THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF AGRICULTURE FOOD SECURITY AND COOPERATIVES

FIVE YEAR ENVIRONMENTAL ACTION PLAN
2012 - 2017

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PREFACE

The agriculture will continue to play a central role in Tanzania's economy. The Government has put emphasis towards improving the agriculture production through policy guidance that defines goals, objectives and strategies. Agriculture which is highly dependent on the environment is the dominant sector in Tanzania's economy contributing about 25.7% of GDP. The Government is committed to bring about green revolution that entails transformation of agriculture from subsistence farming towards commercialization and modernization of the sector through intensification of crop production, diversification, technological advancement and infrastructural development. In this endeavor, the government recognizes the paramount importance of the private sector as the engine of growth.

It is widely accepted that, the currently increasing global warming and its consequences of climate change, is having negative effects on the optimal availability of water resources for crop production worldwide including Tanzania. It has also been observed that an increase in population has always been associated with rapid degradation of the environment particularly deforestation, pollution and soil erosion due to increased need for farm expansion, fire wood, improper waste disposal and poor farming practices.

In order for agricultural production to have positive impacts on environment, emphasis needs to be made on interventions that address bottlenecks along the value chains of strategic agricultural produce as expressed in KILIMO KWANZA resolution. To accomplish this, the inputs side of agriculture such as land, seeds, agrochemicals and fertilizers which are basic components, need to be seriously considered. Nevertheless, inappropriate land use practices and their consequences on land degradation threaten the sustainability of ecosystem, human health, food security and productivity leading to declining hectare per capita.

In order to address environmental concerns in the Agricultural sector, the Ministry prepared this Five Year Agriculture Environmental Action Plan which takes on board environmental challenges that were identified in the agriculture sector. This Environmental Action Plan is a tool for providing guidance on implementing the environmental management and thus will enhance sustainable agricultural production processes in the sector.

Mohamed S. Muya
PERMANENT SECRETARY

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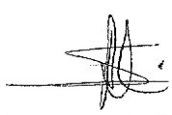
I am deeply indebted to the Directors of the Ministry of Agriculture Food Security and Cooperatives and the Technical Committee on Integrated Work Plan Budget for MAFC for the valuable comments to accomplish this task. Particularly, I wish to thank the Director of Policy and Planning, Mr. Emmanuel Achayo for his commendable efforts and inputs into this Action Plan.

The successful preparation of the Agriculture Sector Environmental Action Plan, 2012 -2017 is a result of commitment and valuable support from DANIDA for financing this process and special thanks goes to the Vice President's Office, Division of Environment for coordination role of preparation process.

I would like to take this opportunity to assure them of our heartfelt appreciation and that we value their cooperation and support.



Shakwaanande R. Natai

Head Environment Management Unit

ACRONYMS AND ABBREVIATIONS

A-CBG	Agriculture Capacity Building Grant
AGITF	Agriculture Input Trust Fund
AIDS	Acquired Immune Deficiency Syndrome
AMESD	African Monitoring of the Environment for Sustainable Development
ASDP	Agricultural Sector Development Programme
ASDS	Agriculture Sector Development Strategy
ASEAP	Agricultural Sector Environmental Action Plan
ASLMs	Agriculture Sector Lead Ministries
ASR	Agriculture Sector Review
CAADP	Comprehensive Africa Agriculture Development Programme
CAGR	Cumulative Average Growth Rate
CMEW	Crops Monitoring and Early Warning
COASCO	Cooperative Audit and Supervision Corporation
CRMP	Coastal Resource Management Project
CRMP	Cooperative Reform and Modernization Programme
DADG	District Agriculture Development Grant
DADPs	Agricultural Development Plans
DALDO	District Agriculture and Livestock Development Officer
DANIDA	Danish International Development Agency
DEV	Development Expenditure
DIDF	District Irrigation Development Fund
DoE	Division of Environment
EBG	Extension Block Grant
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ESMF	Environmental and Social Management Framework
FAO	Food and Agriculture Organization
FFS	Farmers Field School
GBS- PAF	General Budget Support-Performance Framework
GDP	Gross Domestic Product
HIV	Human Immuno-deficiency Virus
IRA	Institute of Resource Assessment
IWRM	Integrated Water Resource Management
KIA	Kilimanjaro International Airport
LGA	Local Government Authority
LGCDG	Local Government Capital Development Grant
LGMD	Local Government Monitoring Database
M&E	Monitoring and Evaluation
MAFC	Ministry of Agriculture Food Security and Cooperatives

MDA	Ministries, Departments and Agencies
MITM	Ministry of Industry, Trade and Marketing
MKUKUTA	Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania
MLDF	Ministry of Livestock Development and Fisheries
MNIA	Mwalimu Nyerere International Airport
MTEF	Medium Term Expenditure Framework
MWID	Ministry of Water and Irrigation Development
NAPA	National Adaptation Programme of Action
NBF	National Biosafety Framework
NBS	National Bureau of Statistics
NEAP	National Environmental Action Plan
NEMC	National Environmental Management Council
NGO	Non-Governmental Organization
NIDF	National Irrigation Development Fund
NPB	National Pharmacy Board
NSGRP	National Strategy for Growth and Reduction of Poverty
OC	Other Charges
PE	Personal Emolument
PER	Public Expenditure Review
PMO-RALG	Prime Minister's Office - Regional Administration and Local Governments
PPP	Public Private Partnership
RPF	Resettlements Policy Framework
SACCOS	Savings and Credit Cooperative Society
SCAPA	Soil Conservation and Agroforestry Programme
SEA	Strategic Environmental Assessment
SEAP	Sector Environmental Action Plan
SoER	State of the Environment Report
SUA	Sokoine University of Agriculture
SWOT	Strengths Weaknesses, Opportunities and Threats
TAFORI	Tanzania Forest Research Institute
TANROADS	Tanzania National Roads Agency
TAZARA	Tanzania Zambia Railways Authority
TBS	Tanzania Bureau of Standards
TF	Task Force
TFNC	Tanzania Food and Nutrition Centre
TMA	Tanzania Meteorological Agency
TOSCI	Tanzania Official Seed Certification Institute
TPRI	Tropical Pesticides Research Institute
TSED	Tanzania Socio-Economic Database

UDSM	University of Dar-es-Salaam
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
URT	United Republic of Tanzania
VAEO	Village Agriculture Extension Officer
VPO	Vice President's Office
WAEO	Ward Agriculture Extension Officer
ZIA	Zanzibar International Airport

EXECUTIVE SUMMARY

The Agricultural Sector Environmental Action Plan (ASEAP) was prepared as a requirement of the Environmental Management Act (EMA 2004) and GBS- PAF 2010. The Act requires the Sectoral Ministries to prepare Environmental Action Plans after every five years as a tool for providing guidance to ensure that environmental concerns are integrated into the Ministry development planning and project implementation in a way which protects the environment.

The main objective of ASEAP is to ensure that, environmental problems and challenges identified in the agriculture sector are addressed through appropriate interventions by farmers, institutions and other sectoral stakeholders related to agricultural development for sustainable livelihood, environmental and natural resource protection and economic development.

Preparation of ASEAP involved data collection and field observations from seven region which were selected based on ecological zones. These regions include Mbeya, Mwanza, Arusha, Manyara, Tanga, Mtwara, Coast and Dodoma. Other areas visited include agricultural research centers, and agro processing industries. Review of various national reports and a focus group discussions on issues/ challenges and socio-economic activities in concerned villages and districts provided basic information which were used to prepare the ASEAP.

The institutional set up of the agricultural sector was analyzed focusing more on their relevance to ASEAP. The roles and function of the Ministry were also analyzed through Divisions and Units with different functions and responsibilities. The Divisions includes Agricultural Research and Development, Crop Development Division, National Food Security Division, Training Division, Agricultural Land use Planning and Management Division, Agricultural Mechanization Division, Irrigation and Technical Services Division, Policy and Planning Division, Administration and Human Resources Management Division.

There are also Units under the Ministry that perform various duties. Among others the Environmental Management Unit (EMU) was established according to the Environmental Management Act Cap 191 in July, 2008. The functions of the Unit are: to monitor compliance with the requirements of EMA, (2004) within the Ministry; to advise on policy, legal reviews on environmental management in the agricultural sector in collaboration with Vice President's Office (Division of Environment); to monitor environmental protection compliance in the agricultural sector; and to oversee the implementation of agricultural strategies in order to minimize adverse social-economic impacts due to agricultural activities. Within MAFC there are strategies, programmes and plans which addresses environmental issues during execution of their activities. They formed important inputs when drawing up the priority activities for ASEAP.

The ASEAP recognizes the existence of the umbrella legal law and other Acts on environmental management in Tanzania, the EMA (2004). Others important legal issues include international environmental agreements, conventions, and protocols that seek to protect the environment and ensure

sustainable development.

Development of ASEAP strategic objectives was based on SWOT analysis leading to identification of gapes and priority activities for ASEAP to address. The detailed Agricultural Environmental Action Plan gives action plan to address gaps and constraints discussed or identified in different sections or chapters. The action plan specifies short term, medium and long term strategies/priority activities and assigns responsibilities to different actors. It also gives indicators of progress of activities. The action plan identifies resources and finally gives sources of fund for implementation of the ASEAP.

CHAPTER 1: INTRODUCTION, OBJECTIVES AND METHODOLOGY

1.0 Introduction

In Tanzania Agriculture is the mainstay of the economy. It contributes 95% of the national food requirement, 65% of the industrial raw materials, 25.7 percent of GDP, 30.9 percent of export earnings and employs 77.5 percent of the population out of which 56 percent are women (URT, 2010). The crop sub-sector contributes about 35 percent of GDP and grows at 3.8 percent annually.

Tanzania depends on a robust and healthy environment to support income generating activities and to provide Tanzanians with food, medicines, energy, and timber for export and building materials. The country's natural resources provide the principal source for peoples' livelihoods especially the rural poor. With more than 70% of Tanzania's population involved in agriculture URT, 2010(budget speech), the integrity of the environment is of key importance to the livelihoods of the vast majority of Tanzanians is to be sustained. Agriculture of which performance is highly dependent on the quality of the environment is the dominant sector in Tanzania's economy contributing 25.7% of GDP (URT 2010). As a developing country, it has also been observed that an increase in population has always been associated with rapid degradation of the environment particularly deforestation, pollution by agrochemicals and soil erosion (Madulu, 2004) due to increased need for farm expansion, and poor farming practice respectively.

The climate in the country is diverse as a result of proximity to the ocean, inland lakes and it's high and low altitude which governs temperature. Diversity of climatic and geographical zones enables farmers to grow a wide range of varieties of annual and permanent/perennial crops. The country grows a large number of food as well as cash crops, in both small scale and commercial large scale (URT, 2008). Smallholders in Tanzania mainly practice rain-fed agriculture for subsistence purposes, while commercial large scale farming is very small (1206 entities) and produces some of the export crops in the country.

The National Agricultural Policy revolves around the goals of developing an efficient, competitive and profitable agricultural industry that contributes to the improvement of the livelihoods of Tanzanians and attainment of broad based economic growth and poverty reduction. The Government is committed to bringing about a green revolution that entails transformation of agriculture from subsistence farming towards commercialization and modernization of the sector through intensification of crop production, diversification, technological advancement and infrastructural development. In this endeavor, the government recognizes the paramount importance of the private sector as the engine of economic growth.

The business environment will have to be improved in order to catalyze the participation of private sector in agricultural development. The policy is committed to promote and to maintain agricultural practices that sustain the environment.

The National Land Policy of 1995 provides enabling environment for any citizen to have right to apply for land and to be granted land title of between 33 to 99 years. Non citizens are not entitled to own land in the country; however, they can access land as investors through the National Investment Centre Certification (URT, 2008). This motivation encourages investments in large scale on agricultural sector. Development Programmes in agricultural sector also focus on modernization and commercialization of private sector based small, medium and large scale agriculture for increased productivity, employment creation, profitability and increased incomes especially in rural areas (MAFC, 2010).

It is widely accepted that, the currently increasing global warming and its consequences of climate change, is having negative effects on the optimal availability of water resources for crop production world wide including Tanzania. In this regard, the country takes advantage of utilizing the identified irrigation potential area amounting to 29.4 million hectares for sustainable irrigation development. Irrigation farming has been verified worldwide that it boosts crop production 3-4 times than rain fed agriculture. Irrigation interventions have vital input in crop production and productivity for ensuring food security and increased income. Furthermore the Irrigation Policy (2009) intends to have irrigation systems which are environmentally sound, by ensuring that, environmental issues are addressed in all irrigation interventions.

In order for environmental issues to have positive impact on agricultural production, emphasis needs to be made on interventions that address bottlenecks along the value chains of the various agricultural produce as expressed in KILIMO KWANZA resolution. To accomplish this, the inputs side of agriculture such as land, seeds, agrochemicals and fertilizers which are basic components, need to be seriously considered as to their environmental quality or consequences. Furthermore, inappropriate land use practices and their consequences on land degradation threaten the sustainability of ecosystems and food security and hence declining productivity per capita and serious threat to human health.

In order to address environmental concerns in the country, various frameworks for environmental management have been put in place. These include, the National Environmental Policy (1997) that seeks to provide a framework to mainstream environmental considerations into decision making process in Tanzania. Environmental issues have also been mainstreamed in the National Strategy for Growth and Reduction of Poverty (MKUKUTA II). In addition, the programmes and strategies in agricultural sector reflect important environmental management issues.

The Environmental Management Act, (2004) under sections 31 provides a solid legal basis and assigns functions to different institutions in order to achieve sustainable management of the environment and its natural resources. The Act also requires the Sectoral Ministries to prepare Environmental Action Plans after every five years as a tool for providing guidance on implementing the environmental management and thus enhancing sustainable agricultural production processes.

This Environmental Action Plan takes on board environmental challenges that were identified in the Agricultural sector. Moreover, environment being a global agenda, Tanzania is a party to a number of environmental conventions and subscribes to the Millennium Development Goals.

