Government of Tanzania

Southern Agricultural Growth Corridor of Tanzania (SAGCOT):

Environmental and Social Management Framework (ESMF)

August 2013

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ERM

Government of Tanzania

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July 2013

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For and on behalf of
Environmental Resources Management

Approved by: Eamonn Barrett

Signed: 

Position: Partner

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Cover graphic: indicative map of SAGCOT prepared by SAGCOT Centre Ltd.

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EXECUTIVE SUMMARY

PROGRAM AND PROJECT BACKGROUND AND DESCRIPTION

The overall SAGCOT Program is broadly identified as a public-private partnership intended to improve the incomes, employment opportunities and food security of smallholder farmers across the southern corridor of Tanzania. This will be done by linking them to internationally competitive supply chains and accelerating commercial agricultural development, in particular by using foreign direct investment attracted by the removal of policy and infrastructural constraints to competitiveness and by facilitated access to land. The SAGCOT area lies along an existing road, rail and power corridor running from Dar es Salaam west through Iringa to Mbeya and beyond. Initially investments will be focused on six areas with high potential for quick agricultural development ("clusters"), including the Kilombero Valley. Over the next 20 years the initiative aims to bring 350,000 ha of land into commercial production, increase annual farming revenues by US$1.2 billion, and lift some 450,000 farming households out of poverty.

PROPOSED WORLD BANK SUPPORT TO SAGCOT

The Government of Tanzania (GoT) has requested support from the International Development Agency (IDA, part of the World Bank) to finance projects in the SAGCOT area through the Catalytic Fund related to strengthening smallholder-business linkages (see Component 2 below). The proposed World Bank support ("the Project") will be in the form of a Specific Investment Loan (SIL).

The Project comprises three focused components within the overall SAGCOT Program:

Component 1: Strengthening of SAGCOT Support Institutions (total US$16.3 million, IDA US$8.5 million). The objective of this component would be to strengthen the capacity of the main SAGCOT support institutions in order to pursue their functions of information and data provision, support of investment planning and guidance, government/private sector intermediation, business enabling environment and investment promotion.

Component 2: Strengthening Smallholder-Business Linkages (total US$74.0 million, IDA US$46.3): The objective of this component would be to link smallholder farmers in agricultural value chains. The component would (a) expand the number of smallholders linked to agribusinesses in successful commercial partnerships and (b) improve the revenues derived by smallholders and rural communities from these partnerships in the form of growth in agricultural productivity growth, income and employment.

Component 3: Project Management and Evaluation (total US$2.2 million, IDA US$2.2 million): The component would establish project management and M&E systems and provide office equipment, transportation and technical assistance services. It would support the coordination between implementation agencies at all levels and with other government programs and institutions and the capture of implementation lessons from development of value chain development. It would also include support for establishing and operating the project's progress and impact M&E system.

WORLD BANK SAFEGUARD REQUIREMENTS AND ESMF OBJECTIVES

The World Bank-financed Project has triggered World Bank OP 4.01: Environmental Assessment, OP 4.04: Natural Habitats, OP 4.36: Forests, OP 4.09: Pest Management, OP 4.10: Indigenous Peoples, OP 4.12: Involuntary Resettlement, OP4.11: Physical Cultural Resources, and OP 4.37: Safety of Dams. In order to satisfy the requirements of the World Bank's OP 4.01 (Environmental Assessment), the following documents have been prepared: (i) an Environmental and Social Management Framework (presented herein); (ii) a Resettlement Policy Framework (RPF); and (iii) a Stakeholder Analysis, Participation and Consultation Plan; (ii). Additionally a Strategic Regional Environmental and Social Assessment (SRESA) of the SAGCOT Program has been prepared and is currently being finalized)

The objective of the ESMF is to outline the mandatory procedures to be applied to the World Bank-financed SAGCOT Project investments to ensure the effective management of associated environmental and social issues. It seeks to both enhance environmental and social development benefits of the project and mitigate any adverse impacts, in line with GOT and World Bank policies and guidelines on management of environmental and social issues. Since the precise locations and potential impacts of future subprojects are not known, and cannot be identified prior to appraisal, the ESMF provides the basis for the environmental and social preparation needed for the subproject investments to be supported under Component 2. Most of the investments that are being financed by the World Bank are expected to have moderate environmental and social impacts, but some of the investments may have significant impacts and thus the project is Category A for Environmental Assessment.

The ESMF comprises a main body with supporting information assembled into several annexes. The main body of the ESMF (a) establishes clear procedures and methodologies for the environmental and social assessment, review, approval and implementation of investments to be financed under the SAGCOT Catalytic Fund (Component 2); (b) specifies appropriate roles and responsibilities and outlines the necessary reporting procedures for managing and monitoring environmental and social concerns related to Project investments; (c) determines the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMF; and (d) proposes a budget to implement the recommendations outlined in this document.

The ESMF will apply to all SAGCOT supported investments funded under Component 2 only. Activities funded under Component 1 are not expected to trigger any safeguards policies, given their focus on institutional capacity building and do not include any civil works. That said, Component 1 capacity building activities will include efforts to improve environmental and social management within project agencies.

The annexes contain relevant material referenced throughout the document. The Operational Tools and Guidelines provide the resources needed for implementing the Catalytic Fund Subproject Environmental and Social Review, Appraisal, Monitoring and Reporting Process.

Regarding resettlement, since the extent and location of project investments is not known at this time, and any potential resettlement will only be identified when sub-projects are being assessed, the RPF establishes the resettlement objectives and principles, organisational arrangements and funding mechanisms for any resettlement associated with the World Bank-financed SAGCOT Project.

In order to evaluate the environmental and social issues associated with the broader SAGCOT Program, the overarching objective of the SAGCOT SRESA is to improve the investment decisions of all the different stakeholders by identifying environmental and social issues (both opportunities and constraints) and mainstreaming them into the development planning process. The SRESA aims to look at broader cumulative impacts associated with the broader SAGCOT Program, along with other ongoing activites within the Project Area. Toward this aim, the SRESA includes a scenario analysis of more detailed environmental and social issues in one prominent cluster (the Kilombero Cluster) in order to: i) identify potential Program and Project impacts; ii) highlight areas where future work is needed to manage those impacts; and (iii) iii) develop an initial database for monitoring project-related agribusiness investment impacts in the Corridor. The scenario assessment and monitoring approaches may be applied to a broader range of investment clusters by the SAGCOT Centre and related government authorities.

ENVIRONMENTAL AND SOCIAL CONTEXT

The southern corridor covers approximately one third of mainland Tanzania and is aligned east-west along a backbone of transport and energy infrastructure - the TANZAM highway, the TAZARA railway and transmission lines from various hydropower plants. Within the corridor it is intended that investment should be focused in "clusters" to achieve synergies and economies of scale.

The corridor covers a wide variety of landscapes, agro-ecozones and soils, from the highlands suitable for tea to the coastal lowlands suitable for rice and sugarcane. Rainfall patterns and amounts vary but

are generally bimodal, and there are marked dry seasons. Increasing variability is expected with climate change. Year-round cropping therefore requires irrigation.

A major feature of the corridor is the forest mountain massifs of the Eastern Arc. These are internationally significant due to their unique biodiversity and locally significant as water sources for the region's rivers. A second major feature of the corridor is the many wetlands, seasonally-flooded areas along the rivers which are also highly biodiverse (including freshwater species) and extremely important for their other ecosystem and economic services - flow regulation, fisheries, dry-season grazing, tourism and hunting. The third major biome in the area is dry woodland. The region's exceptional ecological values have been recognized by the establishment of many protected areas in different categories - National Parks, Forest Reserves, Game Reserves, Wildlife Management Areas, Ramsar sites, World Heritage sites - and these cover a large proportion of the corridor area.

The region's population density is low but increasing in line with Tanzania's high growth rates. Livelihoods are largely agricultural, with few urban job opportunities. There is a high dependency on natural resources, especially firewood for cooking. In certain areas such as the Kilombero Valley in-migration by job-seekers is creating population pressure hot-spots. These are compounded by the arrival of agro-pastoralists from other areas, resulting in accelerated environmental degradation and farmer-herder conflicts.

Land is a key issue. Perceptions of unused land waiting for investors and large areas of land suitable for irrigation ignore the realities of subsistence use of land, the needs of pastoralists, the values of wetlands, and the importance of maintaining dry season river flows. Biodiversity is also a key issue: despite the many protected areas there is extreme pressure on some habitats due to degradation, fragmentation and conversion, (especially wetlands but also woodlands and forests) and on some forms of wildlife due to hunting. In addition critical wildlife corridors are being blocked, resulting in increased human-wildlife conflict.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PROCESS AND REQUIREMENTS

In the conceptual design of the SAGCOT Program, numerous stakeholders recognized that implementation activities needed to be planned in an integrated fashion to maintain the Corridor's ecosystem functions and rich natural resource base. A number of protected areas and critical ecosystems are located within the Program area, including Selous Game Reserve, Ruaha and Mikumi National Parks, Udzungwa National Park, Kitulo National Park forest reserves and wetlands, the Ramsar site at Kilombero and various Wildlife Management Areas.

Consequently, the Government of Tanzania aims to ensure the SAGCOT Program integrates sustainability across its planning and implementation focusing on six pillars (i) balancing agricultural production and expansion with wise water use, (ii) developing land use and land capability across the Corridor with attention to continued ecosystem services, (iii) maintaining and enhancing the important protected areas in the region, (iv) improving soil and water management, (v) incorporating low-greenhouse-gas emission investments and other climate mitigation and adaptation management options whenever possible, and (vi) ensuring investments are undertaken in a manner that minimizes environmental impacts through the application of several environmental assessment tools.

In addition, various land agencies plan to shift large tracts of land from Village lands into long term leased General lands for expanding agriculture. Numerous stakeholders including many NGOs have drawn attention to potential "land grabbing" issues associated with the SAGCOT Program. Oversight of the Program's activities in relation to land occupancy and traditional land use rights will require several accountability mechanisms that both respect national laws and follow World Bank policies and international good practice.

Sound development of the SAGCOT Program should include analysis of investment impacts on sensitive wetlands, biodiversity, ecosystem services and land rights. Well-designed development can avoid these impacts, for example, by minimizing clearing of natural vegetation, restoring wildlife corridors and balancing water extraction with maintaining environmental flows. In parallel is the recognition that SAGCOT partners are expected to comply with appropriate Tanzanian laws and

regulations, and encouraged to incorporate World Bank safeguard policies and international good practice concerning land tenure, agriculture and food security into their programs.

All World Bank-supported investments will comply with the environmental and social procedures set forth in this ESMF, to ensure they are consistent with both relevant Tanzanian law and World Bank environmental and social safeguard policies.

INSTITUTIONAL ROLES AND RESPONSIBILITIES UNDER SAGCOT

The Project is supporting several agencies. The majority of the support is directed at the Catalytic Fund with smaller amounts to the other institutions - Tanzania Investment Centre and the SAGCOT Centre. There are several other coordinating and oversight agencies: the Prime Minister's Office, the Ministry of Lands, Housing and Human Settlements Development (MLHHSD), the Vice President's Office and NEMC, all of which will play a supporting role in the implementation of the Project.

IMPACT ANALYSIS AND PROPOSED MITIGATION MEASURES

The objectives of the SAGCOT Program are to have long-term positive socio-economic impacts throughout the Corridor, focused on priority clusters. Through the Catalytic Fund, the Project aims to provide opportunities for smallholder producers to engage in profitable agriculture, support agribusiness investment and development along the value chain, and build supply chains which include smallholder and emergent farmers and benefit rural communities. However, the SAGCOT Program is also likely to have significant environmental and social impacts associated with the numerous development challenges in the region and the Corridor's important biodiversity and ecosystem services. Such concerns must raise the level of scrutiny for all development schemes in the Corridor.

The key impacts and issues relate to (i) water, (ii) land, (iii) biodiversity and (iv) social acceptability, together with all the associated governance issues.

World Bank-supported SAGCOT Project

A majority (75%) of the Bank's loan will be directed to support of the SAGCOT Catalytic Fund. Activities eligible for Matching Grants Fund financing, e.g. warehouse refurbishment or improvement of product grading systems, will be small scale and with very limited potential for negative social or environmental impacts. The ESMF thus includes measures to address these localized negative environmental and social impacts (in relation to, e.g., land acquisition, livelihoods, water and wildlife).

Most of the remainder of the Bank's loan (22%) will be directed towards support for two key SAGCOT institutions. The project will (i) finance the core functions of the SAGCOT Centre, and (ii) support core functions at the TIC, including its ability to attract agribusiness investment. These two organisations are central to the operations of the SAGCOT Program, and by building capacity for improved environmental and social management, the project will contribute to improved management of those issues for the overall SAGCOT Program

SAGCOT Program as a Whole

The short-term economic impacts of SAGCOT investments will be significant and positive. However, until clear mechanisms for ensuring fair compensation and sustained smallholder and community benefits have been designed and implemented, the benefits of these positive impacts will not accrue equitably to the various stakeholders and interest groups. Those who may not receive benefits may include pastoralists, unless they are included in land use planning and decision-making.

The impacts of the SAGCOT Program on the corridor as a whole will vary from cluster to cluster, but with a disproportionate impact on wetlands since these are actively targeted by investors for irrigation development and they currently have little effective protection.

Through land conversion and by encouraging in-migration, without suitable mitigation and control measures SAGCOT investments would likely accelerate and intensify existing trends of habitat degradation, fragmentation and loss, with negative consequences for biodiversity including severance of strategic wildlife corridors and an increase in the risk of local extinctions. Critical Natural Habitats may be affected. Large irrigation schemes and multiple small schemes would have significant hydrological effects with negative consequences downstream, including impacts on water quality as well as dry season flows. These processes would affect the sustainability of SAGCOT's benefits.

However, if the overall SAGCOT Program is implemented using a "green growth" approach, and with positive actions to promote gender equality and climate change mainstreaming, the Program has the potential to achieve significant economic development with limited negative environmental and social impacts.

Kilombero Valley

Because of the scale and complexity of the corridor a single cluster with significant investor and donor interest - the Kilombero Cluster - was identified as a case study for the Strategic Regional Environmental and Social Assessment. The Kilombero River provides two-thirds of the total flow of the Rufiji River, Tanzania's largest watercourse. The cluster is located in the Kilombero Valley of which the main feature is East Africa's largest wetland, a seasonally flooded grassland some 260 km long and up to 52 km wide, surrounded by farmland, miombo woodland, the Mahenge Mountains to the south and the forested Udzungwa Mountains to the north. In 2002 the Valley was designated a Ramsar site in recognition of its international importance as a wetland, in particular as home to the Africa's largest population of the near-threatened puku antelope. In recent years rapid population growth and in-migration, conversion of the woodland and grassland to farms and settlements, a major incursion of cattle and illegal hunting have led to very significant drops in both wildlife numbers and the productivity of the fishery. There is also some evidence of reduced dry season river flows.

Spreadsheet scenarios modelling agricultural change in the Kilombero Valley confirm the high existing pressures on natural resources: there is little unused land; population increase is rapidly converting remaining village land to crops; grazing land and fuelwood supplies are already critical issues in some areas; dry season river flows will not support the planned irrigation expansion unless storage dams are built; and in any case large-scale irrigation development is likely to have significant negative hydrological and ecological effects through consumptive use of water and contamination by agrochemicals and wastes.

On present trends – and without investments through the SAGCOT Program or World Bank-financed SAGCOT Project, the cumulative ecological and environmental impacts of multiple ongoing and planned (though not Project related) roads, hydropower dams (Kihansi, Ruhudji, Mpanga), irrigation, land conversion and population increase in the Valley are and will continue to be severe, negative and irreversible, with consequent impacts on downstream users of the Rufiji River including the proposed Stiegler's Gorge dam, residents and irrigation developments in the Lower Rufiji, the delta and the fishery.

Mitigation Measures for World Bank-supported SAGCOT Project

The following mitigation measures are intended to cover the safeguard issues associated with the proposed World Bank SAGCOT project.

1) **Catalytic Fund**

The logical lead agency for implementation of these recommendations is **Catalytic Fund management**.

1.1 *Resettlement Policy Framework:* apply the measures described in the RPF to all sub-projects under the Catalytic Fund where these involve land acquisition, including agreeing a common approach between the Matching Grants Fund and the Social Venture Capital Fund. The RPF is designed to fill the gaps between Tanzanian law and practice and the requirements of the Bank's *OP 4.12 Involuntary Resettlement*, most importantly in relation to:

- Extent of coverage (to include persons with non-formal property rights);
- Timing of payments (to be done before not after loss of assets);
- Relocation and resettlement (assistance with resettlement to be provided);
- Livelihood restoration (measures to ensure effective livelihood restoration to be provided);
- Consultation (to be more inclusive and to be used in planning);
- Grievance redress mechanisms (to be created and/or improved).

1.2 *Environmental and Social Management Framework:* apply the measures in the ESMF to all sub-projects under the Catalytic Fund, including – to the extent possible -- agreeing on a common approach to safeguards for the Matching Grants Fund and the Social Venture Capital Fund. The ESMF is designed to ensure the compliance of sub-projects with both Tanzanian law on EIA and World Bank safeguard policies.

1.3 *Other Safeguards:* as part of RPF and ESMF implementation, it will be important to screen the proposed sub-projects against the requirements of the *Vulnerable Peoples Development Plan* and *Pest Management Plan*.

1.4 *Catalytic Fund capacity:* provide Catalytic Fund management with the staff, training and budgets necessary for implementation of recommendations (1.1) and (1.2).

CATALYTIC FUND SUBPROJECT SCREENING, APPRAISAL, MONITORING AND REPORTING

Since the Catalytic Fund is the mechanism by which subprojects will be appraised and implemented, a set of ESMF procedures have been developed for the Fund Manager(s) to use in the screening, appraisal, monitoring and reporting process. The design of this assessment system complies with both the World Bank's safeguard policies and Tanzanian EIA regulations and related guidelines. The World Bank will not be providing any funds to directly acquire or purchase land, remove occupants from their current land settlements nor restrict use of or access to traditional resource use in the SAGCOT. Nonetheless, the perceived reputational risks to the World Bank associated with potential land deals and leases to interested investors raise concern across many stakeholders in and outside Tanzania. The World Bank will work closely with these counterpart organizations to define the project's risks and impacts and to provide advice on good practices and strategic approaches to minimize and avoid these.

CONTENTS

ACT	Agricultural Council of Tanzania
AFSP	Accelerated Food Security Project
AGG	Agriculture Green Growth
AGRA	Alliance for a Green Revolution in Africa
ASDP	Agricultural Sector Development Program
AWF	African Wildlife Foundation
BIDP	Bagamoyo Irrigation Development project
BP	Bank Procedure
CBD	Convention on Biological Diversity
CCRO	Certificate of Customary Right of Occupancy
CF	Catalytic Fund
CIA	Central Intelligence Agency
CIP	Commodity Investment Plan
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CRO	Customary Right of Occupancy
CTI	Confederation of Tanzanian Industries
DAP	Di-ammonium Phosphate
DC	District Council
DEO	District Environment Officer
DfID	Department for International Development (UK)
DoE	Division of Environment
EA	Environmental Assessment
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMA	Environmental Management Act
eMJee	eMJee Development Consult
ERM	Environmental Resources Management Ltd.
E&S	Environmental and Social
ESAP	Environmental and Social Action Plan
ESMF	Environmental and Social Management Framework
EU	European Union
EWURA	Energy and Water Utilities Regulatory Authority
FAO	UN Food and Agriculture Organisation
FDI	Foreign Direct Investment
FM	Fund Manager
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GMO	Genetically Modified Organism
GoT	Government of Tanzania
GP	Good Practices
GW	Gigawatt
GWH	Gigawatt-hour
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HR	Human Resources
IDA	International Development Association
IFC	International Finance Corporation
ILIMS	Integrated Land Information Management System
ILO	International Labour Organisation
ILLOVO	Illovo Sugar Ltd.
INM	Integrated Nutrient Management
IP	Indigenous Peoples

IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan
IPPC	International Plant Protection Convention
IPPF	Indigenous Peoples Planning Framework
ISDS	Integrated Safeguards Data Sheet
ISO	International Standards Organisation
IUCN	International Union for the Conservation of Nature
IWRM	Integrated Water Resources Management
KPL	Kilombero Plantations Ltd.
KSCL	Kilombero Sugar Company Ltd.
kV	kilovolt
LGA	Local Government Authorities
LGR	Local Government Roads
LGRP	Local Government Reform Program
M&E	Monitoring and Evaluation
MAFSC	Ministry of Agriculture, Food Security & Cooperatives
MEA	Millennium Ecosystem Assessment
MGF	Matching Grants Facility
MLFD	Ministry of Livestock & Fisheries Development
MLHHSD	Ministry of Lands, Housing and Human Settlements Development
MKUKUTA	National Strategy for Growth and Reduction of Poverty
MNRT	Ministry of Natural Resources and Tourism
MTEF	Mid-term Expenditure Framework
MVIWATA	Mtandao wa Vikundi vya wakulima Tanzania (a small farmers' association)
MW	Megawatt
NAFAKA	Tanzania Staples Value Chain
NAFCO	National Agricultural and Food Corporation
NEMC	National Environment Management Council
NEP	National Environmental Policy
NGO	Non-government Organisation
NIMP	National Irrigation Master Plan
NLUPC	National Land Use Planning Commission
NTC	National Technical Committee (of SAGCOT)
O&OD	Obstacles and Opportunities Development
OHS	Occupation Health and Safety
OP	Operational Policy
PAD	Project Appraisal Document
PCU	Project Coordination Unit
PEA	Preliminary Environmental Assessment
PMO	Office of the Prime Minister
PMO-RALG	Prime Ministers Office Regional Administration and Local Government
POPs	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PPP	Public-Private Partnership
PRAI	Principles of Responsible Agricultural Investment
PS	Performance Standard
PSCP	Private Sector Competitiveness Project
PSDP	Private Sector Development Program
RAP	Resettlement Action Plan
RBWO	Rufiji Basin Water Office
REA	Rural Energy Agency
REDD	Reducing Emissions from Deforestation and Forest Degradation
REF	Rural Energy Fund
RPF	Resettlement Policy Framework
RUBADA	Rufiji Basin Development Authority
SACCO	Savings and Credit Cooperative
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SEA	Strategic Environmental Assessment

SIL	Specific Investment Loan
SOP	Standard Operating Procedure
SPILL	Strategic Plan for Implementation of the Land Laws
SRESA	Strategic Regional Environmental and Social Assessment
SRI	System of Rice Intensification
SVCF	Social Venture Capital Fund
TAC	Technical Advisory Committee
TAFSIP	Tanzania Agriculture and Food Security Investment Plan
TAGT	Tanzania Agriculture Growth Trust
TAHA	Tanzania Agricultural and Horticultural Association
TANESCO	Tanzania Electric Supply Company Limited
TAP	Tanzania Agricultural Partnership
TAZARA	Tanzania-Zambia Railway
TDHS	Tanzania Demography and Health Study
TEU	Twenty-foot Equivalent
TIC	Tanzania Investment Centre
TNBC	Tanzania National Business Council
ToR	Terms of Reference
TPA	Tanzania Ports Authority
TRC	Tanzania Railways Corporation
TSIP	Transport Sector Investment Plan
TSP	Triple Superphosphate
UN	United Nations
URT	United Republic of Tanzania
UNCCD	United Nations Convention to Combat Desertification
UNESCO	United Nations Education, Scientific and Cultural Organisation
UNFCCC	United Nations Framework of Convention to Climate Change
USAID	United States Agency for International Development
VICOBA	Village Community Bank
VLA	Village Land Act
VLUP	Village Land Use Plan
VPO	Vice President's Office
WB	World Bank
WBG	World Bank Group
WCS	Wildlife Conservation Society
WDC	Ward Development Committee
WEF	World Economic Forum
WFP	World Food Program
WMA	Wildlife Management Area
WHO	World Health Organisation
WSDP	Water Sector Development Program
WWF	Worldwide Fund for Nature / World Wildlife Fund

1 INTRODUCTION

This document presents an Environmental and Social Management Framework (ESMF) for the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) Project [the Project] prepared under a consultancy for the Government of Tanzania (GOT) by Environmental Resources Management (ERM). The ESMF has been developed in tandem with a Strategic Regional Environmental and Social Assessment (SRESA) and Resettlement Policy Framework (RPF) by ERM as one of a set of due diligence instruments required to address and manage environmental and social impacts associated with the SAGCOT project.

The SAGCOT is broadly identified as a public-private partnership explicitly designed to achieve higher rates of income growth and job creation through the development of competitive agribusiness value chains across the Southern Corridor. The program concentrates investments within the rail and road corridor stretching from Dar es Salaam in the east through to Morogoro, Iringa, Mbeya, and west to Sumbawanga. Over the next 20 years, SAGCOT aims to bring 350,000 hectares of farmland into commercial production for regional and international markets, to increase annual farming revenues by US$1.2 billion, to lift more than 2 million people (roughly 450,000 farm households) out of poverty. The Bank-financed project will focus on investments for smallholders under the Catalytic Fund.

1.1 ESMF APPROACH AND METHODOLOGY

1.1.1 Objective of the ESMF

The objective of the ESMF is to provide a framework for effective management of environmental and social issues in the proposed SAGCOT Project. It seeks to both enhance environmental and social development benefits of the project and mitigate any adverse impacts, in line with GOT and World Bank policies and guidelines on management of environmental and social development projects. Moreover, since the precise locations and potential impacts of future subprojects are not now known, and will not be identified prior to appraisal, the ESMF provides the basis for the preparation of necessary environmental and social work, as needed for the subproject investments supported through the Project.

This ESMF includes several provisions that were outlined in the Terms of Reference:

- A typology of potential project investments with a screening process that identifies those investments requiring further environmental assessment and associated mitigation provisions;
- Specific environmental and social due diligence provisions necessary to avoid, minimize or mitigate subprojects with potential risks, and monitor their outcomes;
- A summary of key safeguard related regulations and their implication(s) for project implementation and include a clear concise reference table across all World Bank safeguards and Tanzanian environmental and social regulations and mandates;
- Specific capacity building actions and activities to mitigate potential project impacts and enhance positive externalities;
- Recommendations for potential policy amendments, as necessary, to improve the project environmental and social outcomes.
- Serve as a mechanism for guiding the use of these tools and methods for enhancing the understanding and use of these provisions across the program;
- A Monitoring and Evaluation process of project environmental and social issues, including key indicators, baseline values, methods of measurement and possible ways to enhance the use of these indicators; and
- Identification of knowledge gaps and research areas that could improve SAGCOT sustainability and delivery of viable investments.

1.1.2 Methodology

The ESMF has been prepared on behalf of the the Government of Tanzania (GoT) with support from the World Bank and is designed primarily to support the SAGCOT Catalytic Fund during the project's lifespan. Lessons learned in development of this tool draws from earlier ESMFs prepared for other projects in Tanzania. In addition, the ESMF has taken into considerations findings of the Africa Region Safeguard Review(1) which was prepared in February 2011 and will incorporate recommendations from the Review's case studies which apply to SAGCOT.

The two consultants leading preparation of the ESMF, Tania Choufani (ESMF Task Team Leader) and Godfrey Kamukala (Local Environmental Specialist), undertook several consultations at national level in May 2012 to solicit information on the Project. The team also undertook a one day field visit to Bagamoyo District to meet with District Officers and to visit the Bagamoyo Irrigation Development Project.

A list of stakeholders who were consulted with is provided in **Annex 1**, findings of these consultations are summarized in **Annex 2,** and findings of the site visit to Bagamoyo is attached as **Annex 3.** The ESMF has incorporated these consultations and will be expanded and updated over the project lifespan to accommodate the evolution of the Catalytic Fund as it moves from design to inception and operation.

1.1.3 Structure of the Document

The ESMF is divided into a main body with supporting information assembled into several annexes and Operational Tools and Guidelines. The main body of the ESMF: (a) establishes clear procedures and methodologies for the environmental and social assessment, review, approval and implementation of investments to be financed under the SAGCOT Catalytic Fund; (b) specifies appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social concerns related to Project investments; (c) determines the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMF; and (d) proposes a budget to implement recommendations outlined in the document.

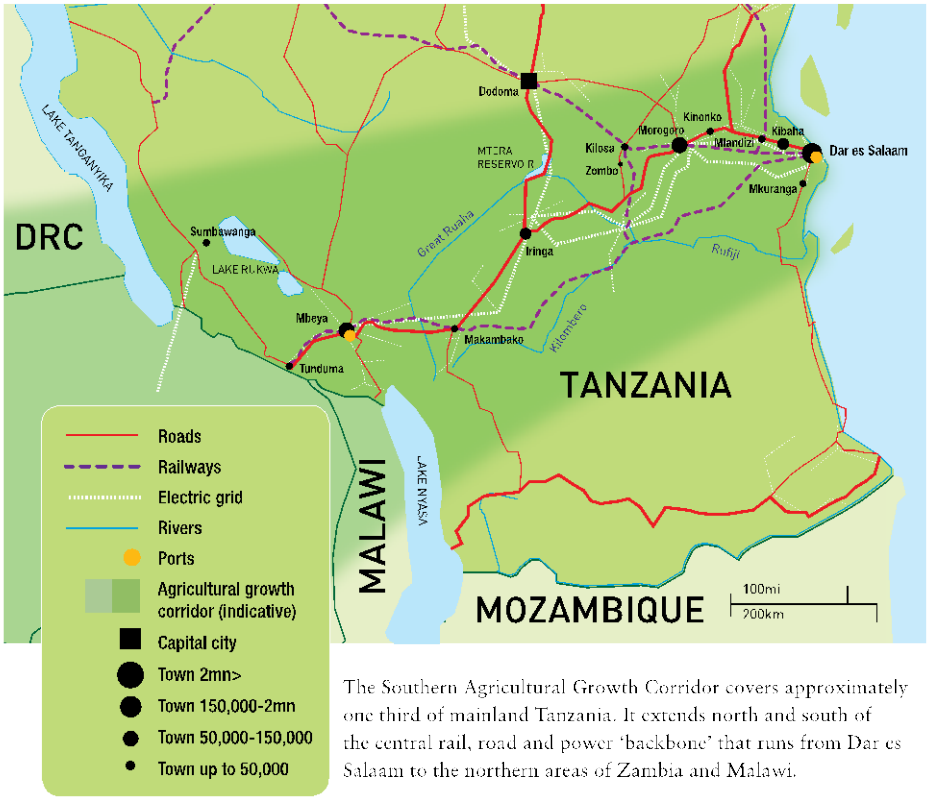
The annexes contain relevant material referenced throughout the document while the Operational Tools and Guidelines provide the resources needed for implementing the Catalytic Fund Subproject Environmental and Social Review, Appraisal, Monitoring and Reporting Process.

1.2 GOVERNMENT OF TANZANIA SAGCOT OBJECTIVES

The SAGCOT is closely aligned with the newly drafted National Strategy for Growth and Reduction of Poverty (Mkukuta II and Mkuza II) – Cluster I: Growth and Reduction of Income Poverty. This highlights the need for the modernization and commercialization of private sector- based agricultural activities through accelerating productivity growth and removing bottlenecks along agribusiness value chains. The SAGCOT objectives are also cited in the GoT's Five Year Development Plan The SAGCOT program planning was initiated by the GoT with support from a range of public and private sector agencies including Norway, USAID, AGRA, Yara, Unilever, DuPont and Syngenta. Program implementation will be supported by the GoT together with the support of multiple private and public sector partners.

[1] Green, K. C. Pizarro and M.Pajazetovic Assessing the Use of Environmental and Social Frameworks in Africa, World Bank 2011.

Figure 1.1 Map of Southern Corridor in Tanzania



The Southern Agricultural Growth Corridor covers approximately one third of mainland Tanzania. It extends north and south of the central rail, road and power 'backbone' that runs from Dar es Salaam to the northern areas of Zambia and Malawi.

1.3 PROPOSED COMPONENTS OF THE SAGCOT PROJECT

1. Project Components. The project will be implemented over a 5 year period and would comprise three main components:

- **Component 1: Strengthening of SAGCOT Support Institutions (total US$16.3 million, IDA US$8.5 million).** The objective of this component would be to strengthen the capacity of the main SAGCOT support institutions in order to pursue their functions of information and data provision, support of investment planning and guidance, government/private sector intermediation, business enabling environment and investment promotion. The component would support two institutions under the following sub-components:

  a) **SAGCOT Centre (total US$ 11.4 million, IDA US$ 3.5 million):** under this sub-component the project would jointly with other donors support the SAGCOT-Centre, which was established as a public private partnership entity in 2011 to: (i) Facilitate agri-business and partnership development; (ii) Ensure inclusive and sustainable investment and development; and (iii) Advocate for an improved enabling environment. The project would support the Centre by providing financing for staff and operational costs, studies (about one study per year, initial topics identified are water use management and doing business) and consulting services to be contracted by the Centre.

  b) **Tanzanian Investment Centre (Government institution) (IDA US$5 million):** under this sub-component the project would support the TIC which was established as a public sector entity in 1977 and designated as the first point of call and a "one-stop facilitation centre" for all potential investors coming into the country. The project support would aim to: (i) strengthen its capacity to leverage high quality, responsible, inclusive and sustainable commercial investments (these investments are not yet identified as the aim is to strengthen the capacity to support investment efforts, a current example the TIC is supporting is the

Mkulazi investment) in the SAGCOT, and (ii) monitor and evaluate investments. The project would finance incremental equipment, technical assistance (e.g., processing systems, organisational development, investment promotion) and consultancies (e.g., for setting up web based information systems to monitor, promote and foster investment).

- **Component 2: Strengthening Smallholder-Business Linkages (total US$74.0 million, IDA US$46.3):** The objective of this component would be to link smallholder farmers in agricultural value chains. The component would (a) expand the number of smallholders linked to agribusinesses in successful commercial partnerships and (b) improve the revenues derived by smallholders and rural communities from these partnerships in the form of growth in agricultural productivity growth, income and employment. This component would comprise two sub-components:

  a) **Fund Management (total US$8.5 million, IDA US$4.25 million):** under this sub-component the project would jointly with other donors support a management structure responsible for the implementation of the catalytic fund. Project support would include fees (including salaries), goods and equipment, office operational costs, meetings and workshops, communications and technical assistance.

  b) **Matching Grants (total US$ 65.5 million, IDA US$42 million):** Matching Grants (MG) at a size of US$250,000 up to US$1.5 million with a matching contribution of 30% (national businesses) and 40% (international business operators) would be provided to existing agribusiness operators following a defined process of application, evaluation and competitive selection. The grants could be used for operational cost and capital costs directly related to expanding smallholder participation in competitive agricultural supply chains.

- **Component 3: Project Management and Evaluation (total US$2.2 million, IDA US$2.2 million):** The component would establish project management and M&E systems and provide office equipment, transportation and technical assistance services. It would support the coordination between implementation agencies at all levels and with other government programs and institutions and the capture of implementation lessons from development of value chain development. It would also include support for establishing and operating the project's progress and impact M&E system.

This chapter provides an overview of the biophysical and social baseline for the SAGCOT corridor (*Figure 2.1*). Where possible (i.e. where the data allow) the descriptions are focused on the SAGCOT clusters. Given its role as a case study for this assessment, particular attention has been given to describing conditions in the Kilombero cluster.

2.1 CLIMATE

2.1.1 Overview

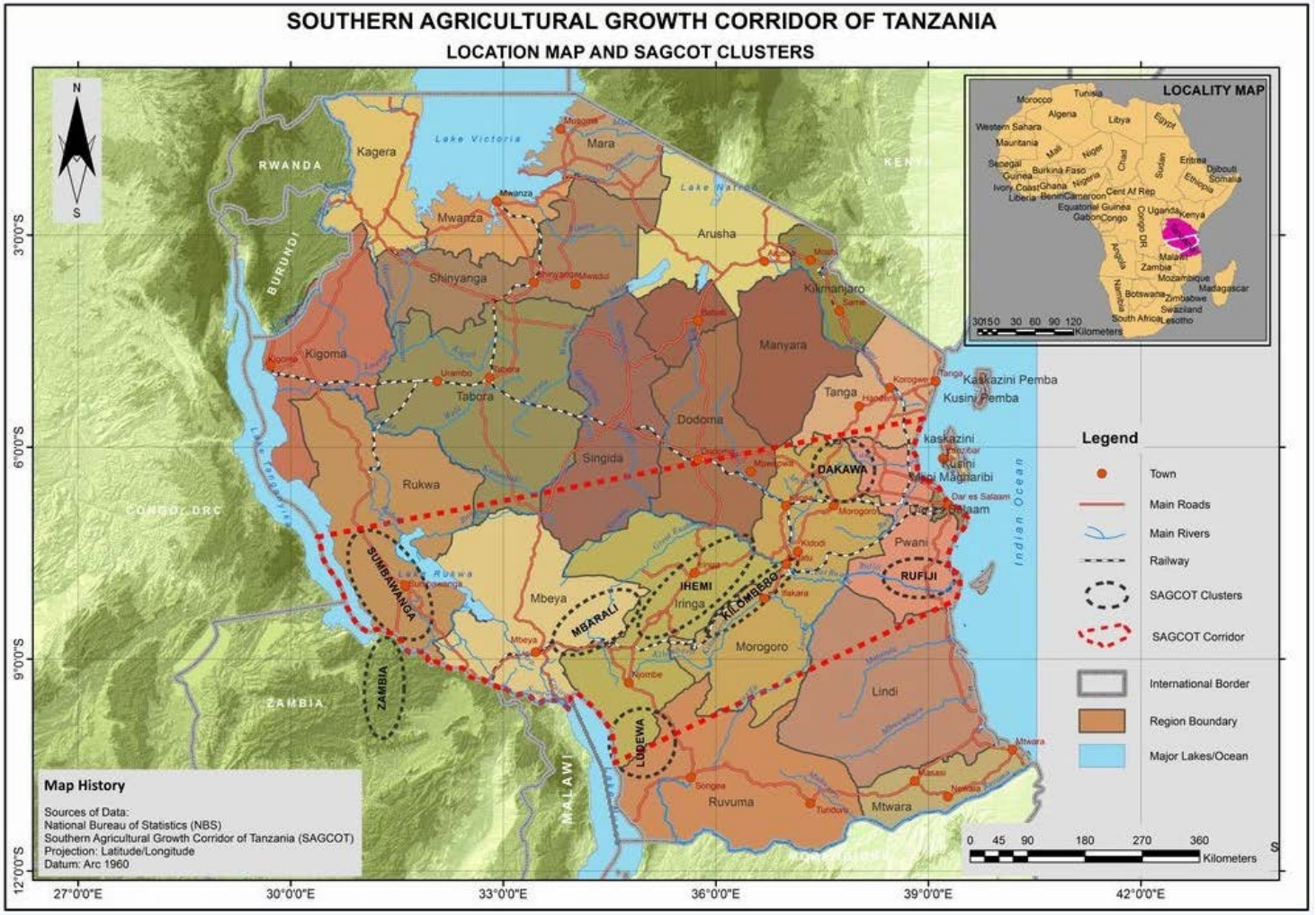
The climate of the corridor reflects Tanzania's location just south of the equator, and is complex with wide regional variations dictated by topography and altitude, along with pronounced seasonality. Conditions in the coastal regions are generally warm and humid, with a tropical climate. Temperatures range from 25 to 27°C throughout much of the year, with a slight drop during the coolest months from June to September. Further inland, in the country's highland regions, the climate is temperate, and temperatures range from around 20 to 23 °C year round(1). The climate throughout the country is heavily influenced by the El Niño – Southern Oscillation (ENSO) cycle (Kilimo Kwanza Committee, 2011).

Seasonal rainfall patterns in Tanzania are affected by the migration of a low pressure/high precipitation zone known as the Inter-Tropical Convergence Zone (ITCZ) around the equator. The wet season in central and southern parts of the country, lasting from around October to March, is associated with the presence of the ITCZ in this area. Eastern areas of Tanzania instead experience two distinct wet seasons associated with the migration of the ITCZ southward through the country in October to December, and northward in March to May. Wet season rainfall ranges from 50 to 200 mm per month, but can reach up to 300 mm per month in the wettest regions. Sea surface temperatures influence the timing, duration and intensity of rainfall, and these features therefore show inter-annual variation (2).

Existing climate variability leads to significant economic costs for Tanzania, since much of the economy is dependent on activities sensitive to climate, such as agriculture. Periodic extreme events occur, such as major droughts in 2005/2006 and major flooding in 1997/1998(3). These are largely linked to the ENSO cycle, with flooding associated with El Niño phases and droughts associated with La Nina phases (Kilimo Kwanza Committee, 2011).

(1) Sweeney, New & Lizcano (2010). UNDP Climate Change Country Profiles - Tanzania. Available at: http://country-profiles.geog.ox.ac.uk
(2) ibid
(3) DFID (2011). The Economics of Climate Change in the United Republic of Tanzania.

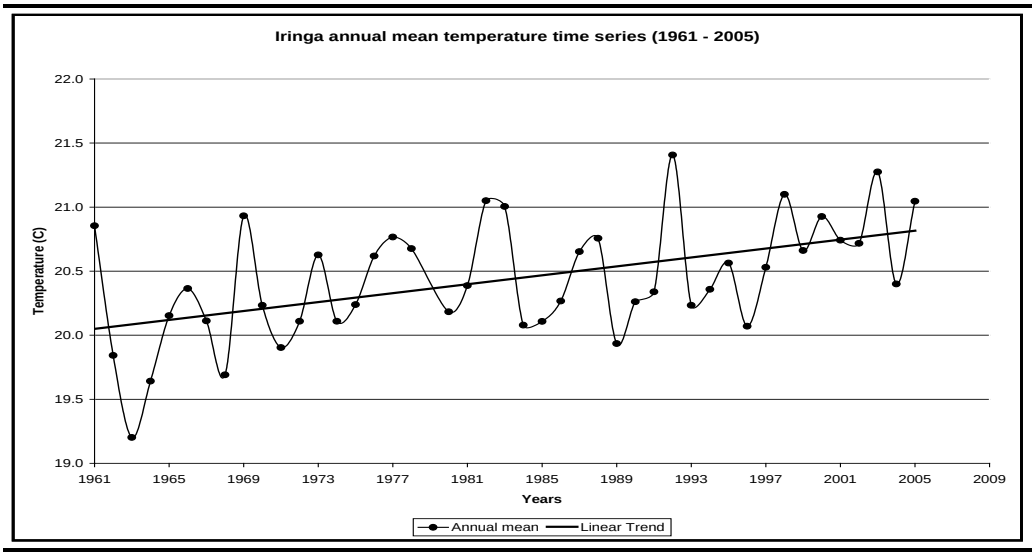
Figure 2.1 SAGCOT Corridor and Clusters



Note: International border shown for Lake Malawi is the median boundary: this is not accepted by all riparian states.

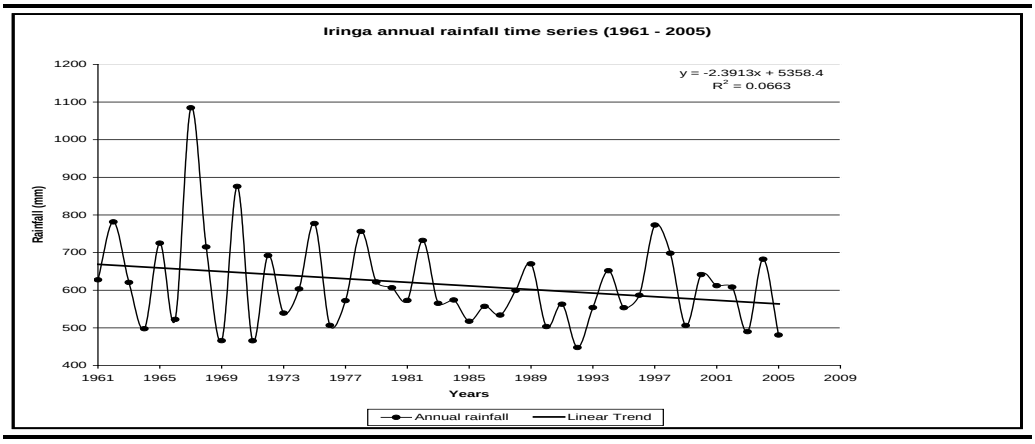
There is some indication that extreme events have intensified over recent decades, indicating that the country's climate is already experiencing climate change [(1)]. An average temperature increase of 0.23ºC per decade for Tanzania has contributed to an increase in mean annual temperature of 1ºC since 1960; this increase is most pronounced in January and February. An average decrease in annual rainfall of 2.8 mm per month per decade has also occurred, with the greatest decreases in the south of the country. Decreases in rainfall have been most pronounced for the March to May period[(2)]. Both trends are illustrated in *Figure 2.2* and *Figure 2.3* which depict annual mean temperature and rainfall for Iringa, a city located in the centre of the southern corridor.

Figure 2.2 Annual Mean Temperature for Iringa, 1961-2005



Source: Kangalawe (2012)

Figure 2.3 Annual Mean Precipitation for Iringa, 1961-2005



Source: Kangalawe (2012)

2.1.2 Climate Change Predictions

Future climate predictions carry a high level of uncertainty and vary greatly depending on the model used, with significant disagreements between models. The information in this section follows the results of the recent DFID review of climate predictions for Tanzania, the

(1) ibid
(2) Sweeney, New & Lizcano (2010). UNDP Climate Change Country Profiles - Tanzania. Available at: http://country-profiles.geog.ox.ac.uk

Economics of Climate Change (ECC) in the United Republic of Tanzania(1), unless another source is referenced.

The ECC report highlights that, despite uncertainty relating to changes in specific parameters, the impacts of climate change for the country are likely to be large. There is broad agreement between models that an increase of average annual temperatures of 1 °C to 3 °C above that of the baseline period is possible by the 2050s. By 2100, a rise in temperature of up to 5 °C has been predicted with a higher global emissions scenario, while with lower emission scenarios temperatures are still expected to increase by between 1.5 to 3 °C. The greatest increases in temperature are predicted for the north and north-east of Tanzania (Kilimo Kwanza Committee, 2011).

While all models show changes in precipitation they do not agree on how it will change, in terms of both the direction and size of the change. Variability in predictions is compounded by differences between seasons, regions and rainfall regimes. Changes in rainfall patterns are expected to vary regionally with greater increases predicted in the north of the country, while some areas may experience decreased precipitation (2). Many models predict increased precipitation, especially towards the end of the summer months. Within the corridor, some models predict a decrease in rainfall during the shorter early rainy season in the upper reaches of the Wami-Ruvu and Rufiji basins. As a result the rivers fed by these basins may experience decreases in flow of up to 10% (Milder *et al.*, 2012). Other models, however, predict an increase in flow in the Rufiji river as a result of changes to rainfall and soil moisture(3).

Other regional differences include the threat presented to coastal regions by climate change. Predictions suggest that approximately 8% of Tanzania's coastal wetlands could be lost by 2050 as a result of flooding associated with sea level rise.

Predictions relating to future changes in extreme events, as opposed to averages, are even more uncertain. Many models indicate that there will be an intensification of heavy rainfall, with patterns of change again varying regionally. With an increase in the intensity of rainfall and the number of extreme rainfall events, flood risks will increase (4). Wetter regions in particular are at risk of more frequent and more severe flooding. Predictions for changes to drought events vary greatly, with both intensifications and reductions in drought severity predicted depending on the model and the region(5). In both cases, the most severe events are likely to be exacerbated if coupled with El Niño or La Nina events in the Pacific Ocean.

Climate change may result in increased intensity and frequency of extreme events and related natural disasters, such as landslides. In addition, adverse impacts are also expected in terms of changes in the prevalence of pests and of diseases such as malaria, and aggravation of existing environmental challenges including water scarcity, land degradation, loss of biodiversity and ecosystem services, deforestation and air pollution. These may lead to social impacts affecting poverty, vulnerability, health and economic development(6).

Changes to temperature and precipitation are likely to have large economic impacts, particularly within the agricultural sector. Severe impacts have been predicted for some crops, with average maize yields expected to decrease by up to 16% by 2030, and by 35% by 2050 under the worst-case projections. In the most drought prone regions, such as Dodoma in central Tanzania (north of the SAGCOT corridor), cereal yield losses could reach up to 80% (Milder *et al.*, 2012). By contrast, yields of crops such as coffee, cultivated in the highlands,

(1) DFID (2011). The Economics of Climate Change in the United Republic of Tanzania.
(1) (2) IIED. 2009. Cultivating success: the need to climate-proof Tanzanian agriculture. M. Chambwera & J. MacGregor. IIED Briefing: www.iied.org/pubs/display.php?o=17
(3) Wingqvist (2010). Tanzania Environment and Climate Change Policy Brief. Environmental Economics Unit, University of Gothenburg.
(4) Ibid.
(5) DFID (2011). The Economics of Climate Change in the United Republic of Tanzania.
(6) Wingqvist (2010). Tanzania Environment and Climate Change Policy Brief. Environmental Economics Unit, University of Gothenburg.

may increase if predicted changes to climate occur. While the details may not be certain at this stage, it is likely that the broad distribution of agro-ecological zones within the country will change, and that there will be greater variability in production, linked to increasing variability in the weather (Kilimo Kwanza Committee, 2011).

2.1.3 Climate Change Adaptation

Various studies report that at present Tanzania is not adequately prepared to address the likely impacts of future climate change, and that the country's vulnerability may be increased due to changes in land-use patterns, rising population pressure and increased demands on land and water(1).

The main government body with responsibility for climate change issues is the Division of Environment. There is also a National Climate Change Steering Committee (NCCSC)(2). Other important government agencies concerned with climate change include the Ministry of Water and Irrigation; Ministry of Agriculture, Food Security and Cooperatives; Ministry of Natural Resources and Tourism; Ministry of Energy and Minerals; Ministry of Infrastructure; Ministry of Industry, Trade and Marketing; the Tanzania Meteorological Agency and the National Environmental Management Committee (NEMC).

As a low emitter by world standards - Tanzania currently releases relatively low levels of greenhouse gases, predominantly from its agricultural sector as well as from transport and industry - the majority of national and sectoral development plans for Tanzania do not consider the problems of increasing greenhouse gas emissions. There is concern that the current planning process commits Tanzania to higher emission levels (Kilimo Kwanza Committee, 2011). With increasing population growth, urban expansion and development, emissions are rapidly increasing and projections indicate that by 2030 emissions could be double their 2005 levels.

Tanzania's National Adaptation Program of Action (NAPA) aims to mitigate climate change impacts with a focus on the agricultural sector. NAPA identifies priority activities required for climate change adaptation, such as increasing water efficiency in crop production; the development of alternative farming systems, water storage Programs and technology; and community based catchment conservation and management Programs. Other proposed activities aim to reduce deforestation and improve energy sources, including renewables. The effectiveness of NAPA is constrained by lack of funding.

Climate Change Adaptation in Africa (CCAA) is another relevant development Program, focusing on research and development to improve the ability of African countries to adapt to climate change. Within Tanzania, CCAA undertakes crop modelling to predict and assess future impacts on the agriculture sector, as well as capacity building through training in local communities to reduce farmers' vulnerability.

