

Kilombero Plantations Limited
P.O. Box 23294 ▪ 320 Toure Drive ▪ Dar es Salaam ▪ Tanzania

REPORT FOR ENVIRONMENTAL IMPACT STATEMENT:

**REDEVELOPMENT OF RICE & BEAN CROPPING
MNGETA FARM, KILOMBERO VALLEY**

Submitted to:

NATIONAL ENVIRONMENT MANAGEMENT COUNCIL (NEMC)
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EXECUTIVE SUMMARY

INTRODUCTION

Kilombero Plantations Limited (KPL) was formed in July 2007 as a public-private partnership between the Rufiji Basin Development Authority (RUBADA) and InfEnergy Tanzania Limited (ITL, a subsidiary of InfEnergy Limited, Great Britain) to redevelop Mngeta Farm, Kilombero District.

Mngeta Farm originates from a joint venture between the governments of North Korea and Tanzania, the Korea Tanzania Agricultural Company (KOTACO). Started in the mid-1980s, KOTACO was a personal project between President Julius K. Nyerere and Kim Il-sung to develop the Mngeta Division of the Kilombero Valley. President Nyerere envisioned 5000 ha of irrigated rice and 10,000 ha of oil palm.

KOTACO cleared the entire 5,818 ha Mngeta Farm by 1989 but only 2500 ha was ever farmed. It was abandoned in 1993 at the time of widespread famine in North Korea after the collapse of the Soviet Union. Following the liquidation of KOTACO in 1993, RUBADA took possession the Mngeta Farm assets on behalf of the Government of Tanzania. Between 1993 and 2007, the farm was leased to a series of tenants who failed to develop it, the last tenant even failing to pay RUBADA rent for 5 years.

When KPL began preliminary operations at Mngeta in November 2007, only 400 ha was being farmed mechanically; elephant grass had reclaimed most of the farm area; and squatters were scattered over approximately 2500 ha of titled area.

The 2006 ITL \$65 million investment plan for Mngeta Farm consisted of two phases:

Years 1 – 3 Re-establishment of Rice

- a) Re-clear 5818 ha to establish mechanized rain-fed rice and dry season bean crops
- b) Construct large-scale rice factory for drying, milling and storing

Years 3 - 7 Oil Palm Plantation

- c) Construct sub-surface irrigation for 5,000 ha
- d) Convert Mngeta Farm to oil palm plantation
- e) Develop 2500 ha of smallholder oil palm within 45 km radius of the farm
- f) Shift rice and bean production to another 5,000 ha in the Kilombero Valley

However, given, (i) 2.5 years of obstruction in the completion of land title transfer (primarily by an insolvent tenant who refused to vacate) (ii) District and Regional Government resistance to oil palm at Mngeta Farm, and (iii) the global financial crisis, ITL directors have decided to develop only Phase 1, an approximate \$36.5 million investment, for the foreseeable future.

KPL has received formal approval from the Cabinet, the Ministry of Agriculture, the Ministry of Finance (Treasury Registrar), the Ministry of Justice (Attorney General's Office) and the Tanzania Investment Centre. (*See Annex A for Approvals*).

This Report for the Environmental Impact Statement will address only Phase 1, the redevelopment of Mngeta Farm for large-scale commercial rainy season rice and dry season bean crops.

KPL is introducing Zero Tillage rice farming in Tanzania. One of a set of techniques the FAO describes as “conservation agriculture,” Zero Till enhances and sustains farm

production by conserving and improving soil, water and biological resources. A permanent or semi-permanent organic soil cover (e.g. a growing crop or dead mulch) protects the soil from sun, rain and wind and allows soil micro-organisms and fauna to take on the task of "tilling" and soil nutrient balancing - natural processes disturbed by mechanical tillage. Developed in the United States in the 1960s, and adopted by Australia South American commercial farms in the 1980s, Zero Till agriculture has yet to be adopted widely in Africa.

APPLIED METHODS

Different methods and tools were used for the present Environmental and Social Impact report. The EIA report has followed the guidelines as stipulated in the Environmental Management Act No 20 of 2004 and Environmental Impact Assessment and Audit Regulation, 2005 G.N. No. 349 of 2005. This included the approval of the Scoping report (March 2008) and the Terms of Reference (ToR) by the Environmental Authorities.

Consultation was conducted with key stakeholders including RUBADA, Kilombero District Authority, Local Community leaders, the neighbouring residents close to the project area and the squatters who have invaded the farm.