1.1 Objective of the Environmental Action Plan

To ensure that, environmental problems and challenges identified in the Agricultural Sector are addressed through appropriate interventions by farmers, relevant institutions and other sectoral stakeholders for environmental and natural resource protection to achieve and for sustainable agriculture that contributes to improved livelihoods and economic development.

1.2 Methodology

The development of ASEAP was based on guidelines for the preparation of Environmental Action Plans for sector ministries and Local Government Authorities from Division of Environment in the Vice President's Office. Development of ASEAP also took into consideration the Ministry of agriculture institutional structure, implementations status of national policies, plans, legislation and multilateral environmental agreements and also their adequacy in facilitating the mandate of the Ministry of Agriculture in environmental management in general.

1.2.1 Study Area and Sampling Procedures

This study was conducted in regions which were purposively selected based on seven agro-ecological zones. These regions include Mbeya, Mwanza, Arusha, Manyara, Tanga, Mtwara, Coast and Dodoma. Agricultural Research Centers in those zones were also involved. Within the selected regions one to two districts were purposively picked based on evidence of existence of specific environmental agricultural issues/ challenges. In each district two to three villages were randomly selected for farmers interviews.

1.2.2 Study Design

The study adopted cross-sectional approach which allows data to be collected at a single point in time to capture important aspects in a study area (Bailey, 1994; Casely and Kumar, 1987 and Babbie, 1990). This kind of study design is fast and accommodates a large number of study units at low cost.

1.2.3 Data Collection

Both primary and secondary data were collected. Primary data were obtained through interviews using questionnaires, focus group discussions on issues and challenges and socio-economic activities in concerned villages and districts. Field observations were also used in primary data collection. Primary data collection involved key informants of a multidisciplinary nature at district level including officials from agricultural, environmental, community development, and health; land and forest sectors. In various research and training centers and agro processing industries, two officials were requested to provide primary information.

In order to supplement primary information collected from field surveys, secondary data collection was undertaken through review of documentary information from websites, official reports from districts, scientific journals, and various national reports. The national Tanzania homepage was used to get government policies and documents through the homepage reviewed policies, plans, strategies and legislations concerning agriculture and environment were used. Other relevant secondary information was obtained from different research institution reports.

In each purposively selected village a sample of 30% of village residents were randomly selected for interview using an open ended and close ended questionnaire. In addition to this, 10 15 villagers conducting various economic activities were purposively selected for participation in focus group discussion. Quantitative data analysis was done to obtain frequencies, percentages etc. descriptive analysis was done in analyzing qualitative information collected through key informants, focus group discussion and field observation.

1.3 **Agricultural Sector Socio-Economic Development**

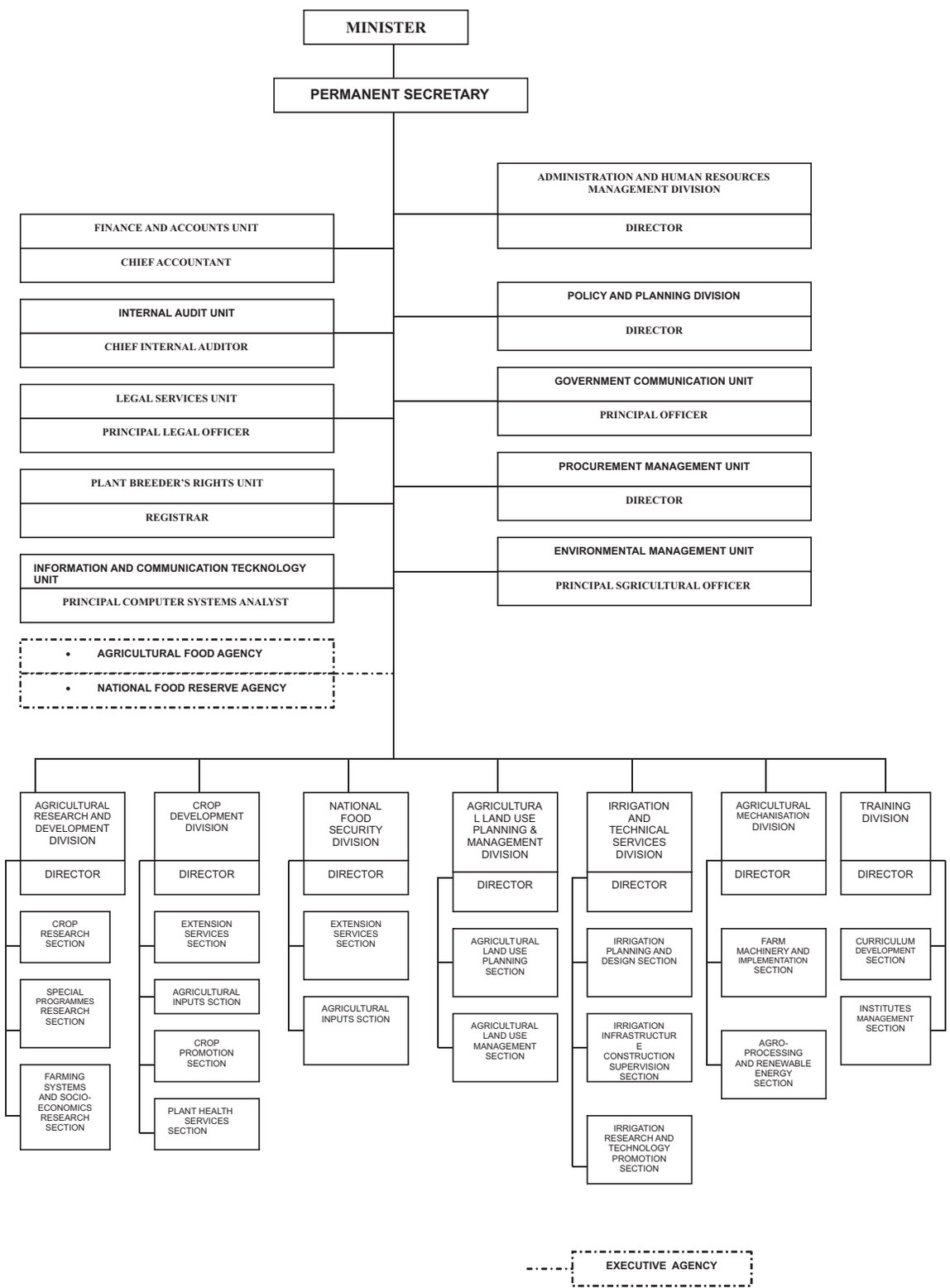
Socio-economic activities performed by farmers includes; fishing, aquaculture, hunting, livestock keeping, carpentry, bee keeping, pot and mat making etc. These are informal in the sense that in most cases you find farmers engaging in these activities. The Ministry will continue to strengthen the implementation of its programmes Agricultural Sector Development Programme (ASDP) and Cooperative Reform and Modernization Programme (CRMP) in order to address many of the challenges facing the sector. With 'KILIMO KWANZA' and Comprehensive African Agricultural Development Programme (CAADP) initiatives, the Ministry expects to stimulate broad-based poverty reduction by accelerating agricultural growth in a sustainable manner in the country. This is a good opportunity for the country to ensure that both public and private resources are exploited efficiently and sustainably for the betterment of the agricultural sector.

CHAPTER 2: INSTITUTIONAL AND LEGAL FRAMEWORK

2.1 Institutional Structure in Relation to Environmental Management

The Institutional structure of the Ministry of Agriculture Food Security and Co-operatives (MAFC) is as shown in chart 1 below.

Chart 1: MAFC ORGANIZATIONAL STRUCTURE



Source; MAFC, 2011

The Ministry is charged with the responsibility of facilitating the development of sustainable agriculture for increased productivity and profitability, so as to enhance income and food security. In undertaking its mandated roles the Ministry puts more emphasis in improving efficiency and effectiveness in the agricultural sector in order to meet requirements of different stakeholders thereby enabling them to contribute to the national development. The Ministry also acquires, retains, and develops standards expected by its clients, and promotes sustainable cooperative development services to the public. In order to carry out its functions efficiently and effectively, the Ministry is divided into Divisions and Units (as shown above in the chart) with different functions and responsibilities. The Divisions involved includes:

- **Agricultural Research and Development**
  This is responsible for undertaking the development of appropriate agricultural technologies, using Participatory Approaches.
- **Crop Development Division**
  The division provides expertise and services on crop development. It encourages crop producers to access and adopt improved varieties of high value crops.
- **National Food Security Division**
  It ensures that, food security for all citizens is maintained at all levels and at all times.
- **Training Division**
  The division conducts short and long term pre-service and in-service training and offers tailor-made training to youth and farmers.
- **Agricultural Land use Planning and Management Division**
  It provides expertise on agricultural land use planning and management.
- **Agricultural Mechanization Division**
  This division is responsible for providing expertise in mechanization of agricultural production.
- **Irrigation and Technical Services Division**
  The division is responsible for providing expertise in the development of irrigation infrastructure and efficient water management for increased agricultural production in the country.
- **Policy and Planning Division**
  It provides expertise and services in policy formulation, implementation, monitoring and evaluation.
- **Administration and Human Resources Management Division**
  It performs administrative and managerial functions.

There are also Units under the Ministry that perform various duties. These Units includes: Plant Breeder's Right's, Information, Education and Communication, Procurement Management, Legal Services and Environmental Management Unit.

The Environmental Management Unit (EMU) was established according to the Environmental Management Act Cap 191 in July, 2008. The functions of the Unit are therefore: to monitor compliance with the requirements of EMA 2004 within the Ministry; to advise on policy, legal reviews on environmental management in the agricultural sector in collaboration with Vice President's Office

(Division of Environment and the National Environment Management Council (NEMC); to monitor environmental protection compliance in the agricultural sector; and to oversee the implementation of agricultural strategies in order to minimize adverse environmental and social-economic impacts brought about by unsustainable agricultural activities and practices.

The EMU functions includes undertaking strategic environmental assessment of the agricultural sector policies, plans, and programs; in coordination with NEMC ensure enforcement of environmental violations related to Agriculture, seek implementation of environmental related research as prioritized in the National Environmental Research Agenda (NERA), carry out environmental awareness activities related to the sector especially educating the public on environmentally friendly agriculture and liaise with NEMC in overseeing the preparation and implementation of Environmental and Social Impact Assessment of the ASDP intervention both at national and local levels. At the local level in collaboration with National Facilitation Teams (NFTs) of the ASDP it provides technical capacity of the District Facilitation Teams (DFTs) to integrate environmental issues in the District Agricultural Development Plans (DADPs).

Finally, to prepare and coordinate the implementation of Agricultural Sector environmental action plans at the national, District and local levels as required under EMA 2004.

The implementation of the Environmental Management activities is carried out by MAFC using its various Sections/Units supported by various development programs such as the Environmental Management Act Implementation Support Program (EMA-ISP); Agricultural Sector Development Programme (ASDP); Joint Program on Environment (JP 11), the Accelerated Food Security Project (AFSP) and any other sector projects or programs.

2.2 Implementation of National Policies, Legislations and Multilateral Agreements

2.2.1 Policy Framework

The government through parliament has enacted a number of legislations relevant to environmental management. Implementation of the Agricultural sector activities is governed by its own policy and legislations without jeopardizing requirements of other policies and legislations under different ministries.

i. The National Agricultural Policy Draft (2009)

Agricultural development is highly dependent on land, forest, air, water and other environmental resources. Sustainable utilization of these resources is vital for the growth and sustainability of the sector. However, agriculture is vulnerable to the effects of climate change; such that changes in temperature and rainfall amount, patterns, intensity and distribution, normally affects the growing seasons and crop yields. There is a scientific consensus that the contribution of non industrial countries like Tanzania to the current concentration of greenhouse gases, is mainly human-induced through activities that lead to

changes in land-use such as deforestation and forest degradation. Additional emissions arise out of paddy cultivation and livestock keeping through production of methane. Unsustainable farming methods and systems rampant in our country have always led to deforestation, land clearing and/or bush fires all of which contribute to climate change. The challenge that we therefore face, is how we mitigate effects/impacts of climate change arising from the agricultural sector activities.

The agriculture policy objectives promotes integrated and sustainable use and management of natural resources, ensures basic food security and improves standards of nutrition as well as the standard of living in rural areas, promotes access by women and youth to land, credit, education and information.

The policy also recognizes the dependence of agriculture on environmental resources, hence the need for environmental protection. It identifies the need for developing mechanism for linking agricultural sector in protecting and enhancing the environment. While the policy emphasis is primarily on agricultural development, sustainability issues are equally important and need to be treated so.

ii. The National Environmental Policy (1997)

National Environmental Policy is a national framework for environmental management. It emphasizes the sound management of the impacts of projects development and use in order to minimize environmental degradation. With regards to the Agricultural Sector, the environmental policy document emphasizes the strengthening of environmentally sound use of agrochemicals to minimize pollution of water, efficiency use of water in irrigation, soil erosion control and minimization of encroachment in forest, woodlands, wetlands and pastures among others.

Iii. The National Irrigation Policy (2010)

The National Irrigation Policy (NIP) provides the basis for a focused development of the irrigation sector in Tanzania. The Policy covers the activities and interventions required for the sector to effectively contribute towards enhancement of production and productivity in the agricultural sector (URT, 2010a). The NIP (section 2.4) among other areas highlights the need for the development and management of irrigation schemes and the increased use of available water resources. The main objective is to ensure sustainable availability of water for irrigation and its efficient use for enhanced crop productivity and profitability in order to contribute to food security and poverty reduction. The wider environmental issues relating to irrigation are somewhat peripheral. Other policies related to environment include;

iv. National Forestry Policy (1998)

The National Forestry Policy aims at fostering sustainable forest management, conservation of biodiversity and water catchments areas and prevention of soil erosion. The policy emphasizes on the involvement of local communities, private sector and government in ensuring better and sustainable management and use of forest resources. Sustainability of water sources is one of the key prerequisites for local and national development. Population pressure and inefficient management and protection have contributed to deterioration of catchments areas causing water scarcity, which directly affects agriculture. However, the conservation of biodiversity under the Forest Policy means that the wild

relatives of our crop varieties are also preserved for future use.

v. The Land Policy (1995)

The overall objective of the policy is to promote and ensure a secure land tenure system, to encourage the optimal use of land resources and to facilitate broad-based socio and economic development without upsetting or endangering the ecological balance of the environment. The policy requires that the village land use plans be used as a tool for implementing policies for better land use and management. Further more, village land use plans will provide a basis for guiding extension service packages including techniques in agriculture, livestock, forestry, wildlife, fisheries and environmental conservation. Concerning urban agriculture, the policy will continue to regulate the conduct of urban agriculture and will ensure that it does not disrupt planned urban development. Other relevant policies are attached as annex 1.