2.2 WATER RESOURCES

2.2.1 Introduction

The following sections describe the main hydrological characteristics of the study area, focussing on the river basins (and sub-basins) in which the SAGCOT clusters are located (see *Figure 2.4*). They include a description of the principal surface water features, a presentation of some of the key available water resources data (including their reliability) and a summary of the main water users in each basin. The descriptions focus primarily on surface water resources, although groundwater is discussed where this is a significant feature and where data are available. In addition, the presentation is based upon the current (or historical)

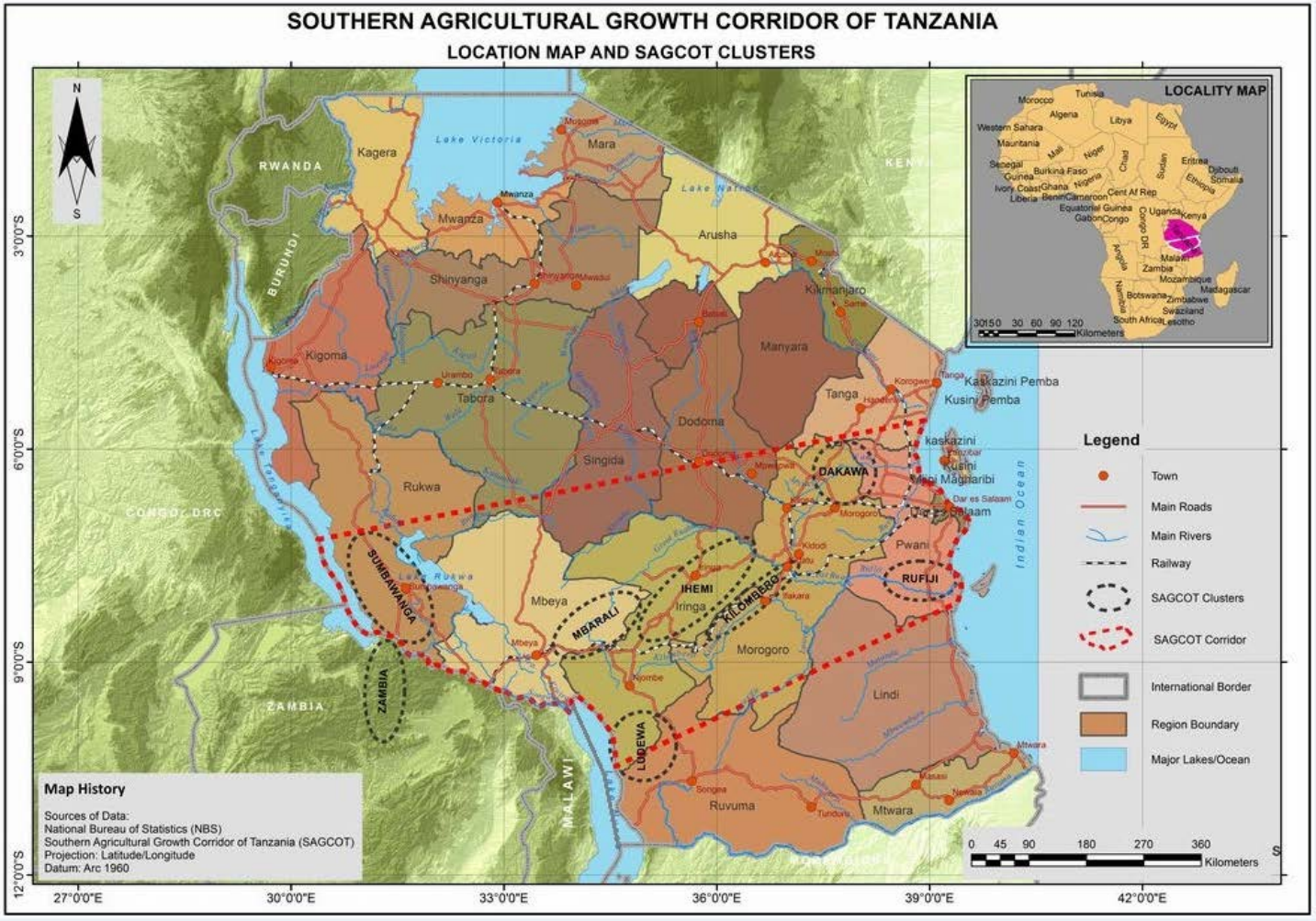
(1) DFID (2011). The Economics of Climate Change in the United Republic of Tanzania.
(2) Wingqvist (2010). Tanzania Environment and Climate Change Policy Brief. Environmental Economics Unit, University of Gothenburg.

hydrological situation in each basin: the possible future effects of climate change on these water resources were broadly discussed in *Section 2.1.*

Data Sources

The data and information presented in this section have been drawn from a number of different sources (details are included in the list of referenced literature at the end of the report). These include a series of technical studies and reports that have been prepared for the Rufiji and Wami river basins, where several of the SAGCOT clusters are located. In particular, the majority of the information presented for the four clusters that are located in the Rufiji Basin has been extracted from the Rufiji IWRMD Plan: Interim Report, published by WREM International in January 2012. Far less information is available for the Lake Rukwa and Lake Nyasa basins, and so these

Figure 2.4 SAGCOT Corridor Watersheds



Note: International border shown for Lake Malawi is the median boundary: this is not accepted by all riparian states.

areas have been described in a more qualitative manner based primarily upon semi-structured interviews with key informants in the various basin water administrations.

2.2.2 *Wami, Ruvu and Coast Basin*

The Dakawa cluster falls within the Wami River Sub-Basin in eastern Tanzania, which in turn forms part of the Wami, Ruvu and Coast Basin. The Wami River has its source in the Kaguru Mountains and flows in a south-easterly direction from the semi-arid Dodoma region, through the humid inland swamps of the Morogoro region to the Indian Ocean. The total sub-basin area is approximately 43,000 km^2.

The average annual rainfall across the sub-basin varies from 550-750 mm in the highlands near Dodoma, to 900-1000 mm in the central areas near Dakawa and towards the estuary (IUCN, 2010). There is a marked difference between wet and dry seasons, with the dry season typically lasting from July to October, and two distinct wet periods from November to December (the 'short rains') and March to June (the 'long rains').

As with rainfall, seasonal flows are not uniform across the sub-basin. Many large rivers such as the Wami, Mkata and Mkondoa (and a few smaller rivers) are perennial, while others like the Kinyasungwe, Lukigura and many small rivers are ephemeral (see *Table 2.1*). All sites have a defined peak flow during the long rains (typically peaking in April/May) and a second smaller peak in larger catchments during the short rains. The lowest flow periods of the year are typically in October for all sites, whilst low or no flow periods extend longer for seasonal rivers like the Kinyasungwe and Lukigura (IUCN, 2010).

Table 2.1 ***Average Daily Flow at Six Gauging Stations in the Wami Sub-Basin***

River/tributary	Gauging station	Catchment area	Average daily flow (m3/s)	% days at zero flow
Wami	1G1 – Dakawa Bridge	28,488	25.8	0.0
Wami	1G2 – Mandera	36,450	60.6	0.6
Lukigura	1GA1A – Kimamba road bridge	1,060	4.0	36.3
Mziha	1GA2 – Kimamba	178	1.3	17.1
Mkondoa	1GD2 – Kilosa	17,560	10.2	0.2
Mdukwe	1GD31 - Mdukwe	460	4.6	0.0

Source: USAID, 2008

The sub-basin contains a number of different wetland systems, including palustrine (marsh), riverine, lacustrine and estuarine wetlands. The Dakawa swamp is a palustrine wetland located within the Dakawa cluster and is one of the largest wetland systems in the sub-basin. The swamp is perennial and seasonally expands during the rainy season between November and May and shrinks during the dry season to its smallest spatial extent in late October.

Water resources in the Wami sub-basin are relatively undeveloped compared to the neighbouring Ruvu sub-basin, with fewer abstractions and infrastructural developments and no major dams or hydroelectric plants. Outside of the major urban areas (Morogoro, Dodoma, and Kibaha) agriculture is the predominant water use, including for large-scale irrigated production of sugarcane, sisal and cotton in districts such as Kilosa and Mvomero in the Morogoro region which have high rainfall and loamy soils with good agricultural potential (USAID, 2008). According to Wami River Basin Water Board figures (as presented in IUCN, 2010), a total area of approximately 7,100 ha is currently under irrigation in Mvomero district where the Dakawa cluster is located, with an average total licensed water abstraction of 0.02 Mm^3/day. It is estimated that there is potential to irrigate some 15,800 ha in the district, including in the Dakawa wetland (without considering environmental constraints).

Water is also commonly used for domestic, fishing and livestock watering purposes throughout the sub-basin. The estimated average total water demand in Mvomero district where the Dakawa cluster is located is approximately 0.01Mm^3/day for a population of around 130,000 people.

Water Quality

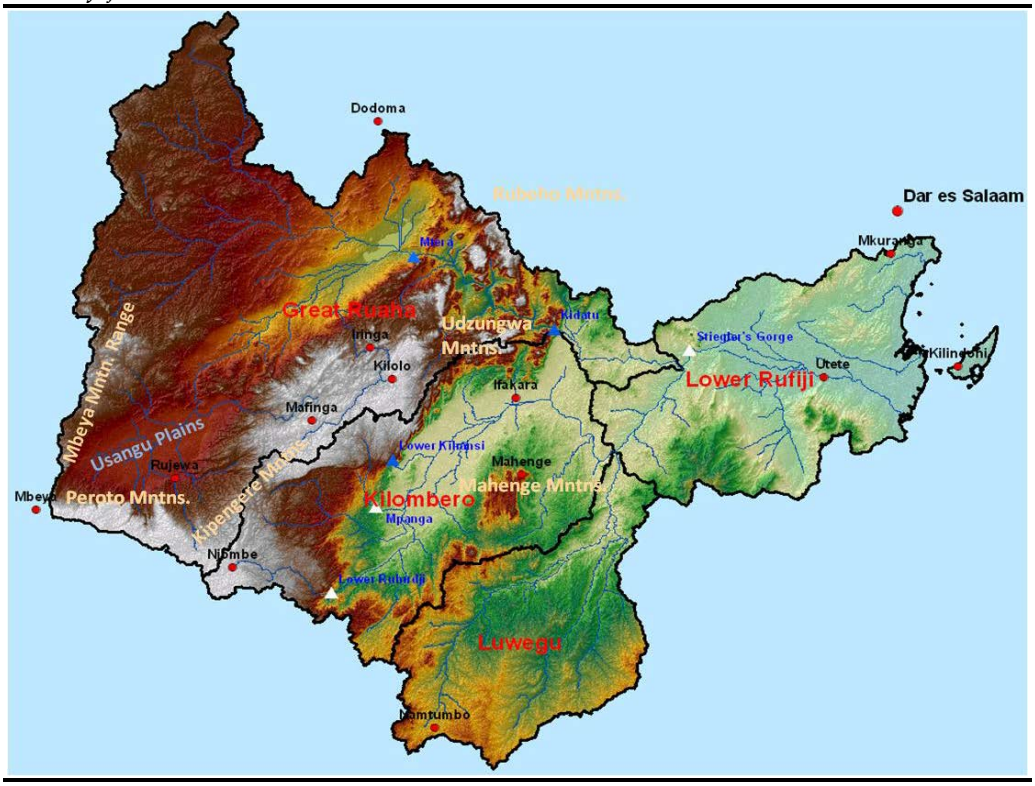
It has not been possible to locate any water quality data for the Wami sub-basin, although data from a 2006 UNESCO-funded water quality monitoring campaign (Kemikimba, 2006) are summarised for the Wami/Ruvu River Basin as a whole in the IUCN (2010). In broad terms, water quality in the basin is characterised by relatively good chemical quality and generally poor physical and bacteriological quality. In particular, all of the surface water samples that were collected in 2006 were contaminated with faecal coliforms from sources such as domestic washing, sewage and livestock. In addition, waters in close proximity to human activities such as deforestation, intensive cultivation and agro-processing (e.g. sugar refining) typically contained high sediment, nutrient and organic pollution levels from a combination of soil erosion, agrochemical runoff and untreated process wastewaters.

2.2.3 Rufiji Basin

There are four SAGCOT clusters within the Rufiji River Basin (*Figure 2.5*). The hydrological characteristics of each cluster and the particular sub-basin in which they are located are discussed in detail in the following sections. There follows a short discussion of the wider basin itself [(1)].

With a catchment area of approximately 184,000 km^2, the Rufiji Basin covers approximately 20% of mainland Tanzania, and is the largest of the nine river basins in the country. It comprises four sub-basins (the Great Ruaha, Kilombero, Luwegu, and Lower Rufiji, as shown in *Figure 2.5*) and receives one third of all Tanzanian rainfall and produces one quarter of the country's river flow (WREM, 2012).

Figure 2.5 The Rufiji River Basin and Sub-Basins



Source: WREM, 2012

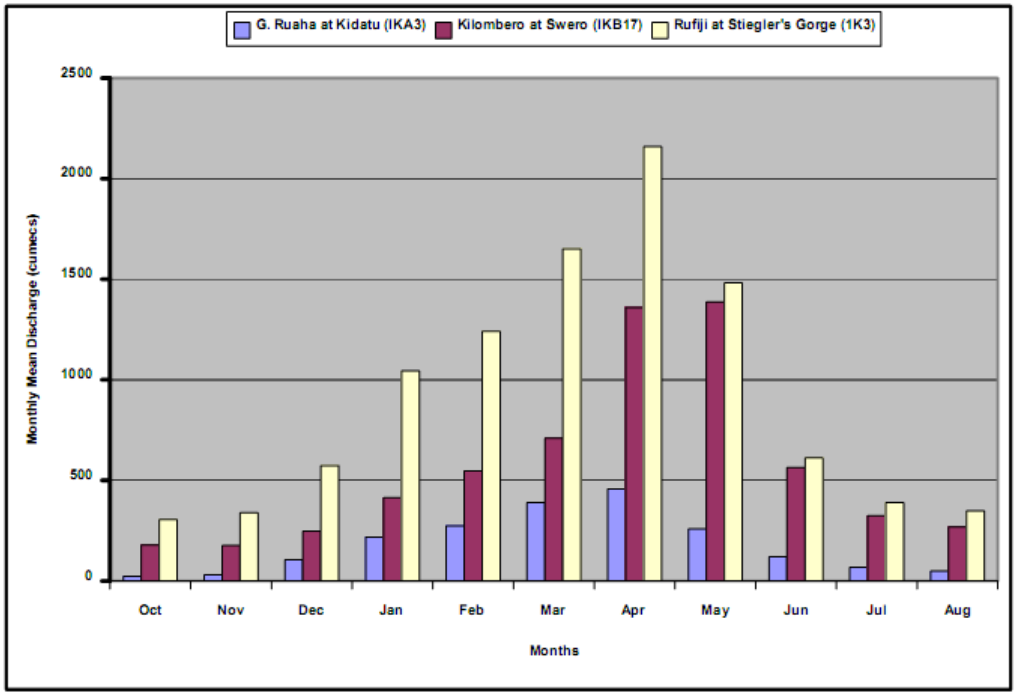
(1) [(1)] The majority of the information presented in these sections has been extracted from the Rufiji IWRMD Plan: Interim Report Volume II – Water Resources Availability Assessment, published by WREM International in January 2012.

The flow in the Rufiji River is markedly seasonal due to strongly seasonal precipitation, as clearly seen in *Figure 2.6*, which displays the long term monthly streamflow means at Kidatu (Great Ruaha River), Swero (Kilombero River), and Stiegler's Gorge (Lower Rufiji River). The figure shows that the highest flows are expected in March, April, and May, and the lowest in August, October, and November. The seasonal flow pattern of the Kilombero is shifted relative to that of Great Ruaha as a result of the delayed onset of the rainy season in the Kilombero Valley (WREM, 2012).

The figure also shows the contributions to river flow from some of the main sub-basins. In all, 62% of flow in the Rufiji is contributed by the Kilombero, which covers only 22% of the Rufiji Basin but receives twice the average annual basin rainfall. The contribution of the Great Ruaha is about 15%, and the remainder is contributed by the Luwegu (18%) and the Lower Rufiji (5%) (WREM, 2012).

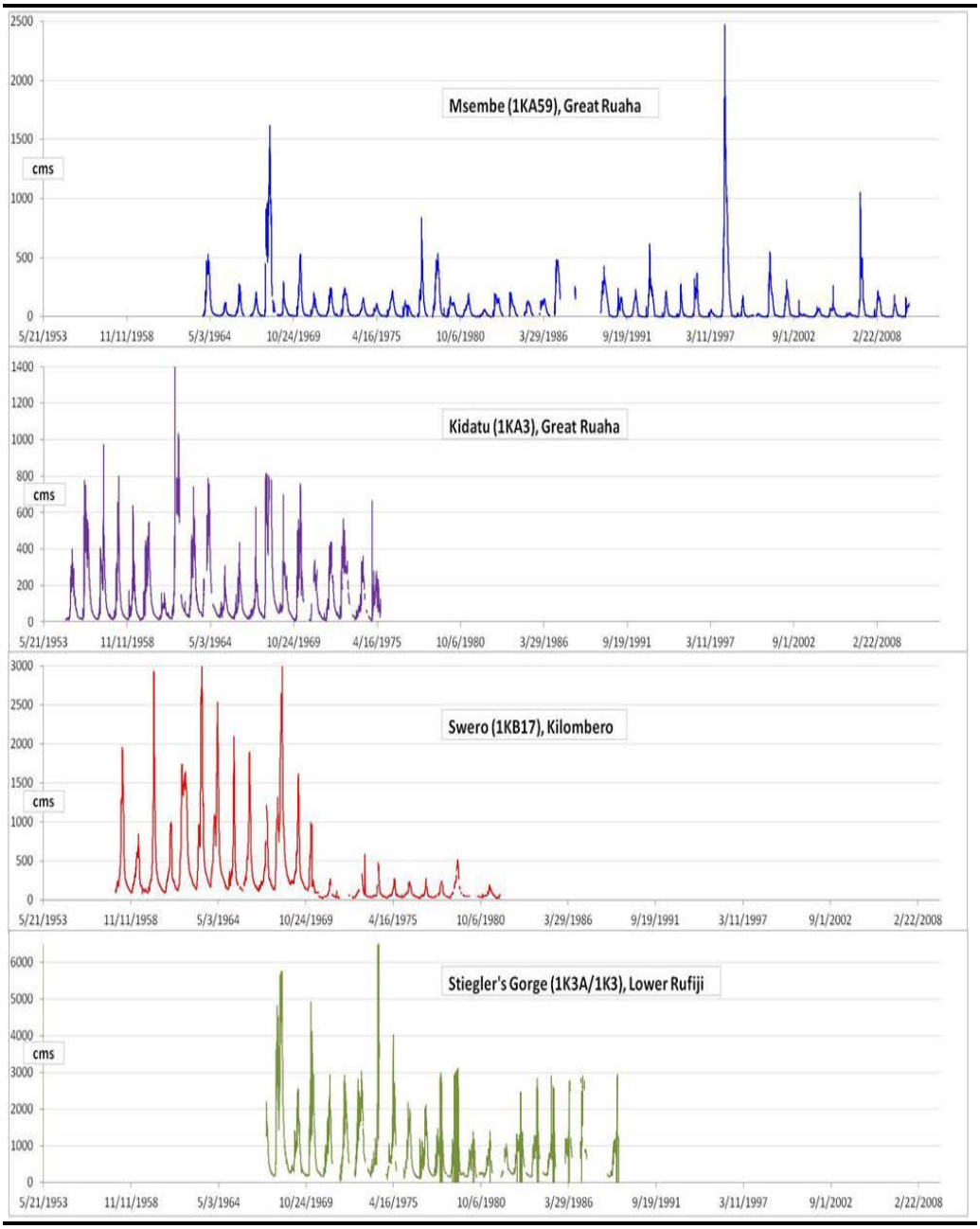
Figure 2.7 shows the data from four main gauging stations: Msembe (1KA59), Downstream Kidatu (1KA3), Swero (1KB17), and Stiegler's Gorge (1K3A combined with 1K3). The first two are on the Great Ruaha, the third (Swero) is at the outlet of the Kilombero, and the fourth is at the upstream end of the Lower Rufiji.

Figure 2.6 ***Monthly mean Discharge at Kidatu, Swero and Steigler's Gorge***



Source: WREM (2012), Vol. II

Figure 2.7 *Daily Streamflow at Four Stations in the Rufiji Basin*



Source: WREM, 2012

The sub-basin flow data are discussed further in the following sections (including those for the Kilombero at Swero, where there appears to be a sudden shift in flow conditions pre and post 1970 that is likely due to data errors). However, the figure shows that although these are some of the best monitoring stations in the basin, their data records are characterised by many data gaps, obvious discrepancies (as in the post-1969 period at Swero), and inconsistent temporal coverage. These deficiencies limit the usefulness of the data records for hydrological analysis (WREM, 2012).

Despite these data issues, the graphs do show the distinct seasonality of the flows and their high annual and inter-annual variability. In particular, the observed records at Stiegler's Gorge indicate that the long term annual mean discharge varies from 20 to 25 billion cubic metres (bcm) per year. However, the actual annual flow volume can fall as low as 10 bcm (a 50% reduction over the mean), or rise to 60 bcm (a 180% increase over the mean).

Water Quality

Table 2.2 summarises water quality data for the Rufiji Basin as a whole based on the records of the Rufiji Basin Water Quality and Environmental Laboratory (WQEL) from 2000 to 2011. The data allow the following generalisations (*Box 1.1*).

Box 1.1 Water Quality Characteristics of Rufiji Basin

- In general, the water resources of Rufiji Basin, both surface and groundwater, have relatively good chemical quality and poor physical and bacteriological quality.
- Surface waters have generally poorer physical quality than ground waters. The common physical quality problems are turbidity, colour, total suspended solids, and odour.
- Both surface and ground waters are contaminated with micro-organisms of faecal origin. Surface waters have a higher occurrence of faecal contamination, and higher numbers of faecal coliform organisms per unit volume, than ground waters.
- With respect to mineral content, both surface and ground waters are relatively fresh, with the larger proportion of waters having low concentrations of dissolved substances. Surface waters are relatively more fresh and softer than ground waters. Despite the lowly mineralized character of most waters, there are pockets of highly mineralized waters in the basin, especially in Great Ruaha and Lower Rufiji sub-basins.
- Notwithstanding the above, chemical quality problems do occur in some waters. The key problem parameters in relation to chemical quality, which are more common in ground waters than surface waters, are acidic and alkaline reaction, hardness, and relatively high concentrations of sodium, chlorides and sulphates.
- There is great variability in the degree of acidity or alkalinity of the waters (measured as pH), which ranges from 5.2 to 9.0 units in surface waters and 4.3 to 10.7 units in ground waters.
- Based on the above characteristics, the waters of the basin, both surface and ground, generally only require minor treatment (to remove colour, turbidity, and micro-organisms) to be fit for human consumption and other uses.
- There is strong seasonality in water quality in both surface and ground waters. In the wet season, turbidity, colour and bacteriological contamination problems increase while the chemical content gets diluted by rainwater. The opposite trend is observed in the dry season.

Source: WREM, 2012

Table 2.2 Summary of WQEL Water Quality Data for Rufiji Basin

Parameter	Units	Surface Water						Groundwater					
		No. samples	Range	Mean	25%ile	75%ile	Non-compliant	No. samples	Range	Mean	25%ile	75%ile	Non-compliant
Turbidity	NTU	359	0-945	41	4	35	29.5%	342	0-800	26	0	13	19.9%
pH	Units	368	5.2-9.0	7.07	6.60	7.50	16.8%	361	4.4-10.8	6.9	6.5	7.2	224.7%
Conductivity	µS/cm	371	5-1740	111	28	105	0.0%	367	7-7960	466	46	391	0.0%
Total Hardness	mg $CaCO_3$/l	319	0-283	25	11	26	0.0%	335	2-2025	103	10	68	5.1%
Na	mg/l	236	0.01-260	11.11	0.96	9.20	0.4%	217	0-1091	56.6	2.8	53.0	6.5%
K	mg/l	316	0-172	5.97	1.50	3.20	3.2%	295	0-163	10.1	2.0	6.3	5.8%
Ca	mg/l	325	0-62.8	4.77	1.60	4.40	0.0%	333	0-587	25.3	1.6	13.2	6.6%
Mg	mg/l	278	0-103	3.56	1.21	3.89	0.0%	251	0-236	12.6	1.2	7.4	0.0%
Mn	mg/l	295	0-5.6	0.25	0.00	0.30	8.5%	338	0-5.8	0.2	0.0	0.1	5.9%
Total Fe	mg/l	268	0-3	0.37	0.03	0.59	8.6%	329	0-1.7	0.1	0.0	0.1	1.2%
HCO_3	mg/l	319	2-688	45.1	14.6	48.8	0.0%	331	0-2419	137.7	22.0	183.0	0.0%
SO_4	mg/l	310	0-470	8.4	0.0	7.0	0.0%	336	0-1296	26.7	1.0	9.0	1.8%
Cl	mg/l	305	0-249	8.3	3.3	8.5	0.0%	333	0-1843	66.3	3.5	31.9	0.0%
F	mg/l	296	0-1.8	0.19	0.00	0.30	0.0%	324	0-5.7	0.4	1.0	0.7	0.9%
NO_3	mg/l	310	0-27.5	1.28	0.20	1.58	0.0%	328	0-154	3.57	0.50	2.80	0.3%
NO_2	mg/l	292	0-0.65	0.02	0.00	0.01	0.0%	295	0-0.56	0.00	0.00	0.00	0.0%
PO_4	mg/l	21	0-0.42	0.107	0.050	0.120	0.0%	46	0-2.250	0.392	0.103	0.648	0.0%
Coliforms	cfu/100 ml	104	0-585	89	6	144	68.3	49	0-320	39	3	28	44.9%

Source: WREM, 2012

Note: Compliance (an indication of suitability) is with respect to the Tanzanian national standards for drinking water quality

2.2.4 Lower Rufiji Sub-Basin

The Rufiji cluster lies within the Lower Rufiji Sub-Basin in eastern Tanzania (*Figure 5.4*). The sub-basin has an area of approximately 32,600 km² (18% of the total Rufiji Basin area) and provides approximately 5% of the average annual runoff from the Rufiji Basin, which equates to 1,100 Mm^3/year (WREM, 2012). It has abundant surface water resources, and comprises all five wetland types: riverine, palustrine, lacustrine, estuarine, and marine.

The Lower Rufiji's climate is hot and humid. Mean annual rainfall varies spatially from 600 mm to 1,200 mm and the region experiences two rainy seasons: the 'short rains' from November to January, and the 'long rains' from March to May. The wettest months are March and April and the driest months are June to October. The potential evaporation in the Lower Rufiji is estimated to range from 1400 to 2000 mm per annum (WREM, 2012).

The sub-basin encompasses the area below Stiegler's Gorge and includes the Rufiji floodplain and Delta. The Rufiji floodplain is approximately 150 km wide, and during flooding the river leaves its channel and forms meanders and ox-bow lakes. The floodplain has 10 permanent riverine lakes (the Tagalala Lakes) and supports a variety of natural vegetation including grasslands, forests, swamps, and woodlands. The river spreads into several 'distributaries' downstream of the longitudinal line between Kikale (north) and Mohoro (South) and then flows through the Delta mangrove wetland into the Indian Ocean. There are nine major distributaries within the Delta; the northern ones are currently experiencing increasing flows while flow in the southern distributaries is decreasing.

As shown in *Figure 2.6* and *Figure 2.7* there is a distinctly seasonal flow pattern in the Lower Rufiji River, with high annual and inter-annual variability. The average annual flow at Stiegler's Gorge (from 1972 to 2005) was 20.6 billion cubic metres (bcm), with the driest year yielding only 10.0 bcm (a 50% reduction below the average flow volume), and the wettest 58.2 bcm (a 180% increase over the average). However, as noted earlier the flow gauging data records throughout the Rufiji Basin are characterised by gaps and inconsistencies and there is some uncertainty about these values (see below for discussion with respect to the Kilombero River).

The Rufiji floodplain and its delta is inhabited by approximately 200,000 people who live by small scale farming and fishing. The Lower Rufiji Sub-Basin also supports significant agricultural activities. It is reported that about 114,000 ha are suitable for irrigation in the sub-basin, of which about 57,000 ha are highly suitable for agriculture, especially rice production (WREM, 2012). *Table 2.3* lists a number of plans for irrigation development in the sub-basin, several of which are at a fairly advanced stage.

Water Quality

There were insufficient data within the Rufiji Basin WQEL records to characterise the water quality of the Lower Rufiji sub-basin. However, it is unlikely that the conditions will differ markedly from the general Rufiji Basin characteristics described in 2.3.

Table 2.3 Irrigation Potential in the Lower Rufiji Sub-Basin

No.	Scheme	Potential (ha)	Crop	Status
1.	KORECA-RUBADA	15,000	Paddy	Feasibility study conducted
2.	Vital Grain (Mholo/Nyamwange	7,000	Sugarcane	
3.	CAS	7,000	Sorghum	
4.	Bungu	5,000	Cassava	
5.	Kilimani	4,000	Maize	
6.	Nyamweke	300		Smallholder under ASDP (feasibility has been done)
7.	Segeni	120		Smallholder; feasibility has been done

No.	Scheme	Potential (ha)	Crop	Status
8.	Nyakitope Lugongwe	300		Smallholder; feasibility has been done
9.	Siasa	3,000		Smallholder; feasibility has been done
10.	Ruwe	2,500		Smallholder; feasibility has been done
11.	Ngorongo	200		Smallholder; feasibility has been done
12.	Namatipo	100		Smallholder; feasibility has been done

Source: WREM, 2012

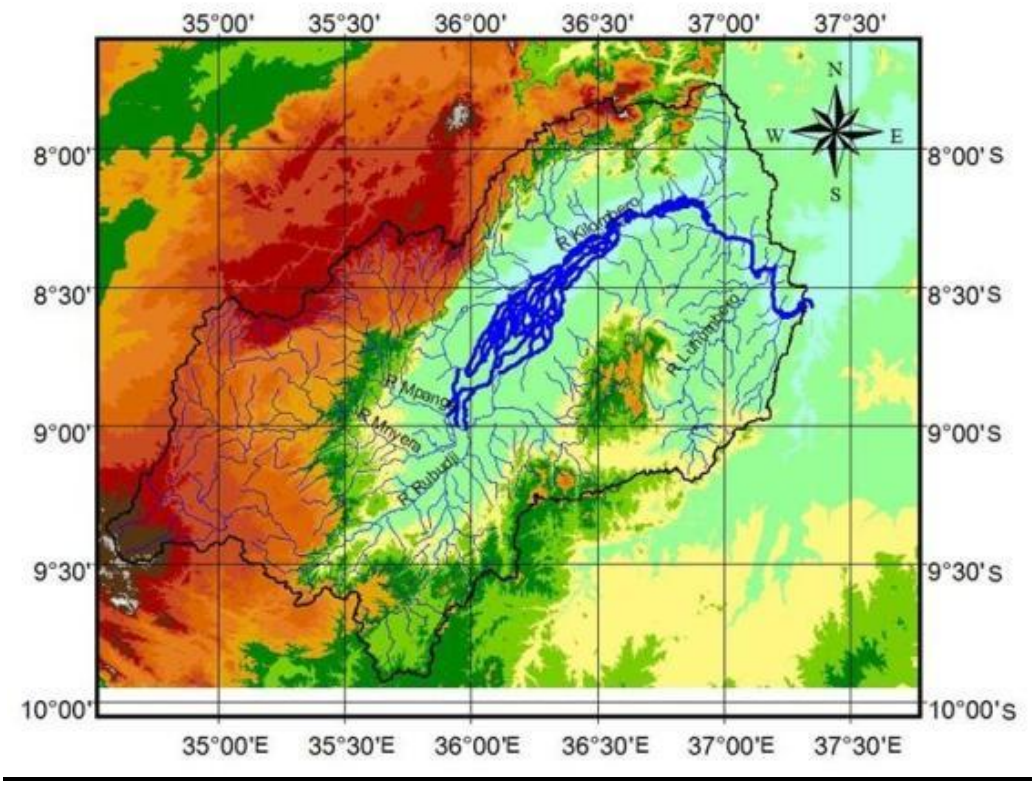
2.2.5 *Kilombero Valley*

The Kilombero cluster lies within the Kilombero Sub-Basin in south-central Tanzania (*Figure 5.4*). The sub-basin has an area of approximately 40,330 km^2 (22% of the total Rufiji Basin area) and provides some 62% of the average annual runoff from the Rufiji Basin, which equates to 13,800 Mm^3/year (WREM, 2012).

The climate in the Kilombero sub-basin is highly variable between the highlands and the lowlands, and is hot and humid in the valley. Mean annual rainfall varies from 1,100 mm to 2,100 mm. The highest rainfall (1,500 – 2,100 mm) occurs in eastern Mahenge and the Central Udzungwa Mountains (which are drained by the Mpanga and Kihansi Rivers) and the low altitude southwest plains. The Kilombero plains receive about 1,200 to 1,400 mm of rainfall annually. The largest part of annual rainfall (80-90%) occurs during the rainy season between December and April, while the period from June through September is relatively dry with typical monthly amounts below 10 mm, except in the Udzungwa Mountains (WREM, 2012).

The river network in the Kilombero Sub-Basin consists of the main Kilombero River, which is formed at Kikowe where its two major tributaries, the Ruhudji and Mnyera Rivers meet (*Figure 2.8*). The Ruhudji originates from the Lupembe Escarpment and the Njombe Highlands, drains part of the south Udzungwa and east Livingstone Mountains, and has no major tributaries. The Mnyera River drains the western part of the Mufindi escarpment. The Mpanga River drains the central Udzungwa and joins the Kilombero River just downstream of the Ruhudji-Mnyera confluence.

Figure 2.8 *Kilombero River System*



Source: WREM, 2012

The swamps, lakes, and the seasonally inundated flood plains in the Kilombero Sub-Basin comprise one of the largest freshwater wetlands in East Africa, covering an area of approximately 260 km by 52 km, that is also a designated Ramsar Site (Ramsar Bulletin Board, 2002). Many large, medium, and small rivers in the sub-basin are perennial, while a few small rivers are seasonal and flow only during the rainy season. Within the Kilombero floodplain and wetland, the main river gives way to a braided and meandering system of smaller channels and ponds (*Figure 2.8*). There is also a manmade lake, the Kihansi Reservoir, which has a 25 m high dam and an installed hydropower capacity of 180 MW, with a total turbine discharge capacity of approximately 25 m^3/s.

Streamflow in the Kilombero sub-basin has been monitored at 32 river gauging stations a various times. The river network was originally established in the mid-1950s, although it fell into disrepair in many places during the 1970s and 1980s and has only begun to be reinstated since the early 2000s. The Kihansi catchment in particular has a dense river gauging network consisting of 12 stations. Of these, eight are directly operated by TANESCO, one is operated jointly by TANESCO and RBWO, and the other three are operated by the Rufiji Basin Water Office (RBWO).

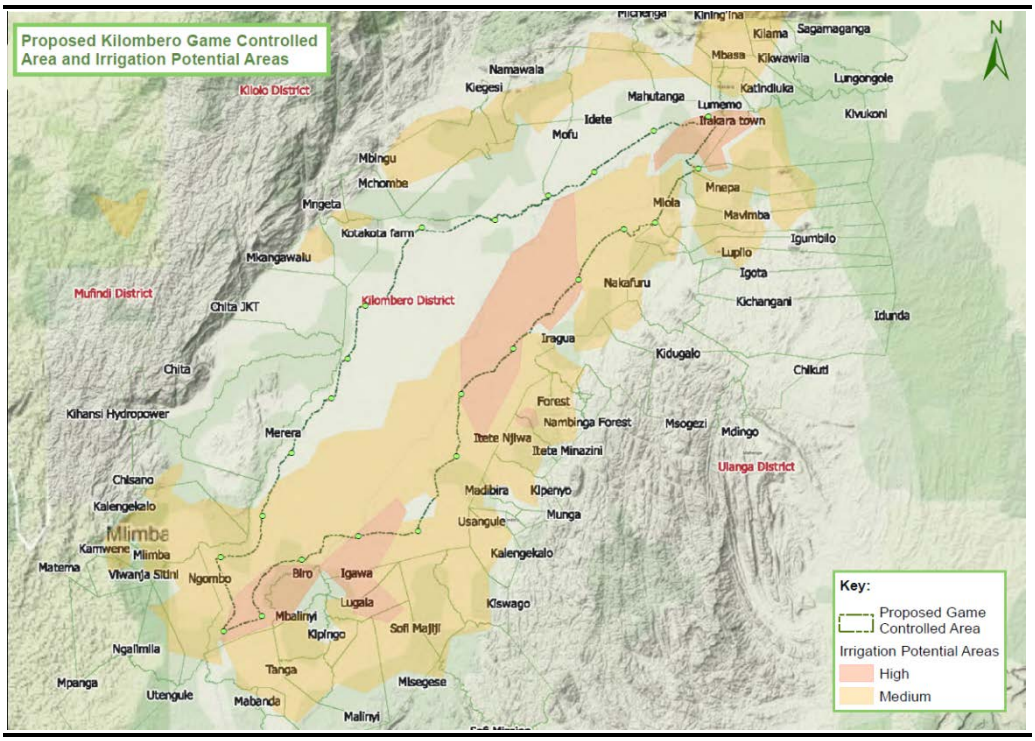
As shown in *Figure 2.7*, like the Rufiji Basin as a whole, the flows in the Kilombero River are markedly seasonal; the highest monthly flows (averaging around 1,400 m3/s, based upon the entire record) are expected in April and May, and the lowest (averaging around 200 m^3/s, again based upon the entire record) are in October and November (note, the seasonal flow pattern of Kilombero is slightly shifted relative to the Great Ruaha as a result of the delayed onset of the rainy season in the Kilombero Valley). There is also a marked inter-annual variability in flows.

It is important to note that these absolute flow statistics, taken from the records at Swero (RBWB station 1KB17), are extremely dubious. The problem can be seen very clearly in *Figure 2.7* where the peak flows at Swero drop dramatically between 1969 and 1971. Closer inspection of the flow records of this station pre- and post-1970 indicates that there are unit

conversion errors in the earlier data that have led to substantial overestimates of flows in the Kilombero River. If only the RWRB records from 1970 onwards are analysed (1970-1981 data are available), the *annual* mean daily flow at Swero is 85 m^3/s, compared to a *dry season* average of 200 m^3/s calculated previously, and the 95 percentile flow (i.e. the flow that is equalled or exceeded 95% of the time) is 32 m^3/s. Although these flow statistics are based upon a relatively short record (1970-1981), nevertheless they indicate that the long-term water yield in the Kilombero Valley (from surface water) is relatively low in comparison to the likely water demands due to future expansion of irrigation (see below), and much lower than previously understood[1].

With regard to water users, although fishing and livestock rearing have traditionally been the primary economic activities in the sub-basin, agriculture (especially rice farming) is rapidly expanding and irrigation water use by far surpasses all other uses in volumetric terms. Estimates of potential irrigable area in the Kilombero Sub-Basin total some 330,000 ha (RUBADA, 2011). *Figure 2.9* shows the distribution of this area across the sub-basin, and *Table 2.3* details the existing and planned irrigation schemes, including the 43,000 ha planned for fast-track implementation with USAID sponsorship (*Figure 2.10*). It is critical to note that development of all of this land for irrigation even without the USAID schemes would require an estimated average daily water supply of approximately 180 m^3/s, which far exceeds the mean daily flow in the Kilombero river as calculated using the post 1970 record (above). It should also be noted that the areas with highest irrigation potential (green in *Figure 5.9*) are in the centre of the Kilombero Game Controlled Area and Kilombero Valley Ramsar Site.

Figure 2.9 ***Potential Irrigable Areas in Kilombero Sub-Basin***



Source: WREM, 2012, adapted from National Irrigation Master Plan

Table 2.3 ***Current and Planned Irrigation Development in the Kilombero Sub-Basin***

No.	Scheme	Potential (ha)	Developed (ha)	Product	Remarks
1.	Mngeta Farm	5,780	5,780	Paddy	Now Kilombero Holdings
2.	Kihansi Farm	5,100		Rice	
3.	Ngalimira	5,000			

[1] During this period of record (1970-1981), the instantaneous minimum flow recorded was 25.70 m^3/s and the maximum 513.00 m^3/s.

No.	Scheme	Potential (ha)	Developed (ha)	Product	Remarks
4.	Ngohelanga	5,000		Rice	
5.	Kilombero Sugar Company	7,000	7,000	Sugarcane	
6.	Idete Prison	6,000	6,000	Rice	Irrigation status uncertain
7.	Mofu Farm	500		Rice	
8.	Mbingu Farm	3,000	3,000	Rice	
9.	Udagaji	1,935			Sponsored by USAID
10.	Mgugwe	2,270			Sponsored by USAID
11.	Kisegese	7,298			Sponsored by USAID
12.	Mpanga-ngalimila	31,500			Sponsored by USAID; may include Ngalimira (No. 3)
	Total	123,383	16,000		

Note: KVTC (28,000 ha) and the Escarpment Forest Company (15,000 ha) also have irrigation rights, but only water their nurseries (a few ha).
Source: adapted from WREM, 2012, with additions

Figure 2.10 Location of Planned USAID Irrigation Schemes in Kilombero District

Source: WREM 2012

Water Quality

Table 2.5 summarises the surface water quality data for the Kilombero sub-basin based upon the aforementioned Rufiji Basin WQEL records (WREM, 2012). The data are consistent with the earlier generalisations for the Rufiji Basin as a whole (*Box 1.1*), in particular that the surface waters generally have poor physical and bacteriological quality, but good chemical quality. As discussed previously, the former is primarily due to contamination from sources such as domestic washing, sewage and livestock, and impacts due to human activities such as

deforestation, intensive cultivation and agro-processing (eg sugar refining). Also of note is that the rivers in the Kilombero sub-basin have a mildly acidic character in comparison to those of the Rufiji Basin as a whole, and in particular the Great Ruaha sub-basin (as discussed in the next section). The Kilombero sub-basin rivers are also less mineralised. These differences are probably linked to the amount of rainfall and extent of weathering in the two sub-basins, with weathering in the Kilombero sub-basin being more advanced than in the Great Ruaha sub-basin (WREM, 2012).

Table 2.5 ***Water Quality in Kilombero Sub-basin***

Parameter	Units	No. samples	Range	Mean	25%ile	75%ile	Non-compliant
Turbidity	NTU	58	0-186	43	9	69	48.3%
pH	Units	59	5.9-7.9	6.9	6.6	7.1	3.4%
Conductivity	µS/cm	59	15-266	57	26	65	0.0%
Total Hardness	mg $CaCO_3$/l	59	0.6-89	2.1	13	23	0.0%
Na	mg/l	40	0.1-34.9	4.1	1.1	4.0	0.0%
K	mg/l	59	0.1-17.5	3.9	1.5	5.3	0.0%
Ca	mg/l	59	0.4-15.6	3.4	1.2	4.0	0.0%
Mg	mg/l	59	0.1-12.2	3.1	1.7	3.8	0.0%
Total Fe	mg/l	28	0-0.9	0.3	0.0	0.5	0.0%
HCO_3	mg/l	59	4.9-119.6	33.6	18.3	41.5	0.0%
SO_4	mg/l	47	0-14	2.2	0.1	3.0	0.0%
Cl	mg/l	48	0.4-10.6	5.2	4.3	7.1	0.0%
F	mg/l	47	0-1	0.1	0.0	0.2	0.0%
NO_2	mg/l	48	0-4.9	0.80	0.20	0.73	0.0%
Faecal coliforms	cfu/100 ml	-	-	-	-	-	-

Notes: Compliance (an indication of suitability) is with respect to the Tanzanian national standards for drinking water quality Based on data for Ruhudji River, Kihansi River, Kilombero River, Mchilipa River, Kiberege River, Sanje River, Sanjo River, Itete River, Lumemo River *Source*: WREM, 2012

2.2.6 Great Ruaha Sub-basin

The Mbarali and Ihemi clusters lie within the Great Ruaha Sub-Basin in Central Tanzania (*Figure 2.5*). The Mbarali Cluster is located in the Usangu Plains, where the Great Ruaha emanates from the highlands (the Poroto, Kipengere, and Mbeya Mountains) and flows through a wetland system, the Usangu (or Utengele) Wetland, before flowing through Ruaha National Park (RNP) to the Mtera reservoir and power plants at Mtera and Kidatu. The Ihemi Cluster is primarily located in the Little Ruaha River catchment, a tributary that joins the Great Ruaha just as it leaves the RNP. The sub-basin has an area of approximately 85,550 km^2 (some 46% of the total Rufiji Basin area) and provides approximately 15% of the average annual runoff from the Rufiji Basin, which equates to 3,300 Mm^3/year (WREM, 2012).

The Great Ruaha Sub-Basin is situated within a semi-arid belt which runs from north to south through the central portion of Tanzania. The mean annual rainfall in the sub-basin ranges from 400 mm to 1,200 mm. Rainfall increases southwards and on the slopes of the Udzungwa and Kipengere range. The sub-basin experiences a unimodal rainfall regime characterised by a single rainy season usually extending from late November to early-mid May. The dry season occurs earlier in the Great Ruaha than in Kilombero. The rainfall variability is high, and precipitation is often in the form of heavy showers causing rapid surface runoff and a sudden spate in seasonal streams and rivers. The climate is characterised by low humidity. Annual potential evaporation is highly variable, estimated to range from 1,200 mm in the south to 2,000 mm in the north (in December and January) (WREM, 2012).
There are two large manmade lakes in the Great Ruaha Sub-Basin. These largely regulate the hydrological regime of the river downstream: the Mtera and Kidatu Reservoirs, both of which

were constructed in the 1970s. Mtera is the larger of the two and was built to store water for hydropower production at both Mtera (80 MW) and Kidatu (200 MW). It has a 50 m high dam with live storage of 3.2 bcm, corresponding to about 90% of the long term mean annual natural flow at that location. This storage capacity is critical during low flows, providing the means to sustain the riverine flora and fauna and to support power generation at the Kidatu power station downstream. The importance of the Mtera-Kidatu system became abundantly clear in the early 1990s when the system storage was critically depleted causing a substantial reduction in industrial output and severe impacts on the Tanzanian economy (Ministry of Water, 1999). The turbine discharge capacity at Mtera is 96 m^3/s, and at Kidatu 140 m^3/s.

Upstream of the hydropower plants the river is heavily used for irrigation. Farming in the Great Ruaha is concentrated in the southern Usangu Plains (where the Mbarali Cluster is located) and involve cultivation of maize, beans, rice, and vegetables, with the former two crops grown mostly under rainfed conditions, and the latter under irrigation. Paddy rice is the predominant irrigated crop; a core area of 15,000 to 20,000 ha can be irrigated every year, which can expand to a maximum of about 40,000 to 55,000 ha depending on water availability.

With the exception of a few large farming ventures, most farmers use surface irrigation, the efficiency of which is low (15 to 20%). These practices combined with the continued expansion of irrigated land since the early 1990s have led to high water losses and noticeable river flow reductions in the central Usangu Plains, the flow in the Great Ruaha through Ruaha National Park(1), and the inflow to the Mtera reservoir. Specifically, the flow of many once perennial Usangu rivers now completely ceases for most of the period from September to January. This is most prominently observed at Msembe gauging station that is located just downstream of the Usangu area, and where flow has been monitored (intermittently) from 1964 to the present.

Figure 2.11 presents the Msembe data in annual and seasonal time steps, with the seasonal values averaged over the wet and dry season months (respectively December to May, and June to November). All plots show evidence of flow alteration post 1990, but the flow alteration during the dry season (bottom graph) is dramatic, reaching more than 50% of the pre-1990 conditions (WREM, 2012).

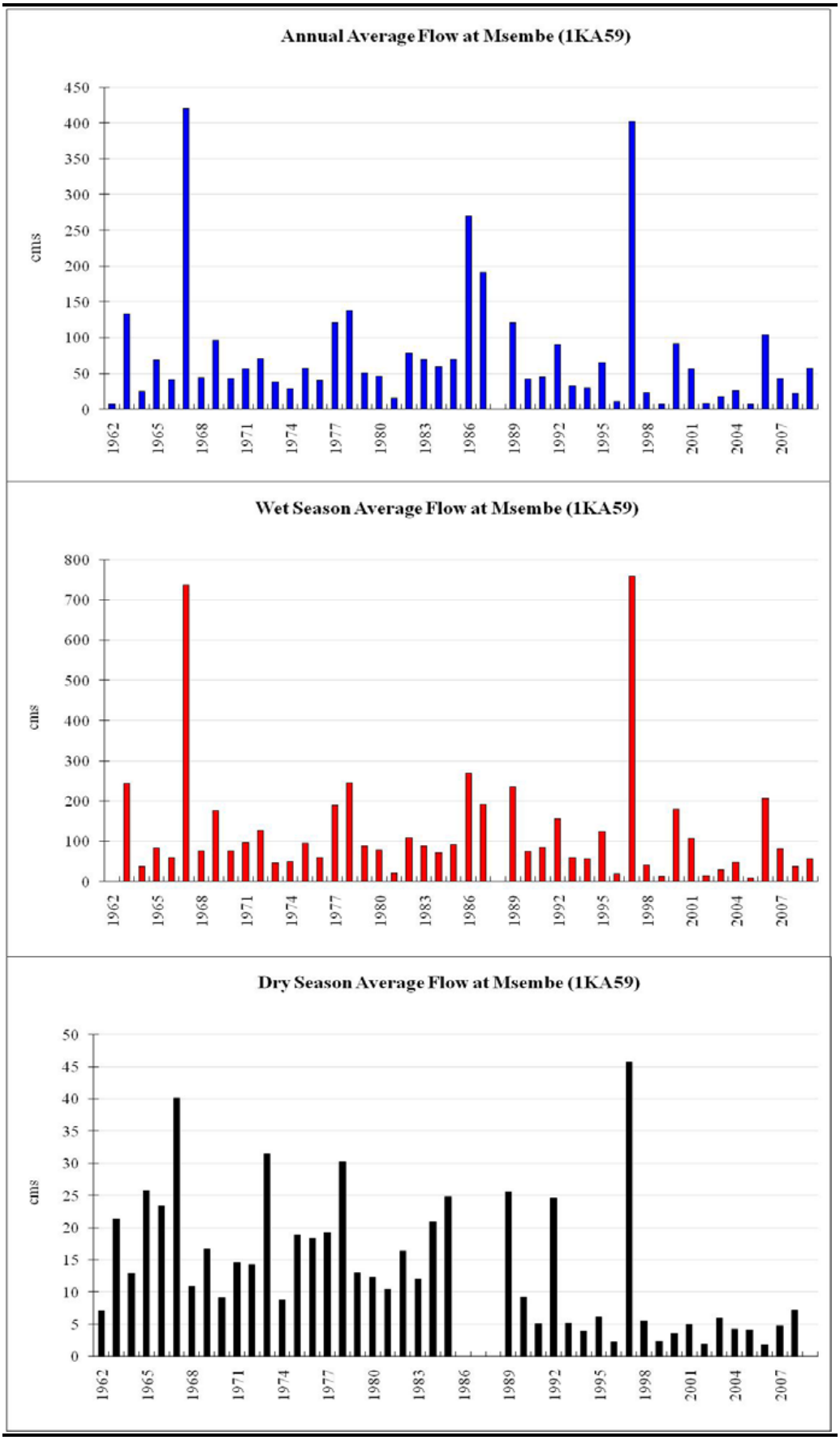
In addition to agriculture, the Usangu Plains are also an important pastoral area with livestock numbers in the hundreds of thousands and goats, sheep, and donkeys in the tens of thousands. During the dry season, water is scarce on the central Usangu Plains, and pastoralists migrate to graze their herds to the only permanent water source, the Utengule-Ihefu wetland, compounding the water resources depletion issue described above (WREM, 2012).

Water Quality

Table 2.6 summarises the surface water quality data for the Great Ruaha sub-basin based upon the aforementioned Rufiji Basin WQEL records (WREM, 2012). The data are consistent with the generalisations for the Rufiji Basin as a whole (*Figure 5.5*), and indicate that the surface waters generally have poor physical and bacteriological quality, but good chemical quality. In addition, the rivers in the Great Ruaha sub-basin are more alkaline and mineralised in character in comparison to those of the Rufiji Basin as a whole, and in particular the Kilombero sub-basin as discussed in the previous section, probably due to the relatively low rainfall and reduced extent of weathering in the sub-basin (WREM, 2012).

(1) (1) As graphically documented at http://www.suestolberger.com/river1.htm

Figure 2.11 Annual and Seasonal Flow at Msembe



Source: WREM, 2012

Table 2.4 Water Quality in Great Ruaha Sub-basin

Parameter	Units	No. samples	Range	Mean	25%ile	75%ile	Non-compliant
Turbidity	NTU	65	2-945	73	19	66	58.5%
pH	Units	65	6.2-8.8	7.5	7.2	7.7	3.1%
Conductivity	µS/cm	65	18-1228	197	56	227	0.0%
Total Hardness	mg CaCO3/l	53	6-223	38	18	42	0.0%
Na	mg/l	37	0.1-153	16.54	2.20	9.90	0.0%
K	mg/l	52	0.2-95	11.59	2.38	3.90	9.6%
Ca	mg/l	48	0.8-35.6	7.59	2.40	7.40	0.0%
Mg	mg/l	46	0.2-16.5	4.33	1.94	4.83	0.0%
Total Fe	mg/l	45	0-3	0.55	0.09	0.83	13.3%
HCO_3	mg/l	53	7.3-68.8	81.69	29.28	85.40	0.0%
SO_4	mg/l	50	0-110	15.3	3.0	15.8	0.0%
Cl	mg/l	49	0-66	10.3	5.6	10.6	0.0%
F	mg/l	49	0-1.3	0.24	0.00	0.41	0.0%
NO_2	mg/l	49	0-22.1	1.51	0.30	1.70	0.0%
Faecal coliforms	cfu/100 ml	26	0-410	115	25	151	84.6%

Notes: Compliance (an indication of suitability) is with respect to the Tanzanian national standards for drinking water quality. Based on data for GR River (at Mkupule, Msembe, Mtera dam), Ndembera River, Little Ruaha River, Mwega River, Chebi River, Lukosi River, Lyovi River, Mtitu River.
Source: WREM, 2012

2.2.7 *Lake Nyasa Basin*

The Ludewa cluster forms a large part of the Lake Nyasa drainage basin that lies within south-west Tanzania (*Figure 2.4*). The main water sources in the cluster are Lake Nyasa itself, and the Luhuhu River and its tributaries, the Kitewaka, Mchuchuma , Nkiwe and Lumbira. In addition, according to anecdotal information from the LNBWB there are several boreholes in Ludewa District, both in the upper plateau and in the Lake Nyasa lowlands, which is an indication of good groundwater potential. It has not been possible to find any flow data or information for any of these rivers or boreholes.