In November 2006, ITL first commissioned the Environmental Association of Tanzania (ENATA) to commence the EIA after signing a sales agreement with RUBADA to purchase Mngeta Farm. In September 2007, further site visits and stakeholder consultations were carried out by Dr. James Lyimo and Dr. Claude Mung'ong'o and in February 2008 by Dr. Rocio Diaz-Chavez of the Centre for Environmental Policy, Imperial College, London, who also reviewed the Guidance on the EIA for Agriculture (No. 2) in England (Regulations 2006). Additional public meetings were held with the three villages surrounding Mngeta Farm in May 2009.

In addition, a biodiversity survey of the farm was completed in March 2007 and an avifauna survey of the entire Kilombero Valley in January and February 2008 to ascertain the range of rare cisticola bird species recorded on the farm. A study of the squatters who continue to occupy the farm was completed in February 2009. Finally, a GPS map and individual survey of each squatter who continues to occupy the farm was completed in September 2009.

RELATED POLICIES AND LEGAL FRAMEWORK

The EIA study has examined policies and relevant legislation Acts to ensure that implementation of the project abides by National Policies and legislation.

The policies include: National Environmental Policy (NEP), 1987, National Energy Policy of 2003, National Land Policy 1996, National Human Settlements Development Policy (2000), National Water Policy 2002, National Health Policy 2003, National Agricultural Policy of 1997, Poverty Reduction Strategy of 2000, National Strategy for Growth and Reduction of Poverty NSGRP June 2005

The Acts include: Environmental Management Act No. 20 of 2004, The National Land use Planning Commission Act, No. 3 of 1984, The Land Act No 4 of 1999, The Tanzania Investment (TIC) Act of 1997, The Occupational Health and Safety Act of 2003

The existing regulations include: The relevant international treaties which Tanzania has ratified include, the 1977 Geneva Convention concerning the protection of workers against occupational hazards in the working environment, the 1991 Bamako Convention on the ban of the import in Africa and control of trans boundary movement and

management of hazardous wastes within Africa and the Basel Convention on control of trans boundary of movements of hazardous and their disposal of 1989.

The institutional frameworks include NEMC with roles of monitoring implementation of the EMMP and compliance to the whole EIA. Furthermore NEMC will be carrying out Environmental Audit Review and approval of Annual Environmental Report. Another institution is EWURA with the responsibility of reviewing tariffs and prices of the energy products.

POSITIVE IMPACTS

According to the KPL plan, at full production of 5,818 ha at target yields, the farm will produce or employ annually:

- 20,000 tons of paddy rice (about 1.6% of current Tanzania national production)
- 13,000 tons of high quality milled rice
- 15,000 tons of soya and other bean crops
- 3 billion TZ shillings in corporate tax revenues to the government
- Over 160 full-time employees
- Over 300 part-time employees
- 665 million TZ shillings in staff salaries
- 110 million TZ shillings in annual NSSF contributions
- 100 million TZ shillings in annual PAYE income tax on employees

In addition, KPL will deploy an annual 50 million TZ shilling community development fund between the three villages surrounding Mngeta Farm for communal projects of their choice.

KPL is actively seeking donor funding to increase the capacity of the farm's hydro-power weir in order to supply electricity to the local villages. KPL has been in discussions with the Rural Energy Agency to participate in a rural electrification project.

KPL is prepared to assist smallholder farmers in the Mngeta area in increasing their agricultural output by:

- providing high-quality rice seed at cost once varieties that flourish in the local area have been identified and multiplied; KPL, with the Ministry of Agriculture, is currently conducting trials of 26 new varieties on Mngeta Farm
- providing high quality rice milling at cost
- providing machine planting and harvesting to medium size farmers at cost

ISSUES OF ENVIRONMENTAL AND SOCIAL CONCERNS

The project is located within Kilombero valley Floodplain Ramsar Convention Site, a designated wetland of global importance. Hence management of the biodiversity of the area is quite important. On the Mngeta Farm itself, the mammalian diversity is poor but the project area is rich in avifauna including two rare species of *Cisticola SPP*. A supplementary study on *Cisticola* has also been conducted to assure the development of the farm will not adversely reduce the range or breeding areas of the *Cisticola*. Furthermore, the Ramsar Site regulations have also been reviewed to comply with them.

The project should preserve all natural forest on its farm. And the project should encourage village agroforestry to develop sustainable fuel wood and building pole production.

KPL should work with Non Governmental Organisations (NGOs), such as the Alliance for a Green Revolution in Africa, to promote local rice farming efficiency and increased yields for better smallholder land use.