2.2.2 Legal Framework

i. Environmental Management Act, No. 20 (2004)

The Environmental Management Act No. 20 of 2004 (EMA) forms an umbrella law on environmental management in Tanzania. The Act provides a legal and institutional framework necessary for coordinating environmental activities across sectors taking into consideration accountability and the role of individual citizens.

The Act also provides an opportunity for establishing environmental protected areas out of critically sensitive habitats that are not under any form of protection; and to develop management and monitoring plans for such areas once declared so. The areas include threatened mountains, coastal habitats, riverbanks and indigenous forests.

Furthermore, threatened wetlands as well as areas condemned to environmental abuse could as well be re-categorized as areas in need of special protection. Agricultural activities are also carried out within these areas. It is in this context that the ASEAP is expected to come up with a plan that will identify critically sensitive areas for better management including rational utilization of existing resources as well as restoration plans for those in degraded state. This will also help to meet the challenge of making an inventory of ecosystems that are under threat, especially wetlands and forest ecosystems, which is now a legal requirement under the law.

ii. Fertilizer Act, No. 9 (2008)

The Act makes provisions for regulation of manufacturing, importation, exportation, sale and utilization of agricultural fertilizers, and to repeal the Fertilizers and Animal Food Stuffs Act, Cap. 378. The Act prohibits the use, storage, discharge, release, placing or cause to be placed any fertilizer or fertilizer supplement in a manner likely to have adverse effect on human health or the environment.

iii. Plant Protection Act, No. 13 (1997)

The Act makes provision for consolidation of the Plant Protection, to prevent the Introduction and spread of harmful organisms, to ensure sustainable plant and environmental protection, to control the importation and use of plant protection substances, to regulate Export and imports of plants and plant products and ensure the fulfillment of international Commitments, to entrust all plant protection regulatory functions to the Government, it also provides under different sections for safeguards against pollution of groundwater and the natural environment by plant protection substances.

iv. Seed Act, No 18 No. (2004)

The Act controls and regulates the standard of agricultural seeds and matters incidental to and herewith. It regulates introduction and cultivation of crops varieties and in so doing protects the environment in terms of unintentional effects on the crop improvement and biodiversity. It also addresses issues of variety uniformity, distinctness and stability before any variety is released to the Tanzanian environment.

v. Plant Breeders Rights Act, No. 22 (2002)

The Act establishes registry of plant breeder's rights; promotion of plant breeding and facilitation of agricultural advancements through the grant and regulation of plant breeders' rights and for matters connected therewith. It also provides protection system for plant varieties not registrable under the Patent Act.

vi. Land Use Planning Act, No. 6 (2007)

The Act provides for the procedures for the preparation, administration and enforcement of land use plans. Among other objectives of the Act, is to facilitate the orderly management of Land use and to promote sustainable land use practices (section 4). Programme activities that affect land use and livelihoods shall comply with the provisions of this Act. Any infringement of existing land use shall need consultation with land use planning authorities.

vii. The Food Security Act, No. 10 (1991)

The Act provides for establishment of Board of Trustees and the Department of Food Security, which oversees and develops food security programmes and strategies to ensure effective food security system for the whole country. The Department is, therefore an important actor in any future land allocation master plan for development projects to ensure that there is no inherent conflict between private and public food crops/pasture development.

viii. Land Act, No. 4 (1999)

Private Group Property is given either through Granted Rights in General and Reserved Land (Land Act, Section 19) or through Customary Rights in Village Lands (Village Land Act, Section 22). Provision is also made for holding land by joint occupancy or occupancy in common. Open land is more subjected to land degradation whereas private ownership is usually in line with environmental conservation.

ix. Village Land Act, No. 5 (1999)

The Act requires each village to identify and register all communal land, and obtain the approval of all members of the village for identification and registration (Village Assembly, Section 13). A Register of Communal Land (Section 13(6)) is to be maintained by each Village Land, and land cannot be allocated to individuals, families, or groups for private ownership (Section 12(1) (a).

X. The Forest Act, No. 14 (2002)

The Act controls forestry development in Tanzania. The Act also controls forest plantation management and conservation of natural trees genes. It also supports integrated land use planning and environmental monitoring. Optimum agricultural activities under Kilimo Kwanza will have no negative impact on the current forest state under conservation. There is an opportunity of adopting intensive agriculture which will do away with shifting cultivation which results in clearing of vegetation. There is also the possibility of practicing agro-forestry which conserves forests and at the same time promoting agricultural activities.

xi. Water Resource Management Act, No. 11 (2009)

The Water Resource management Act No. 11 of 2009 repealed the Water Utilization Act No. 42 of 1974 and its subsequent amendments. The Act provides for institutional and legal framework for sustainable management and development of water resources. The Act establishes a mechanism for more participatory management of water resources. Negative impacts of irrigation agriculture on water resource management may not take place because there are regulations safeguarding or protecting water catchments area. There are also regulation that specifies the distance between water sources for irrigation and cultivated areas. There are rules and regulations made by water users Association and also the Government on how to control extraction of water from water sources.

xii. The Disaster Relief Coordination Act, No. 9 (1990)

The Act provides for establishment of Disaster management department for ensuring mitigation and preparedness of any negative impacts resulting from the expected weather conditions such as flash floods, and drought. Further more, the policy provides for effective manageability of the warning systems. The severity of disaster consequences depends on the interplay between the warnings issued and the degree of the public response to the warning. Warning systems need to be known, developed and tested continuously for the purpose of making them effective. Plant Protection and Food security under the Ministry of Agriculture Food Security and Cooperatives are mandated with the obligation of early warning in ensuring food security in the country.

These Acts will provide a basis for environmental management within the Agricultural sector as they will provide a basis for the ASEAP implementation.

2.2.3 Strategies, Programmes and Plans

The Strategies, Programmes and Plans, which address environmental issues in Agricultural sector, are as follows:-

i. National Strategy for Growth and Poverty Reduction II (NSGRP)

The NSGRP recognizes that Agricultural development is critical for the attainment of the NSGRP and Millennium Development Goals targets. It also recognizes the role of agricultural sector in poverty reduction and the need for mainstreaming environment as one of the crosscutting issues.

ii. Agricultural Sector Development Strategy (ASDS) of 2001

Agricultural development is strongly influenced by a number of issues that are outside the mandate of the lead Ministries. In practical terms, the ASDS address some of the many issues that can constrain the performance of Tanzanian agriculture and lead to continuing rural poverty. These include rural infrastructure development, prevention and mitigation of the effects of HIV/AIDS and malaria, gender and youth and environmental management issues. To foster agricultural development, Government in close consultation with the private sector and other stakeholders will institute mechanisms for coordinating and mainstreaming these issues in other sector planning.

iii. Rural Development Strategy

The RDS provides strategic framework to facilitate coordinated implementation of various sector policies and strategies that focus on development of rural communities. On environment, the RDS recognizes the needs for improved capacity for environmental management and conservation for local authorities and local communities. In addition, the RDS outlines strategic interventions into various sectoral issues including agricultural projects**.**

iv. National Water sector Development strategy (2006) and Programme

The National Water Sector Development Strategy promotes integrated water resources management for agricultural production and the development of urban and rural water supply. It sets out a strategy for implementing the National Water policy of 2002. It aims at achieving sustainable development in the sector through efficient use of water resources and efforts to increase the availability of water and sanitation services.

v. Agricultural Sector Development Programme (ASDP)

The ASDP identifies the need to streamline crosscutting issues such as environment, HIV/AIDS and Gender into multi- sectoral activities. The Program has provided for institutional framework on environmental management issues through Environmental Social Management Framework (ESMF) and Resettlement Policy Framework (RPF). This framework is a tool to ensure that, agricultural activities are undertaken sustainably. The ASDP underscores the importance of promoting environmental research through linkage with the Vice President's Office and NEMC. It recognizes the linkage between subsistence agriculture and poverty, hence the need for promoting agricultural productivity and farm income as well as household food security.

vi. National Environnemental Action Plan (2004)

The NEAP provides analysis and guidelines for dealing with environmental management problems at sectoral level. It also addresses the six key problems outlined in the National Environmental Policy (1997) which are land degradation, lack of access to good quality water for both urban and rural inhabitants, environmental pollution; loss of wildlife habitats and biodiversity; deterioration of aquatic systems; and deforestation. It gives strategic approach for mainstreaming environmental issues into decision making process and the need for defining sector policies and action plans.

vii. The National Irrigation Master Plan (2002)

The National Irrigation Master Plan (NIMP, 2002) is one of the major master plans under the Agricultural Sector. The purpose of the National Irrigation Master Plan is to address food security issues through alleviation of many existing constraints to irrigation development.

The main objective of the NIMP is "Sustainable Irrigation Development" with emphasis on comprehensive measures through "Effective Use of National Resources", to largely contribute to attainment of the primary objective of the Agricultural Sector Development Strategy (ASDS). As of June 2009, the total area provided with improved irrigation infrastructure was 310,745 Hectares (NIP, 2010). By June 2010 cumulative area developed was 331,490 hectares and by June 2011, the cumulative area equipped with improved irrigation infrastructure has increased to 345,690 hectares.

viii. The National Agricultural Land Use Master Plan

The National Agricultural land use Planning and management Master plan was prepared in 2007 with the main objective of preparing guidelines for the formulation of National Agricultural land use planning and management master plan. It is intended to be one of the tools to guide the implementation of the Tanzania Development Vision 2025, National Strategy for growth and reduction of poverty 2005 and the Agricultural Sector Development strategy which are key tools **f**or the modernization of agriculture in the country.

2.2.4 Multilateral Environmental Agreements

The Agricultural Sector recognizes many international environmental agreements, conventions, and protocols that seek to protect the environment and ensure sustainable development. In recognition of the rights and obligations with respect to shared trans-boundary natural resources regionally and internationally, the Environmental Management Act requires implementation of environmental management measures to avoid and reduce potential trans-boundary environmental impacts that are detrimental to the interests of other states and the environment. This is because; environmental processes of the agricultural sector tend to be trans-boundary in nature.

These obligations are imposed under Part XV of the Environmental Management act, 2004 and Part XII of the Water Resources Management Act, 2009 which impose similar obligations with regard to water. It requires the development of policies and strategies which ensure the sustainable, equitable utilization and management of trans-boundary waters. Table 2-1 gives a summary of the international commitments and agreements.

Table 2- 1 Summary of the key International Commitments/Agreements and Tanzania Participation

S/No	International Commitments/ Agreements	Year of Ratification
1	The Basel Convention on the Control of Transboundary Mo vements of Hazardous Waste and Their Disposal	**1989**
2	Convention on Biological Diversity	**1992**
3	The United Nations Framework Convention on Climate Change	**1992**
4	United Nations Convention to Combat Desertification	**1994**
5	The Kyoto Protocol -fighting global warming.	**1997**
6	Stockholm Convention on Persistent Organic Pollutants	**2001**
7	The Cartagena Protocol on Biosafety to the Convention on Biological Diversity	**2000**

Source, BICO (2006):

However, despite all the Policies, Plans, Programme and legal framework in place, the sector still faces some shortcomings that include, inadequate manpower to address environmental issues, implementation tools such as sector specific guidelines and procedures, conflicting policies, inadequate as well as donor dependent funding.

2.3 Involvement of other Stakeholders in Implementation of National Policies, Legislations and agreements

The involvement of other stakeholders in the implementation of agricultural activities is highly encouraged by the ministry. There are different stakeholders involved.

Bilateral / Multilateral Organizations

The financing of agricultural activities in Tanzania has been through a variety of financial sources with the Government traditionally being the main source of funds to the sector mostly to support services and infrastructure. Government resources have supplemented by Development Partners (e.g. NORAD, DFID, DANIDA, CIDA UNDP, WORLD BANK, FAO, SADC, ICRAF etc) who have been supporting the development of the sector through contribution to the ASDP Basket Fund and stand-alone projects. In addition, resources to the sector have also been channeled through Non Governmental Organizations (NGOs), both local and foreign, and these have also made significant contributions to the sector. These resources flowing through this window have encouraged the commercial private sector to invest in agriculture. Also, there are numerous microfinance institutions (MFIs) which are operating in rural areas in the form of SACCOS, SACCAS, and VICOBA to support agricultural activities. The role of these microfinance institutions has been significant to the growth of agricultural sector in rural areas.

Processors and Agri-business

Growth of agricultural sector does not come from increased production alone, but from a chain of profitable transactions involving private sector operators. This group includes importers and exporters, wholesale distributors, retail suppliers, stockists, farm produce buyers, transporters and processors of agricultural produce. The agri-business community plays a key role in engendering growth through the importation and distribution of agricultural inputs, the procurement and processing, as well as the exporting and marketing of agricultural produce.

Non-Governmental Organizations

Non-Governmental and Community-Based Organizations (NGOs and CBOs) play a particularly important role in agriculture and rural development in Tanzania. There are both large international NGOs and small national NGOs working with farmers, pastoralists and agro-pastoralists. However, not all NGOs work closely with district authorities1, so the level of involvement of NGOs varies considerably and not very much known.

Other Institutions and Groups

Other non-public institutions which are important to agriculture include academic, consultancy firms and other service providers. The Government mobilizes their skills and capacity to contribute to the development of the sector.

Ministries

There are many other Ministries whose work contributes to agriculture through cross-cutting and multi-sectoral activities and issues. Cross-sectoral issues are crucial, as they link the agricultural sector to other sectors and to other parts of the economy; they also link agriculture with other essential aspects of farmers' daily lives. These are;

Prime Minister's Office (PMO): is responsible for the coordination of Government business and affairs.

