary trade barriers, for instance certification and quality standards, were lowered. Maize with high moisture content (above 10 percent) was also traded, but it attracted lower prices.

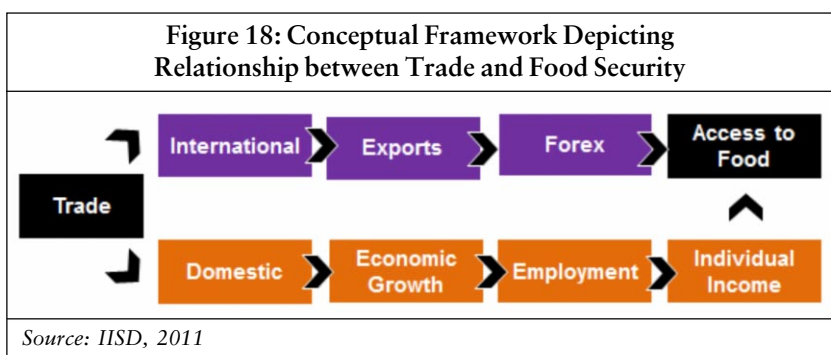
A similar pattern was repeated in 2008 and 2011. In 2008, Kenya imported 200,000 MT of maize worth over US\$90mn from Uganda to avert a then looming food crisis. In 2011, due to low

production of maize and looming hunger, especially northern Kenya, the country had a shortfall of 700,000 bags of maize and had to import it in a bid to ensure Kenya's food security. The official and unofficial flow of maize from Tanzania to Kenya started again. On May 05, 2011, the Tanzanian government, through a gazette notice, banned its maize export to other countries. The move was intended to stabilise the maize prices and ensure food security in Tanzania.

However, the ban caused unintended price distortion in the market (the farm gate prices of maize for example, remained relatively low in Tanzania, whereas the prices of maize in the Kenya were quite high), post-harvest losses and increased cost of storage to the Tanzanian farmers (damaging the farmers' future morale to increase maize production). For example, the ban on maize export led to a 30 percent fall in maize price from Tsh 45,000 to Tsh 30,000 per 100 kg bag. The ban also prompted unscrupulous traders to resort to '*panya*' (illegal) routes and evade the customs authorities at the border points in order to gain access to the lucrative maize market in Kenya.

Following the ban, the farmers and traders complained for missing the opportunity to sell their produce at high prices in Kenya. Other neighbouring countries complained of Tanzania interfering with free trade in the region. The ban was later lifted at the end of 2011 following requests from grain stakeholders in Tanzania and authorities in neighbouring countries. The maize flow from Tanzania to Kenya is now continuous and it is putting pressure on price of normal quality maize flour (Sembe) in Tanzania from Tsh 700/kg in December 2010 to Tsh 1,200/kg in April 2012. The maize price fluctuation (in most cases arising from speculations in the markets) and rising flour prices are leading to hardships and may have far reaching consequences, such as draining on savings, and falling standards of living resulting from rising expenditures and stagnant incomes. Other effects include health and sanitation vulnerabilities, as well as declining economic well-being of families.

Figure 18: Conceptual Framework Depicting Relationship between Trade and Food Security



The natural forest is almost getting extinguished due to the human activities. It is said that natural forests have more use value than exotic trees. One tree species which is becoming extinct is locally known as *misana*. This tree has multiple uses such as traditional medicine and weather forecasting. Most of the wild

animals used to be a source of protein. Thus, change in biodiversity is one of the factors affecting food security in Njombe district.

### 3.2.2. Potential Benefits of Climate Change on Tanzania's Food Production Systems

The potential benefit from climate change on Tanzania's food production system is that the country still has ample areas in the southern, western and lake zones with low risk, vulnerability hotspots and high climate change adaptive capacities. Thus, Tanzania has potential to be one of the leading food producers in the region. It should strengthen its comparative advantage in food production and strategically be better placed to increase the food supply in the region by strengthening its grains supply chain. Tanzania can actually produce food at a lower opportunity cost than other regional states and sell it at prices that are more competitive.

To achieve the above, recently the government established the Cereals and Other Produce Board (CPB) through the Cereals and Other Produce Act No. 19 of 2009 for development, promotion, and marketing of, among other things, grains and other agricultural produce. The legal framework of the CPB provides mechanisms to promote production, processing and marketing of cereals and other produce. It also provides mechanisms to enhance competition through buying and selling of cereals and other produce. The other functions of the CPB are to purchase and sell cereals and other produce at a competitive price; import or export cereals and other produce; provide warehousing services for cereals and other produce; and provide grain and other services such as cleaning, drying, weighing,

Another evidence of climate change–trade linkage can be drawn from the experience of Njombe region. Following the changes in climate, biodiversity has been altered significantly in the region. There has been loss of vegetation and/or deforestation in areas where Njombe district used to have plenty of green vegetation. This problem is mainly due to expanding agricultural activities as farmers clear more land for farming. In addition, the growing trade in logging, timber, charcoal and other wood products is probably the major motivation for trade. Massive trade in forest products is taking place between Njombe and other markets within Tanzania such as Dar-es-Salaam, Arusha, Dodoma and Morogoro. Furthermore, many traders mainly from Kenya buy timber and logs in Njombe for export. The traffic has been growing with time owing to the attractive prices in both domestic and export markets. It is reported that while farmers used to sell trees with 10 years of age and above in the past (some 20 to 30 years), today trees are sold and cut haphazardly. Even those stocks of trees that are under ten years of age are sold and cut for the domestic as well as export markets. Unless strategic measures are taken, the current trend of charcoal and timber harvesting threatens the sustainability of the ecosystem.

Likewise, a good number of species of plants, birds, animals and insects have also disappeared following the change in climate and loss of habitat. Some of the bird species which are said to have disappeared in local names are *nzalalikoko*, very famous for predicting the rainfall season through their unique songs, and *dudumizi*, also used for traditional weather forecasting.

grading and packaging according to market standards.

### 3.3. Food Security and Trade

#### 3.3.1. Relationship between Trade and Food Security in Tanzania

Figure 18 provides a clear understanding of how trade and food security relate to each other. According to Policy Report 2 by IISD (2010) on trade and foreign security, when a country exports its commodities, it receives foreign exchange which in turn can be used to purchase food in the international market. However, domestically, trade within the country helps to stimulate the economy through employment creation, which in turn enables people to earn their own income that would be used to purchase food for their own consumption.

Thus, if trade policies are set in ways that promote export of commodities from a given country, the foreign exchange earned would help in purchasing food from other countries in time of food shortage, thus playing a major role in promoting food security in the country.

#### 3.3.2. Contribution of Trade to Food Security in Tanzania

In order to achieve food security through regional trade, there are three prerequisites that have to be fulfilled. A food surplus region and a food deficit region must exist; complementarity between what is produced and consumed in both regions; and a working trade relation between the two regions. These prerequisites are based on the on-going theoretical discussion and have been empirically verified and approved by experts (ESRF, 2010). An additional factor refers to the geographically closeness of the trading regions to enable low and competitive transportation costs of the importing country. The closeness is not a prerequisite as such, but an important parameter to enhance regional trade.