The main water uses in the region are for domestic, irrigation and fishing purposes, although the irrigation potential is understood to be relatively undeveloped at present. According to LNBWB sources, a total area of approximately 17,000 ha is planned for irrigation in the Lake Nyasa basin, although this is mainly in the Illeje, Kyela and Rungwe districts that lie to the north of the lake and away from the Ludewa Cluster. Approximately 2,700 ha are currently under, or planned for irrigation in the cluster itself, with an average total water demand of approximately 0.5 Mm/day. In addition, there are six licensed water supply permits in the cluster, including one village supply and three mines owned by the National Development Corporation. No abstraction data were available for these sites.

No water quality data could be found for this river basin.

2.2.8 *Lake Rukwa and Lake Tanganyika Basins*

The Sumbawanga cluster sits astride the watershed divide between the Lake Rukwa and Lake Tanganyika drainage basins. The main water sources in the cluster are the two lakes themselves, and their feeder rivers and streams that lie within the cluster boundaries. The latter include the Muze, Nzovwe, Momba, Lwiche and Mfwizi rivers which drain into Lake Rukwa, and another Lwiche River that drains into Lake Tanganyika. It has not been possible to find any flow data for any of these rivers.

The main water uses in the region are for domestic, irrigation and fishing purposes, with irrigated agriculture being main user. According to Lake Rukwa BWB sources, an average of approximately 1.3 Mm^3/day of water is abstracted from springs and rivers in the Rukwa

Region to irrigate a total area of some 7,700 ha. Most of the irrigation takes place in the Kafufu sub-basin in the Mpanda district to the north of Sumbawamba Cluster. However, there are several schemes situated within the cluster itself, including rice production, which account for approximately 20% of the regional abstraction (0.26 Mm^3/day). By comparison, the licensed potable village water supply abstractions in the cluster are approximately 0.01 Mm^3/day, i.e. an order of magnitude less than for irrigation.

No water quality data could be found for these two river basins.

2.3 *ECOSYSTEMS*

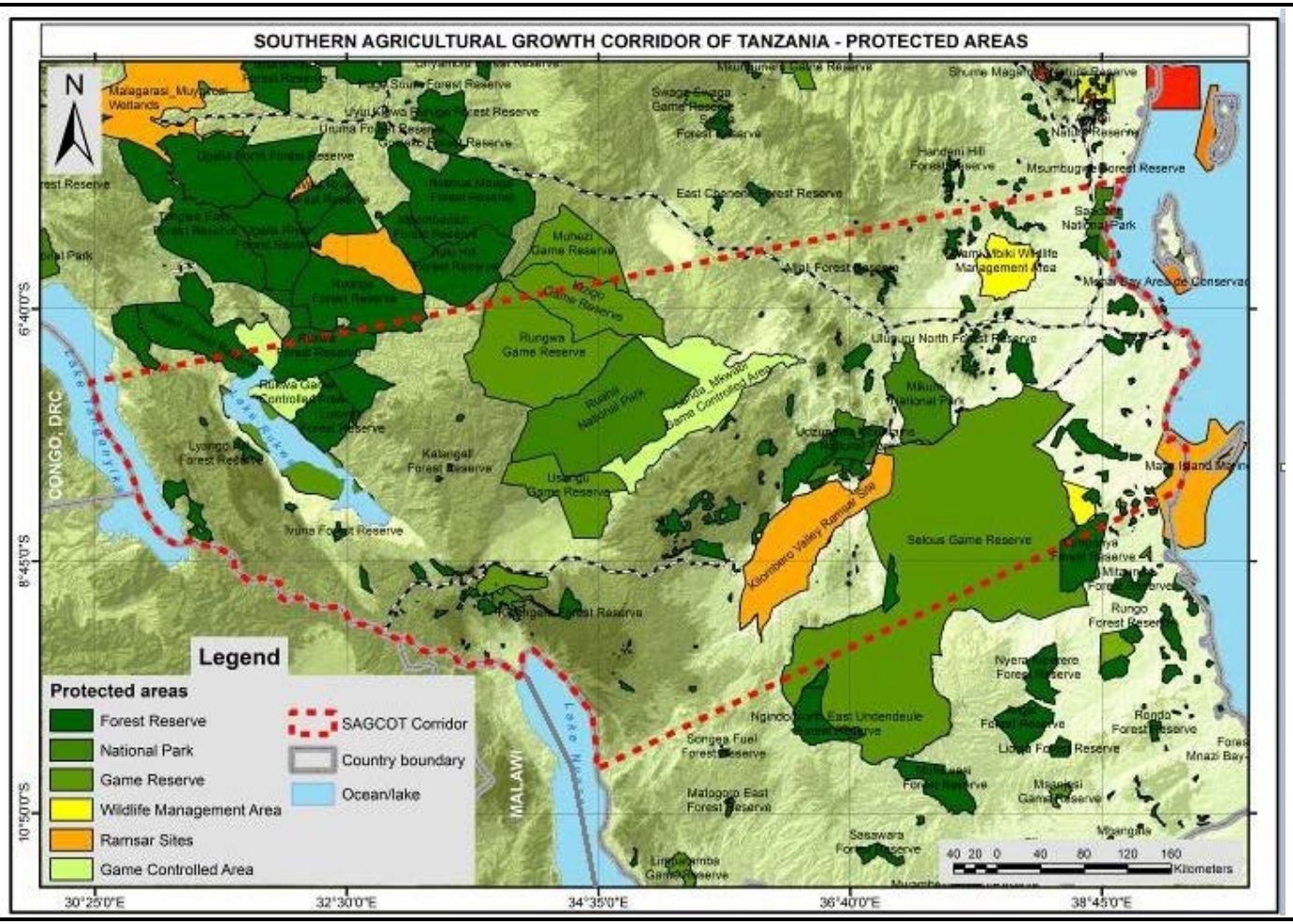
The SAGCOT area contains some of Tanzania's most important and ecologically diverse landscapes and protected areas (*Figure 2.12*) and encompasses four of Tanzania's nine major river basins (see *Section 2.2*). The following sections describe the six main ecoregions where the SAGCOT clusters are located, as follows:

- the Rufiji Floodplain (and Delta), which contains the Rufiji cluster;
- the Eastern Arc Mountains, which contain the Dakawa cluster;
- the Kilombero River Valley, which contains the Kilombero cluster;
- the Ruaha River System, which contains the Mbarali and Ihemi clusters;
- the Lake Katavi-Rukwa-Lukwati Landscape, which contains the Sumbawanga cluster; and
- the Southern Highlands, which contain the Ludewa cluster.

2.3.1 *The Rufiji Floodplain*

The Rufiji floodplain extends to some 1,400 km^2, of which mangrove forests cover 550 km^2 (MoW, 2012; MNRT, 2004). The Rufiji Delta is characterised by the following habitats: estuary; inshore and intertidal (45%); swamp and marsh (0.6%); floodplain grassland (14%); bushland, thicket, woodland and forest (12%); mangrove forest (24%); mixed cropping (3%); cultivation with tree crops (2%); and settlements (0.1%) (MoW, 2012).

Figure 2.12 Protected Areas in SAGCOT Corridor



Note: International border shown for Lake Malawi is the median boundary: this is not accepted by all riparian states.

The wetlands of the delta include important mangrove and seagrass communities, which act to reduce the amount of sediment transported from the Rufiji River onto inshore corals. The Rufiji mangroves are the most extensive and varied in eastern Africa, but the mangrove *Herriteria littoralis* is threatened by clear felling (MNRT, 2004; MoW, 2012). The Rufiji delta is home to five species of globally threatened turtles, two of which are nesting species (MNRT, 2004). The dugong (*Dugong dugon*) population has declined globally and is CITES-listed as "vulnerable to extinction" (MNRT, 2004); dugong habitat requirements and their slow rate of reproduction render them vulnerable to human activities, as they are threatened by hunting, fish net captures, pollution, and diseases (Muir *et al.*, 2003). The delta provides breeding grounds for prawns, shrimps, and fish. The Rufiji Delta is Tanzania's most important prawn producing area, accounting for about 80% of the national industrial catches of which over 90% of the prawns caught are exported (Richmond *et al.*, 2002). Current production from the Rufiji Delta is unknown but in 1981 the potential catch was estimated to be approximately 7,000 t/yr for prawns and 10,000 t/yr for fish (RUBADA, 1981). Conversion of mangroves to rice farms is a threat to this ecosystem, as is the use of pesticides for crop protection. Dynamite and poisons are known to be used in fishing operations in the Rufiji delta and its coastal environment (MNRT, 2004). The planned Stiegler's Gorge hydropower dam will affect the ecology of the Rufiji River downstream (Mwalyosi, 1988; Mwalyosi, 1993). A Ramsar Site has been established that covers the Rufiji Delta, Mafia Island Marine Park and the Kilwa coast (MNRT, 2004).

2.3.2 The Eastern Arc Mountains

Thirteen separate mountain blocks comprise the Eastern Arc (*Figure 2.13*), supporting around 3,300 km^2 of sub-montane, montane and upper montane forest, which represents less than 30% of the estimated original forest cover for the area (MNRT, 2005a; Burgess et al 2007). Most forest is found within nearly 150 Government Forest Reserves, with 106 of these fully protected for water catchment, biodiversity and soil conservation (Burgess et al, 2007). Eight of the 13 mountains in the Eastern Arc; namely the Nguu, Nguru, Uluguru, Ukaguru, Rubeho, Malundwe, Udzungwa, and Mahenge Highlands are in the SAGCOT area.

Figure 2.13 Eastern Arc Mountains

The Eastern Arc Mountains rank among the most important areas in the world for the conservation of endemic birds, endemic plants, and other taxonomic groups (Burgess *et al.*, 2007), and are considered to be amongst the world's top 25 biodiversity hotspots. At least 800 vascular plant species are endemic to the Eastern Arc, almost 10% of these being trees (MNRT, 2005a; Burgess *et al.*, 2007). The Eastern Arc is home to four endemic or near-endemic species of primates - the Sanje mangabey (*Cercocebus sanjei*), the Iringa red colobus (*Procolobus gordonorum*), the mountain galago (*Galagoides orinus*) and the newly discovered Kipunji monkey (*Rungwecebus kipunji*) – and most of the known species of African violet (*Saintpaulia* spp) (Burgess *et al*., 2007). Most Eastern Arc endemics are closed-forest specialists and comprise taxa with an ancient history and those of more recent origin, including some possessing ancient affinities with taxa from West Africa, Madagascar, and even South America and Southeast Asia (MNRT, 2005a).

Assessments of threats and conservation priority have shown that the Eastern Arc is amongst the most threatened regions both in Africa and globally, and one where the extinction risk to fauna and flora is intense and increasing (Burgess *et al*., 2007). A number of studies have concluded that the Ulugurus and Udzungwas are amongst the three most important blocks in the Eastern Arc (MNRT, 2005a). Two National Parks support Eastern Arc habitats in Tanzania: the first is Udzungwa Mountains National Park (1,900 km^2) which contains large areas of mountain forest and grassland; the second is Mikumi National Park (1,450 km^2) that includes a small area (4 km^2) of montane forest on Malundwe Hill (Burgess *et al*., 2007). There are three other areas of Eastern Arc forests gazetted as Nature Reserves, the Kilombero and Uluguru Nature Reserves which are managed by the government, and the private Nature

Reserve in the Mufindi Tea Estate in the Udzungwa Mountains (Burgess *et al.*, 2007; Doggart *et al.*, 2008; URT, 2010). The Mufindi escarpment on the north side of the Kilombero Valley contains the southernmost forests in the Eastern Arc Mountains. The Mufindi forests are home to 38 restricted range vertebrates, 5 of which are endemic and 10 of which are restricted range vertebrates in montane grasslands in unprotected village lands (Doggart *et al.*, 2008). The mosaic of forest and grasslands in Mufindi create the so-called Mngeta Corridor, linking northern and southern faunal assemblage in the Eastern Arc Mountains (Doggart *et al.*, 2008). Parts of the Udzungwa Mountains are an Important Bird Area. The grasslands in Idete contain the rare black African duck (*Anas sparsa*) and the African migrant blue swallow (*Hirundo atrocaerulea*), which is listed as vulnerable by IUCN (Doggart *et al.*, 2008; Green Resources Ltd., 2009).

2.3.3 The Kilombero Valley

The Kilombero Valley runs southwest to northeast, separating the Udzungwa Mountains with a steep fault scarp on the north side of the valley from the rolling hills and Mahenge Highlands to the south. The Kilombero Valley floodplain (where the cluster is situated) is a natural wetland ecosystem that is fed by several rivers, including the Ruhudji, Mnyera, and Pitu, which then divide into many channels in the central floodplain, making it one of the largest freshwater floodplains in East Africa. As a wetland ecosystem, it regulates the flow of the Rufiji River and is an important source of nutrients and sediment for downstream areas (MoW, 2012).

The valley is roughly divided into the seasonally flooded floodplain, the surrounding alluvial fans, and the surrounding hills. The elevation of valley floor is about 300 m above sea level. Land use and land cover types in the Kilombero Valley, based on Landsat Images taken in 1995 (MNRT, 2009), are noted in *Table 2.7*. Grassland constitutes 43.9% of the floodplain, particularly in the west, whilst swamp habitat is common near the river in the western and eastern reaches.

Table 2.5 Land Use and Cover Types in the Kilombero Valley Ramsar Site

Land Use/Cover	Area (km^2)	Proportion (%)
Bushland	531.1	5.1
Cultivated Land	727.4	6.9
Forest	843.0	8.0
Grassland	2,079.8	19.9
Inundated Bushland	1,499.8	14.3
Inundated Grassland	2,516.7	24.0
Inundated Woodland	75.7	0.7
Permanent Swamp	41.6	0.4
Urban Areas	1.0	0.0
Water	16.8	0.2
Woodland	2,140.0	20.4
	10,472.9	100.0

Source: MNRT, 2009

Habitats

The ecology of the Kilombero Valley reflects the hydrological gradient from the centre to the margins of the valley, creating a complex mosaic of habitats and plants supporting a wide range of birds and other animals. The Valley contains a diverse flora of around 350 species of plants, including both endemic and threatened species. Surveys have identified eight different sets of plant communities (Starkey *et al.*, 2002), described briefly in *Table 5.8*. The Kibasira Swamp remains wet even during the dry season, and vegetation in this area represents another community in the floodplain mosaic. Miombo woodland areas on the alluvial fans and low hills edging the floodplain provide habitats for a range of species as well as seasonal habitat when the valley floods (Starkey *et al.*, 2002). Plant communities in the

valley's swamps and gallery forests contain many unique and poorly-known species, but are increasingly heavily exploited by residents and incomers (Starkey *et al*., 2002).

Table 2.6 ***Plant Communities in the Kilombero Valley***

S/N	Plant community type	Vegetation characteristics
1	Papyrus Swamp	This area is dominated by *Cyperus papyrus*, and is almost permanently flooded.
2	Riverside	This community is found near open water and is flooded over in the wet season, being the last to dry out in dry season. No trees survive. The perennial grass *Phragmites mauritianus* dominates, occurring with annuals such as *Gisekia pharnaceoides*, *Zaleya pentandra.*
3	Low lying valley grassland	The perennial grass *Panicum fluviicola* is characteristic of the interior of the floodplain occurring with annual grass species such as *Oryza longistaminata*, *Eragrostis aethiopica* and *Echinochloa colona*. Prolonged flooding means that no trees can survive.
4	Tall grass	This community is dominated by the tall grasses *Sorghum verticilliflorum*, *Cymbopogon giganteus* and *Hyparrhenia collina*. It is not flooded as deeply as the low-lying valley. Trees such as *Kigelia africana*, *Acacia xanthophloea* and *Borassus aethiopum*, which are species that can withstand poor drainage, occur infrequently in scattered locations.
5	Marginal grassland	Grasses such as *Echinochloa colona*, *Paspalum scrobiculatum* and *Panicum coloratum* are common. This community occurs towards the margins of the flood plain and experiences shallow flooding in the wet season. It is heavily grazed and burned in the dry season resulting in bare ground. Shrubs such as *Grewia bicolor* and *Ziziphus mucronata* occur with occasional trees such as *Acacia xanthophloea.*
6	Marginal woodland	The grass layer contains species such as *Hyparrhenia colina*, *Echinochloa colona* and Digitaria ciliaris although this area is also heavily grazed and burned. Tree species such as *Tamarindus indica*, *Lonchocarpus eriocalyx*, *Senna singueana* and *Dalbergia melanoxylon* are characteristic of this community, as are the shrubs *Grewia bicolor*, *Fleuggea virosa* and *Harrisonia abyssinica*.
7	Combretaceous wooded grassland	This community is rarely flooded. *Combretum fragans* is dominant in the tree layer and other trees include *Piliostigma thonningii*, *Terminalia sericea* and *Vitex cuneata*. These trees are small and are not dense. The grass layer is well developed and is characterised by species such as *Hyparrhenia anamesa*, *Sorghastrum bipennatum* and *Heteropogon melanocarpus*.
8	Miombo woodland	The miombo woodland exists on higher ground. *Brachystegia spiciformis* is the dominant tree species, along with *Diplorhyncus condylocarpon*, *Afzalea quanzensis*, *Piliostigma thonningii*, *Uapaca kirkiana*, *Pterocarpus angolensis* and *Brachystegia bussei* are also found in this area.

Source: Adapted from Starkey *et al*., 2002 and MNRT, 2009

Wildlife

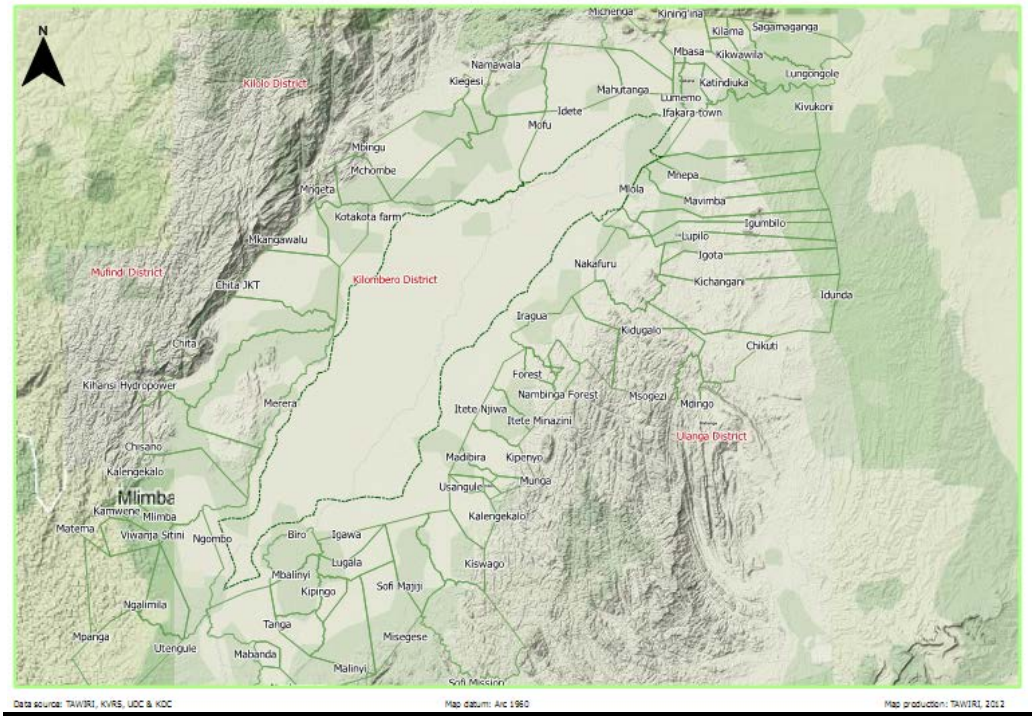
Information on wildlife in the valley can be found in a number of reports but in general the data are preliminary, scattered and incomplete (see in particular: Starkey *et al*., 2002; UDS, 2009).

The Kilombero Valley is home to at least 64 mammal species, 251 bird species, 51 reptiles, 26 amphibians and 81 butterfly species (MoW, 2012). Critically, the valley recently harboured some 75% of the world's population of the Near Threatened Puku antelope (*Kobus vardonii*). The valley is an Important Bird Area (IBA) with species such as the Kilombero weaver (*Ploceus burnieri*), Kilombero Cisticola and Melodious Cisticola (*Cisticola* sp. nov.), all endemic to the valley (MNRT, 2002a; MoW, 2012). Two other bird species found in the valley, the Olive-headed weaver (*Ploceus olivaceiceps*) and Pale-billed hornbill (*Tockus palliddirostris*), are near endemic to Tanzania (MNRT, 2002a; MoW, 2012). The valley is a stop-over for Palaearctic birds migrating from Europe to southern Africa (MNRT, 2002a; MoW, 2012). Few

surveys have been done to identify invertebrate species in the valley, with only limited studies on butterflies in a selected area. Likewise small mammals and other vertebrates have not been thoroughly surveyed (MNRT, 2009).

In April 2002, the Kilombero Valley Flood Plain Ramsar Site was designated and added to the list of Wetlands of International Importance. The Ramsar Site covers 7,967 km^2 with a catchment area of about 40,000 km^2 (MNRT, 2002a). Following extensive encroachment, revised boundaries for the Kilombero Game Controlled Area are currently being negotiated with communities using the floodplain (*Figure 2.14*).

Figure 2.14 Proposed New Kilombero GCA Boundaries



Source: TAWIRI, 2012

The Kilombero Valley wetlands are used by wildlife as dry season habitat, moving out to elevated land on the perimeter (formerly miombo woodland) during the wet season when the valley is flooded. Some permanent wetlands in the valley, such as Kibasila swamp, are key dry season habitats for wildlife (MNRT, 2009).

There are wildlife migration routes or corridors across the valley linking the Udzungwa National Park and the Selous Game Reserve while other routes are used by wildlife to move within the valley. Nearly all migration corridors are reported to be closed due to infrastructure development, encroachment and the establishment of plantations (MNRT, 2009a).

Poaching is a serious problem in the valley with special concern for species such as puku, hippo, crocodile and elephant. The lion population has been destroyed, at least in part through poisoning by livestock herders.

The most consistent monitoring of wildlife in Tanzania is the series of annual aerial counts by Tanzania Wildlife Research Institute (TAWIRI). Since 1994 TAWIRI has conducted aerial censuses in all protected areas providing standardized data of wildlife numbers, density, and distribution. Occasionally the counts also cover areas adjacent to protected areas with wildlife, human activity, and livestock data. Most research studies are conducted *ad hoc*, and not all have monitoring as a requirement. TANAPA has an ecological monitoring department in the Udzungwa National Park for conducting research and monitoring (MoW, 2011). Available data on key species in the Kilombero Valley are summarised in *Table 2.9*.

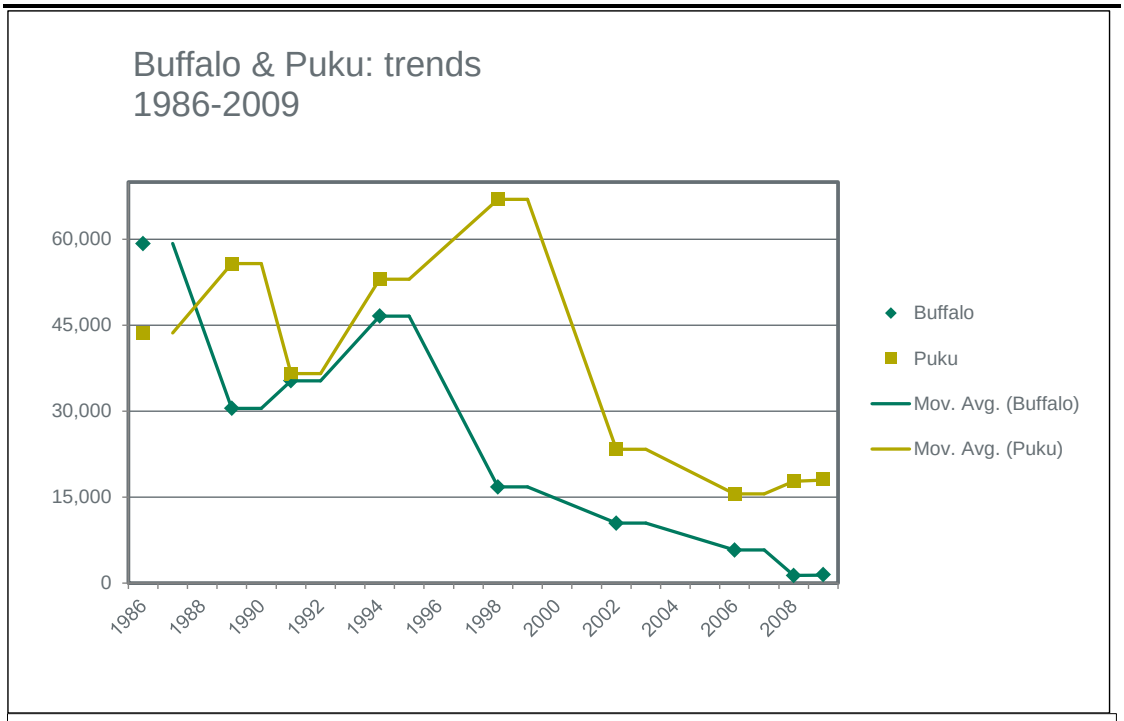
Table 2.7 ***Wildlife in Kilombero Valley: Composite Data 1976-2009***

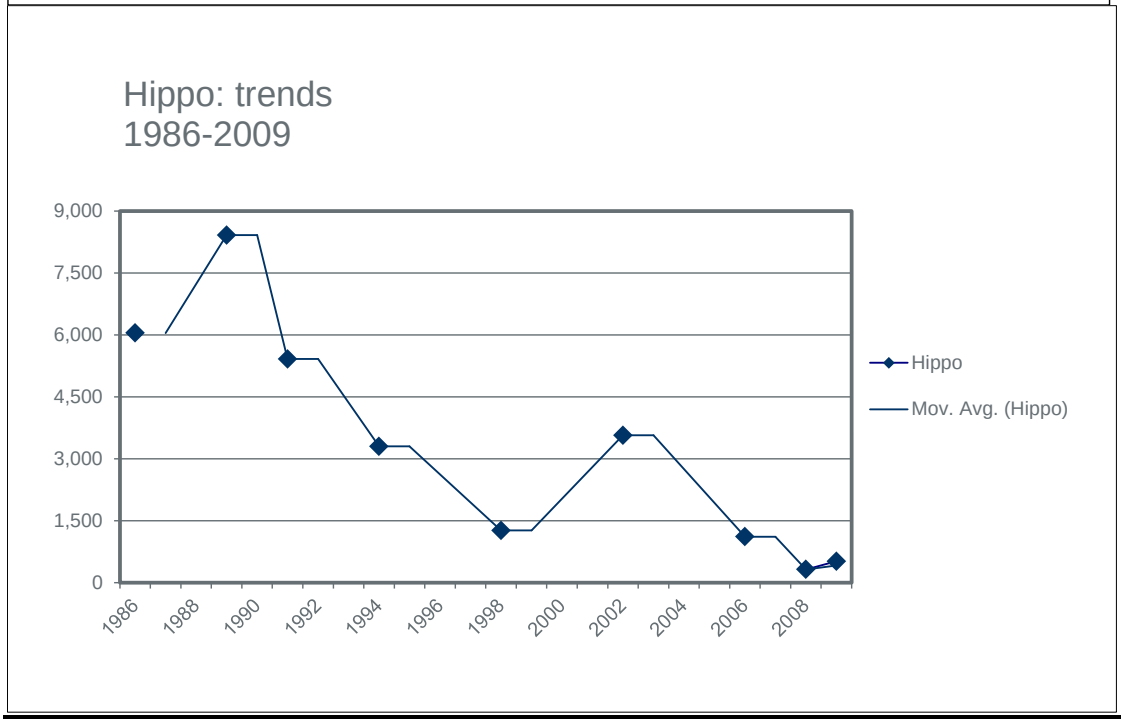
Year	1976	1986	1989	1991	1994	1998	2002	2006	2008	2009
Buffalo	39,380	59,260	30,494	35,301	46,607	16,778	10,449	5,769	1,314	1,462
Elephant	5,848	2,330	995	1,848	1,903	5,308	4,727	2,546	1,387	1,535
Hippo	4,442	6,044	8,414	5,413	3,297	1,262	3,566	1,111	317	514
Puku	26,427	43,670	55,760	36,560	53,020	66,964	23,358	15,546	17,754	18,161
Reedbuck	nd	nd	494	89	31	520	520	nd	7	52
Sable Antelope	1,292	1,127	nd	687	417	nd	nd	nd	7	4
Warthog	nd	nd	2,920	1,291	1,207	nd	235	nd	293	290
Zebra	6,107	1,919	976	716	569	631	nd	2,167	nd	nd

Sources: composite from inconsistent data in Tanzania Conservation Monitoring Centre/Frankfurt Zoological Society, quoted in Starkey *et al.*, 2002; TAWIRI (2008) quoted in WREM Int. (2012); TAWIRI (2002, 2006, 2008) quoted in UDS (2009); and TAWIRI (2011).
Notes: data are for dry season and refer to the GCA; error ranges not given; the data are inconsistent between sources; refer to the original sources for full data.

Although these counts are approximate and have major error ranges, when graphed they reveal dramatic crashes in population numbers over the last two decades (*Figure 2.15*). Of most concern is the puku since this marsh-dwelling antelope has an extremely restricted range and the Kilombero Valley population is critical to the survival of the species (MoW, 2012). The general trend for most species is that the populations are declining (MNRT, 2009), with at least 194 species at some level of threat in Kilombero valley, including mammals, birds, reptiles and amphibians. Amongst bird species the Kilombero weaver (*Ploceus burnieri*) is a globally threatened species while the Madagascar squacco heron (*Ardeola idae*), Stierling's woodpecker (*Dendropicos stierlingi*), the olive-headed weaver (*Ploceus olivaceiceps*), and Southern-banded snake eagle (*Circaetus fasciolatus*) are all Near Threatened (www.iucnredlist.org).

Figure 2.15 *Kilombero Valley: Wildlife Population Trends 1986 – 2009*





There are four commercial hunting concessions within the Kilombero Valley Game Controlled Area, but three have recently been abandoned due to the catastrophic decline in wildlife numbers as a result of encroachment by farmers and livestock.

Other Terrestrial Species

The gallery forests in the valley provide cold season habitats for montane and semi-montane bird species. Three bird species in particular are found in significant numbers, namely the African skimmer (*Rynchops flavirostris*), African openbilled Stork (*Anastomus lamelligerus*), and wattled plover (*Vanellus senegallus*). Large trees in the floodplain provide roosts for many waterbird species (Starkey *et al*., 2002). The valley is an Important Bird Area, harbouring the globally threatened Kilombero weaver (*Ploceus burnieri*), which is strictly endemic to the valley, and two other birds endemic to the valley, the Kilombero cisticola (*Cisticola* sp. nov.) and the melodious cisticola (*Cisticola* sp. nov.). A number of other threatened species,

including some endemic to Tanzania, are also found in the valley. The valley is a stop-over for Palaearctic migratory birds migrating from Europe to southern Africa.

The Magombera chameleon (*Kinyongia magomberae*) has recently been described from Magombera forest and the Udzungwa Mountains National Park. This is possibly endemic to the Kilombero Valley and the Eastern Arc Mountains. A toad endemic to the Kilombero Valley wetlands namely, *Amietopphryne reesi*, is known only from the confluence of the Kihansi and Kilombero rivers and the butterfly *Sallya pseudotrimeni*, found in the valley, is endemic to Tanzania (MNRT, 2009).

Fish and Fisheries

The Kilombero Valley is home to one of the most distinctive fish faunas amongst East African Rivers. In all, 37 fish species from 12 different genera have been found in the Kilombero River (MNRT, 2009). At least two species, *Alestes stuhlmannii*, and *Citharinus congicus*, are endemic, being confined to the Kilombero system where they have evolved (MNRT, 2002; MNRT, 2009a). The majority of the river's fish species are shared with the Zambezi River, other east coast rivers, and a few with the Congo basin (MNRT, 2009). Two fish species, *Distichodus petersii* and *Oreochromis pangani*, appear on the 2012 IUCN Red List as "vulnerable" and "critically endangered" respectively (www.iucnredlist.org).

The Rufiji basin is the only eastward flowing river system in Africa to have a *Citharinus* species (*C. congicus*), a genus otherwise confined to West African, westward flowing rivers (Bailey, 1969). The tigerfish, *Hydrocynus vittatus*, is found throughout the Rufiji basin but within Tanzania the giant tigerfish, *Hydrocynus goliath*, is restricted to the Kilombero basin, although it also occurs in Lake Tanganyika and the Congo basin. These taxonomic links between the Kilombero and Congo basins indicate that in geological times the upper Kilombero River drained westwards to the Congo. The faulting which created Lakes Tanganyika and Nyasa also created a new watershed east of the Rift Valley, cutting off the Kilombero headwaters and forcing them to drain eastwards (Bannister & Clark, 1980). The Kilombero retained some species unchanged, but others evolved into new species. The Kilombero freshwater ecosystem reflects this evolutionary shift, and its conservation is important scientifically apart from any other reasons.

The tilapia endemic to the Kilombero-Rufiji system, *Oreochromis urolepis*, appears to have evolved from the east coast species, *O. mossambicus*, a resident of the lower Zambezi (Trewavas, 1983). *O. urolepis* possess a genetic trait that is important in aquaculture: hybridization of female *O. urolepis* and male *O. mossambicus* results in all-male offspring; the use of monosex hybrids has become widespread in tilapia aquaculture as a method of choice to control over-breeding and hence stunted growth in ponds. Introduced tilapia species, such as *O. niloticus*, could escape and interbreed with the wild population of *O. urolepis*, causing a breakdown to the wild genotype and loss of the monosex trait (MNRT, 2009).
The peak breeding season is November-January (Hopson, 1989), with a secondary peak in March to April (MNRT, 2009). The river begins to rise in November-December with the beginning of the rains, triggering an upstream migration of fish from downstream, some of which then spread laterally across the floodplain. Species involved in this migration include the cyprinid *Labeo* (especially *L. ulangensis*), the catfish *Clarias*, the tiger fish and the large barbel *Barbus macrolepis*. *Distochodus*, *Citharinus*, *Mormyrus*, *Alestes*, the squeaker catfish *Synodontis* and smaller species such as *Brycinus affinis* are also involved in spawning migrations (Atkins Land & Water Management, 1981; Benno & Tamatamah, 2005). These types of fish are all known to be migratory in other African rivers, principally for spawning as well as for feeding (MNRT, 2009).

Resident fish species breed in the network of small rivers feeding into the main Kilombero River, as well as in permanent and seasonally inundated floodplain pools. Important tributaries for breeding and as nursery habitats include the Lumemo, Mofu, and Merera Rivers (MNRT, 2009).

The Kilombero floodplain supports a highly productive commercial fishery. Kilombero

District records for 2007/08 show fisheries as the second most important source of revenue (TSh 9,880,847, 5.2%) after agriculture (TSh 172,257,300, 91.1%). In Ulanga District statistics from 2003 show fisheries as providing 13% of district revenue (TSh 17,992,000), compared with 69% (TSh 95,392,000) for agriculture (Tamatamah, 2009; WREM Int., 2012).

Almost 90% of the fishing takes place in the main river, the remaining 10% being in the network of channels and ponds in the floodplain. Species caught in the floodplain ponds and pools are those with wide tolerance of poor environmental conditions such as *Clarias*, *Tilapia* and *Barbus*. Effective fishing in these habitats is difficult due to weeds and to dangerous animals such as crocodiles, hippopotamus and snakes (MNRT, 2009).

April to July is the period of high catches, with another brief peak in November-December as migratory species move upriver to spawn (Atkins Land & water Management, 1981, Benno & Tamatamah, 2005). Low catches in March and April, the peak of the floods, are attributed to the dispersal of fish across the vast watery landscape (MNRT, 2009).

In terms of weight, the catfishes *Bagrus* and *Clarias* dominate the catch, followed by *Distichodus* and tilapia (*Oreochromis* sp.). These species are closely followed by *Hydrocynus*, *Citharinus*, *Schilbe* and *Synodontis*. When catch abundance is considered (number of fishes caught), the smaller species including *Citharinus*, *Schilbe*, *Synodontis* and *Oreochromis* are the most important (MNRT, 2009).

There has been a general decline in catches in the past two decades. Fishermen have observed a decline in both catch per unit of effort (CPUE) and size of some important species. Increases in fishing effort and the use of illegal methods are thought to be major contributing factors to the declining fishery: the number of fishermen and fishing camps has increased dramatically over the last few decades, migrating fish are captured by blocking smaller watercourses, the use of small mesh nets including mosquito nets has spread, as has the use of pesticides (MNRT, 2009a). In addition, the fisheries authorities in the area believe that large livestock numbers are contributing to the destruction of ponds and side channels, areas which are important for spawning.

2.3.4 Greater Ruaha System

The Greater Ruaha System includes Ruaha National Park, Rungwa, Kigizo, and Muhezi Game Reserves and Idodi Pawaga Wildlife Management Area, a contiguous block of protected land that covers 45,000 km^2 (Williams & Athanas, 2012). In 2008 the Usangu Game Reserve and its wetland area were officially annexed into the Ruaha National Park and thereby doubled the size of the park. The Ruaha National Park is one of Africa's largest national parks at just over 20,000 km^2 (Williams & Athanas, 2012). Ruaha National Park is renowned for its elephant populations with over 35,000 individuals recorded, the second largest elephant population in Tanzania. A total population of 4,878 lions was recorded in 2002 (Williams & Athanas, 2012).

The heart of the landscape is the Great Ruaha River which flows into the Rufiji River. From Usangu the Ruaha River flows through the Ruaha National Park, providing the main water source of the park, before being joined by the Little Ruaha River. It then joins the Rufiji River just above Stiegler's Gorge, along the way supplying the Mtera reservoir and the power plants at Mtera and Kidatu. The Ruaha landscape is dominated by an escarpment that is part of the Rift Valley. Much of the habitat of the park is combretum, acacia and commiphora woodland, combined with a mosaic of riverine habitats. The Usangu Wetlands have a core permanent swamp with high biodiversity values surrounded by seasonally flooded flats. The Usangu Flats receive waters from a large catchment (20,800 km^2), with enough runoff to form a permanent swamp but too shallow to form a lake. The Usangu Wetlands are an Important Bird Area of international importance: 418 bird species have been recorded in the Usangu (MNRT, 2002b). Amongst bird species recorded at Usangu, the wattled crane (*Bugeranus carunculatus*) and lesser kestrel (*Falco naumanni*) are globally threatened. Only a few bird counts have been undertaken in the Usangu due to the difficulty of the task. An aerial survey in 2001 recorded a total of 18,500 waterbirds (MNRT, 2002b). Land use change and poor water resource management have led the Great Ruaha River to dry up in many years since 1993. The

area under irrigated rice has increased 13 fold to 45,000 ha in the last four decades (MNRT, 2002b). Increased water abstractions from rivers flowing into the Usangu wetlands have led to cessation of flow in the Great Ruaha River during dry seasons. As a result, the western Usangu wetlands no longer fully flood except in exceptionally wet years.

2.3.5 Katavi-Rukwa-Lukwati Landscape

The Katavi-Rukwa-Lukwati Landscape encompasses an area of about 25, 000 km^2 (Mlengeya *et al*., 2006), including the Katavi and Mahale National Parks, and the Luafi, Rukwa, Lukwati and Ugalla Game Reserves. With a size of 4, 471 km^2, Katavi is the third largest park in Tanzania (Williams & Athanas, 2012). Katavi contains two seasonal lakes, Chada and Katavi, and a network of floodplains, rivers and wetlands. The River Katuma flows across the floodplains connecting the lakes. Drainage is southward into Lake Rukwa while the Nkamba River in the west drains into Lake Tanganyika. Lakes Chada and Katavi are reduced to grasslands during the dry season. Katavi National Park boasts Tanzania's greatest concentrations of African buffalo (*Syncerus caffer*), Nile crocodile (*Crocodilus niloticus*) and hippopotamus (*Hippopotamus amphibius*). There are confirmed reports of chimpanzees, observed north of the Ugalla Game Reserve (Mlengeya *et al.*, 2006). Chimpanzee is an important and endangered primate species whose status needs to be established in the country. Tanzania is considered one of the important range countries for this species. The Kabenga River, which drains into the Katuma River, is the site of large scale gold mining. Metals and chemicals are washed into the hydrological system. Intensive damming and irrigation in many villages in the catchment are resulting in reduced flows downstream (Manase *et al*, 2010; Mlengeya *et al.*, 2006). Poor agricultural practices upstream are resulting in increased siltation of the Katuma and other rivers and lakes. Nile cabbage (*Pistia stratiotes*) spreading along rivers and into lakes has recently been a cause for alarm.

2.3.6 The Southern Highlands

The Southern Highlands are an eco-region distinguished by unique plateau grasslands, montane and riverine forests, rivers and crater lakes up to 3,000 m above sea level. The Livingstone Mountains are an important catchment area for Lake Nyasa. The Lumeme River drains the eastern side of the Livingstone Mountains into the Ruvuma River (NEMC, 2008). The vegetation is mainly miombo woodlands. The Kitulo-Livingstone area comprises Tanzania's largest montane grassland community. The area is a repository of floristic diversity, with high diversity found in 30 species of endemic orchids (WCS Tanzania, 2010). It is also an Important Bird Area, harbouring populations of endangered blue swallow (*Hirundo atrocaerulea*). The montane forests of Mount Rungwe and Livingstone in Kitulo are home to one of two populations of Africa's rarest monkey, the Kipunji (*Rungwecebus kipunji*) (the other being in the Udzungwa Mountains north of the Kilombero Valley).

Natural habitats across the Southern Highlands are threatened by unsustainable land use practices as natural forests and grasslands are being cleared for commercially driven agriculture (WCS Tanzania, 2010). Hunting of mammals and birds is common and there is an unsustainable trade in wildlife, reptiles, frogs and orchids. Both the Mount Rungwe and Livingstone forests are heavily degraded and the extent of habitat connection between the different groups of Kipunji is tenuous (WCS Tanzania, 2010; NEMC, 2008). Despite the establishment of the Kitulo National Park there remains limited information on the mountains of southwest Tanzania compared to the Eastern Arc Mountains.

2.3.7 Protected Areas

Wildlife Protected Area Network

The Wildlife Protected Area Network in Tanzania is made up of National Parks, managed by Tanzania National Parks (TANAPA), Game Reserves and Game Controlled Areas (GCA) managed by the Wildlife Division, and Wildlife Management Areas (WMA) managed by Authorized Associations on behalf of their constituent Village Governments.
As shown earlier in *Figure 5.13*, the SAGCOT area contains:

- *5 of Tanzania's 15 National Parks;*
- *10 of Tanzania's 34 Game Reserves; and*
- *5 Wildlife Management Areas, of an original 16 pilot WMAs (MNRT, 2007a).*

Further details are provided in *Table 2.10*, and the protected areas in the Kilombero Valley are shown in *Figure 2.16*.

Table 2.8 National Parks and Game Reserves in SAGCOT Area

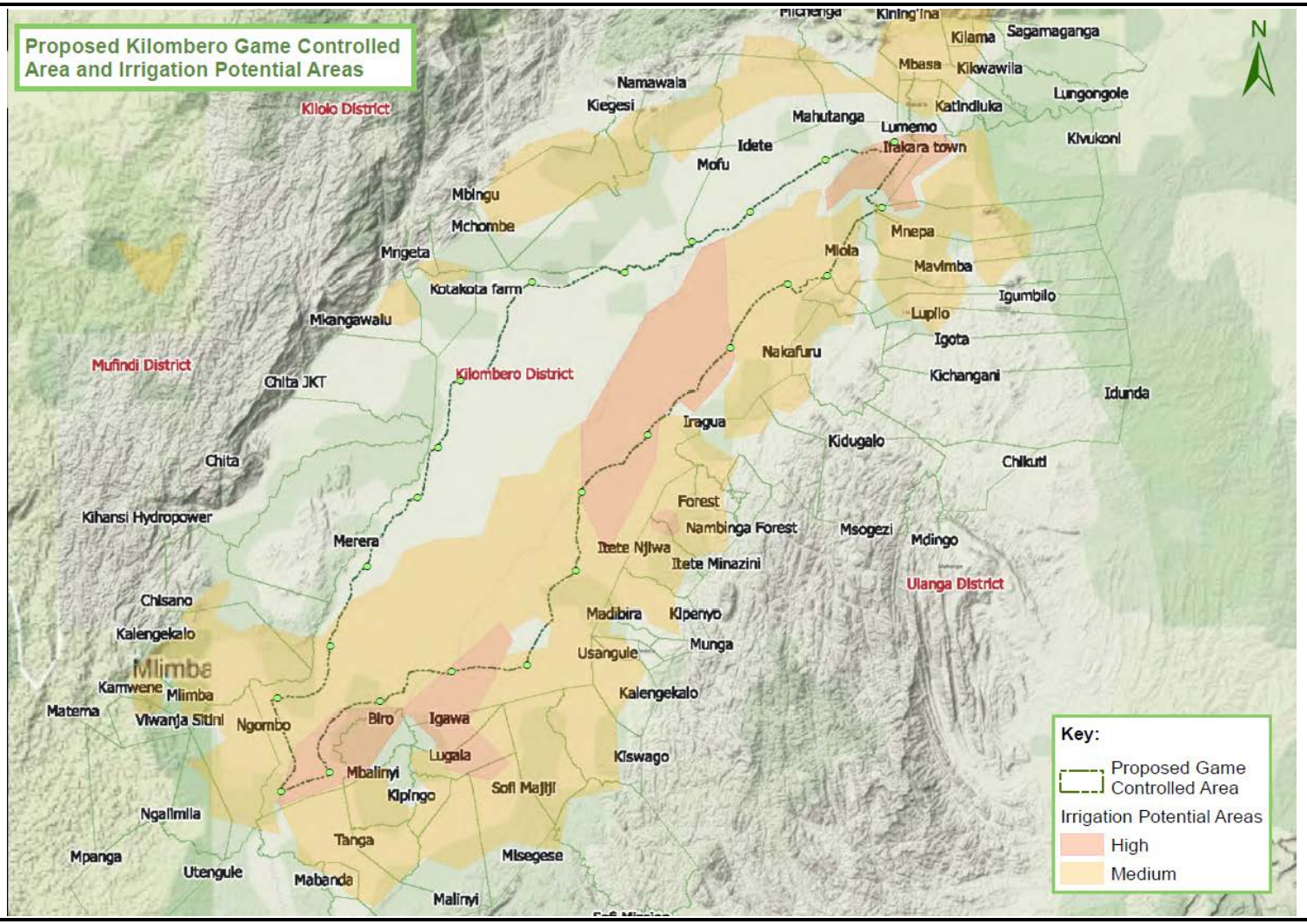
Number	Protected Area	Area (ha)	Rangers (no.)	ha/Ranger
1	Kitulo NP	46,540	15	3,103
2	Udzungwa NP	199,000	47	4,234
3	Mikumi NP	323,000	70	4,614
4	Katavi NP	447,100	64	6,986
5	Ruaha NP	2,030,000	121	16,777
Total National Parks		3,045,640	317	
1	Mpanga/Kipengere GR	157,425	19	8,286
2	Kimisi GR	102,623	8	12,828
3	Selous GR	5,000,000	368	13,587
4	Lwafi GR	90,600	5	18,120
5	Rukwa GR	400,000	21	19,048
6	Lukwati GR	314,600	16	19,663
7	Kizigo GR	400,000	17	23,529
8	Muhesi GR	200,000	8	25,000
9	Rungwa GR	900,000	36	25,000
10	Uwanda GR	500,000	5	100,000
Total Game Reserves		8,065,248	503	

Source: Wildlife Division, 2012

Forests

It is estimated that in 2005, Tanzania mainland had 35.3 million ha of forests, representing 39.9% of the total land area (FAO, 2009). Of these forests, 14.3 million ha are found within gazetted Forest Reserves, 2.5 million ha are proposed Forest Reserves and around 2 million ha are in Game Reserves or National Parks (MNRT, 2009b). Thus in addition to the Wildlife Protected Area Network there is a further protected area network comprising 506 Forest Reserves and 8 Nature Reserves (see Kilombero example in *Box 5.2*) managed by the Tanzania Forest Services Agency on behalf of the central government, together with forest reserves managed by Local Government Authorities, Village Governments and private entities. Some 273 of the central government forest reserves, an additional 67 Local Authority forest reserves and 7 private forests are located within the SAGCOT administrative regions.

Figure 2.16 Protected Areas in Kilombero Valley



Note: International border shown for Lake Malawi is the median boundary: this is not accepted by all riparian states.

Box 2.2 Kilombero Nature Reserve

The Kilombero Nature Reserve was gazetted in 2007 after amalgamating three former forest reserves. Kilombero is the second largest protected area within the Eastern Arc Mountains, after Udzungwa Mountains National Park. It is the largest forested mountain block of the Udzungwa Mountains, lying at 1,040 – 2,600 m.a.s.l., and borders the Udzungwa National Park to the north-east, with which it is integral. Plans are underway to establish a corridor to link the Nature Reserve with Uzungwa Scarp Forest Reserve to the south-west. Currently, this so-called Mngeta Corridor is used for farming activities by Mhanga, Uluti, Itonya, Mngeta, Mchombe and Mkangawalo villages (MNRT 2010).

The Kilombero Nature Reserve is managed by the Nature Reserves Unit of the Tanzania Forest Services Agency (TFS), formerly the Forestry and Beekeeping Division, of the Ministry of Natural Resources and Tourism. Nature Reserves have been created by re-gazetting, amalgamating a number of national Forest Reserves (MNRT, 2010). The legal provisions that establish nature reserves state that they are to be managed for protection of forest habitat and the species of plants and animals that live within them. No extraction of woody materials is allowed, although agreements for co-management can be negotiated with forest-adjacent communities.

Funding and staffing levels available for the management of core sites within the Eastern Arc Mountains has been increasing over the years, and is currently around four times the allocation in 2004. Even allowing for depreciation of the Tanzanian shilling this is still a major increase in funding commitment to the management of these sites.

Budget and Staffing: Kilombero Nature Reserve

Year	Budget allocated in TSh	Staff numbers
2008/09	70,160,000	10
2009/10	72,560,000	18
2010/11	213,280,000	98

Source: MNRT, 2010

Staffing: Kilombero Nature Reserve, 2010/11

Staff Position	Numbers of Individuals
Manager	1
Technical staff at HQ	39
Accounts/Secretarial	14
Drivers	15
Watchmen	7
Forest Guards	22
Total	98

Source: MNRT, 2010

The 22 Forest Guards available to patrol the nature reserve represent an area covered by each ranger of 6,114 ha, which compares favourably to the 13,587 ha for the Selous Game Reserve and is only twice the ratio of 1 ranger to 2,843 ha for the Udzungwa National Park. Ongoing and past assessments of protected area effectiveness indicate that this level of staff available to conduct regular patrols is sufficient to ensure ecosystem health even in the face of increasing human populations (Rovero, 2007).

The combined area of these forest reserves is 5,839,142 ha. Out of the total forested area in SAGCOT, 1,618,857 ha are strictly protected for their water catchment or biodiversity values, and no harvesting is allowed. Three of the nation's eight Nature Reserves, Uluguru, Kilombero and Chome, are also located within the SAGCOT area. The SAGCOT regions also contain a total of 94 Village Land Forest Reserves with a combined area of 929,332 ha.

Table 2.9 Forest Reserves in the SAGCOT area

PA Category	Iringa	Mbeya	Rukwa	Morogoro	Coast	Total
Central Govt. Forest Reserves	56	56	15	100	46	273
Private Forests	2			1	4	7
Local Authority	19	28	3	11	6	67

Forest Reserves						
Area of Production Forest (ha)	320,869	407,945	2,789,503	418,998	282,968	4,220,285
Area of Protection Forest (ha)	413,669	111,513	24,606	1,050,875	18,194	1,618,857
Total Forest Area (ha)	734,538	519,458	2,814,109	1,469,873	301,162	5,839,142

Source: United Republic of Tanzania, 2010

In total about 139,000 km^2 of the SAGCOT area of 307,500 km^2 (45%) is located on land formally reserved by the central and district governments for the purpose of sustainable utilisation and conservation of natural resources.

Effectiveness of Protected Area Network

A number of studies have attempted to assess the effectiveness of Tanzania's protected area network. In one study that used the World Bank/WWF management effectiveness tool to assess the conservation status of more than 100 Eastern Arc forests it was found that more than 60% of forests had only average management effectiveness scores, although no forest was in the "very poor" category (World Bank/WWF, 2007; Madoffe & Munishi, 2010: *Table 2.10*). According to these authors the effectiveness of management of forests is based on two major factors: the degree of ownership and control, and the funds available for management activities. Management and control were found to be strongest in private forests and in central government catchment forest reserves (Madoffe & Munishi, 2010). A 2007 study comparing Udzungwa National Park with four forest reserves located to the south of the park found high rates of destruction in the forest reserves. These forests were determined to be in serious danger of suffering irreplaceable losses. In contrast, the National Park appeared to be well protected, with very few signs of violation in spite of being bordered by human populations four times greater than those next to the southern forest reserves (Trento Museum, 2007).