Vice President's Office (VPO-DoE): Coordinates environmental management issues. The VPO is also responsible for overseeing NGOs' activities.

Ministry of Finance (MoF): Allocates and monitors public funding for the agricultural sector. It also mobilizes support for the sector. Through fiscal policy, MoF rationalizes, harmonizes and provide taxes incentives for attracting more investment in the sector..

Ministry of Livestock Development and Fisheries (MLDF): In addition to its livestock development role, livestock provides a fundamental resource for plant production

Ministry of Works (MoW): Provides backstopping to LGAs for building and maintaining district and feeder roads. The ministry is also directly responsible for the construction and maintenance of regional and trunk roads.

Ministry of Communication and Transport (MCT): Oversees improvements to national and local communication systems. This is required both to attract agricultural investment in the rural areas.

The Ministry of Justice and Constitutional Affairs (MJCA): Dispenses justice as the need arises, both to protect life and property, and as an arbitrator in disputes and conflict.

Other Public Institutions

There are a number of public agencies and institutions which play critical roles in supporting the agricultural sector, often of a regulatory nature. Among these are the Tanzania Official Seed Certification Agency (TOSCA), the Tropical Pesticides Research Institute (TPRI), the National Pharmacy Board (NPB), the National Environmental Management Council (NEMC), the Tanzania Food and Nutrition Centre (TFNC), the Tanzania Forest Research Institute (TAFORI), the Tanzania Bureau of Standards (TBS), and the Cooperative Audit and Supervision Corporation (COASCO).

CHAPTER 3: SECTOR STATE OF THE ENVIRONMENT

3.1 Sector Resources and their Current Status

i. Land Resources

The country is endowed with 95.5 million hectares of land out of which 44 million hectares are classified as suitable for agricultural production (TNBC, 2009). However, only about 10.1 million hectares of land are under cultivation (URT, 2009). Land under medium and large scale farming is 1.5 million hectares while land under small holders is about 8.6 million hectares. For more details see table 3.1 below.

Table 3- 1: The Pattern of Land Utilization in Tanzania

Land Resources	Ha (million)
Total Land	95.5
Available Land	44
Cultivated Land	10.1
Land under medium and large scale farming	1.5
Land under small holders	8.6
Per capital/land holding (ha per head)	0.1
Area suitable for irrigation	29.4
• High potential	2.3
• Medium potential	4.8
• Low potential	22.3
Area under irrigation	0.35
Range land	50
Land under livestock	24.0
Tsetse infected area	26.0

Source: TNBC (2009), Kilimo Kwanza Toward Tanzania Green Revolution and MAFC budget speech 2011

i. Water Resources

Water is becoming increasingly scarce locally with respect to the demands placed upon it. The opportunity cost of Tanzania's demand for water is increasing, especially in many of the areas considered to have irrigation development potential. The use of water for productive purposes which include irrigation is an essential requirement for poverty alleviation and food security. According to water sources research conducted in 2008, about 10423 surface water sources that are potentially available for irrigation were identified (MAFC,Budget speech 2008). These sources are distributed in the six basins as follows (Basins with their sources in bracket). Lake Victoria Basin (4,999), Rufiji river Basin (2,865); Lake Rukwa basin (943), Lake Nyasa Basin (629), Wami/Ruvu River Basin (634) and Central water Basin (326).

A total of 447 potential sources of underground water have also been identified in nine (9) Basins. . These include Pangani River Basin (67), Wami-Ruvu Basin (2) Rufiji River Basin (62), Ruvuma River Basin (57), Lake Nyasa Basin (13), Lake Rukwa Basin (106), Lake Tanganyika Basin (35) and Lake Victoria Basin (54) (NIMP,2002). These sources do obviously entail an increased overall potential for irrigation in the future.

ii. Human Resources

a. Technical Staff at the Ministerial and Local Government Authorities

The total number of existing staff in the Ministry of Agriculture Food Security and Cooperatives headquarters including research and training institutions is 2,212 (MAFC Budget speech 2010), this includes 8 staffs posted at the EMU. Staffing at the Local Government Authority level working in the agricultural sector is about 5,181. However, the actual requirement of agricultural extension workers is about 15,082((MAFC, 2010). However all these would require new skills and orientation to mainstream environment in order to achieve sustainable agriculture at all levels.

b. Small and Large Scale Farmers

There are about 4,901,837 households engaged in agricultural production producing both food and cash crops in small scale. The commercial large scale sub sector is very small (1206 entities) which produces some of the export crops (e.g. coffee, tea, cashewnut sisal, sugar, etc). However, this is likely to increase under the Kilimo Kwanza strategy; potentially bringing new demands for EIA in the sub sector.

iii. Agricultural Implements and Inputs

Farm inputs are important in creating growth in the agriculture sector in Tanzania. Farm inputs have direct impact in increasing production and productivity of the agricultural produce. However, various studies (Urassa, 2010, MAFC, 2007) have shown that the usage of high quality farm inputs in the country is affected by many factors including, infrastructure (poor roads in rural areas), high costs (consistent rising prices), availability, farmers' knowledge and inadequate support on extension services. Major agricultural inputs necessary to support sector growth through increased production and productivity are mainly fertilizers, quality seeds and pesticides.

Plate1: Pesticides and Herbicides found in Mtwara
Source: Field Survey 2011

Fertilizers

The Government has reintroduced in 2003/04 subsidizing fertilizers for grain producing southern highland zone by setting aside Tshs 2 billion to meet part of the transport costs of 33,277 tons (MAFC, 2009).

Plate 2: Various Fertilizers and Seeds in Rufiji District
Source: Field Survey 2011

It was noted that fertilizer use has increased from 241,753 tonnes in 2005/2006 to 287,763 tonnes in 2006/2006. Some of the fertilizers used are SA, UREA, CAN, TSP, DAP etc. The details and Supply trend is as seen in table 3-2. MAFC in collaboration with the private sector has been involved in production and distribution of quality seeds. The main objective of seed industry is to develop and disseminate quality seed of different varieties acceptable to farmers at affordable costs. Patenting for producers of new types of seeds was legislated in the year 2002 so as to motivate researchers.

Table 3- 2: Trend of Fertilizer Supply in Tones

Type	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
SA	21,050	18,345	17,416	7,408	7,000	5,320	10,660
CAN	13,850	24,946	16,487	29,145	32,782	28,951	37,053
UREA	40,149	40,946	37,237	51,576	85,850	122,037	127,597
TSP	5,400	6,279	5,511	2,487	7,117	4,700	6,273
DAP	11,128	15,872	11,626	5,666	12,345	44,829	34,670
NPK20:10:10	320	21,098	15,667	6,803	7,908	6,154	9,946
NPK25:5:5	4,530	2,567	2,386	1,795	3,576	3,208	16,000
NPK6:20:18/10:18:24	13,067	3,853	423	18,515	32,176	22,501	24,290
NPK17:17:17	-	-	-	-	-	-	10,965
MOP/SOP	240	1,617	2,880	1,012	5,944	1,350	6,596
OTHERS	2,600	3,372	1,092	1,246	364	2,703	3,713
TOTAL	**112,334**	**138,895**	**110,725**	**125,653**	**195,062**	**241,753**	**287,763**

Source; Adopted from MAFC, 2008

Various chemicals are also used for controlling pests, diseases and weeds in the field. Major chemicals issued by MAFC are used to control quelea quelea, locusts, armyworms, and rodents. The details are as seen in the table 3-3 below.

Table 3- 3: Pest and Disease Control in the Sector

Pests/Disease	Year	Area covered	Chemical used
Quelea quelea	2006/2007	2,282Ha	6,905 Ltrs
Red Locust	2006/2007	16,840Ha	4,770 Ltrs
Armyworms	2006/2007	10 Regions	29,000Ltrs
Rodents	2006/2007	921Villages	2,581.49Kg

Source: MAFC-2006/2007 Report

Other agrochemicals are obtained from different agro-input suppliers located all over the country, of which if not properly used may cause a negative impacts on the environment. However, there is an opportunity of promoting IPM in order to minimize negative impacts associated with the use of agrochemicals.

Seeds

The potential annual requirement for improved seeds of cereals, legumes and oil seeds in the country has been estimated to be 120,000 tons. Currently farmers use only 12,800 tons (10%) of improved seeds in their production, which means there is large room for increasing productivity in future. Along with this drive, capacity has to be built in the area of adoption of genetically modified seeds and the risks associated with the technology especially as regards matters of food security

Farm Equipments

Most farmers are smallholders, who possess few acres of land and mostly use hand-hoes for production. Being a large population involved in agricultural sector using low level of technology, mechanization could have significant impact on increasing production and productivity in the agricultural sector.

For example, 64% of farmers still use a hand hoe for tilling land, 24% use animal draught ploughs and only 12% use tractors (MAFC, budget speech 2011). In 1994 the Government through the Parliament Act No. 9 of 1994 established Agricultural Inputs Trust Fund (AGITF). Therefore, AGITF has been issuing short term soft loans to agro-inputs suppliers, farmers, SACCOS, District Input Funds and other institutions involved in agricultural production or render agro-inputs services to farmers.

During the period of 2005/2006 the Agricultural Input Trust Fund provided 44 credits worth Tshs 1,278,192,000 out of which, 18 credits worth Tshs 922,392,250 were for agricultural inputs, 10 credits worth Tshs 313,800,000 for purchase of new tractors, and 16 credits worth Tshs 42,000,000 for repair of tractors.

At present the country has 8,005 tractors, 5,066 ploughs, 1,112 harrows, 235 planters, 2,380 trailers and 910 planting tillers. There are about 2 million hand hoes 20, 000 ox- ploughs and 910 power tillers (URT 2008).Some of these implements that has been introduced in order to minimise land degradation resulting from soil compaction includes driven rippers and direct planters, hand jab planters and ripper sub-soilers.

v. Infrastructures

This includes food storage facilities, transport, market and market facilities and irrigation schemes.

a. Food Storage Facilities

Food storage in the country is divided into three parts; National food storage, Household food storage (Farm retention) and Private firms' food storage. The National Food Reserve Agency (NFRA) was formed from the Strategic Grain Reserve (SGR) with the aim of maintaining a national optimal level of food reserve to address local food shortage and to respond to immediate emergency food requirements.

The capacity of the NFRA is about 241,000 metric tonnes of grains, which are in warehouses located in seven zones of Dar es Salaam (Kipawa and Chang'ombe), Arusha, Dodoma, Shinyanga, Iringa (Makambako), Ruvuma (Songea), and Rukwa (Sumbawanga). The stocks from the NFRA, Private and households vary from year to year. For example the stocks for 2010/11 was as follows; NFRA 1181,019 tonnes (MAFC budget speech), Private stocks was 121, 560 tonnes, and Households retention was 231, 435 tonnes making at total of 462, 870 tonnes. (AGSTATS for Food Security June, 2009).

b. Transport

Tanzania has more than 3,685 km of railroads. There are two railway networks which provide both freight and passenger services. These are Tanzania Railways Limited (TRL) and Tanzania Zambia Railways Authority (TAZARA). Three international airports provide airway transportation, and these include, Mwalimu Nyerere International Airport (MNIA), Kilimanjaro International Airport (KIA) and Zanzibar International Airport (ZIA). A road network of approximately 85,000 kms of which about 5% is tarmark/paved and the remaining is unpaved.

About 35,000 km of the network is classified as National Roads and has since 2000 been managed by the Tanzania National Roads Agency (TANROADS). There is also semi-autonomous road network which is under the Ministry of Infrastructure Development. The remaining approximately 50,000 km road network consists of district feeder and community roads and is managed by various Districts under the Prime Minister's Office, Regional Administration and Local Government (PMO-RALG). Others include sea and lake ways.

c. Marketing and Market Facilities

The Ministry of Industry and Trade (MIT) being one of ASLMs in collaboration with other institutions is responsible for developing marketing system including that of the agricultural sector. There is Warehouse Licensing Board for supervising the Warehouse Receipt System (WRS) under the Warehouse Receipt System Act No 10 of 2005. In addition, the Government continued to sensitize and educate the public on availability of market opportunities inside and outside the country.

Plate3: Agricultural Products Marketing in Ruvu Area
Source: Field data: 2011

The Government also continues to strengthen and promote domestic market for increasing the consumption of crops and various products produced in the country. Other activities being carried out are feasibility studies for construction of international agricultural crops markets, improving crop markets infrastructure and advising the LGAs to sustain them. For example Warehouse Receipt System was successfully piloted in Mtwara region and all the Cashewnut crop was sold through the system (MAFC, 2008).

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a. Irrigation Schemes

According to NIMP study (2002), the potential area for irrigation development was determined by a study of water resources, land resources and socio-economic potentials. The study results show the total area of 94.8 million ha, consisting of:

i. 2.3 million ha for "High Potential Area",
ii. 4.8 million ha for "Medium Potential Area",
iii. 22.3 million ha for "Low Potential Area",
iv. 31.1 million ha for "Forest/Marginal Area",
v. 7.3 million ha for "Water Body", and
vi. 27.1 million ha for "Protected Area".

Plate 4: Some of the Country's irrigation Canals
Source: Field survey 2011

The NIMP states that there are about 29.4 million hectares (ha) available for potential irrigation development in Tanzania. This total includes areas of high potential (2.3 million ha), medium potential

(4.8 million ha), and low potential (22.3 million ha), of the total area, the NIMP estimates that for the country to be self sufficient in paddy production which is the most irrigated crop with dual purpose as food and cash crop, 405,400 ha of irrigated land could be developed by 2017 (Table 3-4).