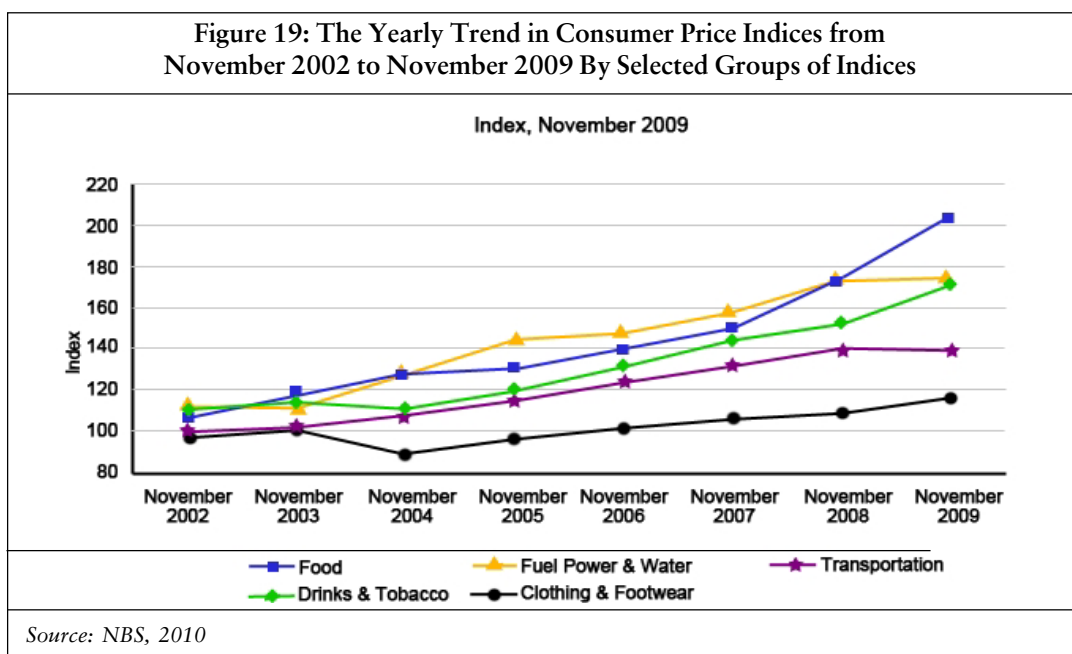
The experience in Tanzania reveals that trade between Tanzania and Kenya is through both official and unofficial border routes. The official border between the two countries includes Horohoro, Taveta, Rombo, Namanga, and Sirari. Maize, rice, and beans are the main staple foods

traded between these two countries (FEWSNET, 2009 in ESRF, 2010). Historically, agricultural commodities trade between Kenya and Tanzania has been very strong. In the past, this trade was partly weak due to poor transport infrastructure and economic performance in Tanzania, making Kenya an outlet for surplus food production from the northern regions and the lake zone. The infrastructure improvement in Tanzania has widened trade in food commodities among the two countries. It is now normal for maize from southern Tanzania, parts of Malawi, and Zambia to reach the Kenyan markets of Nairobi and south eastern and coastal areas (FEWSNET, 2009 in ESRF, 2010a).

The main agricultural production areas of northern Tanzania are a reliable and inexpensive source of food for the insecure marginal agricultural south east and south western lowlands of Kenya. In return, Tanzanian farmers and traders get relatively better prices compared to the domestic market. However, trade normally reverses depending on the season and performance. Foodstuff moves through all border points, road networks and across Lake Victoria. Maize remains the principal commodity imported into Kenya from Tanzania, followed by beans, fish, rice, root crops and sugar. Wheat flour and sugar remain the major agricultural commodities imported by Tanzania from Kenya, in both quantity and dollar terms. Due to export restriction in food commodities in the region, unofficial trade activities do exist that leads to smuggling of food commodities between Kenya and Tanzania. This unofficial trade is believed to be higher than the official one.

The main foods traded between Tanzania and Uganda are rice, beans and bananas. Both sides of the border have similar and favourable agro-climatic conditions conducive for ample food production with surpluses exported to Kenya, Burundi, Rwanda and DRC. There is limited trade within the border areas. Agricultural trade between Uganda and Tanzania is low compared to trade between Tanzania and Kenya, Zambia, Rwanda, Burundi, DRC and Malawi. The main border point between Tanzania and Uganda is at Mutukula, but goods are also shipped across

Figure 19: The Yearly Trend in Consumer Price Indices from November 2002 to November 2009 By Selected Groups of Indices



Lake Victoria from Bukoba in Tanzania. Beans and bananas are exported to Uganda from Tanzania but the direction of trade can reverse depending on the season's performance on either side of the border. Rice is mainly imported from Tanzania and remains the largest commodity traded between the two countries. Since trade in food commodities is restrictive, the rice movement between the two countries is mainly informal (FEWSNET, 2009).

### 3.3.3. Implication of Food Imports to Tanzania's Economy

Recent development in the global economic conditions, such as increases in oil and food prices, and global financial and economic crisis has negatively affected Tanzania's economy. Such shocks impact Tanzania's economy through several channels including trade (especially imports for food and exports) and financial flows (especially foreign direct investment). Thus, one of the major and direct implications of food imports is the imported inflation which normally occurs through world price transmission.

While from 2000 to 2005 the population faced a slowly rising cost of living, between 2005 and 2009 people saw a very rapid rise. This rise in the cost of living is reflected in a range of consumer price indices for Tanzania.<sup>9</sup> Figure 19 shows how consumer price indices for selected products have been rising gradually since 2002,

and rapidly since 2005 in all areas, most notably food, followed by fuel. Indeed, food inflation has been the most dominant component of inflation, particularly with the global food price crisis which began in 2006.

The overall cost of living has increased and livelihood status worsened due to not only the increased living costs, but also poor nutrition following shortage of food.

### 3.3.4. Social and Economic Implications of Regional Trade Policies on Food Security in Tanzania

Tanzania being a member of several multilateral and regional integrations is prone to experiencing several social and economic effects as a result of its participation. The latest report by CUTS on agriculture in select African countries<sup>10</sup> reveals that through the recently developed EAC Agricultural and Rural Development Policy (EAC-ARDP), Tanzania would be in a great position of achieving social and economic goals on food security. It is envisaged that through such policies, employment creation in the markets and in the fields would be achieved; as a result boosting rural incomes, thus rationalising food distribution across a broader geographical area. This distribution of food would lead to lowering food prices for staple foods, making them affordable.

### 3.3.5. Impact of National/Regional Markets and Trade Policies on Food Security

There has been a historical general mistrust of the role of a trade-based food security system among the EAC member states, such that there is no formalised policy framework to encourage food trade in the region. Except for Uganda in recent years, this mistrust is reflected in generally inward-looking food security policies and/or trade policies in each country that discourages export of food commodities. Indeed, all the countries generally experience food deficits although deficits in one country may be accompanied by gluts in another or in some parts within the same country. Some member states such as Tanzania, with plenty of good agricultural land, have the potential of producing food surplus to feed the rest of the region. Food shortages and high food prices have negative impacts on cost of living and inflation rates as noticed recently in Kenya and Tanzania, where inflation rates exploded due to prolonged price transmission and food shortages in some parts of the country. Trade has the potential to soften the impact of rising food prices in the deficit zones of the region and reward, with a better process, those producing it as the market offers competitive prices as part of a trade based rationing system in the region.

In Tanzania, government's inconsistent policy on cross-border trade for food crops, particularly maize and rice, is hurting farmers' incomes and investment drive (ESRF, 2010b). In 2010, for example, the government had banned cross border trade for food crops (though the ban was removed in early October 2010) and farmers in Sengerema and Geita districts were forced to sell their produce at very low prices (Tsh 500 per kg of rice). This would have been fine if the warehouse receipt system in these two districts had been fully operational, as farmers could have waited until the prices increased to sell their crops. The warehouse system has yet to be widely implemented in the country. Efforts to scale it up will go a long way in improving producer prices and food supply in the country.