Table 2.10 Management Effectiveness Scores for Forests in the Eastern Arc

Forest Category	**METT Scores%**			
	Poor 15-30	**Average 31-45**	**Good 46-60**	**Very Good >60**
CGFR	15	49	7	
LGFR	3	9	2	1
Proposed	12	4		
Private	1	1		
Village forests		1	1	
Total number of forests	31	64	10	1

Source: Madoffe & Munishi, 2010 CGFR : Central Government Forest Reserve LGFR : Local Government Forest Reserves Proposed : forests not yet gazetted

A 2011 study found that Local Authority forest reserves receive the least funding amongst the protected areas, while central government catchment reserves and Nature Reserves receive more and National Parks receive the most (Green *et al*, 2011; see also Burgess & Rodgers 2004). The median actual spending on management across all forest reserve areas in the Eastern Arc was US$ 2.3 ha/yr, as compared to the figure of US$ 7.7 ha/yr that is spent in Tanzanian National Parks (TANAPA, 2009; Green *et al.,* 2011). Actual funding across all forest reserve types is, therefore, around one third of National Park spending. The same study determined that the spending reported by protected area managers to be necessary to be effective was US$ 8.3 ha/yr (Green *et al.,* 2011). There are differences in actual spending on management costs across National Parks, with some parks having greater numbers of rangers per unit area than others (*Table 2.8*).

Connectivity

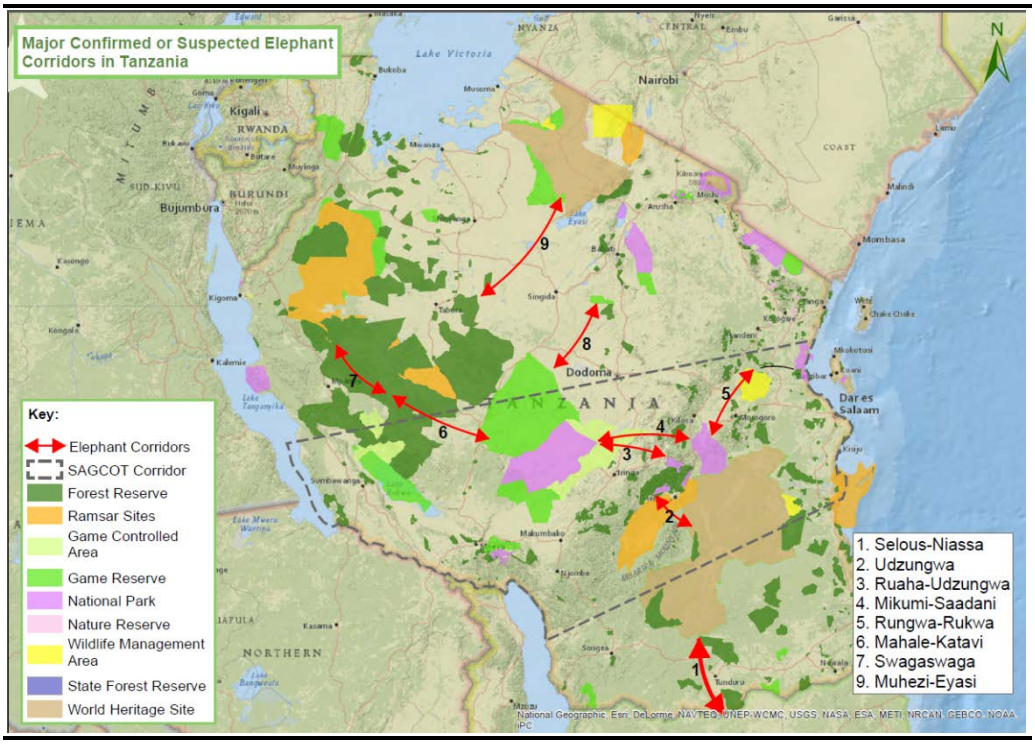
In Tanzania many protected areas are rapidly becoming isolated, yet the long term viability of these

protected areas depends on the ability of animals to disperse and return to the area on an annual basis. The increasing isolation of protected areas in Tanzania is due to the growing human population, new settlements in previously unpopulated areas, land use conversion to agriculture and changing infrastructure. Wildlife corridors are critical for ensuring the long term maintenance of biodiversity. Opportunities for maintaining corridors between protected areas are rapidly diminishing, endangering the future of ecosystem services provided by protected areas.

Wildlife corridors are often identified through their use by large charismatic mammals, particularly elephant (*Loxodonta africana*) (see *Figure 2.17*). However, many smaller animals such as duikers, small carnivores, bats, birds and amphibians also use the corridors. Thus corridors may be important both for maintenance of populations in protected areas linked by corridors, and for populations moving through or living in the corridors.

Summary information on the most important wildlife corridors remaining in mainland Tanzania was presented in a recent TAWIRI report (Jones *et al.,* 2009). Thirteen of these corridors are in the SAGCOT area, and most are in urgent need of protection, including those in the Kilombero Valley (see *Box 2.3*).

Figure 2.17 Major Confirmed or Suspected Elephant Corridors in Tanzania

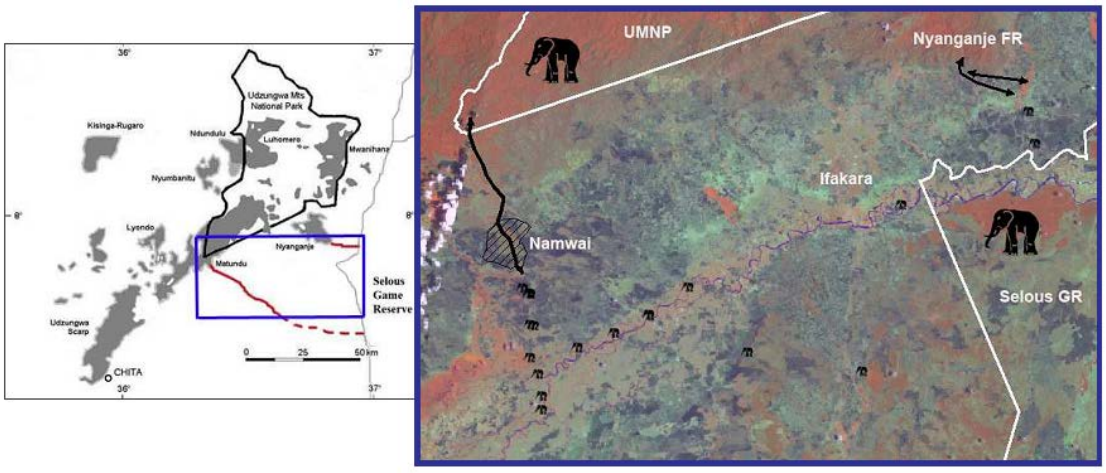


Source: Jones et al. (2007)

Box 2.3 Wildlife Corridors in the Kilombero Valley

Studies undertaken from 2003 to 2006 into the feasibility of maintaining ecological connectivity between the Udzungwa and Selous landscapes found that two routes in particular remain active for wildlife, the Nyanganje and Ruipa Corridors (Jones *et al.*, 2007). However, all of the studies concluded that without urgent conservation efforts these two corridors would also become blocked within five years (Jones *et al.*, 2007; Rovero, 2007; TAWIRI, 2009), and one (Jones *et al.*, 2007) predicted that "*unless urgent interventions are made to protect these two remaining corridors, both corridors will be irreversibly blocked by the end of 2009*".

Ruipa (left) and Nyanganje (right) Wildlife Corridors



Source: Jones et al. (2007)

2.3.8 Critical Natural Habitats

The World Bank does not support projects that, in the Bank's opinion, involve the significant conversion or degradation of critical natural habitats. The Bank defines *critical natural habitats* as:

- "(i) existing protected areas and areas officially proposed by governments as protected areas (e.g., reserves that meet the criteria of the World Conservation Union [IUCN] classifications), areas initially recognized as protected by traditional local communities (e.g., sacred groves), and sites that maintain conditions vital for the viability of these protected areas (as determined by the environmental assessment process); or

- "(ii) sites identified on supplementary lists prepared by the Bank or an authoritative source determined by the Regional environment sector unit (RESU). Such sites may include areas recognized by traditional local communities (e.g., sacred groves); areas with known high suitability for biodiversity conservation; and sites that are critical for rare, vulnerable, migratory, or endangered species. Listings are based on systematic evaluations of such factors as species richness; the degree of endemism, rarity, and vulnerability of component species; representativeness; and integrity of ecosystem processes."(OP 4.04 *Natural Habitats,* Annex A – Definitions).

Using this definition, at least 40% of the SAGCOT area of 307, 500 km² is critical natural habitat (the 111,109 km² of National Parks and Game Reserves listed in *Table 2.10* and the 16,189 km² of protection forest from *Table 2.11*).

2.3.9 Environmental and Ecological Projects

This section briefly describes some of the key environmental and ecological projects in the SAGCOT area.

Reducing Emissions from Deforestation and Forest Degradation (REDD): in April 2008, the

Governments of Norway and Tanzania signed a Letter of Intent on a Climate Change Partnership. The partnership focuses on developing pilot Programs to reduce deforestation; developing methodologies for carbon accounting; and promoting research and capacity building Programs related to climate change challenges. The partnership is also meant to promote Public Private Partnerships (PPP) to enhance investments in sustainable management of forest resources. The Government of Norway had a budget of close to 500 million Norwegian Kroner (around 87 million USD). To date nine pilot projects have been initiated in several parts of the country including in Kilosa and Mount Rungwe in the SAGCOT area. A 17 million Norwegian Kroner (around 3 million USD) research Program is also being assisted from this initiative (www.norway.go.tz).

Sustainable Wetland Management Program (SWMP): since 2004 the Government of Denmark has been supporting the Sustainable Wetlands Management Program (SWMP) in the Wildlife Division of the Ministry of Natural Resources and Tourism. A Wetlands Unit was established within the Wildlife Division and field activities included the integration of wetland issues into planning in Iringa and Mbeya Regions with more focused improvement of sustainable wetland management in 3 significant selected wetland sites within the two Regions. Further support was provided for scientific studies and wetlands inventories in the target Regions. National coordination of wetlands issues was enhanced by strengthening the workings of a National Wetlands Working Group (NWWG) and the National Wetlands Steering Committee (NAWESCO). The project budget is 34 million Danish Kroner (around six million USD) and project activities are expected to be finalized by mid-2013 (MNRT, 2003).

Kilombero and Lower Rufiji Wetlands Ecosystem Management Project (KILORWEMP): this 54 month project is in its final preparation stage (it was expected to begin in March 2012; Belgian Technical Cooperation, 2011). The project is supported by the Government of Belgium which has provided € 4 million in financial support. The project aims to support the implementation of Community Based Natural Resource Management (CBNRM). It is designed to consolidate the processes initiated in Kilombero and Ulanga under the previous project (Kilombero Valley Ramsar Site project, KVRSP) and to extend these to Rufiji District. It will also address key policy issues, and will provide a strong component of permanent technical assistance at both district and central levels. The key implementation partners will be contracted from permanent, Tanzania based conservation NGOs to provide specialized know-how and assistance. The EU has expressed an interest in contributing to the project.

National Forestry Resources Monitoring and Assessment (NAFORMA): this is a project supported by the Government of Finland with Technical Assistance provided by FAO (MNRT, 2007b). The project was designed to last for three years beginning in 2009. The objectives of the project are to develop baseline information on forest and tree resources, assist the forestry authorities to set up a specialized monitoring and inventory unit and to put in place a long term monitoring system of forestry ecosystems in Tanzania. Amongst the outputs of the project are a harmonized forest land use classification system, and maps of the state of forest land and changes based on remote sensing data. A project budget of US$ 3.8 million was set aside and project outputs are expected towards the end of 2012.

WWF - Integrated Water Resource Management in the Great Ruaha River Catchment, Tanzania: this project began in 2006 and has been supported by the European Commission since 2010. The Program's objective is to restore year round flow to the Great Ruaha River, as it traverses the Usangu wetlands and Ruaha National Park. WWF is employing a collaborative approach at village, district and national levels to improve management of water and natural resources in the Great Ruaha River catchment. Communities are encouraged to establish water user associations, as well as a committee that represents the entire catchment. Water withdrawals for irrigation, especially in the dry season are controlled. Farmers are trained in more efficient water use in rice production. Alternative livelihoods, away from agriculture, such as beekeeping, batik dying, soap making, are supported. WWF has also contributed to the information base by undertaking an environmental flow assessment (EFA) in the river (WWF Tanzania Country Office, 2010).

2.4 SOCIO-ECONOMIC PROFILE

Since an in-depth study of the SAGCOT area was not possible within the timeframe of this study, this socio-economic baseline assessment has been carried out using secondary data and key informant interviews. Reports on the Rufiji Basin provide useful indicative statistics for the corridor as a whole. Where available, specific information is also provided for the Kilombero area.

2.4.1 *Population*

The Corridor is home to an estimated 11.1 million people[18] , roughly 25% of Tanzania's total mainland population[19], and is predicted to increase to 16 million by 2025 (adjusted projection based on the 2002 census)[20]. Data for the Kilombero District are shown in *Box 5.4*.

The male:female ratio in the corridor is 94:100. Iringa and Morogoro are the largest urban centres, with a population of roughly 112,500 and 206,000 respectively. Both are university towns.

[18] Calculations by author. Source: http://www.tanzania.go.tz/populationf.html

[19] Mainland population projection for 2012 is 45,930,231. Source: http://www.tanzania.go.tz/populationf.html

[20] Calculations by author. Source: http://www.tanzania.go.tz/populationf.html

Box 2.4 Population Data for Kilombero District

The 2002 National Population and Housing Census gives the total population of Kilombero District as 321,611 (162,214 males, 159,397 female) across a total of 73,393 households. Current population estimates and projections are given in the table below. The average household size in 2002 was listed as 4.4, compared to the Tanzanian average of 4.7 for the same year. However, it should be noted that rural households are larger than their urban counterparts.

Population by Division and Ward, Kilombero District, 2002

Division	Ward	Population and Housing Census 2002			Population projection 2011	Population projection 2015
		Male	Female	Total		
Ifakara	Ifakara	21,936	23,582	45,518	61,817	74,849
	Kibaoni	10,164	10,708	20,872	28,346	34,321
	Lumemo	8,927	9,425	18,352	24,923	30,178
	Michenga**					
	Idete	7,754	7,128	14,882	20,211	24,472
Total		**48,781**	**50,843**	**99,624**	**135,297**	**163,820**
Kidatu	Kidatu	18,227	16,982	35,209	47,817	57,897
	Sanje	4,961	4,748	9,709	13,186	15,965
Total		**23,188**	**21,730**	**44,918**	**61,003**	**73,862**
Mang'ula	Mang'ula	14,388	14,414	28,802	39,115	47,361
	Mwaya**					
	Mkula	4,168	4,229	8,397	11,404	13,808
	Kiberege	9,541	8,918	18/459	25,069	30,354
	Kisawasawa	4,565	4,495	9,060	12,304	14,898
Total		**32,662**	**32,056**	**64,718**	**87,892**	**106,421**
Mngeta	Mchombe	14,220	12,987	27,207	36,949	44,739
	Mngeta**					
	Mofu	2,485	2,401	4,886	6,636	8,034
	Mbingu	7,152	6,389	13,541	18,390	22,267
	Chita	8,681	8,087	16,768	22,772	27,573
Total		**32,538**	**29,864**	**62,402**	**84,747**	**102,613**
Mlimba	Mlimba	16,280	16,519	32,799	44,544	53,934
	Kamwene**					
	Chisano	1,651	1,461	3,112	4,226	5,117
	Masagati	2,922	2,888	5,810	7,890	9,554
	Uchindile	1,005	992	1,997	2,712	3,284
	Utengule	3,187	3,044	6,231	8,462	10,246
Total		**25,045**	**24,904**	**49,949**	**67,835**	**82,135**
Total district	**23**	**162,214**	**159,397**	**321,611**	**436,772**	**528,851**

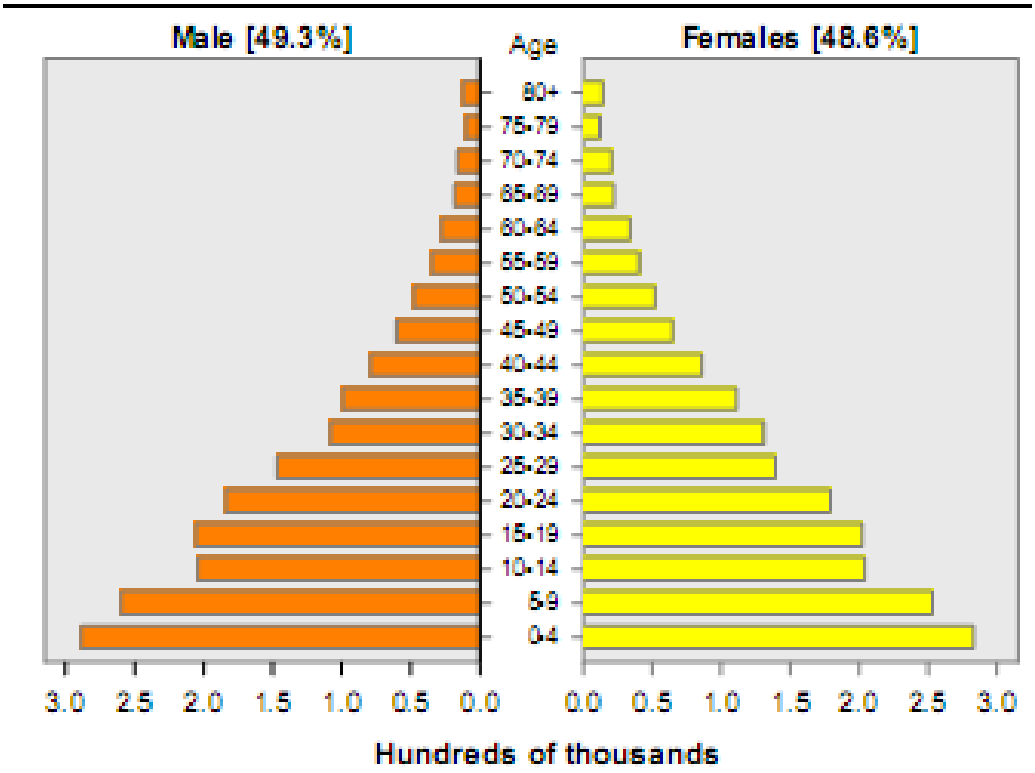
Source: District Planning Office
Note: ** New Wards established in 2010

Mang'ula and Ifakara are the two most populated Divisions in Kilombero, with a population density of 22 persons/km^2. Ifakara is the district capital, so this is to be expected. However, Mang'ula is not the result of urbanisation. Instead, it is the location of several large sugar cane plantations, and their associated workforce. As well as the presence of small urban centres, Ifakara and Mang'ula also offer trading opportunities, fertile agricultural lands and grazing lands which attracts farmers and pastoralists from other parts of the country such as Arusha, Shinyanga, Manyara and Mwanza. Mlimba Division is the least populated division.

The majority of people in the SAGCOT corridor live in rural areas, where population density is low: the mean population density in the Rufiji Basin (excluding Iringa) is 32.6 persons/km^2. This is not equally distributed - large areas are relatively uninhabited as a result of the topography, remoteness and poor infrastructure, protected areas, and the presence of tsetse fly. Population density is higher in the Great Ruaha sub-basin than in the Kilombero, Luwegu and Lower Rufiji sub-basins.

Analysis of the Rufiji Basin as a whole shows a high birth rate and low life expectancy (*Figure 2.18*) which correspond to the national averages for Tanzania. The median age in Tanzania in 2011 was estimated at 18.5 years (50% of the population are 18.5 years or younger)[21], implying high youth dependency on a limited adult workforce, as well as a high need for education services. More specifically, comparing rural and urban populations in Kilombero District in 2002 (*Table 2.13*) reveals a higher age dependency ratio[22] in rural areas. This places greater economic and social pressure on rural households, and men and women of working age, who must support a greater number of family members.

Figure 2.18 2012 Population Pyramid for the Rufiji Basin



Source: WREM Int., 2012 (projection from 2002 Census)

Table 2.11 Age Dependency Ratios in Kilombero District

Age	Total	Rural	Urban
Total	78.15	81.46	70.25
Male	77.36	80.05	70.61
Female	78.95	82.96	69.91

2.4.2 Social Diversity

Ethnicity

The Tanzanian population consists of more than 120 different ethnic groups, with numerous

[21] CIA. World Fact Book. 2012.

[22] Age dependency ratio is defined as the ratio of youths less than 15 years of age plus the persons aged 65 years and above per adults aged 15-64 years(working-age population).

associated languages. The large majority of the tribes are ethnically Bantu. The main ethnic groups in the six SAGCOT crop clusters are listed in *Table 2.14*, and the situation in the Kilombero District is described in *Box 2.5*. However, populations are highly mobile, and as a result many more are present within the corridor as a whole. The agro-pastoralist Sukuma tribe are the largest ethnic group. Originally from the Mwanza region, they can now be found all over the country. Certain parts of the SAGCOT corridor including the Kilombero Valley have experienced a large influx of Sukuma and also Maasai (semi-nomadic pure pastoralists) in recent years. The Barabaig, a pure pastoralist ethnic group, recognised under World Bank Operational Principles 4.10 as an indigenous people, can be found in several parts of the SAGCOT corridor.

Table 2.12 Overview of Main Ethnic Groups in the SAGCOT Clusters

SAGCOT Clusters	Region	Ethnic Groups
Kilombero	Morogoro	Pogoro, Ndamba, Bena, Mbunga Recent in-migration: Maasai, Sukuma, Barabaig
Sumbawanga	Rukwa	Fipa
Ihemi	Iringa	Hehe
Mbarali	Mbeya	Sangu, Hehe, Bena (main); also Sukuma, Barabaig, Maasai
Ludewa	Iringa	Pangwa, Kisi, Manda
Rufiji	Pwani	Ndengereko

Gender

Approximately 98% of Tanzanian rural women classified as economically active are engaged in agriculture. Women farmers are also often casual labourers and unpaid family workers in both commercial and subsistence agriculture, including livestock and fishing.

Cultural practices vary greatly between the many different tribes in Tanzania, but share some common traits: in crop-farming communities in general, women have primary responsibility for (i) domestic work including food preparation, fetching water, finding and fetching fuel wood, and child care, (ii) subsistence agriculture, especially most of the weeding, harvesting, processing and storage activities relating to food crop production. Men and women participate fairly equally in site clearance, land preparation, sowing and planting, but overall women spend more hours per day than men in both productive and reproductive activities[23].

([23])FAO. 1997. *Gender and Participation an Agricultural Development Planning. Lessons from Tanzania.* Dar es Salaam and Rome, November 1997.

Box 2.5 Social Diversity and Ethnicity in Kilombero District

Kilombero District has a diverse ethnic population, and it is not uncommon to find several different ethnic groups living together in one community. For example, during the SRESA visit, the team met with 7 members of a farmer's association in Mbingu Village[24], each of which came from a different ethnic group. This ethnic heterogeneity can be explained by a combination of the villagisation policy of the 1970s, and in-migration in search of employment and other opportunities. It is likely that the degree of ethnic diversity will be directly correlated with the availability of fertile land and other economic opportunities.

The 2002 Census lists the Pogoro, Ndamba, Bena, and Mbunga as the main ethnic groups in Kilombero District. The groups often referred to as 'indigenous' to Kilombero Valley (the Ndamba, Mbunga and Pogoro) arrived in the early 19th century from Malawi. The Ndamba are closely related to the Pogoro, who can be found in greatest numbers in the western part of the valley basin and the adjacent Mahenge Highlands. Other groups who migrated to the Kilombero Valley include the Sagara (central Tanzania), Hehe (Iringa), Ndedeule (Zambia), Sukuma (Mwanza), Ngoni (Southern Tanzania), Ngindo (Rufiji), Mang'ati (pastoralists?) and Chaga (Kilimanjaro). The construction of the TAZARA railway in 1972 also brought another influx of people from different parts of the country. As a result, there are a great many local languages spoken in the Kilombero Valley, although Swahili remains the most commonly used.

Over the last 10 years, and especially after the 2006 evictions of agro-pastoralists from Ihefu and conflict between Maasai and crop farmers in Kilosa, the number of pastoralist and agro-pastoralist groups such as the Maasai, Sukuma and Barbaigs moving into the valley has increased. They have come in search of grazing land due to pressures on grazing elsewhere. The relationship between pastoralists and villagers is often reported to be poor, due to complaints that their cattle cause damage to crops. Many Sukuma (agro-pastoralists), in comparison to the Maasai and Barabaig, have been more successful in becoming integrated into the communities in which they settle. The SRESA team found several examples where Sukuma had been able to participate in decision making processes. They were renting land, growing crops and even had positions in community governance structures and community based organisations (CBOs). The Maasai and Barabaig, on the other hand, have tended to be more isolated from communities and decision making. This is due in part to cultural traditions.

In most pastoral societies gender roles are strongly marked. Women are typically responsible for milking and dairy processing; they may or may not sell the milk, and they usually have control over the proceeds in order to feed the family. Men are responsible for herding and selling meat animals. In systems in which herds are split, women usually stay at fixed homesteads while men go away with the animals[25]. This is true of the Maasai, while with the Barabaig the whole family travels together with the herd as they migrate. In many pastoralist cultures a part of the herd (often goats) is considered for 'home consumption' and often stays with the women. The more valuable cattle remain with the men.

Vulnerable Groups

Generally speaking, individuals, households, or communities with high exposure to risks and low capacity to cope are considered to be extremely vulnerable. Particularly vulnerable populations in SAGCOT include female-headed households, children, the elderly, the disabled and those with long-lasting/chronic illnesses, such as HIV/AIDS. Unemployed youth, youth with unreliable income and female youth are also considered vulnerable[26], as are refugees (see below) (*Table 2.15*). However, not all members of the social groups listed are by definition extremely vulnerable, as there are differences with respect to access to livelihood assets (social, financial, human, physical, natural, political) to mitigate the effects of impoverishing factors[27]. In general, the area is characterised by vulnerable people whose well-being depends very strongly on the delivery of ecosystem services by the local

[24]Mbingu is also Swahili for 'Heaven', indicating that this village has particularly favourable living environment.
[25]FAO. 2001. *Pastoralism in the new millennium*. FAO Animal Production and Health Paper 150.
http://www.fao.org/docrep/005/Y2647E/y2647e00.htm#toc [accessed 09 August 2012]
[26] With regard to youth vulnerability and their engagement in agriculture see e.g.: FANRPAN. 2012. Current and Emerging Youth Policies and Initiatives with a Special Focus and Links to Agriculture. Tanzania (mainland) Case Study Draft Report.
[27]Fred Lerisse, Donald Mmari & Mgeni Baruani. 2003. *Vulnerability and Social Protection Programme in Tanzania*. R & AWG.

environment, and especially the rivers and wetlands (Hamerlynck, 2011).

Refugees

In 2007 the Tanzanian government accepted 162,000 Burundian refugees to become naturalized Tanzanians (referred to as "Newly - Naturalized Tanzanians" (NNTs)). In 2010 the National Strategy for Community Integration Program was announced, spelling out the modalities for the relocation and integration of the NNTs to 16 selected regions and 52 districts around the regions. The relocation exercise was halted in August 2011. One reason for the suspension given by the GoT was that insufficient consultation had taken place within government, especially with Regional and District authorities in the proposed receiving regions. This, according to media sources (e.g. The East African[28]), had led to unrest and security issues in the relocation areas. At this point it is not clear if refugee families may be relocated (and allocated land) within the SAGCOT area. The decision to relocate all NNTs and close the former refugee settlements is still being reviewed and other scenarios are being considered such as the local integration of the NNTs in their current place of residence[29]. Relocation and local integration of the new citizens could lead to social conflict, and their numbers would need to be taken into account with regard to land availability.

Table 2.13 Vulnerable Groups

Group	Main Characteristics
Women	Just over 50% of women aged 15-49 in SAGCOT have completed primary school; between 10 and 26% (different per region) have no education at all (TDHS, 2010). This is similar to men, although the percentages for no education are lower. Between 60-80% of women aged 15-49 are literate (for men this is between 80 and 90%) (TDHS, 2010). Gender based violence (GBV) is a big problem in Tanzania. In the southern corridor between 40 and 70% of women have experienced physical violence (TDHS 2010). GBV is largely culturally accepted by both men and women.
Vulnerable Groups	
Women headed households	Approx. 20% of Tanzanian women ages 25-50 are either unmarried, divorced, separated or widowed. In 2007 23% of rural households were headed by women, the percentage is higher in urban areas (up to 30%)[30]. Women heads of household experience a greater work and time-burden and responsibility, often making them more vulnerable than families with both parents present. Decision-making is (largely) controlled by the women themselves, which often positively influences their choice to join meetings, associations etc.
Youth (15-24)[31] Girls specifically; and unemployed youth and youth with irregular income.	The main vulnerability of girls is early marriage and pregnancies, which often cause school drop-out and limit future life opportunities. The median age of giving birth to a first child is 19 years; close to 20% of girls aged 15-19 have had a live birth or were pregnant with a first child (TDHS, 2010). The rate of unemployment (for a period of at least 12 months) for 20–24 year olds is on average 14 and 13% for men and women in SAGCOT respectively (TDHS, 2010).
Disabled	Approximately 2% of the total Tanzanian population is considered disabled (physically, visually, hearing, intellectually impaired; multiple impaired and albinos; according to 2002 Census definitions). This percentage is slightly higher in Dodoma (2.3), Morogoro (2.5) and Iringa (2.3), while lower in Mbeya (1.3) and Rukwa (1.1) regions. Men are more likely to be disabled than women. Of the total disabled, 54.9% are males, 40.1% females.[32]

[28] See for example: The East African.12 December 2011. *Tanzania: Country Halts Resettlement of Naturalized Burundian Refugees*, by Mike Mande. Available from: http://allafrica.com/stories/201112120526.html [accessed 16 August 2012]
[29] UNHCR. 2012. *Press Briefing on the Local Integration Programme*, May 2012
(1) [30] URT.2007. National Household Budget Survey
(2) [31] UN definition of youth
(3) [32] URT. 2006. *Analytical Report of 2002 Population Census.*

Group	Main Characteristics
Elderly	Elders who are primary caregivers for young children are more vulnerable to poverty and lack of food security (approx. 10% of the elderly (60+ years) in Tanzania, and 14% of elderly women). Tanzanian elderly women are at times accused of witchcraft. Incidents of physical violence against or murder of such accused elderly women have occurred in the southern corridor area(33).
Those with long-lasting/ chronic diseases such as HIV/ AIDS	Only roughly half of women and slightly fewer men in the southern corridor have comprehensive knowledge about AIDS(34) Some 60-70% of women and 50-60% of men in the southern corridor have knowledge on prevention of mother to child transmission of HIV. In terms of attitudes, acceptance is high in relation to willingness to take care of an HIV+ family member at home (90%+); however more than 50% of women would want to keep it a secret, versus approximately 40% of men(35).
Children	Child labour in rural areas is higher than in urban areas. For children aged 5-17 years, 36.1% of boys and 28.2% of girls provide child labour(36). A majority (between 50 – 60%) of children in the corridor live with their parents; up to 22% live with their mother only, even when father is often still alive (TDHS 2010); single (women) headed households are often more vulnerable to poverty than households where both parents are present.
Refugees	Some 162,000 Burundian refugees are in the process of re-establishing themselves in Tanzania as Newly-Naturalised Tanzanians.

2.4.3 Livelihoods

"Livelihoods" is a term used to describe the strategies which people adopt to 'make ends meet' (the options available to them for producing food, cash crops and livestock; securing a cash income and making best use of the markets), what resources they might draw on should they wish to improve their well-being, and on which they may depend in the face of misfortune. People's livelihood strategies, and how they respond to difficulties, are closely linked to tradition, culture and the physical and institutional environment. In rural areas livelihoods are primarily based on the production of food and cash crops, but livestock are also important. Pastoralists and crop farmers have different measures of what constitutes poor rains and what constitutes a drought, and they have different responses to these hazards. Consequently regional and local agro-ecology dominates livelihood patterns in the SAGCOT. Issues such as isolation from roads and markets, proximity to large cities, irrigated plantations, or mining operations that offer substantial casual employment, local culture and government policy also influence livelihoods.

Livelihood Capital

The resources people draw on for their livelihoods are often described as 'assets'. In livelihood analysis, assets are divided into human capital, social capital, natural capital, physical capital and financial capital (*Box 2.6*). The diversity of and access to these assets describes a person's or household's level of vulnerability, i.e. their ability to adapt to change, and their resilience to negative events. Analysing the livelihoods of smallholder farmers in the corridor is essential to understanding their ability to mobilize and manage their assets and entitlements in times of change.

Box 2.6 Forms of Livelihood Capital

- **Human capital:** skills, knowledge/education, health and ability to work
- **Social capital:** social resources, including informal networks, membership of formalised groups and relationships of trust that facilitate co-operation

(4) (33) HelpAge. 2010 *NGO Submission for the Initial Universal Periodic Review of the Republic of Tanzania*
(5) (34) Comprehensive knowledge means knowing that consistent use of a condom during sexual intercourse and having just one uninfected faithful partner can reduce the chance of getting the AIDS virus, knowing that a healthy-looking person can have the AIDS virus, and rejecting the two most common local misconceptions about AIDS transmission or prevention (transmission of the virus by mosquito bites or by supernatural means)
(6) (35) URT.2010. TDHS;
(7) (36) ILO. 2010. *Decent Work Country Profile Tanzania (Mainland).*

- **Natural capital:** natural resources such as land, soil, water, forests and fisheries
- **Physical capital:** basic infrastructure, such as roads, water & sanitation, schools, ICT; and producer goods, including tools and equipment
- **Financial capital:** financial resources including savings, credit, and income from employment, trade and remittances

Source: www.Eldis.org

Main Livelihood Activities

Labour is a critical asset for all individuals and households in the Corridor. It is strongly correlated with investments in human capital. A person's health status will determine their capacity to work, and the level of skills and educations they possess, will also determine the returns they are able to get from their labour. Most economic activities in the Rufiji Basin are unskilled in terms of the modern economy, but many incorporate high levels of traditional ecological knowledge.

Agriculture is the leading economic activity in the Rufiji Basin, employing between 53% and 93% of the population[37]. Employment is also generated through miscellaneous businesses and occupations such as street vending, crafts, charcoal burning, mining, transportation, etc. Almost all occupations are directly or indirectly based on the use and exploitation of natural resources. Fishing and livestock husbandry are important in some districts including Rufiji (fishing) and Chunya, Mbarali, and Manyoni (livestock). Livelihood activities in the Kilombero Valley are described in *Box 2.7*.

Box 2.7 Livelihood Activities in the Kilombero Valley

About 80% of the population of the Kilombero Valley are engaged in agriculture as their main occupation. The majority of this group are subsistence agriculturalists, although agriculture in the area is becoming increasingly commercialised in recent years. The main cash crops are rice, maize, cocoa, sesame and sugar cane. Sugar cane is mostly produced as part of the out-growers Program for the KSC, and tends to be cultivated by wealthier households. Rice is the traditional food crop in the Kilombero valley, and maize and cassava are other common subsistence crops. Households grow a variety of fruits and vegetables for their own consumption, or to sell on the local market. The SRESA team observed papaya, potato, banana, tomato, avocado and okra for sale in the Valley. Banana was also seen being transported by lorry out of the District. Middlemen will often buy produce from Kilombero, and transport it to larger urban markets such as Dar es Salaam, and processors.

The average land holding amongst small holder farmers in the Kilombero Valley is 2 to 5 acres, of which an average of 2 acres is farmed, while the remainder is left fallow – allowing for shifting cultivation. A farm of 20 ha or more is considered 'large', and only approximately 10% of the farms are of this size. Overall, the level of mechanization in farming is very low. Fewer than 5% of farmers own their own machinery, while 60% of farmers are reported to have the means to hire machinery (estimated cost of TZS 45,000/acre). This has consequences on the timing of agricultural activities, as it takes longer to prepare the land, sow and harvest a crop by hand. The owner of rented machinery will prioritise their own use before allowing others to borrow it. Consequently, land preparation or sowing may be delayed. Similarly, a household in which labour is an important income generating activity, may prioritise working on other peoples farms for cash or kind, before working on their own land. This will impact on the yield achieved, as well as the ability of farmers to mitigate against erratic and low rainfall.

According to the 2002 Agricultural Census, agricultural households ranked annual crop farming as their most important source of income, followed by off-farm income (e.g. permanent employment, working on other farmer's farm, temporary employment), tree/forest resources, livestock, permanent crops, remittances and fishing/hunting. The livelihood strategies adopted by different individuals and households are directly related to the agro-ecological environment in which they live, their ethnic traditions and the proximity to urban centres or industrial sites.

Despite the low population density there is high pressure on some key natural resources, particularly forests (and associated wildlife) and wetlands. Unsustainable harvesting practices (whether for bush meat, fish or rare timber), water diversion for dry season irrigation, expansion of cropland, the incursion of agro-pastoralists, urban demands for charcoal and the demands for fuel wood of increasing populations squeezed between protected areas and commodity crops are all affecting

(8) (37) WREM, 2012.

natural capital in the Corridor, thus influencing peoples livelihood strategies and well-being status.

In districts with surplus food production in the Rufiji Basin, surplus produce is sold to neighbouring regions and constitutes an important income source for the rural communities. In 2004/2005 the Iringa region produced about 380,000 surplus tonnes of starch foods[38].

The majority of Tanzanian smallholder farmers use traditional, labour intensive farming techniques, and almost all farms are rain fed with little or no mechanisation. This limits the amount of land that it is possible for a household to cultivate, and the yield that can be achieved. Recent increases in crop production have come more from crop area expansion (involving deforestation) than from a change in practices resulting in higher yields. Similarly, livestock numbers have increased, though there has been no broad-based increase in productivity[39]. Practices such as shifting cultivation and the use of seasonal fire are widely practised.

In addition, smallholder farmers' access to and use of inputs such as improved seeds and fertilizer is low (especially for women), and there are few agro-processing facilities in rural areas. As a result production is low, post-harvest losses are high and people are unable to add value to their produce. Due to poor infrastructure, and limited access to transport, many farmers in rural areas are restricted in their access to markets. Much of their produce is bought by middle-men who offer a low price, knowing that they can transport it to larger urban markets and processors where prices are higher.

Commercial Farming / Industries

Nearly all industries found in SAGCOT are agriculture-based (see *Box 5.8*). Medium to large scale industries employ a small percentage of the population but are important in adding value to and marketing agricultural produce. They are mainly found in the districts of Mufindi, Njombe, Iringa Urban, Kilombero and Kilosa and include tea processing, sugar milling, saw milling, paper milling, wooden pole and board manufacturing, pyrethrum processing, oil milling, fruit processing, wattle processing, industrial glue manufacturing and cereal milling.
Small-scale industries are more numerous and are found all over the corridor. However they are concentrated in urban areas and trading centres. The dominant small-scale industrial activities are milling/ grinding, storing and packaging foodstuffs (maize, rice, wheat, cassava, groundnuts). Other small scale activities include oil presses, carpentry and wood workshops, wood carving, tailoring, hand looms, pottery and black-smith/ metal fabrications.

Various minerals are found in the Corridor, but so far exploitation is generally artisanal. There are proposals for commercial copper mines in Iringa Rural District (around Chamdidi) and uranium mines in Ulanga District[40].

(9) ([38]) WREM, 2012.
(10) ([39]) WREM, Rufiji study
(11) ([40]) WREM.2012. Vol. I

Box 2.8 Agricultural Value Chains in the Kilombero Valley

The role of agricultural value chains in improving income and employment opportunities has received more attention over the last 10 years. In 2003, USAID initiated the DAI PESA Project, with the aim of strengthening market links, providing information, creating an enabling policy environment, strengthening associations and improving the business skills of micro-small enterprises (MSE). This was undertaken in six regions including Morogoro, where the Kilombero Valley is located. The project reported positive impacts in terms of increased income through increased sales of core (cash) crops. Kilombero already had a high number of Savings and Credit Cooperative Societies (SACCOS) before the DAI PESA project started, and therefore the increase in members was relatively low compared to other project areas. Access to credit proved easier in Kilombero because the SACCOS and associations had already established themselves for some time, and therefore had the required experience and trust(41).

The Warehouse Receipt System was introduced in the valley in 2007 by DAI Pesa (USAID). The SRESA team visited a rice farmers association in Mbingu that had been donated a warehouse through this program. Originally a rice growers association, the committee were considering broadening the focus to include other crops. They would also use the warehouse to store crops, which were harvested at other times of the year, thus maximising its potential. The association is also considering building an additional warehouse in future, to compensate for the limited size of the existing warehouse.

Tourism

In 2009 714,000 foreign tourists entered Tanzania (*cf* 459,000 in 2000)(42). The Northern Circuit and Zanzibar currently receive the majority of tourists. The Southern Circuit with Selous Game Reserve, Udzungwa Mountains, Ruaha and Mikumi National Parks attract a significant number of visitors each year but remain less important economically.

Tourism can serve as a powerful incentive to protect natural resources, as it generates many jobs and has a large multiplier effect, with revenue spreading from hotel accommodation, food and beverages, shopping, entertainment and transport to the livelihoods of hotel staff, taxi operators, shopkeepers and suppliers of goods and services.

Tourism may also have adverse effects on local communities through, for example, exclusion of residents from traditional territories, economic dislocation, breakdown of traditional values and environmental degradation(43).

With increased tourism in Tanzania in general there is likely to be an increase in numbers of tourists on the Southern Circuit, necessitating careful planning for preservation of and access to the various destinations and attractions.

2.4.4 Education

Literacy levels are moderate in the Rufiji Basin compared to the rest of Tanzania. The 2002 Population and Housing Census reported rates ranging from 44% to 87% in the various districts, with a mean of 60%. Education levels are also generally low: only 50%-70% of men and women aged 15-49 in the corridor had completed primary education, with men scoring only slighter higher than women - and the quality of primary education is low. Education levels in Kilombero District are discussed in *Box 2.9*.

The Annual Learning Assessment Report by Uwezo '*Are Our Children Learning*', states that: "Large majorities of children lack the competencies they are expected to have developed. Too many children complete primary schooling unable to read and count at the Class 2 level. We find that children from

(41) USAID. 2005. *Training Impact Assessment of DAI PESA Project*; USAID. 2005. *DAI PESA Project Overview*.

(1) (42) UNdata.2010. World Statistics Pocketbook 2010. UN Statistics Division. http://data.un.org/CountryProfile.aspx?crName=United%20Republic%20of%20Tanzania [Accessed 17 August 2012]

(2) (43) United Nations Environment Programme (Lead Author);Peter Saundry (Topic Editor) "*Impacts of tourism and recreation in Africa*". In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, DC. Environmental Information Coalition, National Council for Science and the Environment). [First published in the Encyclopedia of Earth August 25, 2008; Last revised Date August 15, 2011; Retrieved August 17, 2012 <http://www.eoearth.org/article/Impacts_of_tourism_and_recreation_in_Africa>

some districts do much better than others; children of the better off do much better than the less well off"[44].

Completion of secondary education is also low but varies more by region. For example, in Rukwa Region, 4% of women and 16% of men completed secondary school (lowest) compared with 18% of women and 28% of men in Iringa (highest).

Primary education is obligatory and attendance is nearly equal for boys and girls, but for secondary education attendance is generally higher for boys. Morogoro is an exception with girls outnumbering boys 1.2:1.

2.4.5 Health

Public health services in SAGCOT include dispensaries, health centres, clinics and hospitals, operated by regional administrations, districts and municipalities. This system is supplemented by private providers and mission hospitals and clinics.

Over the years, there has been an increase in the number of health facilities in the Rufiji Basin. This change has been modest for districts in regions such as Morogoro and Pwani, but significant for districts in Iringa region. In many of the districts, the change has not been sufficient to cope with the increase in population (see Box 2.10), resulting in an increase in the ratio between beds and the number of people[45] . The number of doctors per head of population is very low; for example, from 2000 to 2006 in Morogoro region there was only one doctor per 45,185 persons.

Figure 2.19 Education in Kilombero District

Kilombero District has 128 Pre- Primary schools with a total number of 9,120 pupils (4,603 boys and 4,517 girls); 166 Primary Schools, of which 162 are Government owned and four under private ownership; and 41 Secondary Schools, of which 31 are Government Schools and ten are private schools. As elsewhere in Tanzania, private schools are considered to be of much higher quality than public schools. Kilombero District has a further six centres providing special education. Five are owned by the government and one is under the Roman Catholic Diocese of Mahenge. Kilombero District has three vocational training centres providing initial vocational training skills in carpentry, masonry, tailoring, welding and cooking. Total enrolment in secondary schools of boys is higher than girls, but more girls than boys attend private schools.

Schools in Kilombero, as in other areas of Tanzania, are often under-resourced. This leads, amongst other things to overcrowded classrooms, a poor learning environment in general, and a poor teaching environment for teachers. District education data also shows that there is a shortage of teachers. Truancy and drop-outs are a significant problem. These challenges are a feature at both primary and secondary school level. There is evidence, based on final primary school examination pass rates provided by the Education Department, that the quality or effectiveness of education is decreasing in the district (see table below).

Table 2.14 Final examination STD VII passing rates in Kilombero District 2006-2010

Year	Pupil who sat for examination	Student who passedSteigler	Students selected	Pass rate in (%)
2006	6,585	4,869	4,869	73.9%
2007	8,708	5,253	5,253	60.3%
2008	10,357	7482	7482	72.2%
2009	10,183	6,017	6,017	59.1%
2010	9,197	4,714	4,714	51.26%

Source: Education Dept.

The number of adults not considered to be illiterate in Kilombero District is about 45,013, representing

(3) [44] Uwezo Tanzania.2011. *Are Our Children Learning?* Annual Learning Assessment Report
(4) [45] WREM, Rufiji

14% of the District population. Women are more likely to be illiterate than men (19,706 men and 25,307 women). Up to 2011, 9283 adults have joined in various adult education Programs, including in so-called Mukeja centres, providing fast track education for adults.

Box 2.9 Health Facilities in Kilombero District

Kilombero District's health facilities include: two hospitals (Saint Francis hospital owned by Roman Catholic Church Diocese of Mahenge and ILLOVO hospital- Owned by ILLOVO Sugar Company); four Government run health centres; and 46 Dispensaries (18 are Government owned, nine are privately owned, 11 are religious owned and eight are owned by parastatal organizations). Based on 2010 population estimates, the availability of healthcare, as a ratio of health facilities per number of people in the district, is poor (1: 8,667).

As for Tanzania as a whole, Kilombero District has a serious shortage of appropriately qualified health staff. The number of health staff in 2010/2011 covered only approximately 40% of the necessary staff. The District counted only 1 medical doctor in 2010/2011. Kilombero District has a ratio of approximately one doctor per 30,000 people.

Health and nutrition status in the corridor is poor, with 30% to 50% of children showing signs of stunting (height for age, the indicator for long term poor nutrition), depending on the region. The 2010 Tanzania Demographic and Health Study (TDHS) reported that nearly 50% of rural populations only eat two meals per day. The large majority of rural populations cannot afford to eat meat on a regular basis(46). Droughts are the challenge to livelihoods most often reported by households in rural Tanzania. Between 85% and 100% of the regions in the corridor had experienced a drought in the last year, and at least one drought in the last 5 years. Morogoro and Mbeya have experienced more droughts than other regions in the corridor, while Ruvuma is least vulnerable to droughts(47). A 2009/10 comprehensive food security and vulnerability analysis by the WFP indicated that between 80% and 90% of Tanzanian households had experienced income and/or food loss during droughts.

Malaria is the leading cause of morbidity and mortality in all districts in the Rufiji Basin.

HIV prevalence in Tanzania is 5.7%, with the three worst-affected districts being located in the corridor: Iringa (16%), and Dar es Salaam and Morogoro (9% each). Conditions in the Kilombero Valley are described in *Box 5.11*.

HIV prevalence is higher among women than men in both urban and rural areas, and urban residents are almost twice as likely as rural residents to be HIV positive. This is due to a combination of a more transient population in urban areas, increased levels of prostitution and transactional sex, and the difficulty that women experience in negotiating safe sexual practices with their partners.

(5) (46) URT. 2011. TDHS 2010
(6) (47) WFP. 2010. United Republic of Tanzania - Comprehensive Food Security and Vulnerability Analysis.

Box 2.10 HIV-AIDS in the Kilombero Valley

Certain areas of the Kilombero Valley have been hard hit by HIV-AIDS. Mobility is one factor contributing to the increased risk of HIV infection. The concentration of male migrants isolated from their families, increases the demand for commercial sex. Kilombero attracts traders, migrant farmers, casual/seasonal labourers and truck drivers, all of whom are at a higher risk of HIV infection, and of contributing to its spread. Their comparative 'wealth' enables them to pay for sex, and also makes them a target for transactional sex. Many of the seasonal casual labourers recruited to work in sugar cane plantations come from areas of Tanzania which have a higher HIV/AIDS rate than Kilombero, such as Mbeya and Iringa, which increases the likelihood that they are infected. The direction of infection is not only from mobile men to local women. Culturally, it is difficult for women to negotiate safe sexual practices with their partners. Unprotected sex with multiple partners, increases the risk of HIV infection in both directions. It has been found that among farm and plantation workers in Iringa and Morogoro HIV prevalence was about 30%, compared to the general population which had an average of 7% . Given the importance of the agricultural sector in general and the heavy reliance of the rural poor on agricultural-related livelihoods in particular, the potential impacts of HIV/AIDS on agricultural production and the labour force are of great concern.

Various sources, including GoT overview of HIV infection in the country, GoT health data and Southern Highlands Senility Organization (SHISO)

Less than 10% of rural households have an improved toilet or latrine. The majority use pit latrines without a slab, or simply an open pit. More than 15% have no facility at all[48] . There are no specific cultural sensitivities with regard to sanitation in the Rufiji Basin, with the exception of the Maasai, where fathers and daughters cannot share the same sanitation facility. The main sources of drinking water in rural areas (shallow wells and springs) are more vulnerable to faecal contamination than boreholes, especially if poorly constructed. The high prevalence of sanitation-related diseases also suggests poor hygiene in homes [49].

Less than 50% of rural households in the corridor have an improved source of drinking water. Roughly half of rural water supplies are unprotected wells, while the other half are sourced from surface water. For 50% of the rural population in the corridor, it takes more than 30 minutes (round trip) to collect water each day[50].

2.4.6 Finance and Savings

Access to credit is very limited in the agriculture sector in Tanzania. Formal micro-credit institutions are often based in the larger towns and not easily accessible for smallholders in more rural areas.

In many communities, village community banks (VICOBAs) or savings and credit cooperative (SACCOs) have been established (see *Table 2.17*). Members can take short-term loans at low interest rates, after paying a weekly or monthly contribution or by paying a membership fee up front. These savings structures are considered an invaluable safeguard against unexpected illness, accident or family death. However, most rural SACCOS are very small, weak and lacking in full-time staff and administrative capacity, and they are of questionable sustainability. The requirement of a first time deposit to become a member, and/or the need for collateral make it difficult to access micro-credit in general, especially for women.

Table 2.15 Active SACCOS in Kilombero District, 2009

No. of SACCOS	Total membership	Total funds SACCOS A/C		Total loaned to members
		Shares	Savings	
84	11,357	376,964,000	551,458,000	3,826,577,000

(7) [48] URT.2011. TDHS 2010
(8) [49] WREM. Rufiji
(9) [50] URT. 2011. TDHS

Source: Cooperative Office

The Warehouse Receipt System (WRS) has been promoted in Tanzania since 2005[51], with varied success. In WRS, produce is stored in warehouses and used as collateral for financing from formal financial institutions. This allows farmers to pay back debts accrued between harvest seasons while safely storing their harvests until market prices are most competitive, rather than being forced to sell their produce immediately in order to repay debts. Where problems have been encountered, these often relate to members' misunderstanding of ownership, or poor management. WRS has been most successful when associated with cash crops such as coffee and cashews[52], [53]. The positive outcomes of WRS are that it curtails cheating on weights and measures, eases access to finance at all levels in the marketing chain, moderates seasonal price variability and promote instruments to mitigate price risks.

Some ethnic groups in Tanzania have never traditionally kept livestock. However, amongst those who do they perform a very important role in terms of both culture and livelihoods. Cattle, in particular, are considered a traditional form of 'bank' or 'savings' by the Maasai, Barabaig and Wasukuma. The more cattle a person owns, the wealthier they are and are considered to be. This is reflected in the system of 'bride price' practised by many ethnic groups, where the prospective husband's family are expected to pay in livestock for the hand of the bride. Also, many Tanzanian farmers will invest in livestock first, if their income increases.

2.4.7 Social Capital, Community Dynamics, Power and Decision-making

Social capital describes the levels of social organization, such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit within a household, or a community. At community level for example, cohesion, shared community assets, solidarity, conflict resolution, community governance and decision making are important indicators for the level of social capital in a community[54].