Table 3- 4: Estimates of Irrigation Schemes Development by Planning Horizon (Ha)

S/N	Irrigation Schemes to be Developed	Short-Term 2003-2007	Medium-Term By 2012	Long-Term By 2017
1	Rehabilitation of traditional irrigation schemes	179,800	216,100	274,600
2	Development of water harvesting schemes	41,600	57,200	68,200
3	New Smallholder Schemes	43,800	51,600	62,600
	Total	**265,200**	**324,900**	**405,400**

Source: NIMP 2002

It should be noted that, construction of structures like irrigation Schemes, crop warehouses, road and marketing structures, the element of environmental management need to be taken on board.

i. Others Resources involved in Agricultural Related Activities

The industrial sector also largely depends on agriculture for its raw materials. There are a large number of companies in manufacturing sector, which use significant amounts of raw materials directly from the agriculture produce. In 2006, there were about 174companies dealing in agri-businesses with a total turnover of about USD 860 Millions (MAFC, 2008). Agricultural sector provides about 20% to 40% industrial raw materials (MAFC, 2010 budget speech), therefore, contributing significant amount of value produced by the manufacturing sector in Tanzania. Some of these agribusiness companies are; Tanzania Breweries, Tanzania Cigarette Company, Mohamed Enterprises, Sumaria Group and Bakhresa Food Products. Others are medium to small scale grain millers and horticultural food processors. Since, some of the agricultural based industries are the most notorious in pollution e.g. in leather processing (the case of Kibaha); the critical issue of concern here is the need to create adequate capacity in matters of lifecycle analysis of agricultural industries for purposes of ensuring satisfactory EIAs are done as well as in supervision of their EMPs. Financial institutions are also important agents of the agriculture sector.

These are the Commercial banks and micro-finance institutions such as Savings and Credit Associations (SACAs), Savings and Credit Cooperative Societies (SACCOs) and informal lending mechanisms. Access to credit and other financial services is a serious constraint to many farmers, from small to large scale producers. Especially, the fact that land until recently could not be used as **c**ollateral, formed a big bottleneck to producers. Though this issue has been resolved through new legislation, commercial banks continue to be reluctant to approve investments in the agricultural sector as it is seen as a relatively high risk sector. Agricultural credit is a crucial input for increasing agricultural production and productivity**.** The Government has been implementing various policies and initiatives to ensure adequate credit goes to

productive sectors including agriculture and empowerment of local investors. Whereas the financial institutions can promote agriculture through credit facilities, caution has to be exercised to ensure such credits are used to access inputs which do not bring stress to the environment. In some instances for example, credits can be extended to procure huge quantities of agro chemicals or fertilizers which for some reason are left out there in the environment, unused.

3.2 Agricultural Sector Activities

i. Crop Production

Both food and cash crops are produced with the target to increase crop productivity through investment in more productive technological packages in farming and crop husbandry (URT, 2007).The total area under food crops namely maize, sorghum, and rice/paddy, wheat, bananas, sweet potatoes, Irish potatoes, cassava, groundnuts, simsim and sunflower; increased from 5. 016 Million Ha in 1997/1998 to 7.126 Million Ha in 2004/2005 (URT 2008). This was an increase of about 42.1 percent, refer table3-5.

Table 3- 5: Food Crops Production Trend in (Tons)

	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Maize	**2,321,951**	**3,157,424**	**3,218,540**	**3,423,025**	**3,302,058**	**3,593,658**
Sorghum	**487,891**	**757,420**	**714,339**	**711,631**	**971,198**	**837,244**
Millets	**138,685**	**200,800**	**220,940**	**227,905**	**193,975**	**207,542**
Paddy	**1,096,239**	**1,059,092**	**1,168,286**	**1,238,564**	**1,341,835**	**1,379,532**
Wheat	**73,716**	**666,653**	**101,912**	**109,531**	**82,784**	**86,359**
Pulses	**850,373**	**879,043**	**885,804**	**1,049,919**	**1,155,985**	**1,111,181**
Cassava	**3,962,093**	**4,440,588**	**5,539,162**	**6,158,301**	**5,198,934**	**5,150,412**
Bananas	**3,118,467**	**2,201,565**	**2,971,721**	**3,507,453**	**3,082,606**	**2,913,252**
Potatoes	**2,282,084**	**2,623,005**	**2,792,803**	**4,189,063**	**3,964,784**	**4,084,315**
Total	**14,331,499**	**15,385,590**	**17,613,507**	**20,615,392**	**19,294,159**	**19,363,495**

Source: Adopted from MAFC, 2008

Cash crops grown are sugarcane, coffee, tea, tobacco, sisal, cotton, cashew and pyrethrum. Between 2005 and 2010 there was an increase in production of pyrethrum, tobacco and cotton, while production of cashew nuts decreased (see table 3-6 below).

Table 3- 6: Cash Crops production Trend (Tons)

	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/2009
Cotton	175,500	137,899	344,210	376,590	130,565	200,662	200,662
Tea	132,395	127,979	133,418	123,218	158,656	158,656	34,165
Tobacco	45,450	46,725	51,970	56,500	65,299	57,454	58,702
Sugar	213,000	228,000	229,620	263,317	192,535	265,434	276,605
Pyrethrum	4,000	2,000	1,000	2,500	1,500	2,300	1,500
Cashewnut	95,000	80,000	71,000	77,446	90,741	99,107	79,069
Coffee	76,428	38,704	33,891	34,334	54,838	41,764	62,345
Sisal	23,280	26,758	27,794	30,934	33,327	33,000	33,208
Total	765,053	688,065	892,903	964,839	727,461	858,377	746,256

Source: Adopted from MAFC, (2008/2010)

In addition to the major crops, Non-traditional crops (exotic) like peaches, Irish potatoes, cocoa, apples, plums, strawberries and some spices have proved to be doing well in some cool humid parts of some regions like Iringa, Mbeya, Morogoro, Arusha, Kilimanjaro, Tanga, Ruvuma, Kagera to mention a few. Oil seeds are doing well in many regions, while, Dodoma region with its semi-arid climate has high potential for groundnuts and wine production.

ii. Irrigation Activities

Agriculture in Tanzania has remained unpredictable and of low productivity due to the utter dependence on rainfall which is erratic, unreliable and not uniformly distributed. This dependence on rain fed agriculture has subjected crop production to be low due to the vagaries of weather. Consequently the country has continued to suffer from frequent food shortages.

In this regard, Tanzania needs to improve irrigation infrastructure for efficient water utilization to take advantage of exploiting the identified irrigation potential area amounting to 29.4 million hectares for sustainable irrigation development and out of which 2.3 million ha have high development potential, 4.8 million ha have medium development potential and the remaining 22.3 million ha has low potential for development (URT, 2002). However, only 345,690 hectares are provided with improved irrigation infrastructure as of June 2011.

iii. Research and Training

Research Institutions

Research and Development institutions are the sources of biological and mechanical inputs. It involves crop research, natural Resource Management research as well as Socio-Economic and farming System Research. The main objective for research is to produce seed for high yielding varieties; drought, pest and disease resistance.

The agricultural research in Tanzania is carried by the National Agricultural Research System (NARS). Within this system, the Department of Research and Development (DRD) under MAFC is responsible for coordination role. The DRD has a network of 22 major research stations and sub-stations in all seven agro-climatic zones in the country. In 2010, 25 types of new seeds were developed and released including

4 new varieties for maize; 5 for rice; 5 for groundnuts; 2 for sugarcane; 8 for cassava; (URT, 2010). Such achievement is transferred from the research institute to the extension worker, especially to the Village Agricultural Extension Officer (VAEO) through training, farm visits and Farmer Field Schools (FFSs). Research prioritization in the sector is still traditional and by and large has not taken environment on board. Emerging issues like climate change need to be looked into and mainstreamed in the general research agenda. Reference to the NERA published by the NEMC could provide environment specific themes of relevance to Agriculture. However records of the past year indicate that these important institutions are underfunded.

Training Institutions

The Ministry has training institutions that offer agricultural extension education in both certificate and diploma level E.g., MATI-Uyole and Ilonga. For example, between 2006/2007 223 women and 538 men graduated at Certificate and Diploma levels from eight Agricultural training institutes (URT, 2007). Short term training programmes on improved/ modern agricultural production techniques are also offered by these institutions to farmers. Such programmes are jointly financed by the government and private sectors. Environment needs to be mainstreamed in the training curricula of agricultural institutes in order to prepare for achievement of sustainable agriculture.

iv. Extension Services

The National Agricultural Extension System has been decentralized to the Local Authorities and affiliated institutions. The MAFC in collaboration with LGAs ensures that, information on improved crop production techniques, improved varieties of crops are made available to farmers through technically empowering the LGAs to get them to farmers. For example technical backstopping was provided to 26 LGAs in eight regions on subprojects for preparation and implementation process (URT, 2007).

Extension services use various forms of multimedia to disseminate technologies to farmers such as posters, leaflets, magazines (ukulima wa Kisasa) and radio programmes. About 65 radio programmes were aired to disseminate production technologies. Also a total of 182 LGA staff from various regions and 100 farmers were trained on Farmer Field Schools (FFS) in 2006/2007 (MAFC, 2008). The technical backstopping was also conducted in LGAs in implementing FFS. Agricultural extension in Tanzania, has for many years, been entirely financed by the public sector.

Over the years, there has been too much government dominance in the management of the sector with declining resources, while co-ordination with the private sector, church based organizations and other Non-Governmental Organizations (NGOs), CBOs has often been very minimal. Most of the NGOs, CBOs and other donor funded projects providing extension services use participatory approach. The only problem with NGOs is that their activities are not coordinated, and in most cases they use the existing government extension staff which sometimes cause inconveniences in implementation of the Agricultural activities. Moreover, two main issues regarding the extension services in Tanzania are inadequate extension officers at farmers' level (Chart 2) and lack of adequate resources to facilitate them

in operations, especially the transport facilities such as motor cycles and bicycles. .

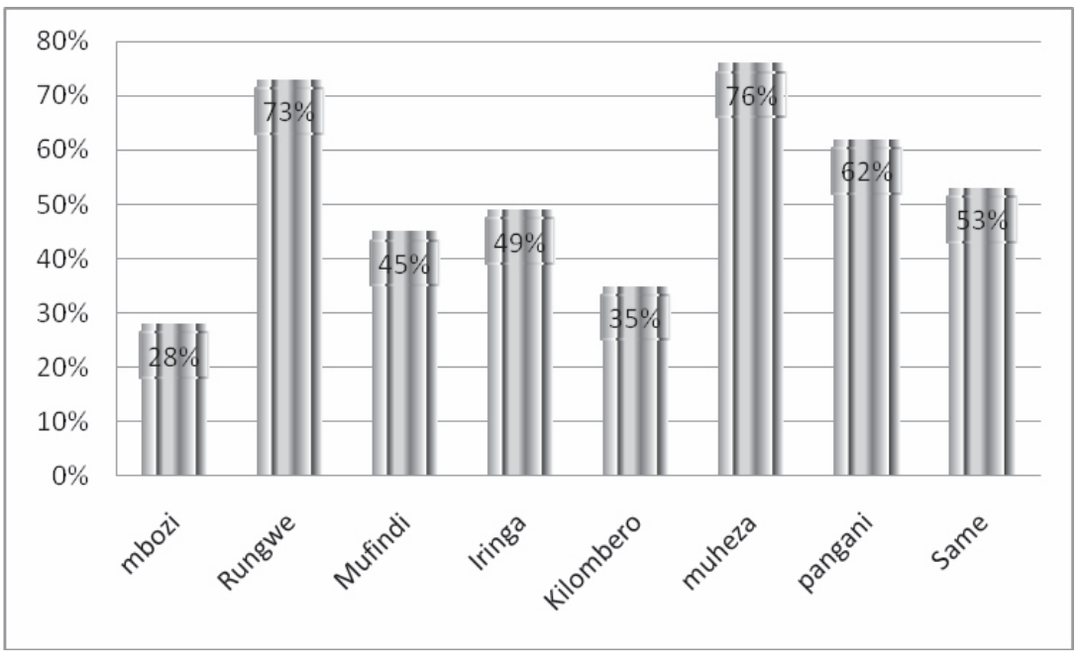

Chart 2: Percentage gaps of Extension Officers in Some Selected Areas

Source: Adopted from (MAFC, 2009)

The Government had recruited and deployed 309 extension officers to various LGAs (MAFC, 2009). However, the recruitment was part of the plan to recruit and deploy 2,500 extension officers to LGAs. Therefore, 309 extension officers recruited represented only 12.4% of the medium term target for the sector. Moreover, inadequacy of extension workers with knowledge on environmental issues worsens the efforts of the Government towards environmental management in agriculture sector.

v. Cooperatives

The Cooperative Development Division is responsible for promoting an enabling environment for the development of sustainable and vibrant member based cooperatives. Thus the Division provides services designed towards facilitating the formation, organization and operation of cooperative societies, and through the Cooperative Societies Act, advises on and monitors emergence and practice of good governance and member empowerment. These services are provided through four service sections which include Registration and legal matters, Cooperative Promotion Services, Inspection and Supervision Services, and Finance Advisory Services. In 2009/2010 the Cooperative Development Division implemented several activities with the view to achieving the overall goal of Tanzania's cooperatives which is to have: Improved and sustainable cooperatives that are capable of fulfilling members' economic and social needs.

The activities were drawn from specific interventions spelt out in the Cooperative Reform and Modernization Program (CRMP). These were in turn formulated into activities designed to attain specific targets and objectives under the Ministry's MTEF Budget. The program provides the overall framework for cooperative development in the country. The program is implemented by the Cooperative Division. The Division activities were implemented in various regions in the country including Kagera,

Kilimanjaro, Tabora, Morogoro, Ruvuma, Mtwara, Lindi, Coast, Dar es Salaam, Dodoma, Mbeya, Mara, Mwanza and Shinyanga. Implementation of the planned activities involved beneficiaries in particular Cooperative Societies leaders, staff and members as well as Cooperative officers in Regional and Local Government Authorities Development Division in collaboration with various stakeholders.

vi. Agro-Processing

Agro-processing is practiced to process crops into consumable form and to increase the value of the harvested crop. Most crops produced in this country are sold unprocessed to local an**d world markets.** It is estimated that only 1% of the crop produced is processed. Currently the government has put more emphases on agro processing in order to add value to the agricultural produce, in order to ensure that this goal is achieved, investors are encouraged to invest in this area. Small scale farmers are also encouraged to process their crops in order to add value, improve handling and reduce crop losses.

vii. Early Warning System

In order to ensure Sustainable National Food Security is attained, the monitoring of the country's food crops at all stages from planting through growth to harvesting is conducted. Early warning systems which are used to provide signals of food shortages includes rainfall data, Crop performance data, food prices at the market and food stocks which include locally produced and imports. Various methods are applied to obtain these data such as food crops production surveys for forecasting food production, food availability and vulnerability assessments. In order to improve weather forecast on crop production, the MAFC through African Union Commission has installed Satellite Data receiving station under the African Monitoring of Environment for Sustainable Environment (AMESD) Project that will deal with the SADC thematic Agricultural and Environmental resource Management.

viii. Agricultural Land Use Planning and Management.