## 3.4. Enhancing Trade-Food Security-Climate Change Linkages

### 3.4.1. Theoretical Linkages between Climate Change, Trade and Food Security

The links between climate change and food security have, to date, largely been explored in relation to impacts on crop productivity, hence food production. The reality of climate change and its effects is becoming more apparent as exemplified by more frequent and severe droughts and floods. These changes are increasingly threatening food security, hence the livelihoods of people. While some of climate change impacts could contribute to increased food production, impacts such as raising temperatures and increased frequency of extreme weather events put severe pressure on food availability, stability, access and utilisation and potentially to social conflicts due to increased competition over limited natural resources, resulting in food insecurity. Smallholder agriculture, pastoralists and fisheries are among the people affected by climate change. In Tanzania, agricultural production for the rural poor is considered both a source of food and income.

On the other hand, trade is an important instrument that can effectively be used to rectify food insecurity. A regional strategy and/or an approach to food security that takes advantage of trade opportunities, economies of scale, and which is designed to exploit the country specific comparative advantages is therefore required. This strategy and/or framework should be built on the assumption that an efficient regional market and trade regime for food commodities can be a cost-effective and sustainable mechanism for sending the right signals to producers, processors and traders to invest in the food trade (for example production, processing, storage and transportation). The framework will however not ignore the role of governments to ensure that they provide the prerequisite public goods such as irrigation infrastructure, roads, storage silos and warehouses, research and extension services, and disease control services. Based on the above discussion, one can forcefully argue that there is a strong relationship between climate change, food security and trade.

### 3.4.2. Climate Change: An Opportunity to Boost Technology Transfer?

Climate change presents some opportunities to enhance regional and international trade and exchange, particularly in technologies. Such opportunities include:

- An opportunity for agricultural production technologies and processing, such as low methane emitting rice varieties and cleaner/green agro-processing technologies, processes and facilities with high eco-efficiency;
- Development and dissemination of renewable energies technologies, such as solar, wind and geothermal energy;
- Improving and disseminating efficient cook stoves to reduce the quantities of charcoal and firewood needed;
- Key value chains to retool their technology and facilities, and restructure production facilities and processes to reduce the carbon content in raw materials to low carbon content, energy consumption and pollution levels;
- To introduce clean technologies for coal and natural gas;
- To develop and promote eco-friendly and low emission production processes in industries, including re-designing and re-engineering manufacturing processes to reduce emissions and waste in, for example, pollution abating technologies in iron smelting and other extraction industries to be established in southern Tanzania;
- Industries to diversify from fossil fuel to renewable energies. This will require research on developing bioreactors, processes, enzymes and micro-organism for producing biofuel from vegetable oils, sugarcane, cassava, and other oil seeds; and
- Enhance human resource capacities and capabilities to enhance skills and know how to implement all the above, that is to manage, develop, access, deliver and facilitate utilisation of the technologies and practices.

The challenge of implanting this low emission transfer technologies is finance to procure,

transfer, and facilitate the adoption of the appropriate proprietary technology held by private and public organisations, or accessing technologies in the public domain under special, negotiated arrangements, by for example incorporating a free exchange of low emission technologies in climate change laws. Another option may be to reduce intellectual property conditionalities on climate change laws.

### 3.4.3. Responses by the Government and Other Key Players

Judging from the field survey results, a number of coping strategies and actions have been undertaken. In Dodoma, Manyara and Arusha regions, respondents mentioned the following:

- Tree planting campaign was established where every household was supposed to plant trees surrounding their houses.
- Cultivation of drought resistant crops such as millet and cassava.
- Seeking food assistance from the government.
- Use of modern farming methods and farm inputs such as fertilizers and improved seeds. However, some of the respondents were not in favour of manufactured fertilisers provided by the government, claiming that once used, the yield is affected during the following cropping season, less is harvested on the same plot of land. In this case, they prefer using cow manure.
- Establishment of environmental conservation by laws as well as environmental conservation society responsible for proper management of the environment by the community.
- Women have now started engaging themselves in other non-farming activities, such as selling of locally produced *pombe* (beer).
- Doing casual labour during the planting, weeding and harvesting seasons.
- Sending young people for employment to the townships as security guards and in salons to plait hair.
- Channelling water for irrigation from the river Ngarenaro or going to the AUWSA for water.
- Opting to switch into business.

- Abiding to forest conservation laws and by-laws, especially in the past.
- To cope with the hardship in the wilds, pastoralists eat indigenous plants (Ochabolehoi, nyoriok, ormeliki and ngooswa) to survive.
- Education, sending children to school.
- Practice mixed farming.

In addition, other players are taking different mitigation measures. For example, in Njombe region, a DANIDA funded Sustainable Wetland Management Programme (SWMP) was initiated in 2002 for capacity building through training, awareness creation and law enforcement. The farming communities are the main targeted population because they are the key players. The programme is in phase III, with each phase taking four years. The current SWMP budget is Tsh25mn. Under this programme the District Council officials visited Mlevela village to sensitise farmers and discourage them from intensive farming in wetlands so that such areas are preserved and/or conserved. Among the responses towards eradicating these problems, the government has created village natural resources and environmental committees in almost all the villages in Tanzania. These committees are mandated to oversee and control problems related to environment. These committees are responsible for promoting conservation and institutionalising by laws, arrest violators and charge them.

Also important to note is the response to these effects of climate change, the government and other practitioners, such as NGOs in Njombe region, have initiated some conservation programmes where they advocate for tree planting and sustainable agriculture. Tanzania Association of Forest (TAF) for example, covers Makambako and Wanging'ombe Divisions dealing with conservation of water sources and tree planting. They have been promoting eucalyptus for timber and fire wood, and gravilea for agro forestry which is critical for agriculture and therefore food production. Other programmes include Participatory Forest Management (PFM), which is meant to encourage joint forest management.

There are challenges faced by the different programmes aiming at addressing the adverse effects of climate change. They include:

- Low commitment by the communities in tackling the negative effects of climate change. This is a real problem in Dodoma region as majority of the people are reluctant to take any initiative to tackle the problem, blaming God as the cause of what is happening. In solving this constraint, education is often provided so that the community understands the importance of getting involved in climate change mitigation initiatives.
- Politics has also been viewed as one of the main challenges facing many mitigation and adaptation projects. One of the local government officials observed that in some cases, for instance when people were told to stop cultivating maize and engage in cultivation of drought resistant crops such as millet, councillors intervened by politicising the whole issue, thus reducing farmers' response rate.

#### 3.4.4. Major Impediments to Inclusive Policy Responses

Major impediments to meeting a triple objective of trade expansion, food security and climate change (mitigation and adaptation) in the EAC are:

##### *a) Controlled Cross Border Trade in Food Commodities*

Although EAC countries have tried to address food insecurity by moving food crops from surplus to deficit areas through trade, most of the cross border trade has remained informal, with very high transaction costs. As a result, such trade has been low and unstable. Substantial trade occurs unofficially along the regional borders with far reaching policy implications on GDP and regional food security. The existence of unofficial trade on a significant scale implies that the governments are not reliably informed about their trade situation, and the opportunities available for improving food security through trade induced production in the whole region.

The increasing informal cross border trade in the region in the wake of market reforms that have been and continue to be undertaken, calls for some corrective measures. There are tariff and non-tariff barriers that are undermining economic liberalisation efforts. These bottlenecks have to be removed, if regional agricultural markets are to integrate. Regional food security will then improve.

#### *b) Policy Framework*

All the original member states have policies and strategies that deal with either agriculture development or food security and nutrition. The new member states, Rwanda and Burundi, have no such policies or strategies. Kenya has a National Agriculture Policy and a Strategy for Revitalising Agriculture, while Tanzania has a National Agriculture Policy, National Agricultural Development Strategy and Food and Nutrition Policy – all of which are being implemented through the Agriculture Sector Development Programme. In Uganda, the food and nutrition policy is being implemented through the plan for modernising agriculture. In EAC member state policies, strategies and thematic areas that affect food security have a number of weaknesses that constraint agricultural production, productivity and food security in the region. They include:

- Some partner states' policies do not encourage cross border trade in food commodities in the region;
- The implementation strategy or action plan for some country is lacking; and
- Most of the policies have inward looking approaches for solving the food security problem.