Community-level social relations are of great importance in Tanzania. Inclusion in community groups such as churches, mosques, the village burial society, women's groups or a political party are important measures of social inclusion. Generally the higher the level of inclusion in community social networks, the better a person's livelihood outcomes are. Research has shown that purely economic associations such as cooperatives and rotating credit groups are considered much less important[55]. Communities' links to the outside, such as at the district or regional level, are often weaker, as are relations with private sector actors. There are relatively few farmer associations in Tanzania, and formal representation of farmers in wider fora is limited.

Access to Resources and Household-Level Decision-making

Tanzania's rural services and infrastructure are very poor. Access to quality inputs (improved seeds, fertilizer, pesticides), credit and extension services are often challenging in many rural Tanzanian areas, including the Southern Corridor. Crop farming is generally rain-fed, and mechanisation limited.

Rural women in general have less access to and control over such economic and productive resources than men. Women's participation in decision-making processes that affect them is often low at all levels. Many laws, and especially customary practices, are discriminatory against women. Moreover, men have more access to and control over agricultural income (a consideration in relation to compensation for lost property such as farmland). Women tend to be dependent on their own non-farm activities for income. Women often are dependent on their husband for permission to access medical care, and continue to be more likely than men to be poor and illiterate and to be subject to gender-based violence. Some cultural groups, especially pastoralists, maintain extreme forms of gender inequality.

[51] UNCTAD. 2009. Review of Warehouse Receipt System and Inventory Credit Initiatives in Eastern and Southern Africa
[52] UNCTAD. 2009. Review of Warehouse Receipt System and Inventory Credit Initiatives in Eastern and Southern Africa
[53] USAID. 2011. Survey and Mapping of Grain Storage Facilities in Tanzania
[54] Krishna, A. & E. Shrader.1999. *Social Capital Assessment Tool*. World Bank.
[55] Narayan, D. and Pritchett, L. 1997. *Cents and Sociability. Household Income in Rural Tanzania.*

Social Conflict - (Agro)-Pastoralists in the Southern Corridor

Social relations between newcomers and rural populations are often complicated, especially where the new populations are pastoralists. In-migration by livestock herders into some areas (e.g. Ihefu – Usangu, Mbeya region and Kilosa, Kilombero and Ulanga districts (see *Box 5.12*), Morogoro Region) has had adverse impacts on social relations in these areas, and resulted in (sometimes violent) conflicts over resource use (land, water, grazing) between the newcomers and the local population. In 2006, in the largest eviction of its kind in Tanzania, large numbers of herders were evicted from Ihefu-Usangu (Mbarali Cluster, Mbeya Region), although many of these pastoralists had lived in the area since the 1970s (Walsh, 2012). Many of the evicted people were resettled in Lindi Region. However many others moved south into the Kilombero valley, especially Wasukuma agro-pastoralists. The government was poorly prepared to execute the eviction process and it was associated with negative social and economic impacts on pastoralist communities, including human rights abuses(56), (57). Another well documented example is Kilosa, where violent conflict between the local population and Maasai took place in 2000. Many Maasai have started to adopt agro-pastoralist activities, although their techniques are often rudimentary(58).

Pastoralists are often perceived as causing environmental degradation. Traditional migration patterns and free range grazing practices can put them at odds with sedentary farmers, when livestock get into fields and damage crops before they are harvested. Similarly, the increased coverage of wildlife reserves and protected areas which exclude livestock and other natural resource use, increase pressure on existing grazing. However, crop-farming, and in the context of Ihefu, rice growing in particular, and poor planning and management of hydropower reservoirs can have a greater impact on the environment than pastoralists (Walsh, 2012). More often than not it is the difference in culture, and nomadic people's ability to engage with services and the democratic processes of decision making at all levels, which impacts most on resource use and management through lack of dialogue and misconceptions and misunderstanding. Across the globe, there have been very few examples where nomadic peoples have been engaged successfully in the process of managing the resources on which they depend.

(56) PINGOs and Hakiardhi. 2007. *Report on eviction and resettlement of pastoralists from Ihefu and Usangu – Mbarali Districts to Kilwa and Lindi Districts.*

(57) Oxfam. http://www.oxfam.org/en/programs/development/tanzania-campaigning-save-pastoralists-livelihoods [accessed 10 August 2012]

(58) REPOA. 2003. *Poverty and Changing Livelihoods of Migrant Maasai Pastoralists in Morogoro and Kilosa Districts, Tanzania.* p29

Box 2.11 Pastoralism in the Kilombero Valley

Pastoralism has traditionally not been practiced in the Kilombero valley, and the first to practice this activity arrived in the valley in the 1970s. However, in the last decade the numbers of pastoralist and agro-pastoralist groups in the valley have increased. The in-migration of livestock herders has been most noticeable since 2006, with an influx of thousands of cattle and other livestock. It is reported that the pastoralists come from as far away as the Shinyanga, Arusha and Manyara regions.

The large majority are Sukuma (agro-pastoralists), many of whom arrived after they were evicted from Ihefu in 2006. Others include the Maasai and Barabaig. A total of 557 pastoralist households are currently registered in the district, with a greater but unknown number of unregistered households. Some of the pastoralists practice transhumance, in which they keep their animals in the area only in the dry season, whilst agro-pastoralists remain all year round and have farms in the valley. Today the valley supports a total of about 52,000 animals, comprising cattle, goats and sheep.

The arrival of migrant pastoralists within the Kilombero Valley has caused social upheaval due to the introduction of a new culture and a new way of life. Among the local longer term residents there is often a dislike of cattle, and farmers generally do not invest in cattle even if they have the means to do so. Usage of water points and resources is often a particular cause of conflict. The pastoralists have moved into previously uninhabited areas, and their presence is associated with increasing pressures from deforestation, all of which result in changes to the local ecosystem and to the services it provides. There has been persistent conflict between farmers and pastoralists over land use in the area, with overlap in areas suitable for both activities and limited land availability overall. Expansion for both activities within the Kidatu and Mang'ula divisions will not be possible as the two wards are surrounded by a number of protected areas and plantations.

Following a government directive, an ongoing process is being carried out at a district level to establish the carrying capacity of land in the valley, and to remove livestock where numbers exceed this capacity. Where carrying capacity is exceeded, registered pastoralists are being ordered to reduce the number of their cattle and contain their livestock within allocated areas, while unregistered pastoralists are being evicted. At the time of writing this report, an official deadline of 1st August 2012 had been announced for reduction in the numbers of cattle in Kilombero and Ulanga Districts, followed by a series of grace periods. Under this process unregistered cattle (i.e. cattle that have not been officially branded) will either have to be sold, culled or moved out of the districts. The number of cattle allowed to stay has been calculated based on the carrying capacity of available grazing. Pastoralists with unregistered cattle are to be 'encouraged' to move out of the districts, if necessary by force. However, it appears that no plan has been put in place to facilitate the process, nor has any alternative location been identified for the families to move to.

2.4.8 Migration

As discussed earlier in this chapter, the eviction of (agro)pastoralists from Ihefu – Usangu, Mbeya Region and the recent in-migration of (agro)pastoralists to different areas in Morogoro Region have let to conflict with crop-farmers and the government.

At the same time there is a major shift in population towards urban centres. Most rural to urban migrants are younger people, active in both production and reproduction [59]. Rural-to-urban and urban-to-urban mobility are both important forces driving migration at the regional level. A breakdown of migratory flows by origin and destination shows that urban-to-urban (49%) and rural-to-urban (51%) mobility are equally important.

2.4.9 Land Issues

Perceptions of the transparency of decisions concerning land and land use will be an important factor affecting success of the Program. Tanzania is an agricultural country and land is the fundamental resource - not only for cultivation: other key uses are grazing and fuelwood collection. Land governance in Tanzania is exhaustively analysed in numerous documents (see e.g. Deininger *et al.*,

[59] Muzzini, E. and Lindeboom, W. 2008. *The urban transition in Tanzania. Building the Empirical Base for Policy Dialogue*. REPOA.

2012), with key features being a strong movement for reform hampered by limited implementation and many ambiguities, resulting in a complex, slow process of formalisation, little certainty of tenure for marginalised groups and limited transferability of land. There is significant public concern over what is perceived to be "land grabbing" by investors and an increasingly vocal civil society willing to speak out on land issues.

Land Tenure and Gender

Customary practices that restrict a woman's property rights are still widespread, but steps are being taken to improve the relevant legislation. The 1999 Land Act gives Tanzanian women the right to obtain access to land, including the right to own, use and sell it, and mandates joint titling of land. The Village Land Act requires women to be represented on land allocation committees and land administration councils [(60)]. Nevertheless, the National Land Policy (1995) stipulates that inheritance of clan (tribal) land will continue to be governed by custom and tradition provided it is not contrary to the Constitution.

In most patrilineal communities (80% of ethnic groups) men control land and women are sometimes allocated small plots for subsistence farming. Men are generally considered to be the natural heads of household and rightful heirs to clan land, but inheritance customs vary for different groups. In general, in patrilineal communities, widows are entrusted with the land they cultivate or on which they live only until their children become adults or until they re-marry. In all tribes the role of the clan council or council of elders in handling inheritance issues is strong. Members of both customary and statutory institutions that adjudicate land disputes mainly tend to be men; women are under-represented[(61)].

Village land councils, which settle land disputes, comprise seven members, of whom three must be female (Ikdahl, 2008)[(62)].

([60])FAO: *Women, agriculture and rural development*
([61])FAO: Gender and Land Rights database
([62]) FAO. 2011. *The State of Food and Agriculture 2010-2011.* Rome

3 ENVIRONMENTAL AND SOCIAL MANAGEMENT PROCESS AND REQUIREMENTS

In the conceptual design of the SAGCOT program, numerous stakeholders recognized that implementation activities needed to be planned in an integrated fashion to maintain the Corridor's ecosystem functions and rich natural resource base. A number of protected areas and critical ecosystems are located within the Program area, including Selous Game Reserve, Ruaha and Mikumi National Parks, Udzungwa National Park, Kitulo National Park forest reserves and wetlands, the RAMSAR site at Kilombero and several other essential Wildlife Management Areas.

Consequently, the Government of Tanzania aims to ensure the SAGCOT Program integrates sustainability across its planning and implementation focusing on six pillars (i) balancing agricultural production and expansion with wise water use, (ii) developing land use and land capability across the Corridor with attention to continued ecosystem services, (iii) maintaining and enhancing the important protected areas in the region, (iv) improving soil and water management, (v) incorporating low-greenhouse-gas emission investments and other climate mitigation and adaptation management options whenever possible, and (vi) ensuring investments are undertaken in a manner that minimizes environmental impacts through the application of several environmental assessment tools.

In addition, there are plans to shift large tracts of land from Village lands into long term leased General lands for expanding agriculture by various land administration agents. Numerous stakeholders including many NGOs have drawn attention to potential "land grabbing" issues associated with SAGCOT and land occupancy and traditional land use rights will require several accountability mechanisms that respect national laws, follow World Bank policies and international good practice.

3.1 TANZANIAN POLICY AND LEGAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

The following section outlines the policies and regulations most relevant to the development and implementation of the Project. **Annex 4** provides a table describing the relevant legislation.

The main legislations guiding the ESMF implementation are:

- National Environmental Policy (1997).
- The Environmental Management Act (Cap. 191) of 2004.
- Environmental Impact Assessment and Audit Regulations, 2005.

3.1.1 *National Environmental Policy (1997)*

The National Environmental Policy seeks to provide policy guidelines and plans to guide the determination of priority actions, and to monitor and regularly review policies, plans and Programs. It further provides for sectoral and cross-sectoral policy analysis in order to achieve compatibility among sectors.

The National Environment Policy provides a framework for environmental protection in Tanzania. The policy requires that project development be done in a way that does not compromise the environmental integrity. It stipulates that the chosen technologies should be environmentally sound, socially acceptable and economically viable.
On addressing the issues of poverty alleviation, the policy focuses on the satisfaction of basic needs of citizens with due cognizance to protecting the environment. Article 46 emphasizes issues of food security and eradication of rural poverty through the promotion of production systems, technologies and practices, which are environmentally sound. Further relevant provisions of this policy are in article 32 which refers to the development of biodiversity and wildlife and Article 45 which cites the importance of internalizing environmental considerations into sectoral policies and Programs, which is fundamental to sustainable development. Other articles are 48(c) and 56 (f) which advocate for technologies that use water efficiently, provides wastewater treatment and protection of workers'

health from environmental health hazards.

The NEP advocates the adoption of Environmental Impact Assessment (EIA) as a tool for screening development project which are likely to cause adverse environmental impacts. It stipulates the establishment of a legal regime requiring EIA to be mandatory for all development projects, including projects such as those to be initiated under SAGCOT.

3.1.2 Environmental Management Act, Cap 191, 2004

The Environmental Management Act (EMA) CAP 191 No. 20 of 2004) provides the legal and institutional framework for the management of the environment and implementation of the nation's environmental policy. The legislation is the framework that facilitates coherent administration of the environment in the country.

Section 81 of the Environmental Management Act (EMA) cites the obligation to undertake an EIA prior to the commencement or financing of a project which is still required even if the Proponent has a permit or license under any other written law. Section 81 also cites that not undertaking an EIA when required is an offence. Section 82 refers to EIA regulations and guidelines by which EIAs will be conducted under the EMA and states that where *"law requires an EIA to be done in respect of any project or undertaking and the manner in which an EIA is to be done, then it is not necessary to apply standards stipulated… in the Act unless the standards prescribed under the law doesn't meet minimum standards…".*

The EMA, as described in Part VI EIA and Other Assessments, also empowers the National Environmental Management Council (NEMC) to screen, review and determine the types of development projects subject to EIA study. The Act outlines projects that require a full EIA or those that may be subjected to full EIA, after NEMC determination. Under this Act, the NEMC is mandated to undertake enforcement, compliance, review and monitoring of environmental impact assessment and has a role of facilitating public participation in environmental decision making, exercise general supervision and coordinating over all matters relating to the environment.

3.1.3 SEA Regulations, 2008

SEA Regulations (2008) under Section 230 (2) of the Environmental Management Act (CAP. 191) requires a Strategic Environmental Assessment (SEA) when (a) a Bill which is likely to have an effect on the management, conservation and enhancement of the environment or the sustainable management of natural resources; (b) when promulgating regulations, policies, programs and development plans; and (c) when any major mineral or petroleum resource is identified or when a major hydroelectric power station or water project is being planned.

The SEA must contain: (a) a full description of the policy, Bill, legislation, strategy, program or plan being considered; (b) identification, description and assessment of the positive and negative effects of the implementation of the proposed document on the environment and the sustainable management of natural resources; (c) identification, description and assessment of the likely effects of alternative means to meet the objectives of the proposed instrument; and (d) identification, description and assessment of a range of practicable measures that could be taken to avoid, mitigate or remedy any adverse effects that may result from the implementation of the proposed policy, Bill, legislation, strategy, program or plan being considered.

3.1.4 Environmental Impact Assessment and Audit Regulations, 2005

The Environmental Impact Assessment and Audit Regulations No.349 of 2005 were made pursuant to Section 82 (1) and 230 (h) and (q) of the Environmental Management Act. The regulations provide the procedures and requirements for undertaking ElAs for various types of development projects with significant environmental impacts. In addition the Regulations provide a list of projects that qualify for Environmental Assessment procedures in Tanzania. The regulations set out in detail the process to be followed in conducting an EIA, the form and content of EIAs, the review process, decision-making processes and appeals. The EIA steps are elaborated in **Annex 5.**

Regulation 46(1) classifies projects into two types: (i) Type A Projects requiring a mandatory ElA; and. (ii) Type B projects requiring a Preliminary Environmental Assessment (PEA). The First Schedule lists typical examples of Type A and B projects. Some of the sub-projects in the proposed area may fall under the category of projects that require mandatory Environmental Assessment. Item twenty two (i) and (vii) of the First Schedule refers to land development planning, land reclamation, housing and human settlement, and resettlement/ relocation of people and animals and development of residential and commercial estates on ecologically sensitive areas, including beach fronts as projects that require a mandatory EIA. The steps that must be taken to conduct an EIA are provided in the Fourth Schedule, whilst Regulation 16 directs that the EIA study, in addition to environmental impacts, also must address social, cultural and economic impacts. Regulation 17 stipulates the need for public participation during the EIA process and Part V, Regulations 18 (1), (2) and (3) directs the content and format of the EIS.

According to this regulation, the investor first registers the project, by submitting Form EA1 to NEMC, with brief outlining details of the project and its likely impacts. The regulations advocate for periodic and independent reassessment and that the outcome of such assessment will serve to provide instructive feedback into the environmental management process. Environmental Impact Statement (EIS) is then submitted to the Technical Advisory Committee (TAC) coordinated by NEMC for review. The proponent will cover the costs related to all the EIA process requirements for the project. In carrying out EIA, these Regulations have steps set out in the Fourth Schedule.

According to the national EIA legislation, EIA is mandatory for projects known to cause adverse environmental and social impacts. Projects listed in Schedule 1 in the National EIA Procedure and Guidelines should undertake a full EIA as shown in **Annex 6A**. For projects listed in Schedule 2 of the guidelines in Tanzania mainland may or may not require a full EIA as shown in **Annex 6B.**

3.1.5 Registration of Environmental Experts

Regulation 31 of GN No. 349/2005 directs the Registrar of Environmental Experts to publish each year in the Gazette and the media the list of individual persons dully certified and registered by the National Environment Management Council as Environmental Experts in the referred year. New applications should be submitted to the Council annually. The experts are entitled to undertake environmental impact assessments and audits of development projects in mainland Tanzania.

3.2 LAND ADMINISTRATION

The principle laws governing land tenure and administration in Tanzania are the Land Act (No. 6), 1999 and the Village Land Act (no. 7), 1999. The Land Act confirms the National Land Policy directive that all land in Tanzania is public land vested in the President as trustee on behalf of all citizens. The Land Act is intended to give legislative backing to the fundamentals of the National Land Policy, by classifying and defining tenure rights over land, land administration procedures, rights and incidents of land occupation, granted rights of occupancy, conversion of interests in land, dispositions affecting land, land leases, mortgaging of land, easements and analogous rights, co-occupation and partitioning and settlement of land disputes. The Act lays down fundamental principles for occupying and using the land. Among them is the principle that any land user shall ensure that land is used productively and that any such use complies with the principles of sustainable development.

The key private right to land is the right of occupancy, which is a right for a term of years (99, 66 or 33 years depending on the circumstances and the recipient). According to the Land Act, the right of occupancy is given in two categories that separate the rights of citizens and non-citizens to occupy land.

(i) A citizen or a group of two or more formed in association, partnership or corporate body will enjoy the right of being granted the right of occupancy or derivative of a granted right of occupancy.

(ii) A non-citizen, or a group, whether formed into a corporate body under the Companies

Ordinance or otherwise, (including corporate bodies whose majority shareholders or owners are non-citizens) may only obtain a right of occupancy or derivative right for purposes of investment prescribed under the Tanzania Investment Act 1997.

Tanzanian land falls into three categories, namely:

Reserved Land is land set aside for wildlife, forests, marine parks, etc., and the way these areas are managed is explained in the laws that protect each sector (e.g. Wildlife Conservation Act, National Parks Ordinance, Marine Parks and Reserves Act, etc.). Specific legal regimes govern these lands under the laws which established them. About 28% of Tanzanian land is Reserved Land.
Village Land includes all land inside the boundaries of registered villages, which the Village Councils and Village Assemblies are given power to manage. The Village Land Act governs the land and gives details of how this is to be done. Village Land comprises approximately 70% of the land in Tanzania, and most land available for agriculture land in the SAGCOT region would fall into this category.

General Land is land which is neither reserved land nor village land and is therefore managed by the Commissioner of Lands. The Land Act governs this land which amounts to around 2% of the land in the country, primarily in urban areas.

Although a custodial duty over land is vested in the President, land administration is undertaken by specific officers legally mandated. While for General Land the overall duty is vested in the Commissioner for Land, for Village Land the duty is vested in the Village Council.

The starting point for a village to assert authority over village land is the issuance of a certificate of village land by the Commissioner for Land. Under support from the World Bank PSCP, 82 villages in the Kilombero Valley region will have village boundaries surveyed and with village land certificates finalized by October 2012. There are approximately 5000 villages in the SAGCOT Corridor and the survey and certificate program for the remaining villages are waiting allocation of resources to complete these tasks. Another 428 are on the priority list to survey this year. The certificate is issued in the name of the President, conferring upon the village council the functions of management of the village Land and affirming the occupation and use of the village land by the villagers in accordance with the customary law applicable to land in the area where the village is located.

Upon receiving a certificate of village land, village councils have the power to engage in a number of activities related to land administration and planning. This includes

- Land use planning: The village land use planning process is a participatory process by which the village divides land into the following three categories: (i) communal village land such as land for schools, pasture or forest land; (ii) individual and family land for housing and for farms; and (iii) land which is reserved and may be made available for either communal use or individual occupation and use.

- Confirmation and registration of individual land rights. The Village Land Act provides for a process by which village councils issue certificates of customary rights of occupancy to villagers for the land they occupy and cultivate, and the maintenance of a registry of those rights.

- Allocation of land to investors. The village council has the power to allocate land or enter into joint ventures involving the use of land by domestic investors, subject to various size qualifications and approvals from other branches of government.

Foreign investors cannot obtain land directly from a village council. Instead, in order for village land to be allocated to a foreign investor, it must first undergo a legal conversion from village to general land. The President is empowered to approve such a conversion where he is of the opinion that it would be in the public interest to do so.

3.3 WORLD BANK SAFEGUARD POLICIES AND REQUIREMENTS

The Project has been assigned an EA Category A given the potential adverse environmental and social impacts within the project's area of influence. All World Bank safeguard policies are listed below with descriptions for policies triggered by the Project:

Applicable?	Application of safeguards
Yes	Environmental Assessment (OP/BP/GP 4.01) The project will promote expanded investment in agribusiness leading to intensified commercialized agriculture and employment generation across agricultural value chains in the Southern Corridor. Given the project's scale and its location in a region with many environmentally sensitive areas with high biodiversity and numerous Critical Natural Habitats, the policy is triggered.
Yes	Natural Habitats (OP/BP 4.04) There are numerous critical natural habitats and natural habitats (mainly forests and wetlands) in the corridor, some of which may be degraded or converted by the Bank-financed activities. Therefore the policy is triggered.
Yes	Forests ((OP/BP 4.36) There are numerous natural forests and critical forest areas within the corridor. Project-related activities have the potential to affect the health and quality of these forests and the rights and welfare of local residents dependent on forest resources. Therefore the policy is triggered.
Yes	Pest Management (OP 4.09) Some of the project activities are likely to promote intensive commercial agriculture in tropical and subtropical environments with significant pest and disease control challenges, so the Policy is triggered.
Yes	Physical Cultural Resources (OP 4.11) The corridor covers about one third of Tanzania's land area and therefore likely contains physical cultural resources, including culturally significant natural sites. However most remain undocumented. Some SAGCOT-related activities will involve significant earthworks and land use change and therefore have the potential to directly affect PCR. Therefore the policy is triggered.
Yes	Involuntary Resettlement (OP/BP 4.12) World Bank project investments will not be used directly for land acquisition for agriculture, but may be used to acquire land for last-mile infrastructure such as roads and/or for agro-processing facilities. In addition some environmental conditionality may restrict residents' access to natural resources, and the SAGCOT program as a whole will involve significant changes in land ownership and use, with associated reputational risks to the Bank. Therefore the policy is triggered.
Yes	Indigenous Peoples (OP 4.10) SAGCOT-related activities will be undertaken in areas used by livestock herders belonging to the Barabaig ethnic group, which is officially recognized as an indigenous group in Tanzania under the World Bank's policy. Therefore this policy is triggered.
Yes	Safety of Dams (OP/BP 4.37) As the World Bank SAGCOT Project is designed, there will not be any funds used for dam construction. However, project activities might rely on the performance of an existing dam or a dam under construction. Therefore this policy is triggered.
No	Projects in Disputed Areas (OP/BP/GP 7.60) There will not be any activities in disputed areas.
No	Projects on International Waterways (OP/BP/GP 7.50) Project activities are expected to focus within areas which do not contain any river, canal, lake or similar body of water that forms a boundary with another state. As the specific location of project activities are not all known at this time, all subprojects will be screened to identify the potential for triggering the policy. . In case that any future project activity might trigger OP 7.50, riparian states of the proposed activity will be formally notified as early as possible.

3.4 APPROACH TO ENVIRONMENTAL AND SOCIAL MANAGEMENT IN SAGCOT

The World Bank-financed Project has triggered World Bank OP 4.01: Environmental Assessment, OP 4.04: Natural Habitats, OP 4.36: Forests, OP 4.09: Pest Management, OP 4.10: Indigenous Peoples, OP 4.12: Involuntary Resettlement, OP4.11: Physical Cultural Resources, and OP 4.37: Safety of Dams. In order to satisfy the requirements of the World Bank's OP 4.01 (Environmental Assessment) for

Category A projects, the following documents have been prepared: (i) an Environmental and Social Management Framework (presented herein); (ii) a Resettlement Policy Framework (RPF); and (iii) a Stakeholder Analysis, Participation and Consultation Plan; (ii). Additionally a Strategic Regional Environmental and Social Assessment (SRESA) of the SAGCOT Program has been prepared and is currently being finalized).
The objective of the ESMF is to outline the mandatory procedures to be applied to the World Bank-financed Project investments to ensure the effective management of associated environmental and social issues. It seeks to both enhance environmental and social development benefits of the project and mitigate any adverse impacts, in line with GOT and World Bank policies and guidelines on management of environmental and social issues. Since the precise locations and potential impacts of future subprojects are not known, and cannot be identified prior to appraisal, the ESMF provides the basis for the environmental and social preparation needed for the subproject investments to be supported under Component 2.

The ESMF comprises a main body with supporting information assembled into several annexes. The main body of the ESMF (a) establishes clear procedures and methodologies for the environmental and social assessment, review, approval and implementation of investments to be financed under the SAGCOT Catalytic Fund (Component 2); (b) specifies appropriate roles and responsibilities and outlines the necessary reporting procedures for managing and monitoring environmental and social concerns related to Project investments; (c) determines the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMF; and (d) proposes a budget to implement the recommendations outlined in this document.

The ESMF will apply to all SAGCOT supported investments funded under Component 2 only. Activities funded under Component 1 are not expected to trigger any safeguards policies, given their focus on institutional capacity building and do not include any civil works. That said, Component 1 capacity building activities will include efforts to improve environmental and social management within project agencies.

The annexes contain relevant material referenced throughout the document. The Operational Tools and Guidelines provide the resources needed for implementing the Catalytic Fund Subproject Environmental and Social Review, Appraisal, Monitoring and Reporting Process.

Regarding resettlement, since the extent and location of project investments is not known at this time, and any potential resettlement will only be identified when sub-projects are being assessed, the RPF establishes the resettlement objectives and principles, organisational arrangements and funding mechanisms for any resettlement associated with the World Bank-financed Project.

In order to evaluate the environmental and social issues associated with the broader SAGCOT Program, the overarching objective of the SAGCOT SRESA, together with the other safeguard tools, is to improve the investment decisions of all the different stakeholders by identifying environmental and social issues (both opportunities and constraints) and mainstreaming them into the development planning process. The SRESA aims to look at broader cumulative impacts associated with the broader SAGCOT Program, along with other ongoing activities within the Project Area. Toward this aim, the SRESA includes a scenario analysis of more detailed environmental and social issues in one prominent cluster (the Kilombero Cluster) in order to: i) identify potential Program and Project impacts; ii) highlight areas where future work is needed to manage those impacts; and (iii) iii) develop an initial database for monitoring project-related agribusiness investment impacts in the Corridor. The scenario assessment and monitoring approaches may be applied to a broader range of investment clusters by the SAGCOT Centre and related government authorities.

3.5 INTERNATIONAL GOOD PRACTICE

In addition to the International Conventions signed and/or ratified by the GoT (refer to **Annex 4**), there are a number of good practice guidelines that should apply to SAGCOT covering the topics of governance and land tenure, and labor and human rights as described below.

3.5.1 *Governance and Land Tenure*

The governance of tenure is a crucial element in determining if and how people, communities and others are able to acquire rights, and associated duties, to use and control land, fisheries and forests. The FAO *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security* (11 May 2012) aims to improve tenure governance by providing guidance and information on internationally accepted practices for systems that deal with the rights to use, manage and control land, fisheries and forests. The Guidelines provide information divided into the following:

- Part 3: Legal recognition and allocation of tenure rights and duties which covers safeguards, public land, fisheries and forests, indigenous peoples and other communities with customary tenure systems, and informal tenure.
- Part 4: Transfers and other changes to tenure rights and duties which covers markets, investments, land consolidation and other readjustment approaches, restitution, redistributive reforms, and expropriation and compensation.
- Part 5: Administration of tenure which covers records of tenure rights, valuation, taxation, regulated spatial planning, resolution of disputes over tenure rights, and transboundary matters.
- Part 6: Responses to climate change and emergencies which covers climate change, natural disasters, and conflicts in respect to tenure of land, fisheries and forests
- Part 7: Promotion, implementation, monitoring and evaluation.

Further information can be found on http://www.fao.org/nr/tenure/voluntary-idelines/en/

3.5.2 *Distribution and use of pesticides*

Pesticide use and management will be guided by the Agricultural Sector Development Project (ASDP) Integrated Pest Management Plan which provides appropriate guidance for IPM in the agricultural sector in Tanzania. To support this, SAGCOT will also apply the standards set under the *International Code of Conduct on the Distribution and Use of Pesticides* which encourage responsible and generally accepted trade practices and sets out the "conduct for public and private entities engaged or associated with the distribution and use of pesticides." The Code is designed for use within the context of national legislation as a basis whereby government authorities, pesticide manufacturers, those engaged in trade and any citizens concerned may judge whether their proposed actions and the actions of others constitute acceptable practices. In addition, it describes the shared responsibility of many sectors of society to work together so that the benefits to be derived from the necessary and acceptable use of pesticides are achieved without significant adverse effects on human health or the environment.

Further information can be found on http://www.fao.org/docrep/005/y4544e/y4544e00.htm

3.5.3 *Labor and Protection of Human Rights*

The SAGCOT will promote socially responsible agricultural development. Decent working conditions should be ensured, including safety in the workplace, respect for labor standards, and participation of all actors in the value chain. Gender equity and youth employment should be emphasized to ensure that the disadvantaged, especially women and youth, have an equal opportunity to participate. The *International Labour Organisation (ILO) and UN Convention on Rights of the Child and Protection of the Rights of all Migrant Workers and Members of their Families* sets the standards for ensuring the protection of human rights and safeguarding the interests of workers, child labour, and the supply chain.

Some of the key ILO Conventions include:

- ILO Convention 87 on Freedom of Association and Protection of the Right to Organize
- ILO Convention 98 on the Right to Organize and Collective Bargaining

- ILO Convention 29 on Forced Labor
- ILO Convention 105 on the Abolition of Forced Labor
- ILO Convention 138 on Minimum Age (of Employment)
- ILO Convention 182 on the Worst Forms of Child Labor
- ILO Convention 100 on Equal Remuneration
- ILO Convention 111 on Discrimination (Employment and Occupation)
- UN Convention on the Rights of the Child, Article 32.1

Further information can be found on http://www.ilo.org/global/standards/lang--en/index.htm

4 INSTITUTIONAL FRAMEWORK

The Project is supporting several agencies as discussed previously. The majority of the support is directed at the Catalytic Fund with smaller amounts to the other institutions - Tanzania Investment Centre, SAGCOT Center, RUBADA, and the Ministry of Lands, Housing and Human Settlement Development. There are several other coordinating and oversight agencies: the Prime Minister's Office, the Vice President's Office and NEMC which play a role in the implementation of the Project. Section 4.1 discusses the possible approaches for addressing safeguard provisions across the SAGCOT Centre, Tanzania Investment Centre, Rubada, and The Ministry of Lands, Housing, and Human Settlement Development. It is important to note that at the drafting of this ESMF, the Catalytic Fund was only in its conceptual stage and there were still a number of administrative structures that required confirmation and approval. Likewise, the exact nature of technical assistance that will be provided by the World Bank to the institutions mentioned has not been defined.

4.1 ROLES AND RESPONSIBILITIES IN THE SAGCOT PROJECT

The primary institutions being supported under the World Bank project are listed in **Table 4.1**.

4.1.1 *Catalytic Fund*

The Fund Manager(s) will identify, finance, and develop viable investments across the value chain in the Corridor. It will also assist in the process of raising third-party commercial finance once the opportunities are "investment ready". In the process, the Fund Manager will ensure that projects are developed in ways that maximise a range of financial, economic, social and commercial developmental impacts.

The Fund Manager(s) shall have the mandate and function of: (a) raising additional Funds subject to the consent of the Board; (b) preparing the investment pricing policy of the Social Venture Capital Fund for approval by the Board; (c) marketing the Funds, (d) approval of applications and (e) operational management of the Funds.

The bulk of World Bank support will go to the Catalytic Fund via the Matching Grant Facility. Therefore, the CF must have in place a set of procedures that assure compliance with both GoT environmental regulations and World Bank safeguards which are described in Chapter 6 of the ESMF and Annex 7: ESMF Operational Tools and Guidelines.

4.1.2 *SAGCOT Centre*

As the key coordinator of the SAGCOT Program with numerous cross-cutting roles, the SAGCOT Centre will be instrumental in communicating the principals of sustainable investment across stakeholders in both the public and private sector. To accomplish this mandate, the SAGCOT Centre will need to have the capacity to (i) keep stakeholders current regarding environmental and social issues surrounding development in the Corridor, (ii) communicate to potential investors in collaboration with TIC and Rubada the sustainable and green investment principles SAGCOT will promote (iii) be the first "stop" for all investments regarding transparent land transfer requirements (iv) provide preliminary information on clean technology and reduced carbon footprint opportunities for investors; and (v) guide investors in good practice for consultation and engagement with local villagers and communities. Finally, the SAGCOT Centre will also be the focal point for annual reporting on safeguard progress across the implementing agencies and organizations to the World Bank.

4.1.3 Tanzania Investment Centre (TIC)

TIC will assist in incorporation and registration of enterprises; promote both foreign and local investment activities; and grant certificates of incentives. As the first port of call, the TIC will need to develop a set of guidelines for potential investors that discuss the principles of sound sustainable agriculture development in the Corridor. These principles will cover the following topics: (i) reliable information of land availability with maps (in a modern GIS format), (ii) information liking land suitability to potential crop production, (iii) transparent methods for land transfer, registration and leasing arrangement, (iv) land lease revenue options or equivalent, (v) corporate social reasonability and community development funds, (vi) the role of grievance mechanism, tribunal or adjudication assurance for investors and villagers, (vii) and realistic road blocks and ways to navigate around these complex issues. The guidelines will be developed from technical information that comes from both RUBADA and the MLHHSD.

Table 4.1 World Bank SAGCOT Project Supported Implementing Agencies and Organizations indicating role and associated Environmental and Social issues and applicable Regulations, Policies and Good Practice

SAGCOT Implementing Member and Role	*Key Environmental and Social Responsibilities*	*Applicable Tanzanian Regulations, World Bank policies and International Good Practice (GP)*			
		Tanzanian Regulations	*World Bank Policies*		*International GP*
Catalytic Fund (CF) The Fund Manager will identify, finance, and develop viable investments across the value chain in the Corridor. It will also assist in the process of raising third-party commercial finance once the opportunities are "investment ready". In the process the Fund Manager will ensure that projects are developed in ways that maximise a range of financial, economic, social and commercial developmental impacts.	Identify all potential environmental and social impacts in specific MGF and SVCF applications Conduct E&S Screening and Review all applications Complete an ESAP for all subprojects moving towards approval Verify all GoT and World Bank E&S requirements are satisfactory Ensure applicants understand E&S requirements Verify there is accountability for transparent and legal land access or transfers for subprojects Conduct annual; monitoring of all Cat A subprojects and a sample of all other subprojects for adherence to the ESAP Report annually on the E&S status and associated activities.	Environmental Legislation and Acts Land Act Village Land Act	The following OPs have been triggered by the Project, specifically under the CF: OP 4.01: Environmental Assessment OP 4.04: Natural Habitats OP 4.36: Forests OP 4.09: Pest Management OP 4.10: Indigenous Peoples OP 4.11: Physical Cultural Resources OP 4.12: Involuntary Resettlement OP 4.37: Safety of Dams		FAO Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security FAO Code of Conduct on the Distribution and Use of Pesticides International Labour Organisation (ILO) and UN Convention on Rights of the Child and Protection of the Rights of all Migrant Workers and Members of their Families

SAGCOT Implementing Member and Role	*Key Environmental and Social Responsibilities*	*Applicable Tanzanian Regulations, World Bank policies and International Good Practice (GP)*			
		Tanzanian Regulations	*World Bank Policies*		*International GP*
SAGCOT Centre The Centre is promoting the SAGCOT program partnership, identifying business opportunities; assisting access to finance; promoting public- private partnerships; and, providing aspects of monitoring and evaluation.	Central coordination of E&S issues communicating the principals of sustainable investment across stakeholders in both the public and private sector. To accomplish this mandate, the SC will need to have the capacity to (i) keep stakeholders current regarding environmental and social issues surrounding development in the Corridor, (ii) communicate to potential investors in collaboration with TIC and Rubada the sustainable and green investment principles SAGCOT will promote (iii) be the first "stop" for all investments regarding transparent land transfer requirements (iv) provide preliminary information on clean technology and reduced carbon footprint opportunities for investors; and (v) guide investors in good practice for consultation and engagement with local villagers and communities				FAO Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security
TIC Assist in incorporation and registration of enterprises, promote both foreign and local investment activities, grant certificates of	Transparent allocation of lands according to viable land suitability Early identification of lands adjacent to important protected areas and other ecosystem and biodiversity		OP 4.10 and OP 4.12 have been triggered by the Project and outline requirements for addressing landtake and indigenous people		**FAO Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security** **WB Interim Guidance on Land**

SAGCOT Implementing Member and Role	*Key Environmental and Social Responsibilities*	*Applicable Tanzanian Regulations, World Bank policies and International Good Practice (GP)*			
		Tanzanian Regulations	*World Bank Policies*		*International GP*
incentive.	issues Promotion of sustainable land management goals				**Use Planning: Good Practice** ✓Conduct analysis of legal structures for land administration, titling process and grievance mechanisms ✓Undertake an assessment of the agency to determine their ability to undertake the proposed activities ✓Provide policy advise to agency on involuntary resettlement issues and potential legal and technical gaps ✓Provide advise on good practice for social assessments to agency ✓Advise Borrower on issues when resource use and access is predicted to change ✓Include loan covenants or other legal binding agreements as necessary to ensure moratorium on demolitions and other necessary measures to reduce Bank safeguard risk ✓Ensure agency has conducted appropriate community and civil society consultation with representative participation across affected parties and vulnerable stakeholders – provide clear documentation for all meetings, discussions and agreements ✓Include social specialist (and environmental specialist) in supervision to verify compliance with social (and environmental) covenants

4.2 ADDRESSING ENVIRONMENTAL AND SOCIAL SAFEGUARDS IN THE SAGCOT AGRIBUSINESS SUPPORT INSTITUTIONS

Since World Bank funding will be used to improve the administrative and policy mandates of these institutions and not direct financing of land acquisition and project investments on the ground in these agencies, the World Bank safeguard policies do not directly apply to this activity. However, a set of capacity strengthening activities are incorporated to strengthen the capacity of implementing agencies in managing the environmental and social risks associated with their broader programs. Ultimately, these measures assist in improving transparency and good environmental and social governance.

Where appropriate, such risks in the case of SAGCOT include supporting the identification of appropriate and available land suitable for investor objectives (e.g., soil type, geology, hydrology, etc); potential conflicts regarding land occupancy/tenure of targeted land deals; potential threats to ecosystem services (e.g. maintaining existing living resources, assuring water availability, identifying multiple resource users and avoiding degradation of soils, vegetative cover, and protecting biodiversity and critical natural resources).

Concerns about potential "land grabbing" have surfaced in both national and international forums and these topics will not go away. Integrated regional planning across the Corridor needs to expand the degree of transparency and accountability across these land management institutions. With today's electronic and social connectivity, land availability, village land transfer, village land use plans, and potential land use change must be managed in a well organized and publically available spatial information system. This process must also link local and national development planning in a more integrated manner. The World Bank and other development partners have been supporting pieces of these advancements across numerous GoT agencies, but there is much more work to be done to bring these pieces together. The parallel Strategic Regional Environmental and Social Assessment (SRESA) integrates many of these issues.

4.3 INSTITUTIONAL OVERSIGHT

SAGCOT as a program links across many public and private entities and the Prime Minister's Office is taking the lead role of coordination. The World Bank project is also required to comply with a number of GOT environment and social mandates.

4.3.1 *The Prime Minister's Office*

Throughout the planning and preparation stage of the World Bank SAGCOT project, the PMO has served as project coordinator. In this role, the Permanent Secretary is the lead authority guiding and coordinating all administrative and management across the SAGCOT public stakeholders. In an agreement with the VPO all technical reports and deliverables by the ERM environmental and social advisory technical team will be reviewed and cleared with a note to the PMO.

4.3.2 *The Division of Environment (DoE)*

The DoE is involved at a more strategic level and is responsible for coordination and oversight of Strategic Environmental Assessments and environmental policies. As such, the office of the Director of the Environment is responsible for promoting the integration of environmental considerations into development policies, plans, programs, strategies and projects. The SRESA will be submitted to the DOE for review and comments. They also work with various agencies on environmental mainstreaming and serve as the focal point for all issues related to environment and climate change.

4.3.3 *The National Environmental Management Council (NEMC)*

NEMC is responsible for screening (allocating the appropriate level of the EA) and reviewing large investments and projects of national significance. They will also review the adequacy of EIAs (including Environmental Management Plans/Environmental Monitoring Plans) and recommendations to the government for approval and clearance of EIA Certificates for projects. This procedure will apply to sub-projects under SAGCOT and funded by the Catalytic Fund (Component

2) that after screening will be required to undergo an EIA. Thus, in case some of the sub-project activities under the SAGCOT fall under the list of project prescribed for full and mandatory EIA then, EIA studies will have to be conducted before implementation of such sub-project activities.

5 IMPACT ANALYSIS AND PROPOSED MITIGATION MEASURES FOR THE SAGCOT PROGRAM

The objectives of the SAGCOT Program are to have long-term positive socio-economic impacts throughout the Corridor, focused on the priority clusters. Through the Catalytic Fund, the Bank-supported Project aims to provide opportunities for smallholder producers to engage in profitable agriculture, support agribusiness investment and development in the corridor along the value chain, and build supply chains which include smallholder and emergent farmers and benefit rural communities. However, the overall SAGCOT Program is also likely to have significant potential environmental and social impacts associated with numerous development challenges in the region and its important biodiversity and related ecosystem services as discussed previously. Such concerns raise the level of scrutiny for all development schemes across the Corridor.

World Bank funding under the project will be also used in part to support administrative and policy enhancements through technical assistance to the SAGCOT Centre and TIC. World Bank safeguard principles will be incorporated into this technical support, but the nature of safeguards application differs from the project activities involving on-the-ground investments that will be supported in the Catalytic Fund. When the World Bank supports strategic planning and policy revisions across these institutions, where potential environmental and social impacts may be significant but indirect or undefined, safeguard concerns are addressed by ensuring that the supported processes are informed by robust analysis of potential downstream environmental and social impacts. Under the leadership of the Government of Tanzania, key Development Partners (including the World Bank and other partners) are working to support the incorporation of such elements into the overall SAGCOT Program.

The following section presents an overview of the potential environmental and social impacts associated with the overall SAGCOT Program and World Bank-supported SAGCOT Project. This analysis draws from the draft SRESA. The ESMF incorporates mitigation measures for those potential impacts associated with the World Bank-supported SAGCOT Project.

5.1 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF SAGCOT PROGRAM AND BANK-FINANCED PROJECT

The objectives of the SAGCOT Program are to have long-term positive socio-economic impacts throughout the Corridor, focused on priority clusters. Through the Catalytic Fund, the Project aims to provide opportunities for smallholder producers to engage in profitable agriculture, support agribusiness investment and development along the value chain, and build supply chains which include smallholder and emergent farmers and benefit rural communities. However, the SAGCOT Program is also likely to have significant environmental and social impacts associated with the numerous development challenges in the region and the Corridor's important biodiversity and ecosystem services. Such concerns must raise the level of scrutiny for all development schemes in the Corridor.

World Bank-supported SAGCOT Project

A majority (75%) of the Bank's loan will be directed to support of the SAGCOT Catalytic Fund. Activities eligible for Matching Grants Fund financing, e.g. warehouse refurbishment or improvement of product grading systems, will be small scale and with very limited potential for negative social or environmental impacts. The ESMF thus includes measures to address these localized negative environmental and social impacts (in relation to, e.g., land acquisition, livelihoods, water and wildlife).

Most of the remainder of the Bank's loan (22%) will be directed towards support for two key SAGCOT institutions. The project will (i) finance the core functions of the SAGCOT Centre which is tasked with facilitating the entire SAGCOT Program, and (ii) support core functions at the TIC, including its ability to attract agribusiness investment. These two organisations are central to the operations of the SAGCOT Program, and by building capacity for improved environmental and social management, the

project will contribute to improved management of those issues for the overall SAGCOT Program

SAGCOT Program as a Whole

The short-term economic impacts of SAGCOT investments will be significant and positive. However, until clear mechanisms for ensuring fair compensation and sustained smallholder and community benefits have been designed and implemented, the benefits of these positive impacts will not accrue equitably to the various stakeholders and interest groups. Those who may not receive benefits may include pastoralists, unless they are included in land use planning and decision-making.

The impacts of the SAGCOT Program on the corridor as a whole will vary from cluster to cluster, but with a disproportionate impact on wetlands since these are actively targeted by investors for irrigation development and they currently have little effective protection.

Through land conversion and by encouraging in-migration, without suitable mitigation and control measures SAGCOT investments would likely accelerate and intensify existing trends of habitat degradation, fragmentation and loss, with negative consequences for biodiversity including severance of strategic wildlife corridors and an increase in the risk of local extinctions. Critical Natural Habitats may be affected. Large irrigation schemes and multiple small schemes would have significant hydrological effects with negative consequences downstream, including impacts on water quality as well as dry season flows. These processes would affect the sustainability of SAGCOT's benefits.

However, if SAGCOT is implemented using a "green growth" approach, and with positive actions to promote gender equality and climate change mainstreaming, the Program has the potential to achieve significant economic development with limited negative environmental and social impacts.

Cumulative Impacts: Scenario Assessment of Kilombero Valley

Because of the scale and complexity of the corridor a single cluster with significant investor and donor interest - the Kilombero Cluster - was identified as a case study for the Strategic Regional Environmental and Social Assessment. The Kilombero River provides two-thirds of the total flow of the Rufiji River, Tanzania's largest watercourse. The cluster is located in the Kilombero Valley of which the main feature is East Africa's largest wetland, a seasonally flooded grassland some 260 km long and up to 52 km wide, surrounded by farmland, miombo woodland, the Mahenge Mountains to the south and the forested Udzungwa Mountains to the north. In 2002 the Valley was designated a Ramsar site in recognition of its international importance as a wetland, in particular as home to the Africa's largest population of the near-threatened puku antelope. In recent years rapid population growth and in-migration, conversion of the woodland and grassland to farms and settlements, a major incursion of cattle and illegal hunting have led to very significant drops in both wildlife numbers and the productivity of the fishery. There is also some evidence of reduced dry season river flows.

Spreadsheet scenarios modelling agricultural change in the Kilombero Valley confirm the high existing pressures on natural resources: there is little unused land; population increase is rapidly converting remaining village land to crops; grazing land and fuelwood supplies are already critical issues in some areas; dry season river flows will not support the planned irrigation expansion unless storage dams are built; and in any case large-scale irrigation development is likely to have significant negative hydrological and ecological effects through consumptive use of water and contamination by agrochemicals and wastes.

Table 5.1 below summarizes the potential environmental and social impacts of the overall SAGCOT Program predicted for development scenarios in the SRESA. The key impacts relate to (i) land, (ii) socio-economics, (iii) water, (iv) biodiversity and (iv) governance issues.

Ref.	Activity / Topic	Receptor	Positive / Negative	Potential Impact /Risk	Risk Management / Mitigation Options
Land					
	Land for investment	Local communities smallholder farmers (emergent farmers) Pastoralists Investors	+/- - +	Vested interests may skew acquisition process; lack of participation, lack of transparency, increased pressure on remaining land	Creation of an independent Land Bank, separated from investment allocation and negotiation; effective participation & transparency in identification & allocation process; strong linkages into local planning priorities
	Land for smallholders and pastoralists	Local communities Migrants Biodiversity/Protected areas/wildlife Pastoralists Smallholders Women	- - - - - -	Reduced land availability, shorter/no fallow, soil degradation; increased pressure on grazing areas, reduced productivity; knock-on effects on remaining habitats and wildlife; increasing poverty	Investment in inclusive local planning processes; participation of women & pastoralists in decision making; strengthening land tenure system in relation to women & pastoralists; investment in non-land based alternatives; community involvement in wildlife management; investment in education
Socio-economics					
	Inclusion of smallholders in value chains	Local communities Emergent farmers Smallholder farmers Subsistence farmers Investors Pre-existing farmer groups	+/- + in proximity to investors +/- - +/- +/-	Greater employment opportunities; shift away from subsistence crops; change in local market prices & food crop availability; inclusion limited to proximity; most farmers unable to take risk; capacity of local groups built; pre-existing groups may loose members; investors extend production; investors have to invest in capacity building & other support activities.	Adopt international standards for responsible agro-investment; investment in agricultural extension, group capacity building and broader subsistence activities (e.g. vegetables) to ensure participating smallholders gain; investment in farmer-to-farmer extension and support services so that lessons from out-growers can spread; adoption and monitoring of appropriate outgrower/contract agreements; regulation of formal and informal transport taxation/charges; improvement of market related information exchange; investors encouraged to work in partnership with NGOs to support engagement activities
	Gender	Rural women Female headed households Rural households	+/- - +/-	Increased workload on women, while benefits captured by men; lack of adequate representation in decision making; loss of land through lack of recognition of rights; greater employment opportunities; unequal pay & conditions;	Investment in education for boys and girls; investment in adult education; review of land tenure legislation and traditional practices to identify areas where women's representation can be improved; promotion of labour saving technologies such as fuel efficient stoves; investment in wells & boreholes to reduce transport of water; continued implementation of Tanzania's gender equality policies;

Ref.	Activity / Topic	Receptor	Positive / Negative	Potential Impact /Risk	Risk Management / Mitigation Options
	Health & Safety	Rural communities Migrant workers Sex workers (full-time & transactional) Employees Rural households Children Elderly	+/- -/+ - +/- +/- -/+ -/+	*Healthcare system:* Pressure on existing health services; inequalities in healthcare; changes in ability to pay; *Nutrition:* changes to food availability; localised change in incidence of malnutrition; less resilience to drought; loss of crop diversity; change in farming systems; *Transmission of disease:* increased incidence of HIV amongst some groups; increased incidence of vector borne diseases associated with changes in land use and intensification of agriculture; *Hygiene & sanitation:* increased pressure on sanitation & water resources; pollution with faecal matter & pesticides; *Occupational health:* exposure to pesticides & other agrochemicals; increase in accidents at work or on roads; *Working conditions:* increased accidents and exposure at work.	incorporation of gender in SAGCOT practices Upgrade Government healthcare systems; ensure investors' commitment to health provision for both workers (including insurance schemes) and local communities; Health Impact Assessment of projects; monitoring local food security, the price of staples and health indicators, especially of children; promote backyard food crops (vegetables, fruits); invest in domestic water supplies; promote latrines and WatSan knowledge; establish safe workplaces and provide training and safety equipment to workers
Water					
	Water availability, seasonality & environmental flows	Aquatic ecosystems Other water users (local communities, smallholder farmers)	- -	Increased irrigation demand from SAGCOT against background of increasing non-commercial production and potable water demand, poorly quantified resource and valuable wetland based ecosystems. Opportunity to enhance water resources planning processes	- Re-instate/upgrade flow monitoring network in all major tributaries, and quality control data - Rainfall/runoff analysis to infill/extend datasets and more accurately estimate water availability and environmental flow conditions at key planned abstraction sites - Use data for dynamic (ie computational) basin-level water resources allocation model

Ref.	Activity / Topic	Receptor	Positive / Negative	Potential Impact /Risk	Risk Management / Mitigation Options
				through support to ongoing initiatives (eg Rufiji Basin)	to test agricultural abstractions against other socio-economic development plans for basin and environmental flow requirements - Ensure Rufiji Basin and sub-basin water resource plans are based on reliable data and fully integrated with agricultural development, energy development and other development plans, and *vice versa*
	Water quality	Aquatic ecosystems Other water users (local communities, smallholder farmers)	-/+	- Agricultural intensification may increase water pollution from agrochemical runoff and/or soil erosion, or pollution from agroprocessing facilities (pesticides, nitrogen, phosphorus and wastes with high BOD are all potential issues). - Potential for secondary WQ impacts from induced economic in-migration coupled with lack of wastewater treatment. - Opportunity to enhance environmental performance of agricultural sector by training outgrowers in best practices, support to agricultural extension initiatives etc.	- Develop and disseminate SAGCOT-specific guidelines on best practices for fertiliser/nutrient use, pesticide/herbicides, soil and water conservation etc - Develop sector-specific guidelines (and ultimately regulations) for the management and control of agro-processing wastes, both solid and liquid, emphasising waste minimisation, re-use and energy recovery - Re-instate/upgrade WQ monitoring system in all major tributaries - Incorporate WQ analyses in basin model, and use to define linkages with flow conditions and to target WQ control measures more effectively
Biodiversity					
	Habitats and connectivity	All terrestrial and freshwater habitats in Kilombero Valley	- + if planned and enforced	Continued rapid degradation of all natural resources and habitats - land, vegetation, water (both physically and potentially by agrochemicals); final and permanent closure of last remaining wildlife corridors across Valley (Ruipa, Nyanganje); degradation of forest habitats especially in Udzungwas.	Develop strategic land use plan for region based on comprehensive surveys of wildlife, habitats, hydrology, existing land use, land tenure and VLUPs, and focusing on protecting critical habitats and restoring connectivity. Enforce regulations concerning the new, smaller Kilombero Game Controlled Area. Re-establish wet-season refugia for puku. Protect and restore the Nyanganje and Ruipa wildlife corridors.