Agriculture is among major kind of land uses in the country, others includes urban/settlement, grazing, game reserve, forest reserve, national park etc. In order to have sustainable land resources utilization in agricultural sector, land use planning and management is inevitable. Land use concerns the products and/or benefits obtained from use of the land as well as the land management actions (activities) carried out by humans to produce those products and benefits (FAO, 1997a; FAO/UNEP, 1999). Land resources inventory including soil survey and land evaluation, socio-economic survey, climatic condition and agro-ecological zoning can be used to develop solutions for natural resource management issues. Agriculture land use planning and management is essential to ensure the long-term quality of the land for human use, the prevention or resolution of social conflicts related to land use, and the conservation of ecosystems of high biodiversity value.

3.3 Environmental Challenges/Issues Facing the Sector

3.3.1 Land Degradation

Land degradation is a situation where the bio-physical environment is affected by one or more human induced processes acting upon the land as a result the land is degraded making it less productive. Over two thirds of the country is affected by land degradation as a result of inappropriate land use, the major

causes of land degradation are overgrazing (49%), deforestation (27%) and unsustainable agriculture practices (24%) resulting into declining of soil fertility and hence low agricultural productivity.

These causal factors are driven by social, economic and political forces and manifest themselves in market, policy and institutional failures, inappropriate technologies and practices. Commercial and non-commercial land users often have quite different perceptions and responses to land degradation problems.

This situation impedes the successful implementation of policies and projects to address land degradation. Land degradation is also influenced by local ecological and socio-economic forces, and the understanding of the dynamics of these interactions at the local level. Deforestation is caused by expanding agricultural frontiers, establishment of settlements and increased demand for wood products (fuel wood, timber, building poles)

Plate 5: Deforestation in Ruangwa District
Source; Field survey 2011

Soil erosion is a significant problem in many areas in the country but more severe in overgrazed areas and on steep slopes where there is vegetation clearing, intensive cultivation and poor land management practices. Experience shows that shifting or nomadic cultivation and poor livestock keeping practices cause deforestation and land degradation (Madulu 2004).

Plate 6: Soil erosion due to poor Agriculture practices in Kondoa
Source; Field survey 2011

3.3.2 Lack of Agricultural Land use Management Plans

Land use and land management practices have a major impact on natural resources including water, soil, nutrients, plants and animals. The major effect of inappropriate agricultural land use on land cover

includes deforestation, soil erosion, soil degradation, salinization, and desertification. An understanding of the use of the land and the management practices within agricultural land use category provides valuable information about the reasons for change in the condition of our natural resources. This information in turn can be incorporated into strategic planning and development at all levels with the aim of optimizing land use, assessing suitability, enhancing productivity and ultimately achieving sustainable practices.

3.3.3 Pollution by Agrochemicals

The environmental pollution in agriculture is mainly due to improper handling and overuse of agrochemicals (insecticides, herbicides, pesticides and fertilizers) and industrial hazardous wastes/effluents. Use of saline irrigation water or irrigation without proper drainage results in accumulation of dissolved salts and consequently leads to development of soil alkalization or acidification. Various degrees of salinity/acidity can cause serious and severe decline in soil productivity and crop yields.

Soil acidification is currently one of the problems in southern coastal areas of Tanzania (FAO, 2004). This is associated with the dusting of large quantities of elemental sulphur upon cashew trees aimed at controlling powdery mildew disease. The dissolved sulfur acidifies the soil. This is common in the cashew nuts growing areas of Mtwara and Lindi regions in the southern coastal areas of Tanzania. This acidification is likely to reduce the productivity of poor and fragile soils.

3.3.4 Poor Water Management for Irrigation

Water resources Management is critical for the success of irrigation development. Nevertheless, water is becoming increasingly scarce locally with respect to the demands placed upon it, resulting into unreliable and unsustainable water resources for irrigation.

The opportunity cost of treating Tanzania's raw water is increasing, especially in many of the areas considered to have irrigation development potential. Therefore reliable and sustainable water resources development is imperative. The use of water for productive purposes which include irrigation is an essential requirement for poverty alleviation and food security. However, irrigation practices in Tanzania are characterized by low water use efficiency, low water productivity and absence of a mechanism for exercising socio-economic mobility of water and over dependency on surface water as a major source of water for irrigation development.

Although Tanzania has the largest water bodies in East Africa, the water supply in many parts of the country faces major problems. Allocation problems and degradation of water resources through competing uses is hurting the economy and the environment and in many cases resulting into water use conflicts.

Irrigated agriculture is one of the major water user; it is therefore imperative that irrigators need to understand their obligations with regard to the use of water as stipulated under the National Water Policy (NAWAPO, 2002), irrigation policy (2010) and the Water Resources Management Act No. 11of 2009.

Plate 7: Poorly Constructed Irrigation Canal
Source: Field Survey 2011

Therefore, every developer needs to secure water abstraction rights before any utilization is undertaken and this is provided in the WRMA of 2009 and is crucial in guiding irrigation development activities.
Climate change is evident and the adverse effects of climate change on the freshwater systems will aggravate the impacts of other stresses, such as population growth, changing economic activity, land-use changes and urbanization. Water demand will grow in the coming decades, due to population growth, increased public water supply, and development of irrigation areas to ensure a high degree of food security. Increased occurrence of floods and droughts will increase the uncertainty in agricultural production and make the variations in yields more pronounced.

Water management practices will have to be adjusted to cope with the changed water resources conditions. In the case of drought, water efficiency measures, including rainwater harvesting techniques will be imperative to reduce pressure on the resource while ensuring domestic and environmental flows. Therefore, it is recommended that, on the supply side to diversify sources of water for irrigation by developing other sources such as ground water, rainwater harvesting and construction of storage structures / dams; and on the demand side to promote the efficiency in water use, water saving technologies, promote and ensure integrated water resources management and to develop drought resistant crop varieties.

3.3.5 Uncontrollable Peri-urban Agriculture-

Urban and peri-urban agriculture are the practices of producing dairy milk and crops particular vegetables, maize, beans and fruits within urban environment for household consumption as well as for sale to the rapidly growing urban population (Sawio 1998). The establishment of urban agriculture in river valleys, flood plains, cliffs, quarries, public land along roads and railway lines and under high-tension pylons besides plot backyard gardens and flowers in front of houses sometime causes various problems if not properly controlled (Mlozi, 2005).

Urban farming is often considered to be negatively affecting the urban environment. For example, livestock keeping in particular is seen by many as a menace because it generates waste, smell, noise and health risks, (e.g. spreads disease). Crop cultivation however, is usually felt to be less damaging to the

urban environment, although many regard the use of chemical inputs as harmful to the air, soil and groundwater (Mlozi, 1997). Other often-mentioned environmental issues related to urban crop cultivation are erosion (especially on slopes), the use of untreated sewage water for irrigation, crop pollution due to vehicle exhaust fumes (especially on crops cultivated along the sides of roads) and the spread of malaria (from mosquitoes breeding in maize stalks). It is therefore crucial for this kind of agricultural practice to be regulated and promoted for health assurance, contribution to food nutrient supplement and income in a sustainable manner.

Plate 8: Crops Cultivation at the edge of high density area in Morogoro
Source: Field survey 2011

3.3.6 Inadequate Human Resources

Existing staff in the Ministry of Agriculture Food Security and Cooperatives headquarters including research and training institutions is about 2212, while at the Local Government Authority level is about 5181 stationed in both Ward and village levels. However according to the department of extension services in the MAFC, the actual requirement is about 15082 agricultural extension workers so that they can provide services up to village level (MAFC, 2011).

3.3.7 Contradicting Policies

During the field survey, respondents when being interviewed and while conducting focus group discussions and also during the inception conference participants boldly stated that, there are conflicting policies and legislations which make implementation of these policies and legislations rather difficult. For example, National research Policy (2010) and National Biotechnology Policy (2010), promote biotechnology development and utilization at the research and technology development, translation of research results into products, and commercialization and marketing of biotechnology Products while Part II Sect 4(3) of EMA (2004) describe general prohibition on items set out in the first schedule of the Regulation including introduction of GMO in agricultural sector.

3.3.8 Inadequate Awareness of Environmental Issues

Insufficient knowledge on environmental issues and appropriate handling and use of the agro-chemicals by the farmers is one of the factors that contribute to environmental degradation in many parts of the country.

3.3.9 Inadequate Finance to Support Agricultural Industry Including Environmental Issues

Environmental challenges in the agricultural sector face inadequate funding due to low priority tand cos involved in addressing environmental issues. Environmental issues that can be funded are those which have direct or immediate impact for increased crop production. Investments on environmental issues that are based on long term impacts on productivity are given low priority.

3.4 Impacts of Global Environmental Concerns to the Sector

3.4.1 Adverse Impacts of Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) of 1992 defines climate change as *"a change of climate which is attributed directly or indirectly to human activities that alter the composition of the global atmosphere and which are in additional to natural climate change variability observed over comparable time periods".*

Climate Change is now the most challenging global problem facing humanity. Its adverse impacts are already being experienced in Tanzania particularly in agricultural sector. Rainfall and temperature are determinants of crop performance, Tumbo (et al, 2010). Fluctuation and unreliability of rainfall pattern as well as the increase in temperature have affected crop performance e.g. maize and rice.

Plate 9: Late onset and early cessation of rainfall causing immature maize
Source: Field Survey 2011

An assessment of temperature patterns in the 12 different climatic zones of Tanzania show that the maximum and minimum temperature has increased in almost all except zone 6 (Dodoma and Singida), where the mean maximum and minimum temperatures declined and zone 12 (Mbeya) where the mean minimum temperature in July decreased. There is therefore a general increase in temperature of 1^0C 2^0C all over the country (URT, 2008). Temperatures increase in recent years has led to increased incidences of notorious plant species (e.g. Striga spp in cereal crops), vermin such as the mole rats, prevalence of crop pests and diseases such as cassava mealy bugs and fungal infection in coconut and cashewnut in Southern zone as well as insect pests (e.g. Prostephanus truncatus).This in turn has caused increased demand for pesticides and herbicides.

Discussions with various stakeholders at the village level have shown that there is a growing feeling and perception that climate change and variability is already occurring. At the village level the concept "climate change" was associated with variability in weather conditions which is associated with rainfall

inconsistency and unpredictability over years rather than actual change.

The variability was related to variations in agricultural seasons in a year. Major concerns were related to indicators like reduced amounts of rainfall, rainfall coming late, increased temperatures, increased incidences of drought and decreased crop productivity

Events such as rainfall coming late, increased temperature and increased incidence of drought are the events which seriously impact on livelihood and have been ranked high. However, there are variations from one district to another depending on the extent of the problem related to such climatic event. For example in Mbarali district (Mbuyuni village) evidence of climate change/variability was cited as change in rainfall regime whereby in the past the rainy seasons would last from December through March. Over the last few decades rains have started later than normal and stays for much shorter periods (URT, 2008).

The increase in temperature has also been pointed out as evidence of climate change. Both of these changes have been noted since 1978. The El Nino event in 1997/98, outbreaks of new crop pests like army worms in 1988, recurrent droughts like those of 1971/72 and 2005/06 are further evidences of climate change observed by farmers in the village past assessments of climate change impacts on agricultural crops and vulnerability thereof have necessitated a wide range of adaptation plans for Agricultural sector.

The communities in the studied villages have a diverse set of approaches that they undertake to adapt to changing environmental conditions. For instance, adaptation to drought conditions is achieved through growing early maturing crop varieties as well as growing drought tolerant crops. Buying supplementary foods was also reported to be an important coping strategy, especially during years of food shortage. In some areas of Rufiji farmers were seen growing crops in the lowlands and near catchment areas which in turn have significant impacts to the ecosystem. It is in these facts that, the AEAP will provide an intervention towards adaptation to climate change impacts.

3.4.2 Introduction of Genetic Modified Organisms and Loss of Biodiversity

Biosafety can simply be referred to as avoidance, through instituting legal, administration and policy instruments, of the risk to human and animal health and the environment arising out of introducing and using Genetically Modified Organisms (GMOs).

Many new products in agriculture, aquaculture, health, industry and environmental remediation have emerged via modern biotechnological process. However, these techniques must be applied according to a number of precautions to ensure safe and effective application. This is because, there is concern over the fear that GMOs can pose a great risk to biological diversity, ecosystems, species and genetic resources whose interaction with it can form a new web of life in among all these, with previously unforeseen negative impacts

It therefore requires negotiations between stakeholders to bridge the different interests between proponents of this powerful new biotechnological science that is argued to have the potential, among others, to boost food security, reduce the need for irrigation and agrochemicals.

Tanzania, weary of potential benefits as well as risks posed by GMOs prepared its National Biosafety Framework in 2007. The framework is a set of instruments, legal administrative and scientific that attempts to regulate the application of biotechnology in Tanzania. In 2009, Tanzania enacted the Environmental Management Act (Biosafety) regulations in order to regulate and control the application of GMOs in Tanzania. The preparation of these regulations highlights the government's goal of promoting biotechnology in the country as highlighted by the Tanzania Biotechnology Policy of 2010, as well as the need to enhance Biosafety as much as possible for the benefit of the present and future generations.

Currently Tanzania has received two applications for the introduction of GMOs and has so far given a permit to one application which is for contained research for cassava at MARI. The second permit for the introduction of the Water Efficient Maize for Africa, through the WEMA project will be issued after compliance of permit conditions. Acknowledging the scientific uncertainties surrounding the introduction of GMOs, Tanzania Biosafety law is based on both the Precautionary and the Polluters Pays Principles which are agreed international norms for good environmental practices.