#### *c) Institutional Framework*

The major actors for agriculture sector include the partner states' responsible ministries, the public sector, private sector and non-state actors. Although the country's policies, strategies and the action plans state the role of each stakeholder, the implementation aspect has been diverging. For instance, when there is food shortage in one country, traders have not been facilitated (or supported) adequately to move food from surplus areas to the deficit parts of the EAC region.



## Chapter 4

# Conclusion and Recommendations

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### 4.1. Climate Change

In summary, Tanzania has several strengths upon which well thought out adaptations can be built and executed. There are several governmental institutions and structures already existing that can be used to execute policies and strategies to mitigate climate change challenges. Strategies and plans to combat climate change being implemented are making progress in mainstreaming them into systems at local levels, where the effects will be felt most. In addition, competence is being developed in adapting to environmental changes. Of utmost importance is the fact that most stakeholders see the need to adapt and ensure good practice to reverse climate change, reduce the scale of vulnerabilities and to minimise the intensity of its effects and suffering.

However, there are weaknesses that work against the country's ability to face challenges posed by climate change. There are structural weaknesses in the Tanzanian policy and institutional landscape that may minimise the efficiency to address climate change challenges. The difficulty of implementing strategies to meet climate change challenges stems mostly from the fact that over 70 percent of the population relies on extraction of natural resources and land for their livelihoods. Alternative livelihoods need to be provided in order to enable agencies such as environmental, forestry and wildlife departments to intervene. Finance is a major constraint that will prevent both government of Tanzania and stakeholders in implementing desired practices, such as agricultural and industrial innovations to reduce carbon emission and increase productivity. The current global economic crisis, rising inflation, poverty levels, and increasing food prices could derail current efforts to adapt

and mitigate climate change. Climate change transcends different sectors and needs a holistic approach. It is important to note that VPO DoE is coordinating all national efforts to minimise overlap of functions by the different ministries, LGAs, research institutions, civil society, NGOs and other entities. It is understood that if these are not harmonised, efficiency and effectiveness will be compromised.

It is quite clear that climate change as a global phenomenon is here to stay and its effects on all aspects of human life are manifesting themselves across all walks of life in Tanzania. It is also recognised that the fight against climate change is a shared responsibility among all the stakeholders. Specifically, the stakeholders suggest the following recommendations and pathways for Tanzania:

*a) Acquire and Deploy an Effective Weather Forecasting Technology*

This will enable the authorities to deliver information to agricultural stakeholders when the season will begin (when will the rains start and end), when to prepare/till farms and deliver inputs, and when to plant. This will minimise crop and business loss that was caused by sticking to traditional knowledge with changing rainfall patterns, for example that the planting season is supposed to begin in October-November. In addition, there is need to strengthen and foster modelling work on climate change.

*b) Public Education and Dissemination of Information*

Awareness raising and education on climate change effects to enhance understanding of

climate change, and to make people have a positive attitude towards the national efforts in addressing the threats facing their communities and sectors and the country as a whole, and taking on board the strengths, weaknesses, opportunities of adaptation and mitigating strategies that might be viable in their areas. Awareness creation through the media, information services, extension services, campaigns, and demonstrations is necessary to elicit endogenous adaptation by the public, the acceptance of state policies, laws and regulations. This will need a spirited effort from all climate change stakeholders.

#### *c) Support Climate Change Adaptation*

The government, private sector and other stakeholders should support climate change adaptation through efficient technology, changing cropping patterns, building new water projects for flood control and drought management, and investing in sustainable non-farm activities. Empower, motivate and provide resources to research institutions to produce appropriate solutions to many of our environmental problems. The MKURABITA should continue to ensure a nationwide land tenure administration reform that guarantees security of tenure. This would increase incentives to manage lands sustainably and ensure a smooth implementation of such initiatives as REDD and agro-forestry.

#### *d) Science and Technology*

Science and technology are necessary for mitigation and adaptation in the industrial sector so that the government should lead the way in negotiating good technology deals for all sectors of the economy. Local, regional and global institutions should cooperate to play a major role in research and development on existing and potential future climate change effects and in the exchange of technology, intellectual property rights, and financing of mitigation and adaptation measures.

*e) Change of Attitude, Behaviour and Practices*  
Individuals should be persuaded to change attitudes by engaging in environmentally friendly acts including tree planting and good farming

practices. People should be educated to plant trees, avoid unsustainable tree cutting practices and in applying appropriate farming practices to avoid climate damaging agricultural production. Effective laws and education on bushfires and tree planting are needed nationwide.

#### *f) Reduce Deforestation, Increase Reforestation and Afforestation*

Deforestation in Tanzania is not easy to change because forces driving it are deeply embedded in the economics of food, fuel, timber, trade, and development. There is need to strengthen the financing and implementation of reforestation and afforestation programmes. However, efforts should be made to make them more systematic and sustainable, and not to be politically driven. In addition, policy interventions should be introduced that mitigate deforestation (tree cutting for firewood and charcoal production), such as reducing the price of widely used energy sources like kerosene.

#### *g) Learning from Other Experiences*

Tanzanians ought to learn from the environmentally developed countries that are several decades ahead in environmental protection, energy conservation and emissions and waste reduction. Typical examples include subsidising energy efficient light bulbs to make them more affordable so that people can save money by saving energy. Others include reducing the use of disposable plastic shopping bags by making them expensive which will make more economic sense for people to bring their own reusable shopping bags than paying for the plastic bags every time. Such smart policies may be most effective in providing the right incentives for the majority of the public to change behaviour and generate tangible results. In addition, a good example related to agricultural trade linkage is the increasing trade between Tanzania and Europe (and other countries around the world) in horticulture products which have been growing during the past decade. This has been made possible following the adoption of new marketing or business model which allows private organisations to work closely with small scale farmers and assist to link them up with international markets through contract farming.

This same business model has transformed the Ethiopian sesame industry.

Use schools and other organisations in conveying messages on the linkage between agriculture and trade by for example developing new school curriculum with subjects or courses on agriculture and international trade. Also inform them how the two sectors depend on each other including spillover and the associated synergies. Government should develop the right policies and ensure effective law enforcement and collaborate with regional bodies like EAC, SADC and AU (African Union) in addressing trans-boundary climate change effects, exchange of expertise and resources, and cooperate in negotiations with the advanced nations since environmental issues transcend beyond national borders.

#### *b) Surveillance and Monitoring*

To build capacity, particularly in gathering, analysing, and disseminating climate data to determine climate change risks, impact and facilitate adaptation planning; there is need to collaborate with civil society and private sector from the bottom up; and invest in research to predict local impacts.

#### *i) Develop and Implement Localised Adaptation Strategies*

To develop and implement a comprehensive adaptation strategy and identify cost effective and appropriate adaptation options for different areas, there is need for the government to:

- Strengthen management plans and effective disaster prevention and response; and
- Develop early warning systems, communication, response systems, organisations, and governance structures providing these services to enable ex ante strategising to know/predict climate change challenges before they enter the crisis stages. This includes hazard awareness education to create personal hazard preparedness/experience. These factors are important contributors to reducing individual and community vulnerability and risks.

#### *j) Coordination*

There is need to establish a coordination mechanism or a workable institutional arrangement to enable agricultural, climate change and traders of food produce stakeholders to have a common language, agenda, strategy and plan of action. This includes, for instance, how can the Ministry of Agriculture (MAFC), Tanzania Meteorological Agency (TMA) and inputs companies (TASTA) coordinate their efforts to promote indigenous adaptive measures, crop diversification, or tell the farmers when to plant and apply inputs (drought tolerant).