Ref.	Activity / Topic	Receptor	Positive / Negative	Potential Impact /Risk	Risk Management / Mitigation Options
				Opportunity for habitat protection and restoration of connectivity.	Design and implement conservation and wildlife awareness campaigns. In agricultural sector, establish, implement and enforce an IPM approach for all crop protection and also for livestock health management.
	Wildlife	All large wildlife in Kilombero Valley and surrounding forests, especially endangered Puku (antelope); some endemic birds	- + if planned and enforced	Further loss and possible local extinction of a variety of endangered animals and birds, some of which are endemic (found nowhere else); of main concern: Puku (wetland antelope); Sanje Mangabey, Udzungwa Red Colobus and Kipunji (monkeys); and the Kilombero weaver; loss of associated existence values and tourism potential; increased elephant-human conflict. Opportunity for protection and restoration of wildlife and re-establishment of tourism and commercial hunting.	Requires protection and restoration of habitat, and protection of wildlife from unsustainable predation (by humans). For habitat protection see above. For protection from humans: enforce the hunting regulations (requires significant upgrade in capacity, reduced corruption and better information); change residents' attitudes (a long-term process) requiring targetted campaigns. A further requirement is much better data on both charismatic and endangered wildlife (e.g. puku, elephant) and other taxa (such as birds), implying wildlife surveys.
	Fish	Fish and the fishery	- (+ if managed)	Reduced dry season flows, drainage of ponds, interruption of spawning movements, reduced water quality (pesticides), increased fishing pressure, loss of fish diversity and productivity of fishery, loss of associated employment and economic benefits	Applied research to fully understand the aquatic ecosystem and fishery (including social aspects); Inclusion of the fishery in all Valley planning fora and mechanisms; Establishment of close links between fishery sector and IWRM planning; Ensure fisheries sector is involved in development of IPM approaches and plans; Establish water quality baseline and monitoring system, focusing on pesticides; Upgrade the capacity of Kilombero and Ulanga district administrations to manage the fishery
	Pesticides	Local residents and communities Pastoralists Local administrations	Scenario 1: - Scenario 2: - Scenario 3: =/-	Intensive use of pesticides in effectively unregulated conditions with inadequate operator training, especially but not only on rice, likely to result in runoff into	Development and implementation of integrated pest management (IPM) measures, combined with training and awareness and enforcement; also requires upgrading of national crop protection administration.

Ref.	Activity / Topic	Receptor	Positive / Negative	Potential Impact /Risk	Risk Management / Mitigation Options
				waterways and effects on aquatic organisms, with biomagnification up the food chain; also direct risks to operators and indirect risks to operators' families.	
Governance					
	Social capital and cohesion	Local residents and communities Pastoralists Local administrations	-/+ - -/+	Lack of perceived fairness in land acquisition and lack of perceived benefits during project operation may jeopardise local acceptability; large-scale investments may directly or indirectly marginalise some residents / land-users Improving local economy provides opportunity for growth of social capital	Fair and transparent procedures for land allocation, acquisition and benefit-sharing; fair and transparent employment conditions; fair and transparent arrangements for outgrowers; support for local services such as education and health care; inclusive planning mechanisms (with participation of, e.g. pastoralists, women); gender sensitivity in all plans and Programs; upgraded SAGCOT communications Program, especially at local level.

On present trends – and without investments through the SAGCOT Program or World Bank-financed SAGCOT Project, the cumulative ecological and environmental impacts of multiple ongoing and planned (though not Project related) roads, hydropower dams (Kihansi, Ruhudji, Mpanga), irrigation, land conversion and population increase in the Valley are and will continue to be severe, negative and irreversible, with consequent impacts on downstream users of the Rufiji River including the proposed Stiegler's Gorge dam, residents and irrigation developments in the Lower Rufiji, the delta and the fishery.

5.1.1 Environmental and Social Risk Levels of World Bank-supported SAGCOT Project

As described in Section 6 below, assessment of risk for SAGCOT Project subproject investments will be determined according to their **environmental risk** level. The risk level is to be estimated based on the intrinsic environmental and social risk associated with (i) the type of intervention to be carried out (e.g., maintenance, expansion, upgrading, new infrastructure); and (ii) the specific type of infrastructure proposed. Where a single sub-project includes multiple types of activities/interventions or infrastructure, the risk rating is assigned based on the highest level of risk applicable for any component of the sub-project.[1]

The environmental risk levels are defined as follows:

- **Risk level III-A:** sub-projects with particularly high environmental, indigenous peoples, cultural heritage, or resettlement risks, as determined by an analysis of the nature and scope of civil works proposed and the ecological and socio-cultural sensitivity of the project site.

- **Risk level III-B:** sub-projects with moderately high environmental or social risk. The proposal presents some risks due to the sensitivity of the setting and the nature and scope of civil works planned. However, mitigation measures are readily available and the sub-project will not have a major impact that places the natural environment, its biodiversity, society, or its cultural property at risk.

- **Risk level II:** sub-projects with moderate environmental, indigenous peoples, cultural heritage, or resettlement risks. The proposal presents some risks given the civil works planned, but its potential adverse impacts are less adverse than those of Risk level IIII projects. These impacts are site-specific[2]; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than for Risk level III projects.

- **Risk level I:** sub-projects likely to have minimal or no adverse environmental or social impacts.

These risk levels and their equivalent World Bank environmental categories are shown in **Table 5.1**.

Table 5.1 Environmental Categories and Environmental Risk Levels

Environmental Risk Level	Environmental Category
III-A	A
III-B	B
II	B
I	C

[1] In cases where the typological definitions for a sector conflict with existing state classifications, the state may include in its proposal a description of a rating system based on the alternative classifications, along with an explanation of why it is necessary to use the alternative system.

[2] If projects impacts are site-specific, but result in significant social impact (i.e., involving land acquisition that affects more than 200 persons, or significantly affects indigenous peoples either positively or negatively), projects are considered to be Type III.

5.1.2 Site Sensitivity and Environmental Risk Levels

As noted above, the environmental and social risks of a particular proposal are a function of the type and scale of the sub-project's activities and the natural and sociocultural sensitivity of the sub-project site.

Table 5.2 Site Sensitivity and Environmental Risk Levels

Project Type	Sensitivity of the Setting		
	Low	Moderate	High
Risk Level III	III-B	III-A	III-A

The following table (**Table 5.3**) presents a preliminary environmental classification of the likely sub-projects for financing by the MGF (supported through SAGCOT Project Component 2).

Table 5.3 Preliminary Environmental Categories for MGF Sub-projects

Type of Matching Grant Facility Sub-project	Likely Environmental Category*	Potential Significant Environmental and Social Concerns
Animal Production		
• Large scale livestock production (e.g. > 500 head of livestock)	A/B	• Direct discharge or run-off of inadequately treated wastewater may cause contamination and eutrophication decline of aquatic resources
• Medium scale Livestock production		• Disposal or use of untreated wastewater for irrigation can affect soil quality and create water pollution. • Potential health issues associated with bird flu and other diseases.
• Small scale animal husbandry	B/C	• Proper siting of animal sheds/pens regarding drinking water supply, homestead heath issues related to animals
Crop Production and Horticulture		
Water management projects for agriculture (drainage, irrigation)	A	• Construction issues such as spoil disposal management.
		• Water pollution and water quality, water; extraction and water rights, land loss and resettlement, natural habitats, species loss, land degradation, dam safety.
		• Threat to water ecosystem services across numerous critical natural habitats
Large scale monoculture (e.g. >500 ha) (cash and food crops)	A	• Water pollution and water quality, water; extraction and water rights, land loss and resettlement, natural habitats, species loss, land degradation
Small scale monoculture (cash and food crops)	B/C	
Field production of flowers and vegetables • Organic production	C	• No biophysical risks
Field production of flowers and vegetables • Conventional production	B	• Contamination due to disposal of pesticides/insecticides containers, Health and Safety, uncontrolled cultivation of genetically modified varieties, crop residual disposal, caste generation and disposal including plastics and non-biodegradables

Type of Matching Grant Facility Sub-project	Likely Environmental Category*	Potential Significant Environmental and Social Concerns
Fertiliser supply	B	• Eutrophication, water quality impacts, soil acidification, salinity changes
		• Threat to water ecosystem services across numerous critical natural habitats
Commercial forestry including plantations	A/B	• Loss of biodiversity, converted land cover may impact wildlife migration and foraging habitats, disruption to fragmented wildlife corridors
		• Threat to ground water supply associated with certain plantation crop selection
Agro-processing		
Rice/wheat mills, cotton gins	B	• General good housekeeping standards and best practice, EMS for large organisations, worker safety, proper emissions and discharge control, potential air, surface and groundwater contamination, processing and solid waste disposal
Manufacture of vegetable and animal oils and fats	A/B	
Manufacture of dairy products	B	
Processing fruits & vegetables, and sources, oil seed crushing	B	
Storage facilities	B	
Grain & seed storage facilities, cold storage, grain elevators		
Beekeeping, honey processing	C	
Slaughterhouses	A/B	• General good housekeeping standards and EMS program, product contamination, worker safety, proper emissions and discharge control, potential air, surface and groundwater contamination, processing and solid waste disposal, odours
Agro-energy		
Biomass biogas, biofuel power development	A/B	• Sustainable supply of energy sources, degradation of natural vegetation, pressure to convert more land to energy crops, food security
Wind turbines	A/B	• Proper siting, noise, bird and bat mortality, access roads
Solar	B/C	• Proper siting
Infrastructure		
Farm roads	B/C	• Proper siting, construction safety, traffic safety, interference with hydrology, drainage on adjacent farmlands.
Bridges and culverts	B/C	
Micro/pico hydro	B/C	• Hydrology of flows, water quality, maintenance of ecosystem services
Farm Support		
Field machinery	B/C	• Safety, disposal of lubricants, oils etc, if large operation with many machines need proper storage and disposal of all hazardous wastes
Seeds, seed stock	B/C	• Agrobiodiversity; seed dressings
Technical support	C	• None

*Preliminary classification is subject to verification based on site visits, to assess the sensitivity of the specific site.

Mitigation Measures for World Bank-supported SAGCOT Project

The following mitigation measures are intended to cover the safeguard issues associated with the proposed World Bank SAGCOT project.

1) **Catalytic Fund**

The logical lead agency for implementation of these recommendations is **Catalytic Fund management**.

1.5 *Resettlement Policy Framework:* apply the measures described in the RPF to all sub-projects under the Catalytic Fund where these involve land acquisition, including agreeing a common approach between the Matching Grants Fund and the Social Venture Capital Fund. The RPF is designed to fill the gaps between Tanzanian law and practice and the requirements of the Bank's *OP 4.12 Involuntary Resettlement*, most importantly in relation to:

- Extent of coverage (to include persons with non-formal property rights);
- Timing of payments (to be done before not after loss of assets);
- Relocation and resettlement (assistance with resettlement to be provided);
- Livelihood restoration (measures to ensure effective livelihood restoration to be provided);
- Consultation (to be more inclusive and to be used in planning);
- Grievance redress mechanisms (to be created and/or improved).

1.6 *Environmental and Social Management Framework:* apply the measures in the ESMF to all sub-projects under the Catalytic Fund, including – to the extent possible -- agreeing a common approach between the Matching Grants Fund and the Social Venture Capital Fund. The ESMF is designed to ensure the compliance of sub-projects with both Tanzanian law on EIA and World Bank safeguard policies.

1.7 *Other Safeguards:* as part of RPF and ESMF implementation, it will be important to screen the proposed sub-projects against the requirements of the *Vulnerable Peoples Development Plan* and *Pest Management Plan*.

1.8 *Catalytic Fund capacity:* provide Catalytic Fund management with the staff, training and budgets necessary for implementation of recommendations (1.1) and (1.2).

6 ENVIRONMENTAL AND SOCIAL REVIEW AND APPRAISAL PROCESS FOR CATALYTIC FUND

6.1 MGF SUB-PROJECT SCREENING, APPRAISAL, MONITORING AND REPORTING

The following section sets out the environmental and social (E&S) assessment and approval process to be adopted by the Catalytic Fund's Matching Grants Facility (MGF). For consistency, the process may also be used by the Social Venture Capital Fund (SVCF) if the Fund Manager and SVCF sponsors so decide.

The process complies with both the World Bank's safeguard policies and Tanzanian EIA regulations and related guidelines. It is also consistent with the Investment Policies and Operating Guidelines for the Matching Grants Facility and Social Venture Capital Fund outlined in the Trust Deed of the SAGCOT Catalytic Trust Fund (which includes Environmental and Social Review Procedures).

The process involves six steps and is integrated into the sub-project review procedure for applicants to the MGF:

1. Application Preparation and Screening;
2. Preparation of Environmental and Social Requirements;
3. Sub-project Appraisal and Selection;
4. Agreement on Environmental and Social Action Plan;
5. Sub-project Approval; and
6. Monitoring and Reporting.

Each step and responsibilities for the CF, Applicant, and World Bank are described below. A set of **ESMF Operational Tools and Guidelines** have been developed for the Fund Manager(s) to use in the sub-project screening, appraisal, monitoring and reporting processes, and to guide MGF applicants on environmental and social due diligence. The tools and guidelines are presented at **Annex 8**.

6.2 STEP 1: SUB-PROJECT APPLICATION PREPARATION AND SCREENING

6.2.1 *Screening*

All sub-projects will be subject to a process of environmental classification and site sensitivity screening.

The initial MGF funding application should include basic information on the environmental and social characteristics of the proposed project, potential environmental and social impacts (including land issues), any existing environmental and social management systems used by the Applicant, and the Applicant's proposed approach to addressing potential impacts.

The Fund Manager (FM) will undertake a **preliminary screening** of proposed sub-projects based on the **inherent environmental and social risks** associated with the sub-project type and requirements (location, size, etc.), using the Screening form in **Annex 8**. The results of the preliminary screening form exercise will be used to determine (i) the eligibility of the sub-project for further processing, (ii) the **environmental category** of the proposed sub-project, and (iii) the environmental and social due diligence work required in order to prepare a detailed application (including preparation of instruments such as Resettlement Action Plans and/or Indigenous Peoples Plans). It will also flag those sub-projects with potential significant environmental or social impacts. This flagging will ensure that particularly high risk projects receive closer World Bank supervision (such as prior review of TORs and final drafts of EAs, resettlement plans, etc.).

Note that eligible lands are only those parcels already in agricultural use or defined as suitable for agricultural use in official land use plans.

6.2.2 Environmental Categories

The following environmental categories will be applied to MGF sub-projects, as established by World Bank OP 4.01:

- **Category A**: defined as those that pose significant environmental and social impacts (due to the scale, type and location of the investment) and will require the preparation of a site specific EIA for approval;
- **Category B**: have moderate or limited environmental and social impacts, which can be mitigated and managed through application of a set of mitigation and management measures and other safeguard plans included in the ESAP;
- **Category C**: have minimal or no negative environmental and social impacts and do not require any further E&S measures.

The Tanzanian EIA screening procedure has similar categorisation: proposals are screened into projects not requiring EIA, projects meriting a preliminary EIA, and projects requiring full EIA (se **Annex 5**). The screening process takes the following criteria into account:

- Affected area;
- Importance and scale of impacts on the environment; and
- The likely degree of public concern i.e. controversial issues which raise public concern as a result of type and scale of the undertaking, sensitivity of the site location, technology used, conflict of interest in land issues and any other factor related to a particular project may require detailed scrutiny and assessment.

Nevertheless, there are some differences between World Bank OP 4.01 environmental categorisation and associated procedures and Tanzanian EIA law and regulations, specifically that the Tanzanian EMA classifies projects based on the type of activity proposed (see Annex 6A and 6B) but the Bank bases the need for a full Environmental Assessment on the results of project-based screening. Consequently, in Tanzania mandatory EIA may be required for some projects that the World Bank might place in Environmental Category B and which therefore would not qualify for a full-scale assessment (such as irrigation projects in non-sensitive areas). Similarly, in other cases the World Bank might require a full EIA while the Tanzanian EMA would require only a Preliminary Environmental Assessment (for example, upgrading of roads in sensitive areas).

This ESMF has been developed to ensure that the requirements of both Tanzanian law and World Bank safeguard policies are met.

6.2.3 Environmental Risk Levels

To assist in categorising the proposed sub-projects, they will be screened and classified according to their **environmental risk** level. The risk level is to be estimated based on the intrinsic environmental and social risk associated with (i) the type of intervention to be carried out (e.g., maintenance, expansion, upgrading, new infrastructure); and (ii) the specific type of infrastructure proposed. Where a single sub-project includes multiple types of activities/interventions or infrastructure, the risk rating is assigned based on the highest level of risk applicable for any component of the sub-project.[1]

The environmental risk levels are defined as follows:

- **Risk level III-A:** sub-projects with particularly high environmental, indigenous peoples, cultural heritage, or resettlement risks, as determined by an analysis of the nature and scope of civil works proposed and the ecological and socio-cultural sensitivity of the project site.

- **Risk level III-B:** sub-projects with moderately high environmental or social risk. The proposal presents some risks due to the sensitivity of the setting and the nature and scope of civil works

[1] In cases where the typological definitions for a sector conflict with existing state classifications, the state may include in its proposal a description of a rating system based on the alternative classifications, along with an explanation of why it is necessary to use the alternative system.

planned. However, mitigation measures are readily available and the sub-project will not have a major impact that places the natural environment, its biodiversity, society, or its cultural property at risk.

- **Risk level II:** sub-projects with moderate environmental, indigenous peoples, cultural heritage, or resettlement risks. The proposal presents some risks given the civil works planned, but its potential adverse impacts are less adverse than those of Risk level IIII projects. These impacts are site-specific[1]; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than for Risk level III projects.

- **Risk level I:** sub-projects likely to have minimal or no adverse environmental or social impacts.

These risk levels and their equivalent World Bank environmental categories are shown in **Table 6.1**.

Table 6.1 Environmental Categories and Environmental Risk Levels

Environmental Risk Level	Environmental Category
III-A	A
III-B	B
II	B
I	C

6.2.4 Site Sensitivity and Environmental Risk Levels

As noted above, the environmental and social risks of a particular proposal are a function of the type and scale of the sub-project's activities and the natural and sociocultural sensitivity of the sub-project site.

A system designating three possible degrees of sensitivity for a setting (i.e., low, medium or high) is presented in **Table 6.2**, using the World Bank policies most likely to be activated by MGF sub-projects. This can be used to differentiate between Risk level III-A and Risk level III-B, as shown in **Table 6.3**.

Table 6.2 Determination of Sub-project Site Sensitivity Levels

Policy	Sensitivity Level		
	Low	Moderate	High
Natural Habitats (OP 4.04)	No critical natural habitats; absence of natural habitats.	No critical natural habitats; presence of other natural habitats.	Presence of critical natural habitats and natural forests.[2]
Involuntary Resettlement (OD 4.12)	Low population density; disperse populations, little or no activity or well-established enterprises in the project's area of influence.	Moderate population density; some activities along the trajectory; mixed property and landholdings along the trajectory.	High population density; cities and major towns; intense activities in the project's area of influence; low-income population and squatters; communal properties. Landholdings that are not very well defined.
Indigenous Peoples (OP 4.10)	No indigenous population.	Dispersed, mixed indigenous peoples; indigenous populations with a high degree of acculturation.	Indigenous populations, reserves and indigenous territories; vulnerable indigenous populations.

[1] If projects impacts are site-specific, but result in significant social impact (i.e., involving land acquisition that affects more than 200 persons, or significantly affects indigenous peoples either positively or negatively), projects are considered to be Type III.
[2] Critical natural habitats are defined as existing and proposed protected areas, along with unprotected natural habitats of known high importance for biodiversity conservation. For details see OP 4.04 *Natural Habitats*.

Policy	Sensitivity Level		
	Low	Moderate	High
Cultural Property (OP 4.11)	No sites of importance known or suspected.	The presence of sites of cultural interest is suspected; there are significant sites in the area of influence.	Sites of cultural importance known in the area of influence.

Based on the highest level of sensitivity identified for any aspect of the proposal, the sub-project is designated as either Risk level III-A or Risk level III-B, in accordance with the matrix below (**Table 6.3**).

Table 6.3 Site Sensitivity and Environmental Risk Levels

Project Type	Sensitivity of the Setting		
	Low	Moderate	High
Risk Level III	**III-B**	**III-A**	**III-A**

For the SAGCOT Investment Project the environmental category of MGF-financed sub-projects will reflect the types of inherent risks associated with each proposal, and will be confirmed based on the E&S screening outcome and any follow up field visits. It is expected that this task will be performed by contracted qualified environmental and social experts, under the oversight of the CF Fund Manager.

The following table (**Table 6.4**) presents a preliminary environmental classification of the likely sub-projects for financing by the MGF.

Table 6.4 Preliminary Environmental Categories for MGF Sub-projects

Type of Matching Grant Facility Sub-project	Likely Environmental Category*	Potential Significant Environmental and Social Concerns
Animal Production		
• Large scale livestock production (e.g. > 500 head of livestock)	A/B	• Direct discharge or run-off of inadequately treated wastewater may cause contamination and eutrophication decline of aquatic resources
• Medium scale Livestock production		• Disposal or use of untreated wastewater for irrigation can affect soil quality and create water pollution. • Potential health issues associated with bird flu and other diseases.
• Small scale animal husbandry	B/C	• Proper siting of animal sheds/pens regarding drinking water supply, homestead heath issues related to animals
Crop Production and Horticulture		
Water management projects for agriculture (drainage, irrigation)	A	• Construction issues such as spoil disposal management.
		• Water pollution and water quality, water; extraction and water rights, land loss and resettlement, natural habitats, species loss, land degradation, dam safety.
		• Threat to water ecosystem services across numerous critical natural habitats
Large scale monoculture (e.g. >500 ha) (cash and food crops)	A	• Water pollution and water quality, water; extraction and water rights, land loss and resettlement, natural habitats, species loss, land degradation
Small scale monoculture (cash and food crops)	B/C	

Type of Matching Grant Facility Sub-project	Likely Environmental Category*	Potential Significant Environmental and Social Concerns
Field production of flowers and vegetables • Organic production	C	• No biophysical risks
Field production of flowers and vegetables • Conventional production	B	• Contamination due to disposal of pesticides/insecticides containers, Health and Safety, uncontrolled cultivation of genetically modified varieties, crop residual disposal, caste generation and disposal including plastics and non-biodegradables
Fertiliser supply	B	• Eutrophication, water quality impacts, soil acidification, salinity changes
		• Threat to water ecosystem services across numerous critical natural habitats
Commercial forestry including plantations	A/B	• Loss of biodiversity, converted land cover may impact wildlife migration and foraging habitats, disruption to fragmented wildlife corridors
		• Threat to ground water supply associated with certain plantation crop selection
Agro-processing		
Rice/wheat mills, cotton gins	B	• General good housekeeping standards and best practice, EMS for large organisations, worker safety, proper emissions and discharge control, potential air, surface and groundwater contamination, processing and solid waste disposal
Manufacture of vegetable and animal oils and fats	A/B	
Manufacture of dairy products	B	
Processing fruits & vegetables, and sources, oil seed crushing	B	
Storage facilities	B	
Grain & seed storage facilities, cold storage, grain elevators		
Beekeeping, honey processing	C	
Slaughterhouses	A/B	• General good housekeeping standards and EMS program, product contamination, worker safety, proper emissions and discharge control, potential air, surface and groundwater contamination, processing and solid waste disposal, odours
Agro-energy		
Biomass biogas, biofuel power development	A/B	• Sustainable supply of energy sources, degradation of natural vegetation, pressure to convert more land to energy crops, food security
Wind turbines	A/B	• Proper siting, noise, bird and bat mortality, access roads
Solar	B/C	• Proper siting
Infrastructure		
Farm roads	B/C	• Proper siting, construction safety, traffic safety, interference with hydrology, drainage on adjacent farmlands.
Bridges and culverts	B/C	
Micro/pico hydro	B/C	• Hydrology of flows, water quality, maintenance of ecosystem services

Type of Matching Grant Facility Sub-project	Likely Environmental Category*	Potential Significant Environmental and Social Concerns
Farm Support		
Field machinery	B/C	• Safety, disposal of lubricants, oils etc, if large operation with many machines need proper storage and disposal of all hazardous wastes
Seeds, seed stock	B/C	• Agrobiodiversity; seed dressings
Technical support	C	• None

*Preliminary classification is subject to verification based on site visits, to assess the sensitivity of the specific site.

6.2.5 Screening Checklists

The CF Sub-project E&S Screening Checklists (**Part 2** of **Annex 8: ESMF Operational Tools and Guidelines**) provide sector-specific guidance on environmental and social impacts, risks and proposed mitigation and management measures associated with sub-project activities. The Checklists provide reference to good practice measures from the World Bank Group Environment, Health and Safety Guidelines and from EBRD Sub-sectoral Environmental and Social Guidelines which apply to the pollution prevention and abatement and occupational, health and safety during construction and operation. These Checklists will assist the FM in identifying the type, nature and significance of impacts associated with each sub-project.

6.3 STEP 2: PREPARATION OF REQUIRED ENVIRONMENTAL AND SOCIAL ACTIONS

Depending on the type of environmental and social impacts, the applicant will be required to undertake environmental and social due diligence according to the guidance in the SAGCOT Investment Project ESMF, the SAGCOT Integrated Pest Management Plan[1], the SAGCOT Investment Project Resettlement Policy Framework, and the SAGCOT Indigenous Peoples Planning Framework.

Specifically, for sub-projects preliminarily determined to be a Category A or B, the FM will arrange a visit to the site to obtain more information on the key environmental and social concerns including site sensitivity, and on how the applicant intends to address them. Depending on the category and types of potential impacts, the FM will inform the CF applicant of the following E&S requirements. The resulting documentation should be submitted with the detailed project application:

- **Environmental Assessment**:
  - **For Category C sub-projects:** no further environmental due diligence necessary.
  - **For Category B sub-projects and those of Environmental risk level III-B**: a set of E&S measures for **mitigation** and management of impacts will be attached in the Applicant's proposal in the form of an Environmental and Social Action Plan (ESAP) and attached to the investment agreement as an E&S covenant.
  - **For Category A sub-projects**: the CF Applicant is required to undertake an EIA in order to obtain an environmental permit from NEMC and to get World Bank No Objection to EIA TOR and draft EIA. The CF Applicant will prepare the EIA and submit it to NEMC and the World Bank for review and approval/no objection. **Annex 5** describes the national EIA process.

- **For land acquisition and/or resettlement**: verification of land tenure will be attached to the Detailed Application. Sub-projects requiring land acquisition or restriction of access to natural resources will not be eligible for CF financing. Any sub-projects that would cause any other form of resettlement as defined in the SAGCOT Resettlement Policy Framework should submit a Resettlement Action Plan as part of the Detailed Application.

[1] The ASDP Integrated Pest Management Plan (IPMP) will be re-banded as the SAGCOT IPMP.

- **Pest management**: if pest management will be introduced into a sub-project application (e.g. through an irrigation investment), then the sub-project will follow the principles of the IPM and prepare a Pest Management Plan.

- **Indigenous Peoples**: if project screening indicates that Indigenous Peoples would be affected by the sub-project (positively or negatively), the Applicant should prepare an Vulnerable People's Development Plan.

It is expected that the majority of proposed investments will be categorised as B and C although it is possible that there will be some Category A sub-projects.

As discussed in previous chapters and detailed in the SAGCOT Resettlement Policy Framework, the World Bank will not provide any funds to acquire or purchase land, remove occupants from their currently used land or settlements, or restrict use of or access to traditional resource use in the SAGCOT region. In addition, sub-projects likely to result in the conversion of critical natural habitats or that may result in the destruction of cultural property will not be supported by the SAGCOT IP. Nonetheless, the perceived reputational risks to the World Bank associated with potential SAGCOT Program land deals and leases to interested investors raises concern amongst many stakeholders in and outside Tanzania. The World Bank will work closely with stakeholders and partner organisations to define and avoid these risks and impacts.

6.4 STEP 3: SUB-PROJECT APPRAISAL AND SELECTION

The Fund Manager is required to review all detailed applications to ensure compliance with the MGF investment policy, which includes E&S standards. The Applicant should submit any required environmental and social due diligence with the Detailed Application. In order to appraise the sub-project, the FM will ensure that the CF applicant has completed the following, as relevant to the sub-project:

a) **Environmental Impact Assessment scoping**: Approval of EIA scoping report for Category A sub-projects by NEMC (if required), and No Objection by the World Bank following review of EIA scoping report (if required) or TOR (if no scoping report is required). Note that the World Bank cannot give a No Objection to any final EIA without evidence of public consultation on TOR (or EIA scoping report).

b) **Acceptance and clearance of the EIA** for Category A sub-projects by the VPO and No Objection of the World Bank following review of the EIA will serve as a sufficient environmental clearance to proceed with further consideration for approval of the sub-project by the Fund Manager. Note that the World Bank cannot give a No Objection to any final EIA without evidence of public consultation on the draft EIA report. Once the EIA has been cleared and accepted (by VPO) and has the World Bank's No Objection, the CF Applicant will submit the approval along with the Final Business Plan to the Fund Manager for review by the Investment Committee.

c) **Verification of land tenure and Resettlement Action Plan**: In cases where sub-projects require verification of land tenure and proof of undisputed land, the CF applicant will submit required documentation to the Fund Manager together with the application. Further details about this process are described in the SAGCOT Resettlement Policy Framework. If a Resettlement Action Plan (RAP) is required, the applicant should submit the RAP with the detailed application for review by the FM. Please note that the RAP will also require No Objection by the World Bank.

d) **Pest Management**: If the sub-project intends to introduce or expand the use of pesticides or other agrochemicals, and a Pest Management Plan is required (as determined by screening, scoping and/or the EIA), the CF applicant will have to include (in the text or in an annex) a list of pesticide products authorised for procurement under the sub-project[1], or an indication of

[1] The World Bank does not finance formulated products that fall in WHO classes IA and IB, or formulations of products in Class

when and how this list will be developed and agreed on. This authorised list will be referenced in the ESAP. The Pest Management Plan will include instructions for the handling, use, disposal of chemicals, and provisions to supply necessary safety equipment and training for their use, which will be reviewed and approved by the FM.

e) **Vulnerable Peoples Development Plan**: When potential adverse effects on vulnerable peoples are identified, a vulnerable peoples development plan will be developed which includes measures to avoid, minimize, mitigate, or compensate for these adverse effects.

f) **Cultural Heritage:** all sub-projects involving earthworks must include an approved Chance Finds procedure in construction contracts, to cover the possibility of discovering physical cultural heritage in the course of excavation (see **Annex 8** for procedure). The key elements of the contractual provisions are (i) that as soon as suspected cultural heritage is discovered during any aspect of construction works, the contractor shall take steps to safeguard the item or feature and shall notify the concerned authority; (ii) the responsible authority shall then direct the contractor as to his subsequent actions; (iii) the contract should also refer to the relevant national law and regulations concerning compensation (if any) for any delays or expenses incurred.

g) **Environmental and Social Action Plan**: For all projects that would entail environmental and/or social impacts, the applicant should prepare a draft Environmental and Social Action Plan that outlines the proposed approach and actions for mitigating and monitoring impacts. A sample format for the ESAP is provided as **Part 3** of **Annex 8**: **ESMF Operational Tools and Guidelines.**

6.5 STEP 4: AGREEMENT ON ENVIRONMENTAL AND SOCIAL ACTION PLAN

The FM is responsible for the preparation and negotiation of the agreement with the MGF Applicant, which includes the Environmental and Social Action Plan (ESAP) prepared by the Applicant. The ESAP will outline E&S actions to be implemented by the CF Applicant against a proposed timeframe, and this will be reviewed by the FM and discussed with the Applicant to ensure the adequacy of the ESAP. The ESAP should consolidate actions from all instruments prepared with the application (e.g. EIA, RAP, PMP, IPP).

The Fund Manager will (i) attach the finalised and agreed ESAP to the Investment Agreement, and (ii) will incorporate E&S covenants in MGF Grant Agreements requiring that the ESAP is implemented in full.

6.6 STEP 5: SUB-PROJECT APPROVAL PROCESS

Tanzanian environmental authorisation: Tanzanian EIA regulations require full EIAs to be approved by the VPO and the EIA Certificate to be signed by the Minister responsible for Environment. For the purpose of the SAGCOT IP, all Category A sub-projects will also have to be reviewed and approved by the World Bank.

World Bank No Objection: all MGF Category A sub-projects recommended for Investment Committee approval require a World Bank No Objection. The Fund Manager will submit all such sub-projects to the World Bank Task Team Leader and Environmental and Social Specialists for review. The World Bank will review and reply to the request within ten (10) business days of receipt of documents from the FM.

Presentation to Investment Committee: the FM presents sub-projects to the Investment Committee (IC) and includes in its submission to the Committee how the Applicant complies with the MGF

II, if (a) the country lacks restrictions on their distribution and use; (b) they are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly. Therefore, in compliance with this requirement, under SAGCOT, sub-projects involving use of chemical pesticides under WHO Class IA, IB and Class II will not be financed.

Investment Policy – the FM should ensure that the E&S management principles in the MGF Investment Policy are discussed in the submission and presentation to the IC.

Preparation of Grant Agreement/Financing Agreement: The FM prepares and negotiates the final MGF Grant Agreement. Per the previous step, the FM should ensure that the ESAP is included in the Agreement and includes monitoring requirements for environmental and social management as well as reporting requirements to the FM (including E&S benchmarks and indicators as relevant to the project's ESAP).

6.7 STEP 6: MONITORING AND REPORTING

Based on the monitoring system agreed with the Applicant in the Grant Agreement, the Applicant (now the project implementing entity) will submit regular reports to the FM. The FM will collect this information and prepare an annual consolidated report on E&S performance of all CF MGF projects. This report should be submitted to the SAGCOT Centre and World Bank.

The FM is responsible for carrying out compliance monitoring by visiting selected sub-projects on a regular basis and reviewing the effectiveness of implementation of the activities specified in the sub-project ESAP. This task could be outsourced to an independent consultant with experience in undertaking similar audits.

In addition to collecting information from sub-projects under implementation, and sub-project monitoring, every year the FM will undertake an audit of 20% of MGF-supported projects using the CF Annual E&S Audit Form (refer to **Part 4** in **Annex 8: ESMF Operational Tools and Guidelines).**

The audit should include all projects assessed as Category A and a representative sample of projects in other Categories.

The audit will measure whether the sub-project:

- Is **complying** with the ESAP;
- Has encountered unanticipated impacts (environmental and/or social) and how the CF **applicant** has or is addressing them;
- Has resulted in any significant impact on highly sensitive biodiversity or critical habitats and protected areas, and/or cultural property; or
- Has **addressed** any grievances arising from the sub-project activities.

In addition, the annual audit will outline results of the preliminary and final classification of all sub-projects, together with copies of environmental and social preparation undertaken and the audit forms. The table of contents for the annual audit should include the following.

1. List of sub-projects visited, environmental categories, and date of visits.
2. List of stakeholders consulted in relation to the sub-project (private owner, operator, farmers, villagers, government, etc.).
3. Summary of main issues identified in the sub-project audits for that period (annual).
4. Overall sub-projects' compliance with ESAPs.
5. Recommendations for improvements to the select sub-project ESAPs, or identification for corrective measures, if necessary.
6. An assessment of any cumulative impacts resulting from the SAGCOT Project.
7. Recommendations for improvements to ESMF based on issues identified, with specific corrective actions to be implemented by sub-projects failing to comply with ESAP.

The FM will report to the SAGCOT Centre and the World Bank on the outcome of the audit.

7 ENVIRONMENTAL AND SOCIAL SUPPORT SERVICES FOR THE CATALYTIC FUND

Successful implementation of the ESMF will rely on (a) establishing the CF's capability to ensure that the subprojects are screened and appraised appropriately; (b) regular monitoring and reporting to track performance of the ESAP for the subprojects, and (c) building additional checklists and guidance as the CF matures.

7.1 APPOINTING AN ENVIRONMENTAL ADVISOR/CONSULTANT

The Fund Manager will have to contract an Environmental Advisor / Consultant to manage the E&S screening, appraisal, monitoring and reporting process of subprojects under the Catalytic Fund.

The Advisor/Consultant will be selected based on experience and skills and should have sufficient familiarity with screening, appraisal, and M&E of subprojects from similar projects or assignments. Their role will be to ensure that the CF E&S process is being applied adequately (ie subprojects are screened properly, ESAPs are prepared and attached to CF Business Plans, audits are carried out, etc). The Advisor/Consultant will report to the Fund Manager. A proposed Terms of Reference for this role is attached as **Annex 9.**

7.2 E&S TRAINING

Trainings on use of the ESMF will not be necessary since the Fund Manager will have an appointed Environmental Advisor/Consultant to manage all E&S issues associated with the CF. Familiarization with IFC Performance Standards, WBG EHS Guidelines and International Good Practice (FAO, ILO) is recommended; thus a budget for training on these topics has been allocated in the overall ESMF budget.

7.3 DEVELOPING ADDITIONAL CHECKLISTS AND GUIDANCE

Early discussions surrounding the function and financing of the CF show that the grant and lending portfolio is relatively wide open. Consequently, the Environmental Advisor/Consultant will probably need to roll out additional subproject checklists (based on **Annex 8**: ESMF Operational Tools and Guidelines) and technical guidance as the CF evolves. For example, the Environmental Advisor/Consultant can develop detailed technical planning guidelines to support these checklists based on the types of subprojects in the Fund Manager's portfolio. An example of such a guideline, based on the World Bank financed Ethiopia Local Investment Grant, is attached as **Annex 11**. This will be determined based on applicant demand and priorities for the SAGCOT program.

7.4 BUDGET

The budget for implementation of the ESMF is estimated at US$ 3.395m. These funds will cover the costs associated with: 1) incorporation of environmental expertise within the Catalytic Fund Management, to ensure compliance with the ESMF procedures including monitoring ($0.175m); 2) capacity building activities to improve environmental and social management services within the implementing agencies ($0.72); and 3) the cost of implementation of the ESMF procedures ($2.5m). IDA funds will be used to cover the first two sets of activities, while costs associated with subproject-specific environmental and social work will be borne by subproject sponsors. Specifically, subproject sponsors will be responsible for costs associated with undertaking of investment-specific Environmental and Social Impact Assessments (ESIAs) in line with the procedures described in this document. In so doing, they will concurrently be complying with both the World Bank's safeguard policies and Tanzanian EIA regulations and related guidelines.

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Environmental and Social Management Framework

Southern Agricultural Growth Corridor of Tanzania
(SAGCOT)

ANNEXES 1 - 10

(FINAL)

July 2013

ANNEX 1 LIST OF STAKEHOLDERS CONSULTED IN TANZANIA FROM MAY 7 – 10, 2012

Date	Organisation	Name and position
07/05/2012	National Environment Management Council	Dr Robert Ntakamlenga
07/05/2012	Ministry of Works	Ms Melania M. Sangeu Assistant Director, Safety and Environment Division
07/05/2012	World Bank	Ms Helen Shahriari Sustainable Development, Senior Social Scientist
07/05/2012	World Bank	Mr. David Rohrbach Senior Agricultural Economist
08/05/2012	Rufiji Basin Development Authority	Mr Aloyce L. Masanja Director General
08/05/2012	Ministry of Natural Resources and Tourism	Mr Piet Oosterom Natural Resource Management Advisor
09/05/2012	Bagamoyo District	Mr. Samweli M. Sarianga District Executive Director
09/05/2012	Bagamoyo District	Mr. Mlyambogo District Lands, Natural Resources and Environmental Officer
09/05/2012	Bagamoyo District	Ms. Fidelica Myovella District Agricultural Officer
10/05/2012	Vice President's Office, Division of Environment	Dr. Constantine Shayo

a) Consultations at national level (May 7 – 10, 2012)

Consultations were undertaken with a selected group of stakeholders in Dar to (a) familiarize the stakeholders on the purpose and objectives of the ESMF and how it will be used in the SAGCOT Project, and (b) to obtain feedback from stakeholders on what are the key issues critical to the success of SAGCOT and what are significant environmental and social issues/impacts that should be incorporated into the ESMF.

The key issues identified during these consultations are summarized in Boxes 2.1 and 2.2.

Box 2.1: Issues and Constraints Identified by Stakeholders at National Level

(a) Potential impacts of Subprojects

- Water scarcity
- Lack of infrastructure maintenance
- Soil erosion
- Soil salinity and land fertility has to be observed
- Issue of health (irrigation resulting in vector related diseases)
- Cumulative impacts in terms of health and socio-economics
- Various forms of pollution
- Livestock grazing and impact on irrigation system
- Sedimentation due to terracing
- HIV/ AIDS due to influx of migrant workers
- Displacement of people
- Land speculation
- Need to understand the land tenure system
- Baseline information on socio- economic aspects and indicators required
- Capacity needs eg employment and funding for irrigation engineers
- Transportation (privatized and expensive)

(b) Recommended mitigation measures

- Provide monitoring guidelines
- Education on health impacts on humans and the environment
- Build capacity to control chemicals
- Rainwater harvesting at household level
- Organic farming (considering potentially resulting in high levels of BOD)
- Integrated Pest Management

(c) Institutional challenges

- Lack of environmental staffing can be explained by the non-inclusion of environmental positions under the scheme of services last year. GoT has now provided inclusion for those positions in the scheme of services for 2012-2013.
- More comprehensive analysis of land requirements

Box 2.2: Issues, Considerations and Constraints Identified by Stakeholders in Bagamoyo

(a) Issues/Considerations

- Land with potential for agriculture is 836,000 hectares out of which 17,450 hectares are suitable for irrigation. Presently only 1,217 hectares are under irrigation.
- Some areas in Bagamoyo District have clear farming systems; others don't.
- There are several farmers Associations; Cooperatives to assist farmers in acquiring inputs e.g. Chama cha Ushirika Ruvu (CHAURU); and NGOs Tanzania Agricultural Horticultural Association (TAHA) e.g involved in irrigation for pineapple production; and DORT Africa
- Fertilizers used are DAP for basal application and Urea for top dressing

(b) Constraints

- Lack of adequate infrastructure
- Land grabbing for speculation
- Sometimes farmers sell their land to investors without proper MoU and essentially no corporate social responsibilities
- No digital maps and hence there are no adequate land classification maps (e.g for land suitability)
- Most of the land use maps do not integrate key relevant sectors
- Lack of harmonization of laws
- EIA reports come to the district office for review, but once the final reports are prepared at national level, they are no longer shared with district so monitoring and enforcement is very difficult
- Environmental Act is not decentralized which makes all EIA decisions go through NEMC
- There are limited environmental clauses in civil work contracts and no screening system or enforcement mechanisms in place

(c) District Requirements

- GIS mapping unit – Geo-reference data
- Equipment- GPS, transportation
- Need workshops on resettlement and ESMF/guidelines
- Need to establish a grievance mechanism or landowners and associations
- Proper training in environmental management e. g. EIA Training

PROJECT BACKGROUND

The BIDP is a cooperative union of 128 families. The project started in 1987 –1990 with preparation, site clearing (the site was unforested grassland), surveying and preparation for 80 hectares of farm sites for training. Indigenous farmers who were cultivating rice along the Ruvu river were incorporated into the project.

The project abstracts irrigation water from the Ruvu river which also supplies water for household use and stocks in the area as well as being a source of fish. By 1995, 100 farmers had been trained but had no land to cultivate. (The original 80ha of the project were for training only.) In response, the Tanzanian government started a pilot farming program with financial support from the Japanese government. 100 hectares of land were taken from the prison department, and 52 ha were allocated to 128 families.

Support under the project was given to local farmers who would receive training in appropriate wheat and rice cultivation techniques; receive farming inputs and technical services such as soil tests and advice on appropriate fertilizers to use, in exchange for 5 bags of rice. Trainee farmers worked on an acre of land each during the training producing about 35 bags on average. The scheme produced 15 new graduate farmers each year and would allocate to them land for cultivation in the "pilot" section of the land.

From 1997 support from the Japanese stopped but farmers continued to receive support from the Tanzanian government until the year 2000 when the cooperative took over. Without the financial and technical support, and in the face of declining yields, increasing crop diseases, farmers started using more and more fertilizers (TSP, DAP and Urea) and insecticides (Thionex, Actellic and Fungise.) Production costs soared. To keep costs low, families use more of the family labour rather than hired help.

Since 1991, 250 farmers have been trained. These are from neighboring villages—Kaole, Matimba and Bagamoyo town. Support from the cooperative is in the form of inputs and irrigation, all at a fee of Tsh 100 000 per family per season. Individual input into the farming is for transplanting, weeding, and harvesting. Each family produces 36 bags of rice, on average, per season translating to an income of Tsh 900 000 on average. Typically, rural dwellers earn less than US $10 a month, so these rice farmers areamong the high earners in their communities.

Training still continues for new farmers at a fee of Tsh 200 000.

ISSUES RAISED BY THE BIDP FARMERS

- Operational costs very high due to pumping water using diesel. Pumping water using gravity would be cheaper
- Using boreholes is not an effective option as water becomes too saline
- During the dry season the area experiences problems of salinity and stops production
- Limitation of funds
- No access to processing plants which means farmers have to transport their crop and incur the expense

RELATED IMPACTS

- Water distribution and canal related problems

BIDP farmers association

Rice plantation

Local rice that has not been husked yet

Ruvo River

Water pumping station (left) and canal system (right)

Legislation	Description
Agricultural and Livestock Policy, 1997	The ultimate goal of having agricultural and Livestock Policy is to improve the well being of the population whose principal occupation is based on agriculture. The policy realizes the need for transformation of small scale farming by increasing their productivity and having them well organized and collaborative to take advantage of supply chains and investments The focus of the policy is to commercialize agriculture so as to increase the livelihood of the smallholder farmers/livestock keepers. The policy's main objectives include: ensure basic food security for the nation and to improve national standards of nutrition, by increasing output, quality and availability of food commodities; improve standards of living in the rural areas through increased income generation from agricultural and livestock production; increase foreign exchange earnings for the nation by encouraging production and increased exportation of agricultural and livestock products; promote integrated and sustainable use and management of natural resources such as land, soil, water and vegetation in order to conserve the environment; provide support services to the agricultural sector, which cannot be provided efficiently by the private sector. The policy also recognizes the development of irrigation systems as an important aspect of the agricultural development strategy, which can help the nation to achieve the following objectives: - (i) Improvement of food security by increasing the production of rice which depends mainly on irrigation and maize through supplementary irrigation on predominantly rain fed fields; (ii) Increasing farmer's productivity and income. (iii) Production of high value crops such as vegetables, flowers etc. Iv) Security of tenure for pastoralists in pastoral lands areas well be guaranteed by appropriate measures including gazetting to protect grazing land from encroachment.
The National Land Policy, 1995	The National Land policy provides guidance and directives on land ownership and tenure rights and the taking of land and other land-based assets. The policy stipulates the organization and procedures for valuing assets and delivery of compensation. The overall aim is to promote and ensure a secure land tenure system in Tanzania that protects the rights to land for all citizens. The National Land Policy advocates for the protection of land resources from degradation for sustainable development. Among other things the policy requires that project development should take due consideration the land capability, ensures proper management of the land to prevent erosion, contamination and other forms of degradation. Important sections of the policy relevant to the investor are 2.4 (on use of land to promote social economic development), section 2.8 (on protection of land resources) and section 4 (on land tenure). It is therefore imperative that the projects operations should be aware of the National Land Policy requirements for protection of land resources and issues related to displacement of local communities.

National Water Policy, 2002	The National Water Policy calls for the adoption of holistic basin approach integrating multi-sectoral planning and management to minimize negative impacts on water resources development to ensure sustainability and protection of the environment. It recognizes that water is scarce and that there is a growing scarcity, misuse and wastage of water resources in many places of Tanzania, which may become a serious threat to sustainable availability of the resource. This policy recognizes essential linkages between water and socioeconomic development; including environmental requirements. The policy also stresses on importance of water for domestic use, agriculture, and trans-boundary issues. However, the main objective of this policy is to develop a comprehensive framework for sustainable development and management of the nation's water resources and to put in place an effective legal and institutional framework for its implementations (URT, 2002). Thus, the policy objectives are as follows: • planning and implementation of water resources and other development Programs in an integrated manner and in ways that protect water catchment areas and their vegetative cover. • improved management and conservation of wetlands; • promotion of technology for efficient and safe water use, particularly for water and wastewater treatment and recycling; and • institution of appropriate user-charges that reflect the full value of water resources. Besides, there is uncontrolled abstraction of water resources from different water basins in the country. Thus, the policy requires investors to observe judicious use of water by putting in place water conservation measures. Hence, investors must comply with the statements of this policy by making sure water rights are sought from relevant authorities before actual water abstraction.
The National Tourism Policy, 1999	The National Tourism Policy seeks to assist in effort to promote the economy and livelihood of the people, essentially poverty alleviation, through encouraging the development of sustainable and quality tourism that is culturally and socially acceptable, ecologically friendly, environmentally sustainable, and economically viable. The policy states that the private sector will play a major role in the industry's development, with the government playing the catalytic role of providing and improving the infrastructure as well as providing a conducive climate for investment. The policy raises specific objectives of maintaining the tourist resource base in an adequate manner as it forms part of the public resources, improving the existing tourism infrastructure and to develop it further so as to accrue higher revenues from the sector.
The Wildlife Policy, 2007	The emphasis of the Wildlife policy (2007 is on involving all stakeholders especially local communities and private sector in conservation and management of natural resources and healthy protection of wetlands. Some of the Wildlife Policy strategies that have significance for wetlands management include: Wildlife Management Areas (WMA) which provide joint management opportunities between state and communities; Wetlands Reserves to set aside core sensitive wetland and open areas, a new category which still needs to be regulated; and promoting the legal use of wetlands (and associated wildlife) through consumptive and non-consumptive use by encouraging tourism. The Wildlife Policy also aims at emphasizing the enhancement and maintenance of the great biological diversity endowment by constituting an important economic base to the Nation.

National Forest Policy of 1998	The overall goal of the National Forest Policy is to enhance the contribution of the forest sector to the sustainable development of Tanzania and the conservation and management of her natural resources for the benefit of present and future generations. In accordance with the policy, an Environmental Impact Assessment (EIA) is required for all investments which change the use of forest land or which may cause damage to the forest environment. The forest policy requires ecosystem stability through conservation of forest biodiversity, water catchments and soil fertility. Biodiversity conservation and management as well as watershed management and soil conservation will be included in the management plans for all protected forests. It emphasizes involvement and consultations of forestry management authority, local communities and other stakeholders in conservation while establishing project sites.
The Energy Policy of Tanzania, 2003	The policy notes the vast energy resources in respect to hydro-powers potential, coal, natural gas and biomass. The latter it is stressed will continue to be the major source of energy for the foreseeable future. Solar, wind and geo-thermal are virtually untapped energy sources The overall goals of the National Energy Policy is: • To exploit the abundant hydro-power sources; • To develop and utilise natural gas resources; • To develop and utilise coal resources; • To step up petroleum exploration activities; and • To arrest fuel wood depletion by evolving more appropriate land use management. Hence, the interaction between energy and the environment is evident at all stages of the energy "system; exploration for energy resources; conversion of energy from one form to another. This calls for consideration of environmental impacts at all stages in the chain.
National Gender Policy (1999)	The key objective of this policy is to provide guidelines that will ensure that gender sensitive plans and strategies are developed in all sectors and institutions. While the policy aims at establishing strategies to eradicate poverty, it puts emphasis on gender quality and equal opportunity of both men and women to participate in development undertakings and to value the role-played by each member of society. The policy highlights that women, who are the main users of the land, will be adequately involved at all levels of project planning to implementation.
The Wildlife Conservation Act No. 5 of 2009	The Wildlife Conservation Act makes provisions for the conservation, management, protection and sustainable utilization of wildlife and wildlife products. The act repeals the Wildlife Conservation Act Cap. 283. The objectives of this Act are to protect and conserve and administer areas with great biological diversity including giving special conservation status to endemic, rare or endangered wildlife species and to enable Tanzania to effectively contribute and benefit from international efforts and measures to protect and enhance global bio-diversity. The law is rich when it comes to effective wildlife management as it explains several limitations to an individual dealing with wildlife in Tanzania. The law provides institutional arrangement and administration related to the management wildlife in Tanzania which range from the Director of Wildlife up to the District Game Officer.