As far as international efforts to promote Biosafety are concerned, Tanzania is a Party to the Cartagena Protocols to the Convention on Biological Diversity (CBD). Efforts are also underway to ensure that the country also becomes party to the Nagoya Kuala Lumpur supplementary Protocol on Liability and Redress adopted in October 2010.

3.5 Impacts of Environmental Disasters to Agriculture

Tanzania's main environmental disasters are drought, floods and epidemics. The first two are closely linked with climate change. Between 1980 and 2008, Tanzania suffered around 65 natural disasters of which 26 were epidemics, 24 were floods and 6 were droughts. In 2006, a severe and prolonged drought caused food shortages and a drop in water levels that led to power rationing.

The 2008/2009 droughts imposed serious impacts on crop production and livestock production. For example, Kirya Ward in Mwanga district lost more than 70% of its livestock during the 2009 drought. The MAFC established the hardest drought hit regions include Kilimanjaro, Manyara, Arusha, Coast, Dodoma and Singida in 2009.

Floods resulting from unpredicted rainfall events have caused damage to property and people's lives with immense economic loss in terms of property and manpower. In late December 2009, torrential rains were experienced in some parts of Tanzania. For example Same district case of landslide and floods where more than 20 lives were lost and Kilosa district floods that left more than 3,000 people homeless and damage to more than 2,000 farmlands and 350 ha of pasture lands (Munishi, 2010).

Plate 10: Land Slide in Same District
Source: Adopted from TBC Information unit, 2011

Kilosa District suffered flooding as the Mkondoa River burst its banks. In Dodoma Region, the districts of Kongwa and Mpwapwa also experienced significant flooding, resulting in over 19,000 persons being affected. Destruction of infrastructure was immense, including roads and connecting bridges. Water sources were damaged and contaminated, causing thousands of families to go without clean and safe water. Destruction of homes, crops and pastureland overwhelmed community capacities to cope.

Plate11: Flood in Kilosa District
Source: (unjobs.org//tanzania/morogoro/kilosa)

3.6 Initiatives Taken to Address These Environmental Challenges

i. Capacity Building to Stakeholders

MAFC set up sector environmental coordination section and has been engaged in capacity building of stakeholders at both national (Agricultural Sector Development Program) and district (District Agricultural Development Projects) levels through LGAs. The focus has been on training of trainers on Environmental policies; legislations and technical management issues relevant (training modules and assessments) to the sector to reduce the impact on the environment emanating directly or indirectly from agriculture.

ii. Improvement of Agronomic Practices

Local adaptations are highly variable depending on the agro-ecological conditions, these may include; Irrigation, preserving and storing food during good years for subsequent use in bad years. The issue of having strategic grain reserves and improving the crop storage infrastructures is very important. Farmers are advised to grow early maturing crop varieties as well as drought tolerant crops, pest resistant and livestock keeping/fishing/bee keeping as part of adaptation strategies.

Also MAFC has made an intervention through Conservation Agriculture and Sustainable Agriculture for Rural Development age (CA SARD project 2004 -2010) in Arumeru, Karatu, Babati, Hanang, Bukoba and Moshi Rural. The Farmer Field School approach was used in promoting conservation agriculture. Other projects includes Land Management Project (LAMP - 1994-2005) promoted reduced tillage, sub soiling, green manures and crop rotation with the objective of maintaining soil fertility and improving water infiltration.

LAMP effectively promoted the use of the ripper and proved that rain water productivity was more than doubled with this simple technique Soil Conservation and Agroforestry Programme in Arusha (SCAPA - 1989-1999) which focused on controlling soil erosion, deforestation and land degradation on farmland and rangelands by introducing holistic land resources management systems to smallholder farmers.

iii. Research on Various Crop varieties

MAFC has invested on research activities so to enable farmers cope with climate change impacts. For example, Ilonga/Uyole Research Centres has developed drought and disease resistant/tolerant and early maturing crop varieties (eg: maize TMV1, UH 615, UH 6303; sorghum- pato, macia, tegemeo, wahi and hakika), crop varieties bred for low soil fertility eg leguminous crops (Beans-lyamungo 85, uyole 94, selian 97); rice, root crops like cassava and sweet potato.

iv. Integration of Environmental issues in the Agricultural Institutional and Legal Framework

The Agricultural Sector Development Program has provided a framework to integrate environmental considerations through instituting Environmental Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) in its program. The government through parliament has enacted a number of legislations and policies relevant to environmental management. Among others, the implementation is being executed through the Agricultural Sector Development Program at various levels. Some of the legislations include; Environmental Management Act 2004; Fertilizer Act 2008; Plant Protection Act 1997; Seed Act 2004; Plant Breeders Rights Act 2002.

The policy, strategies and programs include; the National Agriculture and Livestock Policy of 1997 and Agricultural Sector Development Strategy (ASDS) of 2001; National Strategy for Growth and Poverty Reduction II (Kiswahili synonym MKUKUTA II); Millennium Development Goals (MDG); Comprehensive Africa Agricultural Development Program (CAADP). It is worthy to mention that the National Agricultural Policy under review is in the final stage and has mainstreamed environmental

issues including climate change adaptation; hopefully it will be in place before the end of this year 2011. The involvement of private sector, Non Governmental Organizations and CBOs through various fora has been encouraged at all levels**.**

v. Participation in the International Agreements

The government is implementing the ratified international conventions and treaties (multilateral and bilateral agreements) related to environmental concerns. Some of these includes:- CBD; UNFCCC, UNCCD, Ramsar Convention Rotterdam CHP, Stockholm CPOP, Bamako Convention- ban of the import into Africa and the control of trans-boundary and movement and management of hazardous wastes within Africa, Cartagena Protocol on GMO, Basal Convention and Montreal Protocol.

CHAPTER 4: ENVIRONMENTAL ACTION PLAN

4.1 SWOT Analysis of Institution Capacity

SWOT analysis of institutional capacity aims at providing information on Strength, Weakness, Opportunity and Threat (SWOT) in terms of human resources, finance, institutional arrangement/organization, legislation and awareness. During the inception workshop for preparation of ASEAP involving various stakeholders' issues were identified and also using field survey notes, the follow: issues and challenges related to agricultural sector were identified. These issues and challenges form the basis for the SWOT analysis presented in table 4-1 below.

Table 4- 1: SWOT Analysis of MAFC Capacity

ISSUE	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
1. Land degradation	• Institutional setup • Policies, programmes and strategies in place • Awareness in place • Availability of experts up to village levels	• Inadequate knowledge of farmers and livestock keepers • Unsustainable irrigation practice • Unsustainable farming practices • Gender biasness in land ownership/tenure-ship	• Land and labour available • Different agro-ecological zones • Agroforestry technology available • Traditional soil conservation practices (fanya juu matengo pits)	• Free range livestock keeping • Overgrazing or exceeding livestock carrying capacity of the area. • Deforestation • Mining activities • Population increase and migrations
2. Lack of agriculture land use planning and management	• Policies and legal framework in place • Institutional framework in place • Agricultural land use plan in place • • Agriculture land use planning in some villages in place. • 95% of villages have boundaries	• Gender biasness in land ownership/tenureship • Inadequate land tenure system • Inadequate awareness on how to acquire/access land • Land use conflicts • Misuse of land resources • Weak institutional collaboration in carrying out agricultural land use planning	• Availability of experts up to zonal level • Presence of village land • Presence of environmental committees at the villages levels • Conservation of land for traditional use such as ritual, worship etc	• Persistence of traditional customary land acquisition and • ownership/tenure • Limited funds for agricultural land use planning and survey
3.Pollution by Agrochemicals	• Legal and institutional frameworks in place • Availability of expertise	• Weak enforcement of laws and regulations • Inadequate knowledge on application and handling of agrochemicals	• Technology and alternative control measures in place • Availability of laboratorial at central and regional levels	• Misuse and mishandling of agro-chemicals and package materials • Inadequate funding

ISSUE	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
4.Poor water management for irrigation	• Institutional set-up, irrigation policy, plans, programmes and strategies in place • Availability of expertise at zonal level. • Availability of expertise up to district level	• Inadequate improved irrigation infrastructure • Weak irrigators organization • Inadequate water storage facilities • Water Losses in Irrigation Schemes	• Availability of central and regional laboratories • Availability of water basin offices (9) • Potential areas for irrigation • Availability of water resources	• Adverse climate change (e.g. drought and floods) • High costs for irrigation infrastructures • Inadequate funding • Unreliable water supply for irrigation
5. Adverse impact of Climate change	• Institutional framework, policies, plans, strategies and programmes in place	• Lack of technologies • Inadequate awareness • Inadequate expertise	• Different agro ecological zones • Different adaptive measures(Indigenous and conventional) • Sensitive Global Agenda • Government initiatives such as REDD • Existence of NGOs and CBOs promoting environmental management	• Increased emissions of green house gases • Lack of funds
6.Uncontrollable peri -urban agriculture	• Policies and programmes in place • Availability of expertise	• Weak laws/policies enforcement • Land use conflicts • unplanned land use	• Off farm activities • Market availability • Availability of land	• Unplanned residential development • Population increase
7. Introduction of Genetic Modified Organisms	• Institutional and legal setup in place	• Lack of awareness • Inadequate technologies and expertise	• Availability of research center • Seed agency • High yield crops • Readily available technologies	• Possibility of loosing indigenous species • Risk of introduce undesirable species (mutation)
8.Inadequate Human resources	• Existence of Institutional structure on environmental management issues at all levels • Existence of some expertise on environmental issues at District level • Existence of Environmental committee in some villages • Awareness on environmental issues to staff at ministerial and LGA level	• Inadequate number of trained personnel in environmental issues particularly at LGA level • Low level of environmental education of rural communities • Lack of environmental subject in agriculture curriculum at Certificate and Diploma level • Lack of scheme of service for environmental Officers	• Development and implementation of human resources capacity building in environmental issues • Availability of training institutional	• Low priority on environmental management issues • Lack of incentives for existing staff, hence low motivation
9. Contradicting Policies	• Institutional framework, Policies, Strategies, Guidelines, Laws and regulation in place. • Availability of expertise	• Weak Law enforcement and compliance • Inadequate implementation framework • Conflicting Policies • Inadequate harmonization and coordination	• Synergy of National Policies to International Policies and agreements • Coordination mechanism in place	• Low priority on environmental issues due to limited resources
10. Inadequate Finance to support agriculture environmental issues .	• Availability of funds from government • Existence of professional financial experts	• Insufficient Programmes and plans • Lack of environmental code at all levels • Lack of crosscut environmental objective • Misallocation of funds	• Availability of funds from Donors • Funds for environmental management issues are available at different levels	• Delayed disbursement of funds

ISSUE	STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
11.Inadequate awareness on environmental issues	• Existence of Policies, programmes and Strategies • Existence of extension services	• Inadequate knowledge on environmental issues especially at low level • Inadequate extension staff • Poor participation of young generation from the pre-primary level	• Existence of NGOs, CBOs working on environmental issue • Availability of mass media channels at all levels • Existence of various national and International exhibition days • Existence of village environmental committee	• High costs for preparation and dissemination of information
12.Inadequate and weak enforcement of Laws/By Laws	• Existence of Policies, Legal framework Programmes and Strategies • Expertise in place	• Conflicts over resource use • Increased rate of environmental degradation • Corruption • Poverty	• Existence of local leaders • Existence of district and village tribunals • Existence of village administrative structure	• Political interests and interference

4.2 Strategic Objectives and Activities

In this section for each key issue, strategic objectives are identified in order to fill the identified gaps; key activities that need to be done in order to address the specific objectives are identified. Key issues identified in this section includes land degradation, pollution by agrochemicals, lack of land use plan in some districts, inadequate human resource and inadequate finance, adverse effects of climate change and introduction of GMOs. Others are contradicting policies and unplanned peri-urban agriculture as well as inadequate awareness on environmental issues. The detail is as seen in the table 4-2 below.

Table 4- 2: Strategic Objectives and Activities

Key Issues	Strategic Objective	Identified Gap	Key Activities
1.Land Degradation	• Proper land use and farming practices including management of land and forest resource adopted	Inadequate knowledge of farming practices and livestock keeping	• To prepare and disseminate guideline on various technologies regarding proper land use practices • To Disseminate National Agriculture land use master plan to key stakeholders • To capacitate/ recruit extension workers up to village level • To review distribution systems and criteria used in access inputs to cover more farmers • To promote alternative source of energy
2. Lack of agriculture land use planning and management	• Agricultural land use patterns and tenure developed and implemented	Inadequate land tenure system and awareness of land acquisition	• To complete agricultural land use planning exercise • To finalize agriculture land use master plan • To mainstream gender issues in agriculture land tenure

Key Issues	Strategic Objective	Identified Gap	Key Activities
3.Pollution by agrochemicals	• Strengthen Laws and capacity on application, handling distributions of agrochemicals by stakeholders	• Weak enforcement of laws and regulations • Inadequate knowledge on agrochemical handling and utilization • Inadequate funding for disposing expired chemicals and containers	• To recruit and train more regulatory inspectors and equip them with appropriate facilities • To develop and implement mechanisms for enforcing laws and regulations • To prepare and disseminate guideline/ manual on agro-chemical and packaging material handling • To formulate programme/projects for disposing expired chemicals and containers
4.Poor wat er management for irrigation	• Improved irrigation infrastructure and O & M in place • Irrigators organizations formed/ strengthened	• Poor irrigation infrastructure • Weak irrigators' organizations.	• To improve water management in irrigation schemes • To capacitate and strengthen irrigators organizations for sustainability of irrigation schemes.
5.Uncontrollable peri-urban agriculture	• Urban agriculture well planned and developed	• Weak laws/policies enforcement • Land use conflicts •	• To develop and implement mechanism for enforcing laws and regulations • To prepare and disseminate guideline/manual on peri-urban agriculture • To prepare peri urban agricultural master plan
6.Inadequate human resource	• Incorporated environment issues in agriculture curriculum and capacitate staffs up to LGAs	• Inadequate number of trained personnel in environmental issues particularly at LGA level • Low level of environmental education for rural communities • Lack of environmental subject in agriculture curriculum at Certificate and Diploma level	• To prepare and disseminate training strategy on Agricultural environmental issues • To incorporate environmental management subject in agriculture training institute curriculum
7.Contradicting Policies	• Contradicting policies harmonized.	• Weak Law enforcement and compliance • Inadequate implementation framework • Conflicting Policies • Inadequate harmonization and coordination	• To develop and implement mechanisms for enforcing laws and regulations • To review existing policies and accommodate emerging issues • To harmonize Policies Laws, Regulations at Ministerial level
8. Inadequate Finance to support agricultural environmental issues	• Programmes and projects developed	• Insufficient funds for environmental issues • Lack of environmental code at all levels • Lack of sector crosscut environmental objective • Misallocation of funds	• To develop programmes and projects on agricultural environmental activities