## **4.2. Food Security**

Like climate change, food security is a real economic and nutritional problem in Tanzania and has been on the top of the government priority agenda. It has severely affected prospects for high growth and poverty reduction. It is manifested in different forms, mainly geographically, seasonally and at household level.

The root causes of food insecurity in Tanzania are the inability of the agricultural sector to function suitably and ensure food availability and ability to acquire it, among others. Like in many other sub-Saharan African (SSA) countries, food insecurity in Tanzania is the result of failure to gain access to food due to poverty. While some parts of the world have made progress towards poverty alleviation, Africa and in particular Tanzania, continues to lag behind. Projections show that there will be an increase in this tendency unless preventive measures are taken.

Many other factors have contributed to this situation including the high prevalence of HIV/AIDS, civil war, poor governance, frequent drought and famine, and agricultural dependency on climate and environment. Thus, among the major factors affecting agriculture and food security in Tanzania, and which this research report has attempted to address include: i) the existing policies on agriculture and investment, including the World Trade Organisation's (WTO) agreements on agriculture and how they are facilitating or hampering the flow of food commodities between bilateral countries, and

relevance including the efficacy of the associated interventions; ii) the current initiatives related to seed multiplication and distribution, plant and animal disease control; iii) the current initiatives and systems related to roads, crop storage and food reserves.

It should also be noted that through price transmission, the global food crisis has also affected food sector in Tanzania. However, the magnitude and dimensions of this effect are probably not clear, as no comprehensive study has been conducted so far to understand the winners and losers, and gauge the magnitude of the benefits and losses. Most responses so far by Tanzania are based on experiences, hearsay, and other agricultural challenges (not directly related to food security). The country does not have a strong data and information system for monitoring food situation in the country.

Based on the lessons learnt from the study, the following recommendations should be considered:

- Undertake research and deploy climate change resilient inputs, such as seeds that may germinate and enable plants to grow with minimum amounts of moisture and innovations geared towards climate change mitigation and adaptation;
- There is need to sensitise the public to stop thinking of climate change effects as only detrimental, but also as a source of opportunity for transforming our societies and encouraging it to utilise the opportunities, for example shifting to better farming practices;
- Strengthen crop monitoring and food early warning systems and the warehousing capacity of the Food Reserve Agency and transportation of grains to food insecure areas during the crisis or when the food prices are high; and
- Revise the Investment Act and Agricultural Policy to establish clear and binding rules of engagement (MoU) and regulations that will guide the business relationship, knowledge and technology transfer, and resource sharing and use between large scale agricultural investors and small scale

farms (such as in satellite farms and agricultural growth corridors) so as to:

1. Attract investors for a specific reason. This should be done in such a manner as to avoid agricultural and food trade investments that have adverse environmental effects, such as destroying vegetation cover and soil fertility. This should include limiting the land given to investors, for example less than 2,000 ha like in other East Asian countries;
2. Establish technical facilitation programmes and farming contracts with climate risk insurance that will empower smallholder farmers to cope with climate change effects and maximise yields, volumes, and minimise post-harvest losses during food production; and
3. Prevent the export enclave type of economy by binding producers to produce and supply food; first and foremost, to the local market (for example an investor can supply a maximum of one third of his produce to export markets).

### 4.3. Trade

The analysis made earlier shows that despite many challenges, Tanzania has made some notable achievements on trade. In addition, the country has a number of opportunities, which can be utilised to improve the country's trade. A few examples of sectors that have grown include agriculture, fishing, industry and construction, manufacturing, mining and quarrying, and services sector.

Overall, Tanzania has registered growth in export earnings. The share of Tanzanian exports in world exports has increased from 0.012 percent in 1997 to 0.026 percent in 2009 and has thus more than doubled in twelve years. Tanzania's increasing market share is attributable to export growth in both the goods and services sectors. Europe is currently the main export market for Tanzania, with Switzerland as the lead export destination for more than half of Tanzania's exports to Europe.

Tanzania's trade with other EAC partners has also been growing in significance at an average rate of 19.6 percent between 2000 and 2007, with Kenya and Burundi as the major export markets. This increase has mainly been due to the lower tariffs arising from the implementation of the EAC Customs Union. Due to the situations of political unrest in the Middle East, Tanzania's exports to this market have declined from 8 percent in 2009 to 2 percent by 2010. These changes in Tanzania's trade patterns reflect a clear shift in its direction of trade from Europe to the African and Asian markets.

Tanzania's Exports have gone through a considerable diversification process over the last twenty years. The share of top five exports has decreased from 67.4 percent in 1997 to 57.3 percent in 2009, implying broadening of the range of exported products. In addition, exports are not very concentrated, with the concentration index remaining around 0.1 for the period under review.

There has been some growth in non-traditional crops over the last ten years, despite the fall in some export crops notably traditional crops. There are several factors driving diversification process in Tanzania. On one hand, the availability of natural resources and in particular the discovery of gold and minerals has contributed to the diversification during the last decade. However, some of the diversification and the expansion of the exporting sector in general are also likely to be attributed to the reduction of trade barriers.

There exists a gap between the country's trade policy and climate change. Tanzania's trade policy and country's strategies in improving trade are not directly linked to the climate change issues which, as a result, leave aside an important component which has a great impact on the trading issues within and outside the country. In order to address the climate change issues effectively, trading activities, as well as the investment opportunities, must be channelled towards friendly innovations and technologies to climate change.

Tanzania has the potential to continue being the leading food producer in the region given availability of ample land areas in the southern, western and lake zones with low risk and high climate change adaptive capacities. It, however, needs to strengthen its comparative advantage in food production and strategically be better placed to increase food supply in the region, beginning with strengthening its grains supply chain. Tanzania can actually produce food at a lower opportunity cost than other regional states and sell it at prices that are more competitive.

With regard to trade, the following recommendations can be made:

#### *a) Controlled Cross Border Trade in Food Commodities*

In order to tap the existing trade potential in the region, it is necessary to develop free trade arrangements including free movement of goods and services produced within the region, rationalisation and harmonisation of macroeconomic policies and tariff rates, and any other measure that will make cross border trading less risky. Although the ongoing regional trade liberalisation initiatives have had some desirable consequences, a lot still has to be done. There are still unilateral food export bans and cumbersome documentation procedures, which tend to undermine trade liberalisation efforts. In some cases, this is happening despite the fact that the relevant regional agenda has already been adopted. Regional governments should redefine their role and move from being providers of goods and services to efficient regulators of activities.

Member states governments should establish a liberal economic environment conducive to intra-regional trade in food. This, in particular, should entail the liberalisation of the domestic markets, trade and foreign exchange markets. The increased degree of economic liberalisation is necessary for increasing intra-regional trade. This is because it would allow countries to adjust their production and consumption patterns in accordance with comparative advantage. There is need for member countries to become more open.

### *b) Policy Framework*

Member states in East Africa need to develop a joint framework and implementation strategy. In addition, they also need to avoid inward looking policies for solving the food security problem, which is a common practice to most member states in East Africa.

### *c) Institutional Framework*

The major actors for agriculture sector include the partner states' responsible ministries, the public sector, private and non-state actors. The implementation aspect of most policy frameworks in East Africa has been different and inconsistent with food security policies. There is need to ensure that all responsible institutions in all countries are well coordinated and information sharing is strong.

### *d) Legal and Regulatory Framework*

In order to ensure attainment of food security in the country, inspectorate capacity, strong regulatory framework which is in line with new development in technology, assured enforcement and prompt litigation are pre-requisites. Most laws on agricultural inputs are not punitive enough to deter potential offenders.