The Forestry Act No. of 2002	The Forestry Act spells out clearly the importance of conservation and management of natural resources (including forest biodiversity, water catchments and soil fertility) for present and future generations. This Act classifies different types of forests. There are national forests reserve consisting of forest reserves; nature forests reserves and forests on general land. Also there are local authority forests reserve which consists of local authority forest reserves and forests on general land. Village forests which consist of village land forest reserves and community forest reserves created out of village forests. There are also forests which are not reserved but are within the village land and of which their management is vested in the village council. There are private forests which consist of forests on village land held by one or more individuals under a customary right of occupancy. Forests on general or village land of which the rights of occupancy or a lease has been granted to a person, partnership, corporate body, Non-Governmental Organization or any other body or organization for the purpose of managing the forest which is required to be carried out in accordance with this Act.
The Investment Act (No. 26) of 1997	The Tanzania Investment Act No.26 of 1997 established the Tanzania Investment Centre (TIC) as a one-stop house for investment in Tanzania. The Act applies to business enterprises that are either wholly owned by a foreign investor or jointly owned with a local citizen. The Act also, sets out immigration requirements for foreign investors, procedures for getting credits from domestic sources and procedures for technology transfer.
The Local Government (District Authorities) Act Cap 287 R.E 2002	This Act provides the establishment of local government (district authorities) including their roles, functions and institutional framework for their day to day operations. This legislation puts in place institutions such as the village Council and a District Council. The local government authorities are empowered under this law to set by-laws for the purpose of managing environment and make decisions concerning welfare of the villagers.
Plant Protection Act No. 13 (1997)	This Plant Protection Act has provisions for prevention of 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 plant and plant products and ensure fulfilment of international commitments, and to entrust all plant protection regulatory functions to the government and for matters incidental thereto or connected therewith. Under the Act, the activities of Tanzania Pesticides Research Institute have been incorporated into the Plant Protection Act. In relation to Integrated Pest Management (IPM), importation of biological control agents is not allowed unless under the prescribed permit by the Ministry.
The Village Land Act No. 5 of 1999	The Act provides guidance on the use and administration of the village land. This act puts land administration functions in the hands of the Village Assembly and Village Council. The investor will consult these two institutions including the Village Chairman and Village Executive Officer so that land lease agreements are accordingly prepared Thus, the investor will continuously abide by this law on day to day administration of the of the land given'
The Tourism Act No.29 of 2008	This Act provides among others, requirements for the designation, registration and grading of tourism facilities and activities (Part III). It also provides procedure required in the licensing of tourism facilities and activities including registration of tour guides. It also provides in Part IV establishment of the *Tanzania Tourism Licensing Board* whose functions are spelled in Section 19(1) as to include receiving and considering applications for licenses and issuance licenses.

Water Resources Management Act, 2009	The Water Resources Management Act of 2009 is a new Act that governs the management of water resources in Tanzania mainland. It provides the legal framework for sustainable management and development of water resources. The Act prescribes principles for water resources management, provisions for the prevention and control of water pollution, and participation of stakeholders and the general public in the implementation. The Act requires any development project within a water basin to be authorized by the respective Water Basin Officer. The main objective of this Act is to ensure that national water resources are protected, used, developed, conserved, managed and controlled in ways which take into account a number of fundamentals, including meeting the basic human needs of present and future generations, promoting equitable access to water and the principle that water is essential for life and that safe drinking water is a basic human right, promoting the efficient, sustainable and beneficial use of water in the public interest, and protecting biological diversity, especially aquatic ecosystems, etc. The investor is expected to involve the use of water resources during implementation of its sub-projects especially associated with irrigation activities and delivery of water service to serviced land.
Land Use Planning Act No. 6 of 2007	The Land Use Planning Act provides procedures related to the preparation of village land use planning in a sustainable and participatory manner. Among other functions, it recommends measures to ensure that Government policies, including those for development and conservation of land are in harmony. It also takes adequate account of their effects on land use and seeks the advancement of scientific knowledge of changes in land use. It encourages development of technology to prevent, or minimize adverse effects that endanger man's health and his/her welfare; it also specifies standards, norms and criteria for beneficial uses and maintenance of the quality of land. The objectives of land use planning includes: - Facilitate the efficient and orderly management of land use Promote sustainable land use practices Facilitate the establishment of a framework for the prevention of land use conflicts The people surrounding the subprojects may find themselves in land conflicts that may be a result of lack of land use planning. Thus, subprojects should take into consideration and understand the strategic planning of the other land surrounding the project. The Land Use Planning Commission is the principal advisory organ of the Government on all matters related to land use.

INTERNATIONAL CONVENTIONS AND TREATIES

Tanzania as part of the World ecosystem is party to number of international agreement conventions and treaties which as far as this project are concerned they are relevant.

a) Convention on Biological Diversity (CBD), 1992

Tanzania signed the CBD in 1992 and ratified it in March 1996, thereby committing to the conservation and sustainable use of biological diversity. The objective of the Convention on Biological Diversity (CBD; 1992) is to conserve biological diversity, promote the sustainable use of its components, and encourage equitable sharing of the benefits arising from the utilization of genetic resources. Article 8 of the CBD addresses *in situ* conservation, stating that each Contracting Party shall:

i) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;
ii) Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings; and

iii) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application.

Article 6 provides general measures for conservation and sustainable use of biodiversity. Article 9 deals with ex-situ conservation strategies. Article 14 requires parties to carry out EIA on all projects and development in protected areas. However, whenever possible the investor shall conserve natural biodiversity by avoiding unnecessary land clearance and wetland drainage**.**

b) Ramsar Convention on Wetlands

The Ramsar Convention, is an intergovernmental treaty adopted in the Iranian city of Ramsar in 1971 that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

The Convention adopted an approach of conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world".

The Government of Tanzania ratified RAMSAR Convention on Wetland in 2000. It is an important treaty for the conservation and sustainable utilization of wetland resources. It recognizes the fundamental ecological functions of wetland and their economical, cultural and scientific value.

The Kilombero Valley is of considerable biological interest in its own right and thus was designated as s a Ramsar site in 2002 in recognition of its internationally important wetland habitats and is recognized by Birdlife International as an important Bird Area (IBA).

c) The International Plant Protection Convention

The International Plant Protection Convention (IPPC) sets standards for the safe movement of plants and plant products to prevent the spread of plant pests and diseases internationally. These standards are important as they allow for the protection of domestic consumers, producers and the environment from the risks of introduced pests, and help exporters demonstrate that their products are safe.

a) United Nations Convention to Combat Desertification (UNCCD)

Tanzania signed and ratified the United Nations Convention to Combat Desertification (UNCCD) in 1994 and 1997 respectively. Established in 1994, UNCCD is the sole legally binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. In the 10-Year Strategy of the UNCCD (2008-2018) that was adopted in 2007, Parties to the Convention further specified their goals: "*to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability*".

b) United Nations Framework of Convention to Climate Change (UNFCCC)

Tanzania signed the UNFCCC on 12 June, 1992 and ratified the convention on and 17 April, 1996. Since then Climate Change has been on top of the agenda in most national for a in Tanzania because it has adversely impacted various sectors such as health, water, agriculture, forestry, energy and wildlife.

The Vice President's Office - DOE manages and circulates all the information regarding implementation of UNFCCC including legal and policy frameworks on climate change issues and article 6 in particular. In addition, the VPO-DOE:

- Communicates climate change information to sector ministries, LGAs and local NGOs; and
- Communicates information to International NGOs, Research and Learning Institutions.

The Vice President's Office has established a Public Relations and Information Unit which functions to disseminate environmental information to the public in collaboration with the public and private media houses.

c) The Stockholm Convention on Persistence organic Pollutants

The Stockholm Convention on Persistent Organic Pollutants (POPS) is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have adverse effects to human health or to the environment. Exposure to Persistent Organic Pollutants (POPs) can lead serious health effects including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease and even diminished intelligence. Given their long range transport, no one government acting alone can protect is citizens or its environment from POPs. In response to this global problem, the Stockholm Convention, which was adopted in 2001 and entered into force in 2004, requires Parties to take measures to eliminate or reduce the release of POPs into the environment. The Convention is administered by the United Nations Environment Program and is based in Geneva, Switzerland.

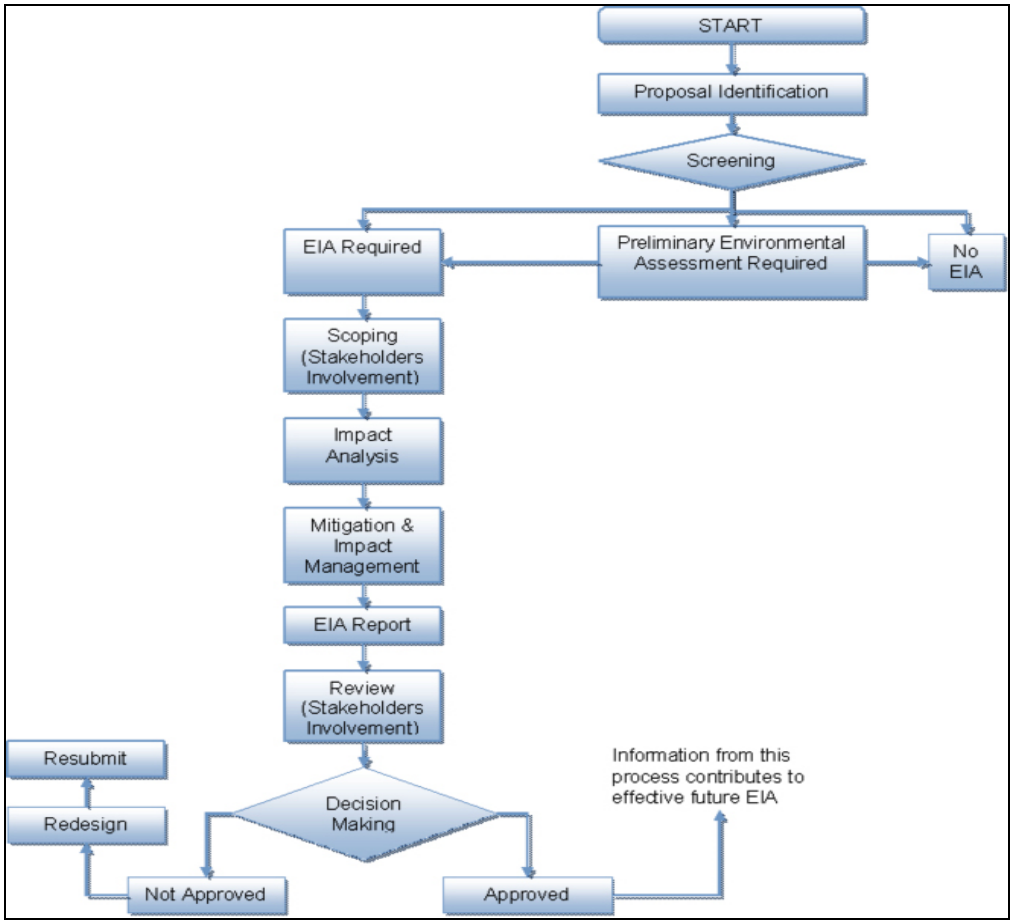
The Convention was adopted on 22 May 2001 at the Conference of Plenipotentiaries on the Stockholm Convention on Persistent Organic Pollutants, Stockholm, 22-23 May 2001. Tanzania became a signatory to the Convention on May 23, 2001 and ratified it on April 30, 2004.

The following table (**Table 5.1**) summarizes the key steps and duration of the EIA process. A chart showing the procedure of EIA in Tanzania is illustrated in **Figure 5.1.**

Table 5.1 Activities and duration under the Tanzanian EIA requirements

S/N	Activity	Duration
1	**Registration of the Proposed Project At NEMC** The proponent is required to fill in a 'Preliminary Environmental Assessment Registration Form' for the project.	Determined by the Proponent
2	**Screening** Return to NEMC three copies of a dully filled Registration Form attached with ten copies of Project Briefs for screening by NEMC. The contents of the Project Brief should be as directed in the EIA and Audit Regulations of 2005.	Screening results within 45 days
3	**Preparation of Scoping Report and Terms of Reference (ToR)** Contract an Environmental Expert/EIA Consultant to prepare a Scoping Report and Terms of Reference (ToR) for conducting the Environmental Impact Assessment (EIA) and submit them to NEMC for review and approval before the commencement of the EIA study.	Approval of Scoping report and ToR within 15 days
4	**Conducting the EIA Study** Conduct EIA study (by the consultant) according to the approved ToR and adhere to the Environmental Management Act of 2004 and Environmental Impact Assessment and Audit Regulations of 2005	Determined by the ToR
5	**Submission of EIS (EIA Report)** Submit an Environmental Impact Statement (EIS) also called Environmental Impact Assessment (EIA) Report to NEMC for review by a Cross-sectoral Technical Advisory Committee (TAC).	TAC meeting convened within 60 days
6	**Review of EIA Study** Facilitate the review process by paying the review costs to NEMC as required;	Determined by the Proponent
7	**Incorporation of the TAC Recommendations** Make corrections and improvements of the draft EIS according to the comments and recommendations raised by the TAC.	Determined by the ToR
8	**Submission of the Revised EIS (EIS Report) to NEMC** Submit the improved (final) version of the EIS to NEMC for final scrutiny and prepare recommendation to the Minister responsible for Environment for final decision making.	

Figure 5.1: EIA process as per Environmental Impact Assessment and Audit Regulations, 2005



Description of EIA Process

a) Registration:
The proponent is required to register a project proposal or concept with NEMC for Tanzania mainland using special application forms known as "Environmental Impact Assessment Registration Forms." In mainland the forms are available at NEMC offices, Environmental Units of sector Ministries, Local Authorities and at Tanzania Investment Centre (TIC).

In Zanzibar the registration is done through submission of report stating concisely the nature of the sub project, activities to be undertaken, proposed location, sub project inputs and expected outputs.

b) Screening:
This is the process of analyzing a project proposal to determine the level at which environmental assessment will be carried out.

c) Scoping:
Scoping is the responsibility of the proponent and his or her consultants. The process that involves extensive public consultations with principal stakeholders is mandatory in order to inform them about the proposed activities and solicit their views about it. The result of these consultations must be documented in the EIA report from whereby the terms of reference for the EIA is drawn and approved by competent authorities.

d) The Review Process:
The process is done by the competent authorities and involve:

- Providing an evaluation of the strengths and weakness of environmental impact statement submitted;

- Identifying the issues not covered, inaccuracies of information, or any conflicts apparent in the assessment process; and
- Taking decision as to whether the proposal should be accepted or not.

e) Monitoring:
The proponent is required to prepare and execute an appropriate monitoring Program during implementation which consist the following aspects of sub project activities:

- Verification of impact reductions;
- Evaluation of mitigation measures; and
- Adherence to approved Environmental Agreement.

This will allow for compliance enforcement as well as learning from mistakes facilitating impact management and handling of unanticipated aspects to aid in the improvement of EIA process and practice.

f) Environmental Audits:
The environmental Audit report will be prepared by the proponent and submitted to competent authorities for evaluation.

g) Decommissioning:
The decommissioning report including restoration or rehabilitation activities shall be prepared by the proponent and submitted to NEMC for record. Should there be need for continued environmental monitoring, the proponent shall bear the costs.

ANNEX 6A: ENVIRONMENTAL IMPACT ASSESSMENT AND AUDIT REGULATIONS NO.349 OF 2005, SCHEDULE I – PROJECTS REQUIRING AN EIA

1. Agricultural

- Cultivating natural and semi-natural not less than 50ha;
- Water management projects for agriculture (drainage, irrigation);
- Large scale mono-culture (cash and food crops);
- Pest control projects (i.e. tsetse, army worm, quelea quelea, locusts, rodents, weeds) etc;
- Fertilizer and nutrient management;
- Agriculture Programs necessitating the resettlement of communities; and
- Introduction of new breeds of crops.

2. Livestock and Range Management

- Large scale livestock movement;
- Livestock markets;
- Introduction of new breeds of livestock;
- Introduction of improved forage species;
- Fencing;
- Provision of public water supply (watering points, wells);
- Ectoparasite management (cattle dips, area treatment);
- Intensive livestock raising units; and
- Livestock routes.

3. Forest activities

- Timber logging and processing;
- Forest plantation and forestation and introduction of new species;
- Selective removal of single commercial tree species; and
- Pest management.

4. Fisheries activities

- Medium to large scale fisheries;
- Artificial fisheries (Aqua-culture for fish, algae, crustaceans shrimps, lobster or crabs); and
- Introduction of new species in water bodies.

5. Wildlife

- Introduction of new species;
- Wildlife catching and trading;
- Hunting;
- Wildlife ranching and farming; and
- Zoo and sanctuaries.

6. Tourism and Recreational Development

- Construction of resort facilities or hotels along the shorelines of lakes, river, island and oceans;
- Hill top resort or hotel development;
- Development of tourism or recreational facilities in protected and adjacent areas (national parks, marine parks, forestry reserves etc) on island sand in surrounding waters;
- Hunting and capturing;
- Camping activities, walk ways and trails etc.;
- Sporting and race tracks/sites; and
- Tour operations.

7. Energy Industry

- Production and distribution of electricity, gas steam and hot water;
- Storage of natural gas;
- Thermal power development (i.e. coal, nuclear);

- Hydro-electric power-electric power;
- Bio-mass power development;
- Wind mills power development;
- Solar (i.e. Impact due to pollution during manufacture of solar devices, acid battery spillage and improper disposal of batteries); and
- Nuclear energy.

8. Petroleum Industry

- Oil gas fields exploration and development, including seismic survey;
- Construction of offshore and onshore pipelines;
- Construction of oil and gas separation, processing, handling and storage facilities;
- Construction of oil refineries;
- Construction of product depots for the storage of petrol, gas, diesel, tar and other products within commercial industrial or residential areas; and
- Transportation of petroleum products.

9. Food and beverage industries

- Manufacture of vegetable and animal oils and fats;
- Oil refinery and ginneries;
- Processing and conserving of meat;
- Manufacture of dairy products;
- Brewing distilling and malting fish meal factories;
- Slaughterhouses;
- Soft drinks;
- Tobacco processing;
- Caned fruits, and sources;
- Sugar factories; and
- Other agro-processing industries.

10. Textile in industry

- Cotton and synthetic fibres;
- Dye for cloth; and
- Ginneries.

11. Leather industry

- Tanning;
- Tanneries;
- Dressing factories; and
- Other cloth factories.

12. Wood, pulp and paper industries

- Manufacture veneer and plywood;
- Manufacture of fibre board and of particle –board; and
- Manufacture of pulp, paper, sand-board cellulos – mills.

13. Building and Civil Engineering Industries

- Industrial and housing estate;
- Major urban projects (multi-storey building, motor terminals, markets etc);
- Tourist installation;
- Construction and expansion/upgrading of roads, harbours, ship yards, fishing harbours, air fields and ports, railways and pipelines;
- River drainage and flood control works;
- Hydro-electric and irrigation dams;
- Reservoir 8. Storage of scrap metal;
- Military installations;
- Construction and expansion of fishing harbours; and
- Developments on beach fronts.

14. Chemical industries

- Manufacture, transportation, use and storage of pesticide or other hazardous and or toxic chemicals;
- Production of pharmaceutical products;
- Storage facilities for petroleum, petrochemical and other chemical products (i.e. filling stations); and
- Production of paints, vanishes, etc.

15. Extractive industry

- Extraction of petroleum;
- Extraction and purification of natural gas;
- Other deep drilling bore holes and wells;
- Mining;
- Quarrying;
- Coal mining; and
- Sand dredging.

16. Non-metallic industries (products)

- Manufacture of cement, asbestos, glass, glass fibre, glass wood;
- Processing of rubber;
- Plastic industry; and
- Lime manufacturing, tiles, ceramics.

17. Metal and engineering industries

- Manufacture of other means of transport (trailers, motor cycles, motor vehicle bicycles – bicycles);
- Bodybuilding;
- Boiler making and manufacture of reeser4voirs, tanks and other sheet containers;
- Foundry and forging;
- Manufacture of non ferrous products;
- Iron and steel; and
- Electroplating.

18. Waste treatment and disposal

(a) Toxic and Hazardous waste

- Construction of incineration plants;
- Construction of recovery plant (off-site);
- Construction of secure land fills facility;
- Construction of storage facility (off-site); and
- Collection and transportation of waste.

(b) Municipal sold waste

- Construction of incinerator plant;
- Construction of composting plant;
- Construction of recovery/re-cycling plant;
- Construction of municipal sold waste landfill facility;
- Construction of waste depots; and
- Collection and transportation.

(c) Municipal sewage

- Construction of wastewater treatment plant;
- Soil collection transport and treatment; and
- Construction of sewage system.

19. Water supply

- Canalization of water coursed;

- Diversion of normal flow of water;
- Water transfers scheme;
- Abstraction or utilization of ground and surface water for build supply; and
- Water treatment plants.

20. Health projects

- Vector control projects (malaria, bilharzias, trypanosomes etc).

21. Land Reclamation and land development

- Rehabilitation of degraded lands;
- Coastal land reclamation;
- Dredging of bars, grayness, dykes, estuaries etc; and
- Spoil disposal.

22. Resettlement/relocation of people and animals

- Establishment of refugee camps;

23. Multi-sectoral Projects

24. Agro-forestry

- dispersed field tree inter cropping;
- alley cropping;
- living fences and other liner planting;
- windbreak/shelterbelts;
- taungya system;
- Integrated conservation and development Programs e.g. protected areas;
- Integrated pest management (e.g. IPM); and
- Diverse construction – public health facilities schools, storage building, nurseries, facilities for ecotourism and field research in protected areas, enclosed latrines, small enterprises, logging mills, manufacturing furniture carpentry shop, access road, well digging, camps, dams reservoirs, river basin development and watershed management projects food aid, humanitarian relief.

25. Trade: importation and exportation of the following

- Hazardous chemicals/waste;
- Plastics;
- Petroleum products;
- Vehicles;
- Used materials;
- Wildlife and wildlife products;
- Pharmaceuticals;
- Food; and
- Beverages.

26. Policies and Programs

- Decisions of policies and Programs on environmental and development;
- Decisions to change designated status;
- Family planning;
- Technical assistance; and
- Urban and rural land use development plans eg. Master plans, etc.

1. Fish culture
2. Bee keeping
3. Small animal husbandry and urban livestock keeping
4. Horticulture and floriculture
5. Wildlife catching and trading
6. Production of tourist handcrafts
7. Charcoal production
8. Fuel wood harvesting
9. Wooden furniture and implement making
10. Basket and other weaving
11. Nuts and seeds for oil processing
12. Bark for tanning processing
13. Brewing and distilleries
14. Bio-gas plants
15. Bird catching and trading
16. Hunting wildlife ranching
17. Zoo, and sanctuaries
18. Tie and dye making
19. Brick making
20. Beach sailing
21. Sea weed farming
22. Salt pans
23. Graves and cemeteries
24. Urban livestock keeping
25. Urban agriculture
26. Fish landing stations
27. Wood carving and sculpture
28. Hospitals and dispensaries, schools, community center and social halls, playground
29. Wood works e.g. boat building
30. Market places (livestock and commodities)
31. Technical assistance
32. Rainwater harvesting
33. Garages
34. Carpentry
35. Black smith
36. Tile manufacturing
37. Kaolin manufacturing
38. Vector control projects e.g. malaria, bilharzias, trypanosomes
39. Livestock stock routes
40. Fire belts
41. Tobacco curing kilns
42. Sugar refineries
43. Tanneries
44. Pulp plant
45. Oil refineries and ginneries
46. Artisanal and small scale mining

Part 1: Catalytic Fund Subproject E&S Screening Form

1. Proposal Information **Recipient Name and Contact Details:**			
Funding source:	MGF: ☐ SVCF: ☐ Other: ☐		
	If other, explain:		
Application/proposal #			
Name of reviewer:		**Date of screening:**	

Subproject Details: Attach location map (longitude – latitude coordinates (GPS reading) if available):	
Subproject name:	
Location: (region/district/village)	
Type of activity:	
Estimated Cost:	
Proposed Date of Commencement of Work:	
Technical Drawing/Specifications Reviewed:	Yes/No – refer to Application Portfolio

2. Physical Data:	Comments
Subproject Site area in ha	
Extension of or changes to existing land use	
Any existing property to transfer to subproject	
Any plans for new construction	
Is there adjacent/nearby critical natural habitat?	

3. Preliminary Environmental and Land Information:	Yes/No	Comments
Is there an EIA required for this subproject? If so, is there a permit?		
Has there been litigation or complaints of any environmental nature directed against the proponent or subproject?		
Will the subproject require the acquisition of land?		
What is the status of the land holding (customary, lease, etc)?		
Is there evidence of land tenure status (affidavit, other documentation)?		
Are there outstanding land disputes?		
What is the plot currently being used for? (e.g. agriculture, gardening, etc)		List the key resources.
Will the proposed activitiy have any impact on any ecosystem services, biodiversity issues or natural habitats?		
Will the subproject require use of pesticides?		

Does the applicant (company) have in place an established Environmental Management System?		
Does the applicant currently incorporate clean technologies and/or sustainable practices?		
Will the proposed activity rely on the performance of an existing dam or a dam under construction?		If yes, see Annex 11 for specific guidelines for the assessment and preparation of the Dam Safety Measures Report.
Will the proposed activity affect any physical cultural resources?		If yes, see Annex 8 for chance find procedures to be followed.

4. Impact identification and classification:

When considering the location of a subproject, rate the sensitivity of the proposed site in the following table according to the given criteria. Higher ratings do not necessarily mean that a site is unsuitable. They indicate a real risk of causing undesirable adverse environmental and social effects, and that more substantial environmental and/or social planning may be required to adequately avoid, mitigate or manage potential effects. The following table should be used as a reference.

Issues	**Site Sensitivity**		
	Low	**Medium**	**High**
Natural habitats	No natural habitats present of any kind	No critical natural habitats; other natural habitats occur	Critical natural habitats present
Water quality and water resource availability and use	Water flows exceed any existing demand; low intensity of water use; potential water use conflicts expected to be low; no potential water quality issues	Medium intensity of water use; multiple water users; water quality issues are important	Intensive water use; multiple water users; potential for conflicts is high; water quality issues are important
Natural hazards vulnerability, floods, soil stability/ erosion	Flat terrain; no potential stability/erosion problems; no known volcanic/seismic/ flood risks	Medium slopes; some erosion potential; medium risks from volcanic/seismic/ flood/ hurricanes	Mountainous terrain; steep slopes; unstable soils; high erosion potential; volcanic, seismic or flood risks
Cultural property	No known or suspected cultural heritage sites	Suspected cultural heritage sites; known heritage sites in broader area of influence	Known heritage sites in project area
Involuntary resettlement	Low population density; dispersed population; legal tenure is well-defined; well-defined water rights	Medium population density; mixed ownership and land tenure; well-defined water rights	High population density; major towns and villages; low-income families and/or illegal ownership of land; communal properties; unclear water rights
Indigenous peoples	No indigenous population	Dispersed and mixed indigenous populations; highly acculturated indigenous populations	Indigenous territories, reserves and/or lands; vulnerable indigenous populations

Rural roads	Potential for Adverse Impacts				
	None	Low	Med	High	Unknown
Soil erosion or flooding concerns (eg, due to highly erodible soils or steep gradients)					
Number of stream crossings or disturbances					
Wet season excavation					
Creation of quarry sites or borrow pits					
Significant vegetation removal					
Wildlife habitats or populations disturbed					
Environmentally sensitive areas disturbed					
Cultural or religious sites disturbed					
Economic or physical resettlement required					
New settlement pressures created					
Other (specify):					

Water supply and use	Potential for Adverse Impacts				
	None	Low	Med	High	Unknown
New access (road) construction					
Existing water sources supply/yield depletion					
Existing water users disrupted					
Downstream water users disrupted					
Increased numbers of water users due to improvements					
Increased social tensions/conflict over water allocation					
Sensitive ecosystems downstream disrupted					
Economic or physical resettlement required					
Local incapacity/inexperience to manage facilities					
Other (specify):					

Irrigation and agriculture	Potential for Adverse Impacts				
	None	Low	Med	High	Unknown
Existing water sources supply/yield depletion					
Existing water users disrupted					
Downstream water users disrupted					
Water storage requirement and viability (soil permeability)					
Vulnerability to water logging (poor drainage)					
Vulnerability to soil and water salinization					
Sensitive downstream habitats and water bodies					
Environmentally sensitive areas disturbed					
Cultural or religious sites disturbed					
Increased agric. chemicals (pesticides, etc) loading					
Increased social tensions over water allocation					
Local incapacity/inexperience to manage facilities					
Local incapacity/inexperience with irrigated agriculture					
Other (specify):					

Water basin and catchment	Potential for Adverse Impacts				
	None	Low	Med	High	Unknown
New access (road) construction					
Wet season soil disturbance					
Potential for debris flows or landslides					
Sensitive downstream ecosystems					
Removal of native plant/tree species					
Introduced plant/tree species					
Invasion of native species					
Wildlife habitats or populations disturbed					
Environmentally sensitive areas disturbed					

Water basin and catchment	Potential for Adverse Impacts				
	None	Low	Med	High	Unknown
Insufficient capacity to manage catchment ponds					
Insufficient capacity to prohibit or control open grazing					
Insufficient capacity to manage new plantations/pastures					
Economic or physical resettlement required					
Other (specify):					

Infrastructure	Potential for Adverse Impacts				
	None	Low	Med	High	Unknown
New access (road) construction					
Alteration of existing drainage conditions					
Vegetation removal					
Wet season soil disturbance					
Construction materials impact on adjacent forests/lands					
Quarries and borrow pits created					
Cultural or religious sites disturbed					
Water supply development effects in available supply					
Effect of sanitation development on existing disposal sites					
Effects of medical waste on existing disposal system					
Economic or physical resettlement required					
Number of potential Project Affected Persons (PAPs)					
In-migration/settlement induced by facilities development					
Local incapacity/inexperience to manage facilities					
Other (specify):					

5. Identify type of activities and likely environmental and social impacts: (Refer to CF Screening Checklists)
What are the likely environmental and social impacts, risks associated with the subproject?

6. Mitigation and Management Measures to be applied
List actions required for mitigation and management of potential risks and impacts.

7. ADDITIONAL INFORMATION

(a) Has the Applicant complied with national laws and regulations (e.g. obtained an environmental permit/clearance from NEMC)?

In case of Yes, please attach the declaration of the Applicant in this regard. In case of No, please provide details in this regard:

(b) E & S assessment comments based on site visit:

(c) Determination of environmental category based on findings of the screening: A ____B ____C ____

- ☐ Requires an EIA
- ☐ Requires preparation of additional E&S information (e.g. to address pesticide use) _____
- ☐ Does not require further environmental or social due diligence

(d) Contact with District Environmental Office:

- ☐ Does this project require review by the DEO?
- ☐ Is the DEO aware of this project and requirements for DEO review?
- ☐ Is there any covenant required for Local District Office?

(e) ESAP

Prepared by: Date:

Part 2: Catalytic Fund Subproject E&S Screening Guidelines
AQUACULTURE

E&S Impacts and Risks	E&S Mitigation and Management Measures
1. Threats to biodiversity Threats to biodiversity are mainly associated with conversion of natural habitats during construction; potential release of alien species into the natural environment during operations; potential loss of genetic resources due to collection of larvae, fry, or juveniles for aquaculture production; potential release of artificially propagated seed into the wild (e.g. there are more farmed than wild Atlantic salmon in existence); sustainability of fish meal and fish oil ingredients for fish and crustacean feeds; and development of antibiotic resistance in pathogenic bacteria that can then spread from farms to wild stock.	• Survey the project area before land and water conversion to aquaculture production is undertaken to identify, categorize, and delineate natural and modified habitats and ascertain their biodiversity importance at the national or regional level; • Ensure that the area to be converted to aquaculture use does not represent a habitat that is unique or protected (such as mangrove areas), or includes high biodiversity value, such as known sites of critically endangered or endangered species, or important wildlife breeding, feeding, and staging areas; • Be aware of the presence of critically endangered or endangered species in the areas already used for aquaculture production, and implement management processes that take them into account; • Design facilities so that as much as possible of the natural vegetation habitat is left intact (e.g. through the use of vegetated buffer zones and habitat corridors) and that conversion and degradation of the natural habitat is minimized; • Design and implement mitigation measures to achieve no net loss of biodiversity where feasible, for instance through post-operation restoration of habitats; offset of losses through the creation of ecologically comparable area(s) managed for biodiversity; and compensation to direct users of biodiversity; • Avoid the need to frequently abandon and replace improperly designed and built aquaculture ponds:
2. Conversion of natural habitats The construction and operational phases of the project cycle of an aquaculture facility may require conversion of the natural environment including, for example, the removal of mangroves for excavation of ponds, or alteration of the natural hydrology of lagoons, bays, rivers, or wetlands. Operational phase issues may also include alteration of aquatic habitats and substrates(e.g. under sea cages or shellfish farms).	• Assess soil properties prior to pond construction to ensure that the bottom-sealing layer of the soil with percolation rates/porosity low enough to satisfactorily hold pond water. If there is not enough clay, then the ponds may demonstrate high seepage rates and require additional expenditure (e.g. pumping in water, or relining with clay-rich or possibly bentonite-rich topsoil from other sites) or eventual abandonment. • High seepage rates can also pollute groundwater required for other purposes in the vicinity with use for drinking water a major concern. • Assess the soil pH and the presence of pesticide and pollutant residues (especially on land that was previously used for intensive agriculture), as well as the natural occurrence of pyrite, prior to construction as the presence of anthropogenic or natural pollutants may hinder the viability of the pond.
3. Conversion of agricultural land If new land areas are not available for aquaculture, an alternative is to convert former agricultural land. If the selected production is based on brackish water, this may pose a risk of salinization of surrounding agricultural land.	• Ensure that the embankments around brackish water pond systems are high enough to form a physical division between agriculture and aquaculture; • Ensure that the saline / brackish water discharges are appropriately treated and disposed of (e.g. through use of discharge canals) for the receiving waters; • Ensure that appropriate discussions are held at the community level to avoid conflicts of interest when agricultural land is transferred to aquaculture production.

E&S Impacts and Risks	E&S Mitigation and Management Measures
4. Introduction of Alien, Selectively Bred, or Genetically Engineered Species Introductions can result in interactions with the wild, including escapes from farms, or open systems (such as mussel rafts). As such, introductions can disturb the existing ecological balance; cause loss of species biodiversity; cause loss of genetic diversity of the wild populations; reduce fitness of wild population through breeding with genetically altered escapees; and result in the transmission or spread of fish diseases. The widespread seeding of an alien genotype is of considerable concern both as regards species biodiversity and genetic biodiversity.	• Farming of sterile fish; • Preventing the escape of species from pond-based aquaculture systems. Examples of common escape prevention measures include: o Installation and maintenance of screens with a mesh that is small enough to prevent the entry and potential escape of aquatic species in the drainage channels connecting production ponds to sedimentation ponds, as well as those connecting sedimentation ponds to the receiving water o Installation of fish-proof strainer dams o Installation and maintenance of gravel filtration on pond discharge structures • When necessary, consider chemical treatment of water released from hatcheries (e.g. with chlorine at acceptable concentrations for the receiving waters) to destroy escaping larvae or juveniles • Consider the hydrology of the region in the design of the pond system and ensure that the pond embankments are high enough to contain the pond water and prevent escape of the species during periods of heavy rainfall and potential flooding • Establish a contingency plan if there is an escape of the species being cultivated into the wild • Preventing the escape of species from open water aquaculture systems. Examples of common escape prevention measures include: o Regularly inspect the cage and pen netting for holes(e.g. before crowding of the harvest and at intervals during the operation) o Design and construct cage and pen units, including choice of nets, to deal with the worst weather and environmental conditions likely to occur on the site o Provide for containment during periods of storm surges and excessively high tides • For cage culture in open waters, use submersible cages that can be submerged during storms below damaging wave action • Provide adequate marking of the fish farm system to warn navigators of the potential obstruction and reduce the risk of collision
5. Impacts of Harvesting on Ecosystem Functions The practice of capturing females, eggs, fry, juveniles, or even fingerlings from the wild for the purpose of stocking aquaculture systems may threaten ecosystem biodiversity. Fry and larvae may be gathered from fresh or brackish water using very fine meshed nets resulting in considerable by-catch, as well as the removal of large number of larvae, fry, and juveniles from the food chain.	• The recommended prevention of this type of ecosystem pressure is the breeding of stock material in captivity. However, for some species, careful harvesting of hatchlings/ and or fry (less than 3 cm) that are still at a stage of expected high mortality can result in relatively little impact on the overall population as compared to collecting larger fingerlings from a smaller population for grow-out.

E&S Impacts and Risks	E&S Mitigation and Management Measures
6. Fish meal and fish oil Fish meal and oil are derived from the capture and processing of wild pelagic fish stocks (e.g. anchovy, pilchard, herring, sardine, sand eel, sprat, and capelin). Although the production of fish meal and oil is not covered by these Guidelines, processed fishmeal and oil are the primary sources of protein and dietary lipids in fish feed for farmed fish in aquaculture operations. The aquaculture sector is an important consumer of fish meal and fish oil, and there are concerns regarding the sustainability of the pelagic fish stocks from which fish meal and fish oil are derived.	• Aquaculture operations should consider incorporating the use of alternatives to supplies of fish feed produced from fish meal and fish oil. Alternatives for fish feed ingredients may include use of plant material substitutes [e.g. soya for bulk protein and single-cell protein (yeast for lysine and other amino acids)] and biotechnology options (e.g. biofermentation products).
7. Contamination of Aquatic Systems Aquaculture activities, particularly pond-based systems, may affect aquatic systems due to construction and operation activities, primarily the mobilization of soils and sediments during construction and through the release of effluents during operation. Fish cage culture can also be a major contributor to marine pollution in areas of high density use. <u>Soil Erosion and Sedimentation</u> Earth excavation and moving activities conducted during construction of some types of aquaculture projects may result in soil erosion and the subsequent sedimentation of nearby water bodies. Sedimentation of aquatic resources may contribute to eutrophication and overall degradation of water quality.	• Construct pond and canal levees with a 2:1 or 3:1 slope (based on soil type) as this adds stability to the pond banks, reduces erosion, and deters weeds. • Avoid pond construction in areas that have a slope of more than 2 percent, as this will require energy-intensive construction and maintenance; • Stabilize the embankments to prevent erosion; • Reduce excavation and disturbance of acid sulfate soils during construction; • Carry out construction work during the 'dry' season to reduce sediment runoff that may pollute adjacent waters; • Install temporary silt fences during construction to slow down and catch any suspended sediments. Silt fences can be made of woven plastic or fabric, or hay bales.
8. Wastewater Discharges <u>Industrial Process Wastewater:</u> The effluent released from aquaculture systems typically contains a high organic and nutrient load, suspended solids, and may also contain chemical residues including feed supplements and antibiotics. The possible impacts include contamination of groundwater and surface water from release of effluents or communication to receiving water from unconfined process and storage tanks (such as ponds and lagoons). Impacts on aquatic systems include creation of eutrophic zones within receiving waters, increased fluctuation of dissolved oxygen levels, creation of visible plumes, and	A range of measures can be taken in pond systems and pen / cage systems to (i) reduce the amount of contamination of the effluent; (ii) prevent pond effluent from entering surrounding water bodies; and (iii) treat the effluent before its release into the receiving waters to reduce contaminant levels. The following management measures can prevent the contamination of effluent: <u>Feed:</u> • Ensure that pellet feed has a minimum amount of "fines" or feed dust. Fines are not consumed and add to the nutrient load in the water;

E&S Impacts and Risks	E&S Mitigation and Management Measures
accumulation of nutrients within the receiving waters. The high nutrient load results from efforts to artificially boost production levels by increasing the food supply for the cultured species. This is done by increasing nutrient availability either directly through supplemental feed or indirectly by fertilizing ponds to increase primary productivity. Pond ecosystems have a limited capacity to recycle organic matter and nutrients, and increasing the stocking rate removes this capacity, resulting in the build-up of organic matter, nitrogenous waste, and phosphorus both in the water mass and on the bottom of the pond or pen / cage.8 The suspended solids are derived from particulate organic matter and erosion of pond floor, walls, and discharge channels. The chemical residues may include the remains of veterinary drugs (e.g. antibiotics) that may have been applied to the cultivated species, and toxic substances such as formalin and malachite green, a cancer causing agent, that may have been that are used to treat finfish for parasites and their eggs for fungal growth. Malachite green is banned in most countries and must not be used. Formalin should only be used under controlled conditions (e.g. in dipping containers) and with proper care – it should not be introduced directly into production systems.	• Match the pellet size to the species' life-cycle stage (e.g. smaller pellets should be fed to fry or juvenile animals to reduce the unconsumed fraction); • Regularly monitor feed uptake to determine whether it is being consumed and adjust feeding rates accordingly. • Feed may be wasted due to overfeeding or not feeding at the right time of day; • Where feasible, use floating or extruded feed pellets as they allow for observation during feeding time; • Store feed in cool, dry facilities and ideally for no longer than 30 days to avoid reduction in vitamin contents. Moldy feed should never be used as it may cause disease; • Spread feed as evenly as possible throughout the culture system, ensuring that as many animals as possible have access to the feed. Some species are highly territorial, and uneaten feed adds to the nutrient load; • Feed several times a day, especially when animals are young, allowing better access to food, better feed conversion ratios and less waste; • Halt feeding at a suitable interval before harvest to eliminate the presence of food and / or fecal material in the animal's gut; • During harvesting, contain and disinfect blood water and effluent to reduce the risk of disease spread and to contain effluent matter. <u>Other organic materials:</u> • Perform slaughter and processing in an area where the effluent is contained; • Prevent effluent leakage from harvest rafts and bins by using harvest bins in good condition with sealed bin liners and secure lids and bindings; • Equip off-loading bays with a waterproof apron and surround with a bund to contain potential spills and prevent contamination with effluent. <u>Suspended solids:</u> • Avoid discharging waters from ponds while they are being harvested with nets, as this will add to the suspended solids in the effluent drainage; • If feasible, use partial draining techniques to empty ponds that have been harvested. The last 10–15 percent of pond water contains the highest quantities of dissolved nutrients, suspended solids, and organic matter. After harvest, hold the remaining water in the pond for a number of days before discharge, or transfer to a separate treatment facility. <u>Fertilizers:</u> • Plan the rate and mode of application of fertilizers to maximize utilization and prevent over-application, taking into account predicted consumption rates; • Increase the efficiency of application and dispersion through such practices as dilution of liquid fertilizers or solution of granulated fertilizers prior to application. Other options include the use of

E&S Impacts and Risks	E&S Mitigation and Management Measures
	powdered fertilizers or the placement of powdered fertilizer bags in shallow water to allow solution and dispersion; • Consider the use of time-released fertilizer in which resin coated granules release nutrients into the pond water, with • the rate of release corresponding to water temperature and movement; • Avoid the use of fertilizers containing ammonia or ammonium in water with pH of 8 or above to avoid the formation of toxic unionized ammonia (NH3); • Depending on the system (e.g., freshwater aquaculture), grow organic fertilizer (e.g. natural grass) in the pond basin after harvest; • Initiate pond fertilization only in static ponds with no pond water overflow that can impact downstream waters and watersheds; • Conduct pond fertilization to avoid or minimize consequences of potential runoff due to floods or heavy rain and avoid application to overflowing ponds. <u>Chemicals:</u> • Design the pond depth to reduce the need for chemical control of aquatic weeds and reduce thermal stratification; • Do not use antifoulants to treat cages and pens. The chemically active substances used in antifouling agents are very poisonous and highly stable in an aquatic environment. Clean nets manually or in a net washing machine. The following management measures can be taken in pond based systems to prevent pond effluent from entering surrounding water bodies: • In some fish systems, avoid automatic drainage of ponds at the end of the production cycle as the same pond water may be used to cultivate several crop rotations of certain species (e.g. catfish); • Reuse water from harvested ponds by pumping it into adjacent ponds to help complement their primary productivity, provided that the level of BOD is controlled; • This process is called "bloom seeding," and requires careful timing of harvests; • Consider the hydrology of the region in the design of the pond system and ensure that the pond embankments are high enough to contain the pond water and prevent loss of effluent during periods of increased rainfall and potential flooding.

Reference:

World Bank Group Environmental, Health, and Safety Guidelines for Aquaculture (April 2007) http://www1.ifc.org/wps/wcm/connect/769e90804886595bb8fafa6a6515bb18/Final%2B-%2BAquaculture.pdf?MOD=AJPERES

EBRD Sub-sectoral Environmental and Social Guidelines: Aquaculture (Marine and Freshwater) – Onshore and Offshore (August 2009) http://www.ebrd.com/downloads/policies/environmental/aqua.pdf

DAIRY PRODUCTION

E&S Impacts and Risks	E&S Mitigation and Management Measures
1. Industrial Process Wastewater Due to the presence of milk solids (e.g. protein, fat, carbohydrates, and lactose), untreated wastewater from dairy processing facilities may have a significant organic content, biochemical oxygen demand (BOD), and chemical oxygen demand (COD). Whey may also contribute to high organic loads in wastewater. Salting activities during cheese production may result in high salinity levels in wastewater. Wastewater may also contain acids, alkali, and detergents with a number of active Ingredients, and disinfectants, including chlorine compounds, hydrogen peroxide, and quaternary ammonia compounds. Wastewater may have a significant microbiological load and may also contain pathogenic viruses and bacteria. <u>Other Wastewater Streams & Water Consumption</u> Dairy processing facilities use considerable quantities of potable water for processing and for cleaning of equipment, process areas, and vehicles.	The following recommended techniques can be used to prevent the contamination of the wastewater stream: • Avoid milk, product, and by-product losses (e.g. from spills, leaks, excessive changeovers, and shut downs) through the adoption of good manufacturing procedures and facility maintenance; · • Separate and collect product waste, including rinse waters and by-products, to facilitate recycling or further processing for subsequent use, sale, or disposal (e.g. whey and casein); • Install grids to reduce or avoid the introduction of solid materials into the wastewater drainage system; • Process and foul drains should be separate in process areas and should discharge directly to a treatment plant and / or municipal sewerage system; • Pipes and tanks should be self–draining, with appropriate procedures for product discharge prior to, or integral with, cleaning procedures; • Subject to sanitary requirements, recycle process water, including condensate from evaporation processes, for preheating and heat-recovery systems for heating and cooling processes, to minimize water and energy consumption; • Adopt best-practice methods for facility cleaning using approved chemicals and / or detergents with minimal environmental impact and compatibility with subsequent wastewater treatment processes. <u>Process Wastewater treatment</u> Techniques for treating industrial process wastewater in this sector include grease traps, skimmers or oil water separators for separation of floatable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically anaerobic followed by aerobic treatment, for reduction of soluble organic matter (BOD); biological nutrient removal for reduction in nitrogen and phosphorus; chlorination of effluent when disinfection is required; dewatering and disposal of residuals; in some instances composting or land application of wastewater treatment residuals of acceptable quality may be possible. Additional engineering controls may be required to contain and neutralize nuisance odors. Source segregation and alternate treatment methods are typically used for high salinity streams that contribute to elevated TDS levels in the wastewater.

E&S Impacts and Risks	E&S Mitigation and Management Measures
2. Solid waste Solid organic waste in dairy processing facilities mainly originates from production processes and includes nonconforming products and product losses (e.g. milk spillages liquid whey and buttermilk), grid and filter residues, sludge from centrifugal separators and wastewater treatment, and packaging waste (e.g. discarded cuts, spent ripening bags, wax residues from cheese production) arising from incoming raw materials and production line damage.	Recommended measures to reduce and manage solid waste include the following: • Where possible and subject to sanitary requirements, segregate solid process waste and non-conforming products for reprocessing into commercial products and byproducts (e.g. butter oil, processed cheese, animal feed, soap stock, or other technical-grade materials); • Optimize product filling and packaging equipment to avoid product- and packaging-material waste; • Optimize the design of packaging material to reduce the volume of waste (e.g. by using recycled materials and by reducing the thickness without compromising food safety criteria). If PET bottles are blown on site, plastic waste cuttings can be reused, or should be sorted as plastic waste for off-site recycling or disposal; • Use uncontaminated sludge from on-site wastewater treatment for agricultural fertilizer or production of biogas.
3. Exhaust Gases Exhaust gas emissions (carbon dioxide [CO2], nitrogen oxides [NOX] and carbon monoxide [CO]) in the dairy processing sector result from the combustion of gas and fuel oil or diesel in turbines, boilers, compressors and other engines for power and heat generation.	Guidance for the management of small combustion source emissions with a capacity of up to 50 megawatt thermal (MWth), including air emission standards for exhaust emissions, is provided in the General EHS Guidelines.
4. Dust Emissions of dust during dairy processing activities include fine milk powder residues in the exhaust air from the spray drying systems and bagging of product. The presence of hot air and fine dust creates fire and explosion impacts.	Recommended measures to prevent and control dust emissions mainly consist of the installation of exhaust ventilation equipped with dry powder retention systems (e.g. cyclones or bag filters). Bag filters are generally favored over wet scrubbing methods, as they use significantly less energy, generate less or no wastewater, and produce less noise. All modern spray dryers should be equipped with explosion release mechanisms and fire prevention systems.
5. Odor The major sources of odor emissions in dairy processing facilities are related to on-site wastewater treatment facilities, in addition to fugitive odor emissions from filling / emptying milk tankers and storage silos.	Recommended management techniques to prevent and control odor emissions include the following: • Ensure wastewater treatment facilities are properly designed and maintained for the anticipated wastewater load; • Keep all working and storage areas clean; • Empty and clean the fat trap frequently (e.g. daily emptying and weekly cleaning); • Minimize stock of waste and by-products and store for short periods in cold, closed, and well-ventilated rooms; • Enclose production activities that cause odor and operate under vacuum.