Key Issues	Strategic Objective	Identified Gap	Key Activities
9.Inadequate awareness on environmental issues	• Awareness program developed	• Inadequate knowledge on environmental issues especially at low level • Inadequate extension staff	• To develop and implement awareness and communication program
10.Adverse effects of Climate Change in agriculture	• Adaptation and mitigation measures for climate change impacts adopted • Improvement in the management of land and forest resources adopted	• Unsatisfactory enforcement of laws, By laws and regulations against forest degradation • Lack of reliable data base on climate and extent of forest resources.	• To create awareness to farmers on climate change and its impacts on agriculture • To develop and design adaptive and mitigation measures in agriculture
11.Introduction of Genetically Modified Organisms (crops)	• Capacity and awareness on GMOs (crops) strengthened	• Lack of awareness • Lack of technologies and expertise •	• To train researchers, adopt and disseminate technology, • To create awareness to decision makers, political leaders, • To train extension workers and farmers

4.3 Detailed Action Plan

Table 4 - 3: Agriculture Sector Environmental Action Plan 2012/2017

Environmental issues/ challenge	Priority actions	Targets	Expected output	Indicator	Time frame	Unit Cost (Tshs.)	Key Actors	Funding Sources
1. Environmental challenges posed by the sector								
1	2	3	4	5	6	7	8	9
1.1Land Degradation	To prepare and disseminate guideline on various technologies regarding proper land use practices	Reduce degraded area by 30% by 2014	Degraded area reduced from 67% to 46%	Percentage of degraded areas reduced	3 years	40,000,000	DLUP/HEMU /DMECH	Govt/Dev. Partners
	To capacitate extension workers up to village level					300,000,000	DLUP/HEMU /DMECH	Govt/Dev. Partners
	To develop plans of controlling identified land degradation causes					40,000,000	DLUP/HEMU /DMECH	Govt/Dev. Partners
	To promote the use of efficient wood fuel stoves and improved charcoal kilns, biogas	Promote alternative sources of energy in 80 Districts by 2016	Deforestation rate reduced	80 Districts using alternative sources of energy	5 years	500,000,000	DMECH/ HEMU	Govt/Dev. Partners
	Sub Total					**880,000,000**		

Environmental issues/ challenge	Priority actions	Targets	Expected output	Indicator	Time frame	Unit Cost (Tshs.)	Key Actors	Funding Sources
1. Environmental challenges posed by the sector								
1	2	3	4	5	6	7	8	9
1.2.Lack of agriculture land use planning and management	To complete agriculture land use planning exercise	Complete land use planning exercise by 2015	Increased land/farms with title deeds	45% of title deeds issued	4years	500,000,000	DLUP/HEMU	Govt/Dev. Partners
	To finalize agriculture land use Master Plan	Finalize agriculture land use Master Plan by 2013	Agriculture land use Master Plan in place	50% of districts/villages includes agriculture land use Master Plan in their plans and budget	2 years	30,000,000	DLUP/HEMU	Govt/Dev. Partners
	To mainstream gender issues in agriculture land	Develop and disseminate technologies that reduce workload to women by 2015	Increased production qualitatively and Quantitatively	At least 4 new technologies developed	2 years	10,000,000	DPP/DLUP/ HEMU	Govt/Dev. Partners
	Sub Total					**540,000,000**		

Environmental issues/ challenge	Priority actions	Targets	Expected output	Indicator	Time frame	Unit Cost (Tshs.)	Key Actors	Funding Sources
1. Environmental challenges posed by the sector								
1	2	3	4	5	6	7	8	9
1.3.Pollutions by agrochemicals	To appoint and train more regulatory inspectors and equip them with appropriate facilities	Appoint and train 100 regulatory inspectors and equip them with appropriate facilities by 2015	Rate of Pollution by agrochemicals reduced	At least 80 regulatory inspectors appointed and 80 trained	4 years	300,000,000	DCD/HEMU	Govt/Dev. Partners
				70% of regulatory inspectors trained	5 years	400,000,000	DCD/HEMU	Govt/Dev. Partners
	To develop and implement mechanisms for enforcing laws and regulations	Develop and implement mechanisms for enforcing laws and regulations by 2015	Rate of Pollutions by agrochemicals reduced	At least 25% of polluters caught by enforcers	2 years	15,000,000	HLU/HEMU	Govt/Dev. Partners
	To prepare and disseminate guideline/ manual on agro-chemical and packaging material handling	Prepare and disseminate guideline/ manual on agro-chemical and packaging material handling by 2015	Increased awareness on agrochemicals and their packaging materials handling	75% of agrochemical users aware on agrochemical handling	4 years	600,000,000	DCD/HEMU	Govt/Dev. Partners
	To formulate programme/projects for disposing expired chemicals and containers	Formulate programme/projects for disposing expired chemicals and containers by 2015	Rate of Pollution by agrochemicals reduced	One comprehensive programmes formulated	1 year	100,000,000	DCD/HEMU	Govt/Dev. Partners
				Two projects formulated	1 year	100,000,000	DCD/HEMU	Govt/Dev. Partners

Environmental issues/ challenge	Priority actions	Targets	Expected output	Indicator	Time frame	Unit Cost (Tshs.)	Key Actors	Funding Sources
1. Environmental challenges posed by the sector								
1	2	3	4	5	6	7	8	9
1.4.Poor Water management for irrigation	To improve water management in irrigation schemes	Improve water management in 60 irrigation schemes by 2015	Increased production and productivity	60 irrigation schemes improved	4 years	60,000,000,000	DITS/HEMU	Govt/Dev. Partners
				60 water users association formulated or strengthened	4 years	100,000,000	DITS/HEMU	Govt/Dev. Partners
	To capacitate and strengthen irrigators organizations for sustainability of irrigation schemes.	Strengthen 60 irrigators organizations by 2015	Improve of irrigation water use	60 irrigators organizations strengthened	4 years	200,000,000	DIT/HEMU	Govt/Dev. Partners
	Sub Total					**60,300,000,000**		

Environmental issues/ challenge	Priority actions	Targets	Expected output	Indicator	Time frame	Unit Cost (Tshs.)	Key Actors	Funding Sources
1. Environmental challenges posed by the sector								
1	2	3	4	5	6	7	8	9
1.5.Uncontrollable Peri-urban agriculture	To develop mechanism for enforcing laws and regulations	Develop mechanism for enforcing laws and regulations in 5 cities and 10 municipals by 2015	Controllable Peri-urban agriculture	5 cities and 10 municipals enforcing laws and regulations	4 years	100,000,000	HLU	Govt/Dev. Partners
	To prepare and disseminate guidelines/manual on peri- urban agriculture	Prepare and disseminate guidelines/manual on peri- urban agriculture to 5 cities and 10 municipals by 2015	Controllable Peri-urban agriculture	5 cities and 10 municipals aware on the importance of controllable peri- urban agriculture	4 years	100,000,000	DCD/HEMU/ HABARI	Govt/Dev. Partners
	Sub Total					**200,000,000**		
1.6.Inadequate Human Resources	To prepare and disseminate training strategy on agriculture environmental issues	Prepare training strategy on agriculture environmental issues y 2015	Adequate Human Resources trained on agriculture environmental issues	75% of personnel trained	4 years	1,000,000,000	HEMU	Govt/Dev. Partners
	To incorporate environment management subject in agricultural training institutes curriculum	Incorporate environment management subject in agricultural training institutes curriculum by 2013	Environment management subject taught in agricultural training institutes	Environmental subject incorporated in agricultural training curriculum	3 years	96,642,000	DT	Govt/Dev. Partners
	Sub Total					**1,096,642,000**		

Environmental issues/ challenge	Priority actions	Targets	Expected output	Indicator	Time frame	Unit Cost (Tshs.)	Key Actors	Funding Sources
1. Environmental challenges posed by the sector								
1	2	3	4	5	6	7	8	9
1.7.Contradicting Policies	To develop and implement mechanisms for enforcing laws and regulations	Develop mechanism for enforce laws and regulation by 2014	Reduce policies conflict between stakeholders	Mechanism for enforce laws and regulations used by enforcers	3 years	300,000,000		Govt/Dev. Partners
	To review existing policies and accommodate emerging issues	Review 6 existing policies, 4 laws and 10 regulations accommodate emerging issues by 2015	Harmonized policies, laws and regulations	6 policies reviewed	4 years	300,000,000	DPP/HEMU	Govt/Dev. Partners
	To harmonize policies, laws and regulations at ministerial level	Harmonize 6 policies, 4 laws and 10 regulations by 2016	Harmonized policies, laws and regulations	4 laws reviewed	5 years	300,000,000	HLU/HEMU	Govt/Dev. Partners
				10 regulations reviewed	5 years	300,000,000	HLU/HEMU	Govt/Dev. Partners
				6 policies harmonized	5 years	300,000,000	DPP	Govt/Dev. Partners
				4 laws harmonized	5 years	300,000,000	HLU	Govt/Dev. Partners
				10 regulations harmonized	5 years	300,000,000	HLU	Govt/Dev. Partners
	Sub Total					**2,100,000,000**		

Environmental issues/ challenge	Priority actions	Targets	Expected output	Indicator	Time frame	Unit Cost (Tshs.)	Key Actors	Funding Sources
1. Environmental challenges posed by the sector								
1	2	3	4	5	6	7	8	9
1.8.Inadequate finances to support agricultural environmental issues	To prepare programs and projects on agriculture environment activities	Prepare programs and projects on agriculture environment activities by 2015	Adequate finances to support agricultural environmental issues	At least 2 programs prepared	4 years	50,000,000	HEMU	Govt/Dev. Partners
				2 projects prepared	4 years	200,000,000	HEMU	Govt/Dev. Partners
	Sub Total					**250,000,000**		
19.Inadequate awareness on environmental issues	To develop and implement awareness and communication programme	Develop communication plan on environmental issues to 140 Districts by 2017	Adequate awareness on environmental issues	140 Districts aware on environmental issues	5 years	500,000,000	HEMU/ HABARI	Govt/Dev. Partners
	Sub Total					**500,000,000**		

Environmental issues/ challenge	Priority actions	Targets	Expected output	Indicator	Time frame	Unit Cost (Tshs.)	Key Actors	Funding Sources
2.Impacts of Global environmental Concerns within the sector								
1	2	3	4	5	6	7	8	9
2.1. Adverse effects of climate change in agriculture	To create awareness to farmers on climate change and its impact on agriculture	Create awareness to farmers on climate change and its impact on agriculture by 2016	Increase knowledge and awareness of climate change issues on agriculture	300 farmers from adverse effect of climate change aware on climate change and its impact on agriculture	Year 5	250,000,000	DRD/HEMU/ DNFS	Govt/Dev. Partners
	To develop and design adaptive and mitigation measures in agriculture	Develop/design adaptive measures in agriculture in 140 Districts by 2015	Increased production and productivity	140 Districts developed/design ed adaptive and measures in agriculture	4 years	250,000,000	DRD/HEMU	Govt/Dev. Partners
	Sub Total					**500,000,000**		

Environmental issues/ challenge	Priority actions	Targets	Expected output	Indicator	Time frame	Unit Cost (Tshs.)	Key Actors	Funding Sources
2.Impacts of Global environmental Concerns within the sector								
1	2	3	4	5	6	7	8	9
2.2.Introduction of genetically modified organisms	To train researchers, adopt and disseminate technologies	Train 34 researchers, adopt and disseminate technologies to 60 Districts by 2015	Increased genetically modified organisms	34 researchers trained and adopted the technology	4 years	3,000,000,000	DCD/ HABARI/ HEMU	Govt/Dev. Partners
				At least 60% of Districts aware on the technology	4 years	300,000,000	DRD/ HEMU	Govt/Dev. Partners
	To create awareness to decision makers, political leaders, extension workers and farmers	Create awareness to decision makers, political leaders, extension workers and farmers in 140 Districts by 2015	Increased genetically modified organisms	140 Districts aware on genetically modified organisms	4 years	300,000,00	DRD/HEMU	Govt/Dev. Partners
	To train extension workers and farmers	Train 500 extension workers and 2,000 farmers on GMO (crops) technologies by 2016	Increase knowledge and awareness of GMO (crops) to extension workers and farmers	500 extension workers and 2000 farmers trained on GMO (Crops)	5 years	300,000,000	DRD/HEMU	Govt/Dev. Partners
	Sub Total					**3,900,000,000**		
	GRAND TOTAL					**71,481,000,000**		

4.4 Funding Sources

The availability of adequate resources is very fundamental to the effective implementation of ASEAP. These resources can be mobilized from the government, development partners and private sectors. Government sources include revenue from central and local governments collected from among others, publicity-provided cervices and environmental fees, charges and taxes, and the National Trust Fund. Private sector sources may include support to the Environmental protection and public private partnerships in financing environmental infrastructure and services. Sources from development partners in clued grants and loans from international development banks and agencies, grants from bilateral and multilateral donors, international environmental funds, international NGOs and individuals

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ANNEX I: OTHER RELEVANT POLICIES

i. Gender Policy (2000)
ii. The Micro-Finance Policy (2000)
iii. The Rural Development Policy (2001)
iv. The National Water Policy (2002)
v. The National Energy Policy (2003)
vi. The National Livestock Policy (2006)
vii. The Local Government Reform Policy (1998)
viii. The Food and Nutrition Policy for Tanzania (1992)
ix. National Human Settlement Development Policy (2000)
x. The Land Policy (1995)
xi. The national Biotechnology Policy 2010

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