In addition, the world market has high quality demands and has developed codes of practice as a result of growing consumer concern about food safety and other production methods and their impact on the environment and consumer. The region, including Tanzania, therefore, needs to ensure the following:

- Harmonisation of laws and preparation of regulations that enable the smooth handling of arising issues;
- Standardisation of authorisation procedures, inspection, certification and monitoring of quality of agricultural and livestock inputs and produce;
- Inculcating observance of good trade practices by the farm inputs dealers and enhance penalties;
- Strengthen the inspectorate section and regulation on agriculture practices; and
- Empower farmers.

The opportunity is to use a better regulatory environment to enhance agricultural production and facilitate intra and inter trade in the food commodities. The country laws on agriculture, land use, food security, immigration and trade have impact in food security and stability. Also, the legal environment has impacts on food security. To improve food security in the region, legal environment needs to be supportive.

### *e) Creation of the Public Awareness*

Throughout the country, government leaders and the private sector as well as CSOs at all levels need to continuously sensitise people on the disquieting food situation in the country. During the last three years for example, the people of Tanzania needed to be alarmed on the possibility of drought due to possible shortage of rains. The weather forecast reports needed to reveal that more regions in the country will be affected by shortage of rains, particularly the central zone which is an indication of a serious food crisis in most parts of Tanzania this year. Farmers could have been urged to improve food storage facilities to enable them store more food and save it by making good use of the available food.

### *f) Regular Assessment of the Food Situation in the Country*

The Ministry of Agriculture, Cooperatives and Food Security must undertake a regular assessment of the food situation in the country, and keep informing the public on the situation and measures that need to be taken to address the problem.

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# Glossary

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**Climate:** Climate is usually defined as the ‘average weather’, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to hundreds of years. These quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description of the climate system.

**Climate Change:** Climate change is ‘a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.’

**Adaptation:** Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.

**Mitigation:** Mitigation of global warming refers to the actions taken by individuals or public and private entities to reduce the greenhouse gas emissions in order to minimise their effects on global climate change. Mitigation of global warming refers to the prevention and control of the products and actions that cause climate change.

**Food Security:** Tanzania has adopted the FAO (2008d) definition of food security. Food security exists when all people at all times have physical or economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. And in achieving food security, Tanzania as well considers the main four components: availability, stability, accessibility and utilisation.

# Endnotes

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1. The list of the interviewed stakeholders and the visited organisations has been provided after accomplishing the second phase of the study
2. PFM refers to processes and mechanisms that enable people who have a direct stake in forest resources to be part of decision making in all aspects of forest management, from managing resources to formulating and implementing institutional frameworks
3. *Revealed Comparative Advantage (RCA)* indices use the trade pattern to identify the sectors in which an economy has a comparative advantage, by comparing the country of interests' trade profile with the world average. The RCA index is defined as the ratio of two shares. The numerator is the share of a country's total exports of the commodity of interest in its total exports. The denominator is share of world exports of the same commodity in total world exports. The RCA index takes a value between 0 and +∞. A country is said to have a revealed comparative advantage if the value exceeds one
4. Walkenhorst, P: "Trade Policy Developments in Tanzania: The Challenge of Global and Regional Integration", MPRA Paper, 2005, No. 23399
5. This is based on a field experience conducted by CPRC, REPOA, SUA and ESRF between September and December 2009
6. See also ESRF, 2010
7. Trade intensity is computed by taking the sum of imports and exports and dividing by total production
8. Agriculture first
9. The National Consumer Price Index (NCPI) covers prices collected in twenty towns in Tanzania mainland. Prices are gathered for two hundred and seven items. All prices are collected at the prevailing market prices. The NCPI is a statistical measure of goods and services bought by persons in urban areas, including all expenditure groups. It measures changes in price-not-expenditure-which are the most important causes of changes in the cost of living
10. CUTS International: "Agriculture in Development of Select African Countries: Linkages with Trade, Productivity, Livelihood and Food Security", Geneva: Switzerland, 2011

## Annex 1

# Economic, Social, and Trade Profile of Stakeholders

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In Tanzania, the key stakeholders in the climate change processes include the policy makers and implementers, government, local government authorities, private sector, civil society organisations, scientific academia, research institutions, community based organisations/NGOs, disaster management practitioners, climate change adaptation advocates, disaster risk proponents, local communities and development partners. The roles and responsibilities of key stakeholders are as follows:

### 1. Climate Change

#### The Vice President's Office (VPO)

The VPO is the main office in charge of coordinating efforts on climate change, and holds a central responsibility for Tanzanian climate policy, among all government ministries and agencies in Tanzania mainland. The functions of the Vice President's Office are environment and union affairs management. More specifically, the Directorate of Environment (DoE) carries the Office's core engagement in this policy field. This department's responsibilities include development of environmental policies and strategies in the areas of climate and biodiversity, participation in international negotiations, and implementation of agreements and initiatives.

The DoE is also engaged in Tanzania's national and international responsibilities, including: facilitating relevant stakeholders to implement the Environmental Management Act (2004); strategies on urgent actions on land degradation and water catchments and strategy on conservation of marine, coastal environment, lakes, rivers, and dams environment; prevention of degradation of environment and unsustainable consumption of natural resources; the UNFCCC; and the Kyoto Protocol. Some of the other responsibilities of the VPO climate engagement include implementing environmental policy, the Tanzania National Adaptation Programme of Action (NAPA, 2007).

Others include coordinating other stakeholders in the implementation of climate change related/linked national policies and international agreements, such as National Development Vision 2025, United Nations Convention to Combat Desertification (UNCCD), the Convention on Biological Diversity (CBD), Vienna Convention on the Protection of Ozone Layer and Montréal Protocol on Substances that Deplete the Ozone layer allied strategies and action plans. VPO on behalf of the Government participates in all climate change processes by presenting policy proposals on mitigation, adaptation, technology transfer within the conventions.

### **The Ministry of Natural Resources and Tourism (MNRT)**

The Ministry of Natural Resources and Tourism is also an important and relevant stakeholder. The ministry is one of the economic ministries responsible for conservation of natural and cultural resources as well as development of tourism. In addition to planning and budgeting resources for the sector, the ministry is also responsible for wildlife and forestry which are pertinent areas of the study. Its main objective is to enforce and ensure compliance to all the rules and regulations pertaining to wildlife, forestry as well as tourism related activities and programmes.

### **National Environmental Management Council (NEMC)**

NEMC was established by the Environmental Management Act of 2004. Its main objective is to enforce and ensure compliance to environmental management issues. The main functions of NEMC include: coordinating indepth consultations and coordinating environmental research, investigations and surveys in order to assist in proper management and conservation of the environment; enforcing and ensuring compliance to the National Environmental Quality Standards; carrying out environmental audit; reviewing and recommending for approval Environmental Impact Statements (EIS); and enhancing environmental education and public awareness.

### **Private sector and the business community**

The private sector plays an important role in reducing the climate effects. Companies invest in a range of projects which mitigate adverse climate impacts. Some of the important areas of investment by such companies include biomass, solar, and wind projects. The private sector also employs and participates in innovative market mechanisms such as the carbon market; although in Tanzania, it is still in its infancy. An expanded and improved carbon market would allow companies and communities to trade emissions credits in order to ensure that mandated caps are met. Finally, the private sector can invest in research and development for new renewable energy technologies.

### **Civil Society Organisations (CSOs)**

CSOs include charities, development NGOs, community groups, women's organisations, professional associations, trade unions and social movements. CSOs in Tanzania play an active role in the climate change advocacy, development and dissemination of adaptation measures. They also participate in the negotiation process, representatives, and climate negotiators to adopt progressive climate policies. Some of them are volunteer organisations with a mandate to facilitate the mobilisation, organisation and education of the people on climate change issues. They also engage themselves with the climate change process as representative of non-governmental observer organisations. In addition, they serve as facilitators among community, local and regional official climate negotiators and implementers.