E&S Impacts and Risks	E&S Mitigation and Management Measures
6. Energy Consumption Dairy processing facilities consume considerable amounts of energy. Typically, approximately eighty percent of the energy requirements are for thermal uses to generate hot water and produce steam for process applications (e.g. pasteurization, evaporation, and milk drying) and cleaning purposes. The remaining 20 percent is used as electricity to drive processing machinery, refrigeration, ventilation, and lighting.	The following industry-specific measures are recommended: • Reduce heat loss by: o Using continuous, instead of batch, pasteurizers o Partially homogenizing milk to reduce the size of heat exchangers o Using multistaged evaporators o Insulating steam, water, and air pipes / tubes o Eliminating steam leakage and using thermostatically o controlled steam and water blending valves • Improve cooling efficiency by: o Insulating refrigerated room / areas o Installing automatic door closing (e.g. with microswitches) and applying airlocks and alarms; • Employ heat recovery for both heating and cooling operations in milk pasteurizers and heat exchangers (e.g. regenerative countercurrent flow); • Investigate the means to recover waste heat including: o Recovering waste heat from refrigeration plant, exhaust, and compressors (e.g. to preheat hot water) o Recovering evaporative energy o Employing heat recovery from air compressors and boilers (e.g. waste gas exchanger)

Reference: World Bank Group Environmental, Health, and Safety Guidelines for Dairy Processing (April 2007)
http://www1.ifc.org/wps/wcm/connect/534a1a8048855373af34ff6a6515bb18/Final%2B-%2BDairy%2BProcessing.pdf?MOD=AJPERES

IRRIGATION

E&S Impacts and Risks	E&S Mitigation and Management Measures
1. Stress on Water Resources Water management for annual crop production should aim to optimize crop yield, while conserving the quantity and quality of water resources.	Surface or groundwater resources used for irrigation should be managed in accordance with the principles of Integrated Water Management consistent with the following recommendations: · • Determine the quantity and quality of water needed for crop production; • Evaluate the capacity of groundwater or surface water resources and collaborate with national or regional institutions to ensure that the project considers existing or emerging plans for water management and monitoring; • Select crops compatible with water availability; • Maximize the use of available precipitation ("rain harvesting"), where feasible, by: o Reducing runoff by methods such as conservation tillage, terraces, and raised ridges that follow the land contour o Diverting water within the catchment area toward the crops themselves by diverting spate flow from wadis, o directing runoff with low walls, and diverting flow toward crops from roads and paths to store water in the soil and reduce the effect of short dry spells o Storing runoff from rainy periods for use during dry spells by using tanks, ponds, cisterns, and earth dams • Implement irrigation water conservation measures including: o Reduce evaporation by avoiding midday irrigation and using trickle or drip irrigation techniques (if practical), or using 'under canopy' rather than overhead sprinkling o Reduce seepage losses in channels by lining them or using closed conduits o Control weeds on inter-row strips and keep them dry o Avoid over and under-irrigation to decrease potential for soil salinization o Maintain border vegetation in canals and drainage systems o Maintain a water management logbook that records precipitation, rainfall, and evaporation, as well as time and amounts of water applied, in order to develop an understanding of long-term trends in water use

E&S Impacts and Risks	E&S Mitigation and Management Measures
2. Soil Erosion and Loss of Productive Capacity Soil degradation may result from poor management especially due to excessive use of machinery and over-intensive farming practices. Soil erosion may be enhanced by heavy rainfalls, storms, and steep or long slopes, and may contribute to subsequent sedimentation of surface water bodies. Soils should be managed so as to prevent or minimize loss of productive capacity and sedimentation of surface waters	Soil loss prevention practices include: • Practice Integrated Nutrient Management (INM) to avoid nutrient depletion or accumulation; • Use crops suited or adapted to the local climate and soil conditions; • In areas with steep slopes, carefully consider planting zones and the direction of planting in relation to land contours to avoid erosion caused by precipitation or irrigation; • Use stone barriers, vegetative cross-slope barriers, terraces, or drainage and diversion canals to prevent wind and water erosion; • Use appropriate machinery to avoid soil compaction caused by excessively heavy equipment; • Avoid the use of overly saline water for irrigation to prevent salinization; • Use plant cover or intercrops and shelterbelts to reduce erosion from wind and heavy rain; • Increase the organic matter content in the soil by applying organic matter such as crop residues, compost, and manure to protect the soil physically from sun, rain, and wind and to feed soil biota. The potential for spreading of pests should be considered before implementing this practice; • Consider adding lime to soil to compensate for acidification, caused by acid deposition and fertilizers, and to maintain stable pH levels; • Assess potential impacts of waste materials such as manure and sludge to soils and water resources due to the presence of contaminants (e.g. heavy metals, nitrogen, phosphorus, and diseases-causing agents) prior to use for soil enhancement.
3. Pesticide Use The primary aim of pest management should be not to eradicate all organisms, but to manage pests and diseases that may negatively affect production of annual crops so that they remain at a level that is under an economically and environmentally damaging threshold.	Pesticides should be managed to avoid their migration into off-site land or water environments by establishing their use as part of an Integrated Pest Management (IPM) strategy. <u>Alternatives to Pesticide Application</u> Where feasible, the following alternatives to pesticides should be considered: • Provide those responsible for deciding on pesticides application with training in pest identification, weed identification, and field scouting; • Rotate crops to reduce the presence of pests and weeds in the soil ecosystem; • Use pest-resistant crop varieties; • Use mechanical weed control and / or thermal weeding; • Support and use beneficial organisms, such as insects, birds, mites, and microbial agents, to perform biological control of pests; • Protect natural enemies of pests by providing a favorable habitat, such as bushes for nesting sites and other original vegetation that can house pest predators; • Use animals to graze areas and manage plant coverage;

E&S Impacts and Risks	E&S Mitigation and Management Measures
	• Use mechanical controls such as traps, barriers, light, and sound to kill, relocate, or repel pests.
4. Eutrophication of Aquatic Environments Nutrient management strategies should aim to optimize crop yield while maintaining and improving the soil nutrient status. These strategies should be implemented as part of an INM approach that aims to prevent, reduce, or control contamination of groundwater resources and eutrophication of surface water resources from runoff and leaching of excess crop nutrients. The periods of greatest risk for runoff and leaching may be during and immediately after spreading if the nutrients are not incorporated into the soil, and during heavy rains that cause rapid runoff.	The following steps should be considered when designing and implementing an INM strategy including evaluating the need for crop nutrient application, following a recommended crop nutrient and post-nutrient application plan, and handling and storage of crop nutrients. <u>Evaluating the Need for Crop Nutrient Application</u> Consider the following to evaluate the need for, and reduce the use of, crop nutrients: • Balance nutrient application according to INM recommendations, including the use of reduced or no soil tillage techniques, nutrient recycling, one-pass soil preparation and sowing, taking into account the potential for increased pesticide consumption; • Use crop rotation methods to enable cultivation of leguminous plants with nitrogen fixation capabilities; • Use plants to cover the soil, especially during a fallow period and in wet regions, to reduce loss of nutrients; • Incorporate organic waste materials into soils rather than burning; • Avoid excess fertilization by analyzing soil before the growing season to estimate how much additional plant nutrient will be needed for the crop to be produced. Evaluate the need for crop nutrient application through test plot observations; • Assess soil acidity, which is important for achieving maximum uptake of phosphates; • Provide farm operators with training in INM following published principles and agricultural practice manuals. • Incorporate manure into the soil or apply between growing crops to improve plant utilization of nutrients and thereby reduce nutrient loss and contamination. Do not apply solid or liquid manure directly onto grazing areas or edible crops. • In areas with intensive livestock breeding, be aware that agricultural crop lands are often used to dispose of manure with the risk of over-fertilization; • Apply "fertigation" in horticulture, in which small amounts of fertilizer added to irrigation water may be applied. This requires detailed management and is mostly used in greenhouse production applications • Time the application of crop nutrients using meteorological information to avoid, where feasible, application during or close to precipitation events; • Use appropriate technical equipment for spraying manure; • Establish buffer zones, strips, or other "no-treatment" areas along water sources, rivers, streams, ponds, lakes, and ditches to act as a

E&S Impacts and Risks	E&S Mitigation and Management Measures
	filter to catch potential runoff from the land; • Implement INM planning and documentation, which may include the use of a fertilizer logbook to record th following information: o Dates of purchase, dates of use, amount of fertilizer used per field / hectare, purpose of use, and weather conditions during application; o Rates of nutrient application for the crop growth stage; o Maintenance schedule of application equipment to o ensure efficient dosage.
5. Biodiversity Impacts If not properly managed, modern, intensive, conventional cultivation methods may lead to adverse impacts on biodiversity. The main ecosystem threats that should be managed at the farm level may include the following: <u>Loss of Genetic Resources and Variability</u> Personnel in charge of annual crop production operations should be aware of the biodiversity issues at the farm level (also termed agricultural biodiversity), as well as more general biodiversity issues in the area where the farm is located.	The following actions should be taken to maintain farm-level agricultural biodiversity: • Where possible, maximize reuse of residue from the previous crop on the soil surface. The potential for spreading of pests should be considered before implementing this practice; • Reduce soil preparation to maintain the structure of soil ecosystems (e.g., promote low-till and no-till strategies); • Utilize field borders to provide wildlife corridors around fields used for annual crop production; • Provide buffer zones on farmland bordering wildland of specific environmental and research interest; • Regularly monitor soil health, for example, by determining the population of soil macrofauna bioindicator species such as the earthworm population; • Use certified crop seeds that do not contain seeds from invasive alien species and that comply with the information on the packaging regarding seed diameter and species; • Ensure protection of the natural enemies of pests by providing favorable habitats, such as hedges, nesting sites, and original vegetation, to house pest predators; and • Promote the use of organic agricultural practices to the extent feasible.
6. Crop Residues and Other Solid Waste The largest volume of residues in crop production is crop residues themselves, although the waste with the most significant impact is often related to pesticide containers and obsolete, expired pesticides.	Prevention and control of potential impacts from the generation of these wastes includes the following: • Recycle crop residues and other organic materials by leaving the materials in the fields, plowing, and / or composting. The potential for spreading of pests should be considered before implementing this practice; • Reuse crop residues as a thermal energy fuel in bioenergy facilities, as a substrate in fermentation facilities, and as feedstock in biorefineries; • Clean (e.g. triple rinse technique) and dispose of (e.g. through crushing, shredding, or return to suppliers) pesticide packaging and containers to ensure that they are not subsequently used as containers for food or drinking water; • Rinsing solutions should be recovered for reuse as diluting agents, or stored for eventual disposal; • Manage expired and unwanted pesticides as hazardous wastes in accordance with the General EHS Guidelines and FAO Guidelines for the

E&S Impacts and Risks	E&S Mitigation and Management Measures
	management of unwanted and expired pesticides.
7. Atmospheric Emissions Atmospheric emissions are primarily associated with emissions of fuel combustion by-products including carbon dioxide (CO2), sulfur dioxide (SO2), nitrogen oxide (NOx), and particulate matter (PM), resulting from the operation of mechanized equipment or from combustion by-products from the disposal or destruction of crop residues. Dioxins and furans may be present in residues if crops have been treated with chlorinated pesticides. Greenhouses gas (GHG) emissions, including nitrous oxide (N2O), methaneCH4), and ammonia (NH3), may result from the use of fertilizers or from soil conditions associated with certain crops such as rice. Ammonia and nitrous oxide are volatilized under high wind and elevated temperature conditions.	Recommended prevention and control measures include the following: • Manage emissions from mechanized farm equipment for mobile and stationary sources; • Where feasible, use biofuels instead of fossil energy to reduce net GHG emissions; • Adopt reduced tillage options to increase the carbon storage capacity of soils; • Favor solar drying techniques for crops that require drying; • Reduce particulate matter emissions by avoiding burning straw and other organic material in the field and by maintaining organic matter to protect soil against wind erosion during and after soil preparation activities; • Avoid unintended emissions of persistent organic pollutants (POPs) which may arise from open burning of pesticide treated agricultural wastes avoiding such practices; • Reduce ammonia and nitrous oxide emissions by: o Reducing ammonia and nitrate concentration in soil; o Applying denitrification inhibitors; o Enhancing soil aeration; and o Enhancing soil incorporation of ammonia and urea fertilizers and manure using techniques such as manure injection, placement of fertilizers at adequate depth beneath soil, use of supergranules in flooded rice fields, among others

Reference:

World Bank Group Environmental, Health, and Safety Guidelines for Plantation Crop Production (April 2007) http://www1.ifc.org/wps/wcm/connect/78335e8048855bb989d4db6a6515bb18/Final%2B-%2BPlantation%2BCrop%2BProduction.pdf?MOD=AJPERES

World Bank Group Environmental, Health, and Safety Guidelines for Annual Crop Production (April 2007)
http://www1.ifc.org/wps/wcm/connect/077b7f004885533bae2cfe6a6515bb18/Final%2B-%2BAnnual%2BCrop%2BProduction.pdf?MOD=AJPERES

Catalytic Fund Subproject E&S Screening Guidelines

BRIDGES AND CULVERTS

E&S Impacts and Risks	E&S Mitigation and Management Measures
1. Land Selection Inappropriate selection of location for the construction of culvert can cause loss of agricultural land, forest or any productive area because of culvert itself and due to drainage system associated with it. The proposed site for the construction site may be located in area with extreme morphology, which is prone to landslides and subsidence. This may lead to land instability as well as poses risk to culvert structure.	• The culvert should be located on the natural drainage areas as far as practicable. This reduces the chances for loss of agricultural or forest land to make new artificial drainage. • The construction site should not be located in area with extreme morphology, which is prone to landslides and subsidence.
2. Borrow Pit Operation and Disposal of Spoil Extraction of boulders, sand and aggregates for construction of project from inappropriate places can cause environmental impacts like landslide, erosion, riverbank cutting, forest disruption, changes in river regime or ponding of water. Improper disposal of excavation spoil and construction waste can disrupt roads, farmlands, waterways, because inconvenience, dust problem and water pollution. Improper disposal of spoil can also trigger landslides and erosion.	• Sites for quarrying should be selected such that the quarrying activity should not result into slope instability, erosion, disruption of natural drainage, riverbank cutting, destruction of vegetation and farmland and other physical resource. • Spoil generation can be limited through balanced cut and fill process. The generated spoil should be used to fill eroded gullies, quarries, burrow pits and depressed areas. • Spoil should not be disposed in river, forest, agricultural land, in places where it can cause inconvenience in people activities or in areas where it disturbs present land stability balance and may trigger erosion and landslides.
3. Disruption of Natural Drainage If not designed properly, the proposed culvert may not allow the passage of sufficient floodwater during heavy rain or flood. Construction of culvert may disrupt natural drainage flow and causes short-term inundation in the nearby upstream areas.	• The design of culvert should be only done after calculating the amount of water approaching the site during the high flood period. The culvert should be large enough so that it allows passing all the water approaching it. This prevents flooding in nearby areas and breaching of road near culvert. • Adequate spurs and embankment should be built near the culvert to direct the water flow through the culvert and reduce the inundation and chances of flooding and land road cutting.
4. Risk on Private Properties and Community Infrastructures Construction and the water flow associated with it may adversely affect private properties and community infrastructures like trails, water pipes and irrigation canals.	• Private properties like houses, sheds and community infrastructures like trails and irrigation canals, should not be disrupted during construction and operation of the project. If minor damage to them is unavoidable, written consent of all stakeholders should be included in the project proposal.

E&S Impacts and Risks	E&S Mitigation and Management Measures
5. Risk on Forests and Natural Resources Natural resources like forests and wetlands may be adversely affected due to project structures like spurs, embankment, culvert and water flow associated with it.	• Natural resources like forests and wetlands should not be disrupted during construction and operation of the project. If minor damage to them is unavoidable, written consent of all stakeholders should be included in the project proposal. • Trees likely to be lost due to project should be protected as much as possible special emphasis should be given to conserve protected plant species. • If trees are cut for the project, compensation plantation should be done in suitable place and the plants should be cared until they can survive themselves.

ANIMAL PRODUCTION

E&S Impacts and Risks	E&S Mitigation and Management Measures
1. Availability of Land and Water Sufficient private land and water source may not be available to sustain the wallowing of ducks. If ducks are taken to the public land for wallowing, this may create social tensions with other local stakeholders. The pigeons if left open may go to neighboring agricultural field for grain depredation.	• If common land will be used for wallowing the ducks, the proposal must consider whether the community will agree to the wallowing of ducks in public waterways. Written consensus regarding such agreement should be included in the project proposal. • If birds, especially pigeons go to neighbor's agricultural land for grain depredation then the pigeons should be enclosed in the pen during the grain depredation season.
2. Structure of Pen /Aviary The pen for bird farming may not be strong enough to withhold occasional rain and hailstorms.	• The pen structure should be made large enough for catering stipulated number of birds. It should be strong enough so that it can withhold occasional rain and hailstorms. The pen should be well ventilated as well as should be capable of retaining heat during winter.
3. Waste Waste and washing from birds if not managed properly can pollute surrounding living areas. In addition, waste can attract disease-transmitting vectors like mosquitoes, flies, rats' etc. create health risks for the community.	• Birds waste should be managed properly it should not be disposed haphazardly. It should be composted before application to the agriculture land. • Bird's waste should be stored or composted at least 30 meters away from water sources.
4. Noise and Odor Community may be offended by the noise produced by the birds and odor emanating from the bird farm.	• The bird's pen and its surroundings should be cleaned regularly. Lime should be added at places where some residual waste is left to prevent odor. • Clean and well sanitary condition of the farm also saves birds from possible bird diseases. • Bird pen should be located farthest possible from the neighbor's house to make the noise of birds more acceptable.
5. Disease and Health Risk Avian influenza (Bird Flu) may be transferred from bird to humans. Rearing of birds inside the house is a dangerous source of indoor air pollution. Disease like fowl cholera, bird flu may be transferred among birds due to inadequate provision of vaccination, treatment and sanitation in bird shed thus killing many birds. Various diseases may attack animals thus killing the animals or reducing the productivity of animals.	• The project proposal should mention the availability of animal health care facility in the area. Birds should be vaccinated against diseases like foul cholera with assistance from nearby veterinary Centre. There should be a provision of separate bird pen for isolating diseased bird from other healthy bird as far as practicable. • A separate bird shed outside the house should be constructed for bird farming to prevent transmission of disease from birds to humans. • Close observation on bird's health should be always done. Good sanitation should be maintained on the farm to prevent the infection of birds from diseases. If any symptoms of disease on birds are suspected, the farmer should

E&S Impacts and Risks	E&S Mitigation and Management Measures
	try to avoid their direct contact as much as possible and ask for technical assistance from nearby veterinary service. • Animals should be vaccinated against diseases occurring in the locality with assistance from nearby veterinary center. • If animals get diseased, their early treatment should be managed with assistance from nearby veterinary center. • There should be a provision for isolating diseased animal from other healthy animals as far as practicable.
6. Fodder and Grazing If sufficient grazing and fodder requirements of animals reared or planned in the project cannot be managed from private resources, the farmers have to depend on public grassland or forest to fulfill the fodder requirement of the animals. This can lead to loss of vegetation and soil erosion on grazing land or forest.	• The fodder and grazing requirements must be calculated for the planned and future herd, and sufficient legal sources of fodder and grazing land must be identified in the project proposal. • If common land will be used for grazing, the project proposal must include agreements of stakeholders to share the grazing on common land. • Fodder should not be collected from such land, which has been legally banned for such purpose (e.g. National Parks, Wild Life Reserve) or the community has not agreed to use for the purpose. Animals should not be left to open grazing on such lands. • Grass and fodder species of improved varieties should be planted in farmlands as necessary, especially at wastelands and slopes.
7. Animal Waste Waste and washing from animal farm will contaminate water sources and living areas, creating a health risk of the community.	• Animal sheds must be at least 30 meters from any water source. • Water source should be fenced to keep animals out from the water source. • The pit to collect animal waste should be a minimum 30 meters away from water sources, children's play area and school or health post. • Water for washing and watering animals (including wallows for buffalo) should be provided at a minimum distance of 30 meters length from the water sources used for washing and drinking by humans, and should be downstream of these sources. • Animal excreta should not be directly thrown to farmland. It should be composed before being used as fertilizers.
8. Animal Shed If animals are reared inside house, flies can be attracted, odors can be spread inside the house and likelihood of transmission of disease like rabies, encephalitis from animals to human can increase.	• Animals should not be reared inside houses where people live. Separate shed for animal should be constructed out of the house.

Reference:
World Bank Group Environmental, Health, and Safety Guidelines for Mammalian Livestock Production (April 2007)
http://www1.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Sustainability/Sustainability+Framework/Environmental%2C+Health%2C+and+Safety+Guidelines/

Catalytic Fund Subproject E&S Screening Guidelines

HORTICULTURE

E&S Impacts and Risks	E&S Mitigation and Management Measures
1. Solid Wastes Large volumes of fruit and vegetable waste will be generated in the form of the removed inedible parts and items rejected from the sorting, grading and various production processes. The majority of this waste can be diverted from disposal by being manufactured into other products, e.g. jams, biofuels, animal feed or composting for use as a soil improver.	• Solid and liquid wastes should be separated e.g. by screening, sedimentation, flotation etc. • Packaging materials typically used include flexible polymer materials, paper, cardboard, glass, cans, and wooden or polymer boxes. • Consider on farm cleaning, sorting and grading of fruit and vegetables to reduce transport requirements and quantity of waste materials produced at the processing facility;. • Ensure organic waste is collected and stored separately from other waste to enable composting and/or use for soil amendment, or use in energy production. • Implement procedures to ensure solid waste is removed from transport equipment and surface areas before rinsing and washing, e.g. using scrapers, brooms and vacuum cleaners.
2. Product Contamination Fruit and vegetable products can become contaminated through: • Contaminated raw products having been received from the farm, chemical residues, and from contamination of other raw ingredients e.g. dioxins, pesticides; • Poor food hygiene standards within the processing operations, e.g. unclean machines, unhygienic handling; • Failure in the processing operation, e.g. under cooking, failure to maintain chilled conditions, sterilisation failure, and poor seals on vacuum packs etc.	• Implement a food safety Program to improve food hygiene standards in accordance with HACCP prerequisites. • Minimise storage time for raw materials to reduce losses from decay and consider use of enclosed/covered storage to prevent damage to materials stored outdoors and emissions of dust and odour;
3. Water Supply Fruit and vegetable processing operations can use large quantities of fresh water for cleaning process areas and equipment, cleaning raw fruit and vegetables, and as process water in peeling, sorting, transporting and canning operations. Much of this water is wasted when it could be treated and reused in the process. Where water abstraction takes place, it is typical for abstraction or water use permits to detail volumes of water abstraction allowed as over abstraction can impact local communities.	• Use taps with automatic shut-off valves and use high water pressure and optimised nozzles; • Separate cooling water from process water to enable recycling of wastewater and recirculation of cooling waters;
4. Effluent treatment Large volumes of effluent (wastewater) containing high organic loads, cleansing and blanching agents and suspended solids may be produced. The effluent may also be contaminated with pesticide residues. Discharge of the effluent directly to water bodies is discouraged as it can pollute them causing damage to wildlife. The volume of effluent flow may vary substantially	• Separate cooling water from process water to enable recycling of wastewater and recirculation of cooling waters; • Check wastewater holding tanks and treatment facilities for potential overflows and leakage; • Installation (or upgrade) of wastewater treatment plant; • Install grids to reduce or avoid introduction of solid materials into the wastewater drainage system

E&S Impacts and Risks	E&S Mitigation and Management Measures
by season, and as the quality of the effluent, after primary treatment to remove solids, is usually suitable for discharge to a municipal wastewater treatment system, it is not usual for further treatment to be carried out on site, unless the peak volumes would cause a problem.	
5. Energy Processing operations may consume energy as: • Thermal energy in the form of steam and hot water used for processing, cleaning, sterilising; • Thermal energy for direct heating and cooling the product; • Electricity for machinery operation, refrigeration, lighting and production of compressed air.	• Reduce energy consumption by designing plant layout to minimise pumping and conveyor distances; • Install controls to maximise the efficiency of cooling plants
6. Refrigerants Chilling facilities may be used to preserve and store the products. The refrigerants used may be ozone depleting chemicals, such as Chlorofluorocarbons (CFCs) and Hydro chlorofluorocarbons (HCFCs), the production of which are being phased out under the Montreal Protocol. Releases of these types of refrigerant gases should be avoided. Ammonia is becoming a more commonly used alternative refrigerant, which has no such restriction but does have health and safety issues.	• Implement changes to non-CFC coolants and/or sealing of leakages in the refrigeration system; • Regular inspection should be carried out of all bulk containment and refrigeration facilities on site to prevent leakage and product loss; • Install insulation in refrigeration areas; consider automatic door closures, airlocks and alarms to prevent chill room doors being left open;
7. Odour Odour can be released through heat-based activities such as steam peeling, blanching and dehydrating and in the storage of solid waste	• Minimise storage time for raw materials to reduce losses from decay and consider use of enclosed/covered storage to prevent damage to materials stored outdoors and emissions of dust and odour

Reference:
EBRD Sub-sectoral Environmental and Social Guidelines: Fruit and Vegetable Processing (April 2009) http://www.ebrd.com/downloads/policies/environmental/fruit.pdf

Part 3: Environmental and Social Action Plan (ESAP)

Action #	Task Title/Description	Deliverable / Indicator of Completion	Due Date	Completion Date
Assessment and Management of Environmental and Social Risks and Impacts				
1.				
2.				
Labor and Working Conditions				
3.				
4.				
Resource Efficiency and Pollution Prevention				
5.				
6.				
7.				
Community, Health, Safety and Security				
8.				
9.				
10.				
Land acquisition and involuntary resettlement				
11.				
12.				
Biodiversity conservation and sustainable management of living natural resources				
13.				
14.				
Indigenous peoples				
15.				
16.				
Cultural heritage				
17.				

Part 3: ESAP Guidance

Projects need to be screened against the WBG exclusion list, the applicable Tanzanian laws, World Bank Safeguard Policies and if the GoT chooses to, the World Bank Performance Standards depending on the scale and risk of the project. This guidance is to help the CF Environmental Reviewer with projects that need to be screened.

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts

- Environmental and Social Assessment and Management Program
  - Does the company have a management system in place to identify the environmental and social impacts and risks of their operations? Does the system identify mitigation and performance measures that address the impacts and risks of their operations? (For example, Quality Assurance; Environmental, Health, Safety & Social, OHS)
  - How often does the company review and update the system?
  - Does the company have resources earmarked to support this?
  - Do they have any best practice certifications (ISO etc)?
- Organization
  - Are there persons responsible for implementation of the management system?
  - Include an outline of the persons responsible including S&E management.
- Training
  - Does the company have training programs in place for the persons responsible?
- Community Engagement
  - Does the company have a community engagement process for affected communities consistent with National law?
  - Does the company have a grievance mechanism in place for affected communities?
- Monitoring
  - Does the company have procedures in place to monitor management program performance?
- Reporting
  - Is appropriate environmental and social performance information periodically reported internally to senior management and stakeholders as relevant?

Performance Standard 2: Labor and Working Conditions

- Human Resources Policy and Management
  - Does the company have an HR policy? Is it clearly understandable and easily accessible to all employees? Does it provide information on rights under national labor and employment law?
  - Has the company documented and communicated working conditions and terms of employment to all workers directly contracted? Does this include guidelines on working hours, overtime procedures, wages paid, types of contracts, frequency of payments and sick and maternity leave?
  - Are the terms and conditions in accordance with any collective agreement with workers?
  - Has the company implemented a grievance mechanism to review and address employee complaints?

- Worker's Organization
  - Does the company comply with national law in allowing workers to form and join workers organizations and bargain collectively? Does it have a workers organization or trade union? If yes, when was this formed? What percentage of the workforce are members? Are members entitled to special benefits?
- Non-Discrimination and Equal Opportunity
  - Does the company have documented transparent procedures with respect to discipline, performance and grievance procedures to ensure that employment decisions are not made on the basis of personal characteristics unrelated to job requirements? Does the company have any preferential employment policies in place?
- Protecting the Work Force

- Does the company ensure child or forced labor is not used directly, or through contractors or in the supply chain? Does the company check the ages of all employees? Does the company ensure that young workers (15-18 years) are not employed in dangerous work? Does the company commit contractors and suppliers to not use child or forced labor?

- Occupational Health and Safety
  - Does the company provide its workers with a safe and healthy work environment? Does this include providing workers with and mandating that workers use personal protective equipment (PPE)? Do workers handle chemicals and fertilizers as part of the company's operations? Has the company taken steps to prevent accidents, injury, and disease by minimizing the causes of hazards?
  - Does the company conduct appropriate monitoring and inspections to ensure worker safety? Does this include monitoring ambient and workplace exposure to noise, and workplace illumination, air quality and temperature as applicable?
  - Does the company have training programs in place for workers in occupational health and safety?
  - Does the company have a fire, life and safety plan, if relevant?

Performance Standard 3: Resource Efficiency and Pollution Prevention

- Pollution Prevention, Resource Conservation and Energy Efficiency
  - Provide details about the company's resource use including sources and estimates of daily use for energy and water.
  - Does the company monitor air and water emissions? Is ambient air quality monitored on site?
  - Does the company apply project-specific pollution prevention and control techniques that are consistent with National law?
- Waste management
  - Does the company have procedures for storage, handling, and disposal of solid wastes? Does this include waste management techniques that are consistent with National law?
  - Does the company treat effluents prior to disposal?
- Hazardous Materials
  - Does the company have procedures for storage, handling and disposal of hazardous materials consistent with National law?
- Emergency Preparedness and Response
  - Does the company have an emergency prevention, preparedness and response plan?

Performance Standard 4: Community, Health, Safety and Security

- Community Health and Safety
  - Are there communities in close proximity to the company's facilities? Does the company take community, health and safety considerations into account in the context of its operations? Do its requirements take into account company infrastructure and equipment safety, hazardous material release, transport and disposal considerations, natural resource use and community exposure to disease?
  - Has the company designated contact persons within the organization responsible for receiving and responding to questions, concerns or complaints raised by nearby communities or other stakeholders?
- Emergency Preparedness and Response
  - Does the company's emergency preparedness and response plan take into account risks and impacts from project activities to local communities?
- Security Personnel Requirements
  - Does the company engage security personnel to provide security services at their facilities? If yes, do the contract provisions include guidelines on how security personnel shall interact with communities in close proximity to the facility?
  - Are security personnel armed? If yes, has the company provided training on the appropriate conduct towards workers and the nearby communities?

Performance Standard 5: Land Acquisition and Involuntary Resettlement

- Project design
  - Is there any land acquisition for the proposed investment? If yes, what was the previous use of the land and how was the land acquired? Was the land acquisition managed by the government?
- Compensation and Benefits for Displaced Persons
  - Has there been any physical and/or economic displacement and resettlement as a result of land acquisition for this project? If yes, provide detailed information with regard to the type of displacement and the displaced persons and communities.
  - Has the company engaged with the displaced persons and communities and/or provided opportunities to derive appropriate development benefits from the project? If yes, provide details.
- Consultation and Grievance Mechanism
  - Has the company disclosed all relevant information, consulted with affected persons and communities and facilitated their informed participation in the decision making process relating to resettlement?
- Resettlement Planning and Implementation
  - Has the company identified persons to be displaced by the project and those eligible for compensation and assistance through a baseline census with appropriate socio-economic baseline data? Has the census established the status of displaced persons according to their legal rights or claim to land?
  - Has the company prepared a Resettlement Action Plan (RAP)?
  - Has the company (if economic but not physical displacement is involved) developed procedures to offer compensation or other assistance that will establish entitlement for affected persons or communities?

Performance Standard 6: Biodiversity conservation and sustainable management of living natural resources

- Protection and Conservation of Biodiversity
  - Has the company identified and addressed the impacts on biodiversity as part of their operations?
  - Does the company conduct any operations in legally protected areas? If yes, has the company addressed the requirements for legally protected areas consistent with National law?
- Management and Use of Renewable Natural Resources
  - Has the company identified renewable natural resources which it will use, and committed to managing them in a sustainable manner consistent with National law?

Performance Standard 7: Indigenous Peoples

- Avoidance of Adverse Impacts
  - Is it likely that Indigenous Peoples (IPs) will be adversely impact as a result of the project's operations? Does the EIA conducted by the company identify the adverse impacts to IPs and identify ways to avoid these where possible?
- Impacts on Traditional or Customary Lands under Use
  - Has the company informed IPs of their rights according to national laws including those recognizing traditional/customary rights?

Performance Standard 8: Cultural Heritage

- Protection of Cultural heritage in Project Design and Execution
  - Is the project located in an area where cultural heritage is expected to be found? Is it possible that the project may affect cultural heritage?

Part 4: Annual E&S Audit Report

Reviewer (Name, Title and Position):	**Subproject Name and Proposal #:**	**Date issued:** Audit report for the period _____ to _____

Data Quality:

_____

_____

1. Is the project in compliance with the ESAP? Y / N
If not, what are the corrective actions required to be compliant?

_____

_____

2. Did the subproject encounter any unexpected environmental and/or social issues and how were they addressed?

_____

_____

3. Has the subproject resulted in impacts on highly sensitive areas of biodiversity, critical habitats, protected areas, or cultural property?

If so, what is the total number of hectares and their location/type of habitat that are being affected:

ESAP with corrective actions attached, and dated:

_____

_____

Approved by (Name, Title and Position):

9 ANNEX 8: CHANCE FINDS PROCEDURE

9.1 APPLICABILITY OF THE CHANCE FINDS PROCEDURE

The following procedure shall apply to all SAGCOT Investment Project activities that may involve physical works that have the potential to uncover or otherwise disturb tangible cultural heritage.

Under SAGCOT implementation arrangements, a contract will be put in place with an 'on-call' archaeological monitor (the "SAGCOT archaeologist") who will advise on chance finds and any other cultural heritage issues arising from the implementation of activities under the SAGCOT Investment Project.

9.2 PURPOSE OF THE PROCEDURE

The objective of this Chance Finds Procedure is to identify and protect previously unrecorded archaeological sites, artefacts or features from the potential impacts of SAGCOT Investment Project-related activities. The Procedure applies to potential cultural heritage objects, features or sites identified as a result of any and all ground disturbing activities associated with construction and any other SAGCOT Investment Project components. As a key part of the Chance Finds Procedure an archaeologist(s) with relevant field experience should be identified who can assist with dealing with the authorities in Tanzania designated with responsibility for cultural heritage.

9.3 LEGAL REQUIREMENTS

There are two principal pieces of Tanzanian national legislation that pertain to chance finds:

- The Antiquities Act, 1964; and
- The Antiquities (Amendment) Act, 1979.

The Antiquities (Amendment) Act, 1979 states that it should be read as one with the 1964 Act.

The Antiquities Act, 1964 defines monuments and other protected objects, and it also sets out that in the case of a discovery (i.e. a chance find):

"….the occupier of any land who knows of any such discovery on or under such land, shall forthwith report the same to an administrative officer, the Commissioner [of National Culture], the Conservator [of Antiquities] or the Curator of the Museum. The discoverer of such a relic, monument, object or site shall take such steps as may be reasonable for the protection thereof and shall, where he makes a report concerning a portable relic or object, if so required (and on payment of the cost of delivery if any) deliver such antiquity or object to an administrative officer, the Commissioner, the Conservator or the Curator of the Museum, as the case may be."

The Antiquities (Amendment) Act, 1979 sets out *inter alia* the Minster's powers:

"….to declare any place or structure of historical interest to be a monument for the purposes of this Act"

and sets out that:

"The Minister, after consulting the Minister for the time being responsible for lands may, by notice in the *Gazette,* declare to be a conservation area any area or site which: (a) in his opinion is a valuable national heritage for its aesthetic value; or (b) contains a homogeneous groups of monuments; or (c) contains buildings, structures or other forms of human settlement which in his opinion are a valuable national heritage for their historical, architectural, social or cultural value"

and:

"….no person except the Director or a person acting on his behalf, shall whether on his own land or elsewhere, (a) excavate, dig or probe for monuments or relics; or (b) remove or collect any relic or any object he supposes to be a relic from the site of its discovery, except for the purposes of protecting it and reporting the discovery under the provisions of section 10 or for the purposes of delivering it to the authorities if required to do so under that section; or (c) search for or collect any ethnographical object, except under and in accordance with an excavation licence or in the case of an ethnographical object, a collectors licence issued by the Director [of Antiquites]."

It also states that:

"No person shall sell or exchange any relic discovered in sales Tanganyika, or any protected object, except under and in accordance with a licence issued by the Commissioner."

9.4 CHANCE FIND PROCEDURE

9.4.1 Scope

The scope and requirements of the Chance Finds Procedure can be divided into two phases: the planning and preparatory phase, and the implementation phase. Prior to initiating ground-disturbing works associated with any type of SAGCOT Investment Project activity, the contractor responsible for the works will receive a detailed briefing on the requirements of the protocol from SAGCOT staff.

A key objective of the briefing prior to onsite and other Project activities will be to familiarise the contractor with the process of using an off-site, 'on-call' archaeological monitor (the SAGCOT archaeologist)[1] and the circumstances under which the monitor will need to be called to the site/work area. The familiarisation process will also include training in the identification/recognition of objects/items of potential interest (see below).

In areas such as those identified where previous survey work has indicated that the sites are of low or moderate potential for containing cultural heritage sites in terms of structures/buildings, the permanent presence of an archaeological monitor **will not be required**. The SAGCOT archaeologist will, however, need to be available to respond to any chance finds identified by SAGCOT personnel or contractors during ground works.

9.4.2 Process for Managing Chance Finds During Implementation

The key steps in the step-by-step process for managing any chance finds identified during construction are as follows.

In the event that the construction team encounters any chance finds during excavation or construction works the following procedures shall apply.

1. All construction activity in the vicinity of the find/feature/site will cease and SAGCOT management personnel, the SAGCOT archaeologist and the authorities will be informed.

2. The site will be marked, and active work at the sire shall cease until an appropriate course of action has been determined (see below).

3. The detailed find location will be recorded.

[1] The SAGCOT archaeologist should be a person who meets the requirements for granting of a licence as defined in Section 12 of the Antiquities (Amendment) Act, 1979, i.e. an expert who "has had sufficient scientific training or experience to carry out the proposed excavation, search or collection satisfactorily".

4. The area will be secured to prevent any damage or loss of removable objects (pottery, artefacts, jewellery, coins, etc).

5. The SAGCOT archaeologist will assess record and photograph the find/feature/site.

6. The archaeologist will undertake the inspection process in accordance with all relevant health and safety protocols established as part of SAGCOT implementation arrangements.

7. The archaeologist will determine the appropriate course of action to take, and will discuss and agree this with the authorities.

8. All finds which have cultural heritage value as determined by the SAGCOT archaeologist will be delivered to the relevant authorities, as defined under the Antiquities Acts defined above, and other relevant legislation as may come into force at a future date.

9. Once the necessary documentation and (if appropriate) recovery and removal of materials with a cultural hertitage value has been completed and authorisation has been given by the responsible statutory authorities, the contractor may resume work at the site.

How this role and position will fit into the CF administrative structure is yet to be determined. This TOR describes the essential tasks required to support the environmental and social screening, review, appraisal and monitoring requirements in the MGF and SVCF.

The Advisor/Consultant will support the overall FM(s) environmental and social due diligence with:

- Development of all CF background information related to E&S application requirements
- Public dissemination of all E&S requirements at appropriate investment and business forums
- ensuring that the applications are screened and reviewed using the E&S Screening Form
- the preparation of each ESAP for applicants
- discussions with each applicant concerning the ESAP requirements
- technical advice, on an as needed basis to applicants and their representative on provisions in the ESAP and any other E&S issues
- monitoring subproject progress as it relates to adherence with the ESAP requirements and associated guidelines,
- resolving implementation bottlenecks, and ensuring overall that E&S subproject implementation proceeds smoothly;
- conducting the annual E&S audit
- collecting and managing E&S information relevant to the subproject and accounts (i.e. environmental monitoring and audit reports); and
- developing the annual E&S report

The Advisor/Consultant will be retained on a full or part time basis pending determination by the FM on the work requirements per year.

In addition, provide technical advice on environmental management and mitigation during the life of the CF and to enhance E&S provisions develop:

- a series of Technical Planning Guidelines specific to the CF based on the types of subprojects coming into the CF for approval modelled on the attached TPG that build upon the checklists and EHS and other Guidelines provided with this ESMF.
- Liaise with the appropriate District Agricultural and Environmental Officers to share knowledge and explain the objectives and ESAP requirements for approved subprojects in their Districts
- Raise awareness across the SAGCOT stakeholders on E&S issues related to the CF, and
- Lead the delivery of capacity-building Programs for interested stakeholders.

ANNEX 10: LOCAL INVESTMENT GRANT TECHNICAL PLANNING GUIDELINE - DRILLED WELL WITH SUBMERSIBLE PUMP

TECHNICAL DESIGN GUIDELINE	Drilled Well with Submersible Pump

(1) Objective/Remarks

In arid and semi-arid areas, water quantity requirements for daily domestic use are high but available water resources are scarce. Surface water and shallow ground water are not available to meet human and livestock needs. Access to deeper aquifers for water extraction tends to be the only viable option to ensure an adequate water supply for urban and rural communities that inhabit these areas.

Ground water from deep aquifers is generally of superior quality to surface water in terms of clarity and quality. Common rural constructions for extracting groundwater for domestic use include open or closed dug wells, drilled wells and protected springs.

Mechanized drilling is chosen over hand-digging or hand-drilling because the process is much faster, greater depths are necessary, and drilling is possible in semi-consolidated and consolidated (hard) rock formations.

To meet community needs, large quantities of water need to be extracted on a daily basis and lifted from deep aquifers. To accomplish this and ensure a reliable water supply, the use of submersible pumps installed in wells is favored.

Submersible pumps are operated by electric or diesel-powered motors and do not require human or animal labor. The amount of time it requires to pump water tends to be much shorter for a similar volume of water collected with a hand pump.

(2) Potential Impacts and Sustainability Issues

With a few exceptions (such as springs and artesian wells), access to all groundwater systems requires the use of pumps to draw the water to the surface. Non-pumping solutions such as lowering buckets into dug wells or large open step-wells which people can access directly to collect water are prone to contamination and thus not considered as viable options.

Successful implementation of projects involving installation and operation of submersible pumps depends on the following factors:

- ***Community involvement*** in project planning and implementation. The community or selected members of the community need to be trained and acquire the technical skills required for routine well and pump maintenance.
- ***Selection of aquifer and siting of pumps*** at proper location and depth, with special attention given to water quality indicators and community needs.
- ***Well construction*** that meets adequate construction standards. Well should be covered with a concrete slab which can be sealed to prevent water pollution.
- ***Maintenance activities*** of both wells and pumps to ensure sustainable service delivery. These should include arrangements for scheduled preventive maintenance operations. Maintenance activities should be performed at the locality and kebele level.
- ***Selection of proper pump technology*** depending on water depth.
- ***Sufficient funding*** especially to cover costs of pump maintenance and spare parts.

(3) Technical Description and Requirements

Site selection

Sites selected for well drilling should be evaluated according to the following factors:

- A geophysical survey, including use of aerial photography, analysis of hydrogeological data, and evaluation of data and records of other wells and boreholes in vicinity, should be conducted in order to determine the ground water potential of a given site.
- Wells should not be located on excessively elevated ground where high pumping head would be required.
- Wells should be located at a distance (30 meter minimum) and upstream from pollution sources that could contaminate ground water source. These include pit latrines, cattle stockyards, and drainage trenches that may contain pathogens and chemical substances.
- Wells should be located within reasonable distances from user communities unless economical and technical evaluations strongly dictate otherwise. The water committee in each locality (woreda, kebele, etc.) has to be consulted.

Construction standards

The drilling and construction of wells should be carried out by qualified contractors using appropriate standard drilling methods. Depending on the underlying rock formation, one of the following commonly used drilling systems can be used:

- *Cable-tool rigs or percussion rigs*, effective in drilling in unconsolidated or semi-consolidated formations down to about 50 meters.
- *Rotary rigs* (mud-flush or air-flush rigs), depending on the complexity and size of the well and effective for hard rock formations.
- *Hand operated* drilling equipment can be appropriate for shallow wells (15-20 meters) in soft rock formations.

For wells drilled in unconsolidated and semi-consolidated formations, the design needs to include screens and sand/gravel packing to prevent sand incursion that could block and damage the pump:

Design/size

Before actual work on a drill commences, the following design criteria need to be considered:

- Per capita water demand of the community: according to WHO guidelines, a minimum of 40 liters of water per person per day should be estimated.
- Maximum number of people to be served by a drilled well.
- Maximum pumping head and the sustained yield of the well.
- Maximum walking distances from settlements to well sites.
- Water quality must meet the WHO and/or national potable water quality standard for human consumption.

Drilled well: Wells need to be deep enough to ensure reliable ground water supplies even during prolonged droughts. Drilling should proceed 15 meters or more below the static water level to achieve sufficient flow of water into the well. Well diameter depends on rock formation. In hard consolidated rock, well diameter can be restricted to 100 mm and needs to be of sufficient size to accommodate a submersible pump cylinder. In unconsolidated formations, well diameter needs to be 200-250 mm to allow for well casing and gravel packs.

Submersible pump: Submersible pumps are designed to be immersed in water and are lowered within 3 meters of the bottom of the well (see Figure 1). The selection of a submersible pump with appropriate design characteristics depends on:

- ***Quantity of water required:*** identify the number of people who will depend on the well and pump for daily access to water, and estimate the total quantity of water to be extracted on a daily basis.
- ***Pumping head:*** determine the elevation difference between the pump and the high point in the system.
- ***Type of power available:*** submersible pumps can be powered by electricity or a diesel generator. Electric motors are relatively economical to operate, simple to maintain, and are the most efficient motor-driven pump for producing water. However, electricity may not be available 24 hours per day.
- ***Size of well:*** determine the diameter of the well, depth to water, and the drawdown at the rate at which water is pumped.

Additional technical aspects of the submersible pump should be discussed with specialized pump manufacturers and suppliers to meet the specific needs of the project. These should consider:

Construction standards (cont.)

- *Screening:* Materials used include woven wire and man-made fabric.
- *Sand/gravel packing:* Graded sand and gravel is placed from the top of the well or commercially available pre-bonded packs of sand and/or gravel are used to eliminate particles from the water before they reach the screen and would otherwise have passed through the screen.

Before bringing a well into service, extensive sand pumping should be done to remove fine particles from around the screen that lines the well, and to reduce the amount of sand which might otherwise be working its way towards the pumping element.

An area with an approximate 30-meter radius surrounding the well should be fenced off to protect groundwater quality from potential deterioration due to: (a) effluents and accidental chemical spillage, (b) excessive application of fertilizers and use of pesticides, (c) landfill waste disposal, and (d) the proximity of latrines.

Environmental and social mitigation and enhancement measures

Construction
Well drilling activity requires deep excavation and operation of heavy duty machinery. Strict construction discipline should be followed and safety devices should be provided to ensure worker safety on site.

Maintenance
A member of the village should be assigned to each well location to:

- **Monitor water withdrawal volumes**: excessive water withdrawals beyond the sustainable yield can deplete the aquifer and could also result in ground collapse and sinking.
- **Perform routine maintenance activities**: to ensure proper functioning of the pump and in accordance with manufacturer's specifications. This may include periodic lubrication of above-ground components, checking for leaks, and replacement of washers and seals.
- **Inspect well location periodically**: to detect cracks and leaks in the structure and clogging of drains.

(4) Labor Effort Activities

Well drilling and installation of submersible pump are the primary activities undertaken during construction.

Well drilling and associated construction should be undertaken by a knowledgeable contractor with assistance from daily laborers.

Installation of the submersible pump should be performed by a mechanic familiar with this type of technology. Installation is relatively straightforward since there are no moving parts connecting a motor at the surface to the pump inside the well.

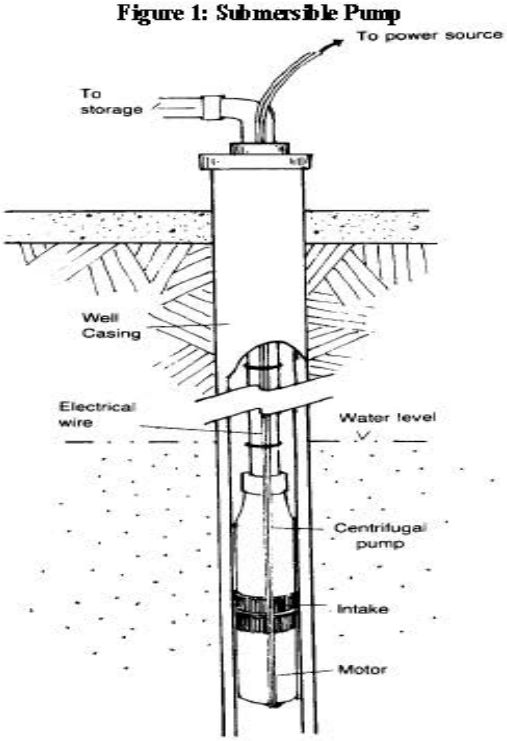
Design/size (cont.)

- Suitability for pumping potable water.
- High pump efficiency and reliability.
- Continuous operation while submerged.
- Ability to withstand reverse rotation if the pump were to suddenly stop.
- Pump casing, impellers, pump shaft, and bearings according to project specifications.

Ancillary equipment needed:

- Pipes for water flow from pump to water collection reservoir.
- Power supply for pump: electricity from grid or direct generator.

Figure 1: Submersible Pump



(5) Unit Costs

Labor:
Well drillers, mechanics, assistants and technicians and daily laborers are required.

Material:
Well drilling equipment, either cable-tool rigs, rotary rigs or hand operated drilling equipment may be employed according to the complexity of the job and rock formations of the area. Concrete, gravel, sand, and screen are needed for the well. Piping is required for the water distribution system. A submersible pump and motor must be purchased. Special equipment for installation of the pump includes tripod, block and tackle, pipe holder, and pipe clamps.

(6) Planning and Implementation Arrangements

Planning arrangements: The planning process should follow the Community Ownership & Management (COM) approach, where the community is fully involved in the planning and implementation process through the woreda water and sanitation committee (WATSAN-committee). The woreda administration plans the program in consultation with the community, and provides a framework (project cycle) for community action, allocates and administers available governmental resources, facilitates contracting services (such as construction, technical assistance, training, capacity building, etc.), and facilitates participatory monitoring and evaluation.

Implementation arrangements: Communities identify their needs and request woreda assistance, form a WATSAN committee and mobilize their own resources, participate in technology selection as well as site selection, contribute labor and capital as appropriate, provide trained care takers and assume full responsibility for maintenance costs, etc. The government and woreda administration assist the community to carry out all these functions effectively.

References

Determining Pumping Requirements, Technical Note No. RWS. 4.D.2, Water for the World http://www.lifewater.org/resources/pumps.htm1
Hand Pump Planning and Implementation Manual, Ministry of Water Resources, Addis Ababa (hard copy)
Guide to Result-Based Planning & Management of Rural WATSAN and Hygiene Program, April 2004, Addis Ababa. (hard copy)
Technical Specifications for Submersible Pumps Supply. Unpublished document, AAWSA, 2006, Addis Ababa. (hard copy)
Towards Better Programming: A Water Handbook, UNICEF, Water, Environment and Sanitation Technical Guidelines Series No 2, 1999 www.unicef.org/ethiopia/wes.htm1

Annex 11: Guidelines for Assessment of Dams and Preparation of a Dam Safety Measures Report

Purpose and Scope of Work:

The purpose of the dam safety assessment is to prepare a reconnaissance-level assessment of quality management of a dam or weir, and of the reliability of the water source. The work will involve initial and wrap-up meetings with personnel responsible for the dam/weir; a field examination; and a Dam Safety Report of findings and recommendations. If deemed necessary, the report will provide terms of reference for more thorough follow-up activities to identify (to feasibility level with cost estimates) the investments and other measures needed to ensure the safety of the dam/weir.

Qualifications of the Dam Specialist:
The work will be carried out by a Dam Specialist (DS) of suitable independence from the owner/operator of the dam/weir, and who has not been associated with the design, construction, and operation of the dam/weir. The DS will have appropriate qualifications and substantial experience with the design, construction, operation and maintenance of dams, especially in developing countries.

Investigations of Operating Conditions:

a. The owner/operator of the dam/weir will provide the DS with the following information:
b. Construction year, first impoundment;
c. Dam size: height (m), crest length (m);
d. Reservoir size (m3);
e. Dam type;
f. Estimated population downstream that would be threatened by dam failure; and
g. Estimated replacement cost.

The DS will discuss with the owner/operator past and current O&M practice with particular reference to:

a. Existing records;
b. Maintenance logbooks;
c. Instrumentation and monitoring;
d. Emergency preparedness;
e. O&M resources (human and financial); and
f. Status of reservoir sedimentation and measures to prolong the life of storage (reservoir conservation).

Investigations of Structural Conditions:
Depending on the type of dam/weir, a suitable checklist for the inspection activities will be used. Inspection details are left to the DS who will carry out the task, however the inspection report should contain the following information:

a. Construction year, first impoundment;
b. Dam/weir size: height (m), crest length (m);
c. Reservoir size (m3);
d. Dam type;
e. Geotechnical aspects of foundations;
f. Design flood return period (years);
g. Availability of as-built drawings;
h. Spillway reliability assessment;
i. Bottom outlet reliability assessment;
j. Seepage;
k. Deformations, settlements;
l. Conditions of slopes/concrete structures;
m. Active storage (m3);
n. Estimated population downstream that would be threatened by dam failure; and
o. Estimated replacement cost.

Investigations of Regulatory Framework:
The DS will:

a. Discuss with relevant authorities (regulator, line ministries, utilities, etc.) the existing regulatory framework for dam/weir safety;
b. Compare the existing regulatory framework, in a matrix format, with comments as necessary, to the "essential elements" identified in the World Bank publication "Regulatory Frameworks for Dam Safety - A Comparative Study"34 ;
c. Identify opportunities and constraints to the achievement of the "essential elements"; and
d. If judged feasible, develop terms of reference for an action plan aimed at achieving the "essential elements" in the national context (priorities, institutional reforms, incentives, enforcements, etc.)

Dam Safety Report:
The DS will produce a Dam Safety Report that includes:

e. Description of the dam/weir, ownership, and regulatory framework.
f. Dam safety assessment according to international standards (ICOLD).
g. Structural measures required to bring safety to acceptable standards, including a preliminary cost estimate differentiating interventions in three categories: a) emergency (human life at immediate risk); b) urgent (likely to pose a risk to human life, major assets at risk); c) significant (any needed rehabilitation beyond meaningful maintenance).
h. Non-structural measures (instrumentation and monitoring, stand-by electricity supply, training, dam safety plans) to be implemented to make dam safety sustainable after rehabilitation; reference should be made to OP4.37 "Safety of Dams", and appendices to the publication "Regulatory Frameworks for Dam Safety - A Comparative Study".
i. Preliminary assessment of reservoir sedimentation status, and recommendations aimed at prolonging the life of storage facilities.
j. Resources needed for reliable O&M (human resources and recurrent costs).
k. Overall assessment of challenges and opportunities for the management of the dam/weir.
l. Terms of reference for the preparation of feasibility studies for any required rehabilitation measures (structural and non-structural).

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