In addition, in Tanzania, several local and international environmental NGOs have strengths in several areas and a wealth of experience, which is important in meeting the challenges of climate change. Years of working with local communities gives them strong credibility and increased ability to sell new strategies to people in comparison to state organisations. This knowledge is critical in overall strategising and benefiting from global efforts at tackling climate change at local level.

### **Local Government Authorities (LGAs)**

LGAs are the apparatus under Prime Minister's Office, Regional Administration and Local Governments (TAMISEMI) through which they govern functions and exercise authority at the local level. LGAs play a crucial role in solving the climate effects by initiating and implementing policies, by-laws, and measures to address climate change effects in natural resources management, agriculture, and livestock management.

### **Other ministries and government agencies**

Other public sector entities that directly or indirectly work and influence decision making processes in the area include Tanzania Meteorological Agency (TMA); Ministry of Water; Ministry of Lands, Housing and Human Settlements Development; Ministry of Agriculture, Food Security and Cooperatives; Ministry of Energy and Minerals; Prime Minister's Office, Regional Administration and Local Governments; Ministry of Livestock Development and Fisheries; Ministry of Industry and Trade; Ministry of Health and Social Welfare; and Ministry of Infrastructure Development. The agencies for these ministries and offices are responsible for creating an enabling environment for development, policy formulation, the legal and regulatory framework, and for managing public investments in infrastructure facilities that address climate change issues in a sustainable manner. They develop and implement specific climate policies and plans for their sectors.

Each of these sectors will have their own goals, which will be aligned with the national NAPA goals and national targets from the international climate agreements. They also work in partnerships with other government organs, private sector entities and associations to ensure that mitigation and adaptation policies, strategies and action plans are adopted in respective sectors and industries. In addition, they play an important role in managing environmental public goods, such as the atmosphere, forests and water bodies and can resolve problems, such as global climate change. Recently, these entities have been expressing concern on how the climate change issues will affect Tanzania's agricultural and industrial competitiveness.

### **Environment and energy organisations**

In the field of climate and energy, research and development efforts are spearheaded by Traditional Energy Development and Environment Organisation (TaTEDO), Kakute Ltd, FELISA, D1 Oils, the University of Dar es Salaam, CAMARTEC, TIRDO, SIDO, VETA, and other stakeholders. Their main activities include conducting applied research, process development and providing expert professional services to industry, government and other organisations. Other areas include disseminating knowledge of producing, processing, promotion and developing climate friendly machinery, equipment, and a market infrastructure of climate friendly energy sources/fuels and fuel saving equipment in communities.

### **Development Partners**

Tanzania is also collaborating with development partners in implementing policies and measures to meet specific climate change challenges. Several studies have been funded by development partners such as the World Bank, The Norway, Netherlands and UK (Department for International Development-DFID) governments, GEF, and the UN's Reducing Emissions from Deforestation in Developing Countries (REDD) programme is currently being implemented. REDD provides climate change strategies in Tanzania by offering a cost effective climate mitigation option with significant co-benefits (for example biodiversity, ecosystem services and rural quality of life). Others include the five year Regional Climate Change Programme funded by the UK's DFID to help southern Africa countries adapt to climate change across borders.

## **2. Food security**

There are a chain of stakeholders associated with food security as well as climate change adaptation agenda in Tanzania. They range from ministries, such as the Ministry of Agriculture, Food Security and Cooperatives; government departments, such as the National Environmental Management Council; agencies, such as TMA; the Parliament, especially Parliamentary Sub Committee for the Environment and/or Agriculture; Division of Environment; Local Government Authorities (LGAs); local farming communities (farmers); suppliers of farm inputs; CSOs; research institutions; donors

and/or international organisations; academia; media; Tanzania National Food Reserves Agency (NFRA) among others. Economic, social and trade profiles of food security key stakeholders are presented as follows:

### **Policy Makers and Ministries, Departments and Agencies (MDAs)**

These are the key decision makers and policy drivers in the country. They are senior and top government and political executives. They include technical as well as influential people to approach. There is therefore a great need to understand them in terms of their behaviour, attitude and preferences towards food security in the country. There is need to know *a priori* where they are likely to support and where they are not likely to support before drawing strategies and/or incentive packages to impress upon them.

As noted earlier, this group is generally sensitive to changes and it takes long to adopt and accept changes. The government processes of instituting change are rather bureaucratic and it may take a long time for a decision to be made.

In Tanzania, this group includes ministries, government departments, and government agencies. Thus, institutions such as the Ministry of Agriculture, Food Security and Cooperatives; Ministry of Water; Ministry of Livestock and Fisheries Development, Vice President's Office–Ministry of Environment; Division of Environment; National Environmental Management Council (NEMC), Food Security Unit and National Bureau of Statistics (NBS) are relevant examples.

### **The Parliament**

The Parliament is the highest law making body in the country. This is the final body to pass all legislations which are tabled during the National Assembly. The Parliament further debates and approves all the sectoral budgets including the budgets for agriculture, and the national budgets. It is composed of various sub-committees including one for agriculture; likewise for trade and industry and the other one for the environment and natural resources. One of the strategic approaches which has been suggested by most stakeholders is to use the sub-committees through training and other dissemination approaches. Timing has also been mentioned as an important factor to ensure that training programmes designed for such sub-committees are organised few months prior to the Parliamentary Sessions. Otherwise, one needs to consult known individual Members of the Parliament.

### **Individuals and/or influential people**

Tanzania has a number of influential individuals who also command respect and confidence from the public as well as the government. Some of them are also big investors in agriculture and trade, and rich people who own big investments in the country and abroad. Lobbying and advocacy have been the most common and effective methods towards winning such stakeholders' confidence to influence agricultural as well as food security policies.

### **Farmers and livestock keepers**

The main stakeholders in this category include farming communities in semi-arid areas (pastoralists and agro-pastoralists); mechanised rain dependent farmers, irrigated agriculture, large and small scale producing food and cash crops; small scale rain fed agriculture (food and cash crops) and mixed crop farming. These are mainly small scale farmers with small capital to invest and an average of 1.5 ha to farm. These farmers rely on their indigenous knowledge and blends of improved practices from research. Their access to improved knowledge is limited due to poor linkages with sources of improved knowledge. Most of the ongoing agricultural interventions aim at enhancing availability of knowledge and technologies that would enable farmers to maximise utilisation of natural resources towards transformation of the agriculture and improved livelihoods of the farming communities.



MVIWATA is a network of small holder farmers in Tanzania. The network has been influential in changing the mindset of small scale farmers in the country. They have been instrumental in the past in facilitating adoption of agricultural technology such as the adoption and use of improved seeds as well as fertilizer through their network of farmers.

### **Input suppliers**

The group consists of input stockists (seeds, fertilizers, pesticides, herbicides, vet drugs); manufacturers and dealers (farm tractors and implements); crop/livestock boards; cooperatives societies and agribusiness. This group seeks information that would enable them stock inputs that are readily marketable. However, they rarely access this information on time to enable them make such decisions. Agricultural policy in Tanzania, among other things, aims at fostering and strengthening linkages with input suppliers to enable flow of information that would lead to timely delivery of inputs in response to climate forecast to their clients for enhanced management of risks in agriculture.

### **Output handling and market support agents**

Output handling and market support agents include crop and livestock buyers/traders, agro-processors, crop/livestock boards, cooperatives societies and related agribusiness. Like the input suppliers, these would also benefit from forecast so as to have strategies that would ensure maximisation of profits from their investment. However, most of the time, access to reliable information is limited. They therefore need to be provided with information on forecasts so as to enhance decision making that would support farmers to take advantage of climate change.

### **Micro-finance institutions (savings, credit and insurance)**

Micro-finance institutions including banks that mobilise savings and provide credits to farmers, input suppliers, output handling and market support agents as well as insurance companies are important stakeholders in agricultural development. This group also needs information on weather forecast to make informed decision to provide services that would not jeopardise their business. They need to be provided with information that would facilitate production of financial products for farmers and supporting agencies provide required services so as to manage risks and reduce vulnerability from climate change, mainly through increase in agricultural productivity and the resulting income levels.

### **NGO's and other farmers' support organisations**

This group comprises of civil service and farmers' support organisations that strive to empower farmers in development endeavours. The group regularly seeks information not only for their own knowledge, but also to meet the information needs of their clients. There is need to foster and strengthen institutional linkages that would ensure accessibility of meteorological and agricultural departments for continuous supply of updated information to this group for passing on to the end users.

### **Relief and disaster management agencies and meteorological service providers**

These include government departments responsible for disaster management and relief organisations, such as Red Cross and Crescent, CARITAS, and the local organisations. The group considers climate change as a natural occurrence that mostly affects agriculture. Thus, they need to utilise forecast information for short term interventions. They also need accurate information that would facilitate long term adaptation strategies and reduce vulnerability on a long term basis.

The meteorology agencies provide climatic information to various clients including farmers and their support organisations. However, information provided is general and not readily useful to support decision making in agriculture.

### **Agricultural extension system**

This group comprise of public as well as private extension service providers. The group regularly seeks information not only for their own knowledge, but also to meet the information needs of farmers. There is a need to enhance training and extension in order to meet demand, and develop training institutions in agriculture, climate and related sciences prepare scientists and development practitioners who provide support to farmers to manage risks and reduce vulnerability. In most cases, trainers are not updated with the current developments, they thus find themselves unable to equip graduates with knowledge that could help them face challenges of climate change. It is therefore necessary to enhance capacity of the relevant department in the training institutions to link with sources of climatic information and regularly update the end users. This would ultimately lead to production of graduates who are better informed with current agricultural challenges as well as climate change and adaptation issues.

### **Media**

Relationship between agriculture and the print and audio-visual media needs to be strengthened to facilitate dissemination of relevant information. Print and electronic media are known to have made impacts in a number of countries in terms of disseminating research findings, policy summaries and creation of the public awareness. Involvement of the media is therefore important to enable other stakeholders understand the trend and development of agriculture.

### **Researchers and academia**

Researchers and academia are important stakeholders for designing agriculture related research agenda and implementing them. They form the centres of excellence in terms of articulating issues pertaining to agricultural policies of the country. These are think tanks which are also meant to conduct research for policy analysis and inform the policy process in the country. Consultations with such institutions are inevitable if research findings are to pass empirical tests and therefore improve their credibility.

### **Development Partners (DPs)**

These are particularly donors who are the major financiers of national and project budgets in Tanzania. There is a claim that domestic policies are influenced by donors through both the technical and financial assistance.

## Annex 2

# Other Initiatives Addressing Climate Change Impacts

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### **Regional Climate Change Programme (RCCP)**

The RCCP aims to contribute to the achievement of Tanzania's climate change adaptation needs, socioeconomic development and poverty alleviation objectives, including the Millennium Development Goals. By synthesising the relevant climate change science, developing strategic research and strengthening science-policy-governance-finance dialogue, the RCCP intends to build an evidence base for appropriate trans-boundary responses, strengthen the region's voice on international platforms and negotiations, and enhance its ability to equitably access the necessary finance for effective climate change adaptation. The funding from IDRC and DFID for the first and second phase for the Tanzanian component is US\$4.1mn.

### **UN-REDD**

Three UN Agencies (UNEP, UNDP and the FAO) collaborated to establish the UN-REDD programme in 2008. This is a multi-donor trust fund that allows donors to pool resources and provide funding with the aim of significantly reducing global emissions from deforestation and forest degradation in developing countries. Through its initial country programme activities, the UN-REDD Programme supports the capacity of national governments to prepare and implement national REDD strategies with the involvement of all stakeholders. In 2010, US\$4.3mn was disbursed to Tanzania to support a National REDD Programme.

### **Reducing Emissions from Deforestation and Forest Degradation (REDD+)**

REDD+ is a climate change mitigation strategy based on international agreements of Reduced Emissions from Deforestation and Forest Degradation (REDD), plus the role of conservation, sustainable forest management, and forest carbon stock enhancement. Development of national REDD strategy in Tanzania is a continuous process involving a series of consultations; stakeholders' engagement, trainings, research and knowledge dissemination: building up 'system ability' in REDD+. In the first phase Tanzania received about US\$100mn (Tsh 170 billion). The main beneficiaries of the funds were non-governmental organisations, such as TaTEDO, Wildlife Conservation Society of Tanzania (WCST) and Tanzania Forests Conservation Groups (TFCG). But at a recent Durban Conference on climate change further funding was suspended as no consensus was reached on disbursement.

### **The GEF trust fund**

The GEF trust fund is the common funding resource of the Global Environment Facility (GEF). Climate change is one of the six focal areas supported by the GEF trust fund. The objective of this part of the fund is to help Tanzania to contribute to the overall objective of the United Nations

Framework Convention on Climate Change (UNFCCC). A sum of US\$12.4mn grant finance was disbursed to Tanzania in support of five projects implemented through several multilateral agencies

#### **The Special Climate Change Fund (SCCF)**

The SCCF was created in 2001 to address the needs of all developing countries under the UNFCCC. The overall objective of the fund is to implement long term adaptation measures that increase the resilience of national development sectors to the impacts of climate change. Within 2007-2010, US\$1.0mn was received by the government of Tanzania for implementation of the project 'Mainstreaming climate change in integrated water resources management in the Pangani river basin'.

#### **Least Developed Countries Trust Fund (LDCF)**

The LDCF, created in 2002, aims to address the special needs of the Least Developed Countries (LDCs), which are especially vulnerable to the adverse impacts of climate change. This includes preparing and implementing National Adaptation Programmes of Action (NAPAs). In 2003, US\$ 200,000 grant for Tanzania's NAPA preparation was made.

#### **The Adaptation Fund (AF)**

The Adaptation Fund is a financial instrument under the UNFCCC and its Kyoto Protocol (KP) and was established to finance concrete adaptation projects and programmes in developing countries that are parties to the KP in an effort to reduce the adverse effects of climate change facing communities, countries and sectors. It became functional in 2009 (although this was first proposed in 2001). One UNEP project proposal for Tanzania has been submitted to the AF Board in August 2011 on the implementation of adaptation measures to reduce vulnerability of livelihood and economy of coastal communities of Tanzania.

#### **Global Climate Change Alliance (GCCA)**

The Global Climate Change Alliance (GCCA) was proposed in 2007 as an initiative of the European Union. Its overall objective is to build a new alliance on climate change between the European Union and developing countries that are most affected and that have the least capacity to deal with climate change. US\$120,000 has been disbursed (out of an approved project budget of US\$3mn) to a project aimed at increasing the capacity of the most vulnerable communities in Tanzania to engage in sustainable use of their natural resources.

#### **The International Climate Initiative (ICI) of Germany**

The International Climate Initiative (ICI) is an innovative, international mechanism for financing climate protection projects. It receives funding from the sale of tradable emission certificates. The overall objective of the fund is to provide financial support to international projects supporting climate change mitigation, adaptation and biodiversity projects with climate relevance. Grant aid for the project 'Conserving mountain forests' of US\$3mn was provided to the Government of Tanzania in 2008.

## 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/pacteac>



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