Although KPL has no immediate plans for large scale irrigation, should the project draw water from Mngeta river for irrigation purposes, the diversion of water for an irrigation scheme will only marginally decrease the total water resources in the Rufiji basin. The contribution of Mngeta river is less than 1% of water resources of the floodplain and the project will divert not more than 40% of the water in river Mngeta during the dry season. The project will treat the effluents and drain the treated water back to the river.

Consultation with different stakeholders including local farmers has been conducted in the Scoping Report and also for the EIS. Of particular importance is the relocation of over 2000 local villagers and migrants who are cultivating seasonal crops from villages nearby or inhabiting the farm. The relocation of their farming plots should take into consideration compensation and the availability of land and of social requirements such as school and health facilities.

MARKET OVERVIEW

Rice production in Tanzania is currently estimated at about 1.2 million metric tons annually (FAO). From 1993 to 2005, annual imports suggest that Tanzania has achieved about 85% self-sufficiency in rice production.

As much as 99% percent of the annual Tanzania crop is produced by small holders, the majority without irrigation. Rice is produced primarily in five regions disbursed geographically across the country. The leading region is Morogoro, which includes the Kilombero Valley, and is the closest to Dar es Salaam, which, with a population of over 2.5 million, is the largest market.

Tanzania's largest wholesale rice, maize and bean markets are five markets in Dar es Salaam. Each of these markets includes 10 to 15 wholesalers which turnover between 10 and 200 tons per week, buying from farmers and traders and selling after marking up the price between 5 to 20%. 100 km outside Dar es Salaam, Morogoro Town has the second largest wholesale rice market. The Dar and Morogoro markets serve local retailers as well as buyers from non-producing coastal regions and Zanzibar.

Tanzania rice producers achieve some of the highest producer prices in the world, averaging 75% above the world market price, given the 75% Common External Tariff on rice of the East African Community.

Little data exists on Tanzania's production and consumption of soybeans, KPL's primary dry season crop; however demand is such in the wholesale markets of Dar es Salaam that the price in Feb. 2009 was about 100% above the world price. Common bean (*Phaseolus vulgaris*) is the largest single source of protein for low-income rural and urban families. Like rice and maize, the bean crop is produced in various areas of the country and traded through the regional markets. A difficult crop to harvest mechanically, common beans could generate higher returns than soybeans and so merit long-term research as an alternative to soya.

RISKS ASSESSMENT AND CONTINGENCY PLANS

Agricultural risks include drought, torrential rains and pests and diseases.

There have been no recorded rain shortfalls in the Kilombero Valley but torrential rains which can damage a crop, particularly as it approaches harvest, is a grave risk. While one cannot insure against drought, crop insurance is available for extraordinary weather events.

Pests and diseases will be managed through careful fertilizer regimens and seed spacing, rigorous monitoring, Integrated Pest Management, and timely application of pesticides, fungicides and foliar chemical.

ZERO OPTION

The alternative option is not to implement the project at all. However, this option is not favoured by the Government policy of privatization and encouraging foreign investors to fund viable projects. The local community will continue living in abject poverty, missing the numerous socio-economic benefits of the project such as employment, improved social services such as roads, health facilities and schools and the technological benefits including the availability of better seed varieties and biodiversity conservation.

DECOMMISSIONING PLAN

In the event of the project closure there will be potential impacts from abandoned infrastructure, unattended plantations and loss of jobs. The decommission plans will take into considerations the Land Act No. 4 of 1999, disposal of machinery, equipment and unemployment.

CONCLUSION AND RECOMMENDATION

In order to meet its growing food needs, the government has made agricultural investment and increased agricultural mechanization high priorities. There are few large-scale commercial farms in the country and even fewer which are practising state-of-the art Zero Tillage farming, which KPL has begun.

Implementation of the project will create employment to local community, generate revenue to the Government, and contribute numerous socio-economic and environmental benefits as well as technological transfer to the country.

The cleared farm represents less than 0.7% of the Ramsar-designated wetland, and the KPL plans to employ best water-conservation and waste-treatment practices and technologies.

It is therefore recommended that the project be implemented taking into consideration the environmental impacts and mitigation measures identified during the EIA study and the monitoring programme to be followed after the approval by the Government.

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• Approval by the Ministry of Finance & Economic Affairs (Treasury Registrar), a letter with Ref. No. TYC/T/200/725/114 of 5 th May 2008	
• Approval by the Ministry of Agriculture, Food & Cooperatives, a letter with Ref. No. CEA 499/515/01 of 24 th June 2008	
• The Ministry of Constitutional Affairs & Justice vetted the addendum of the Shareholder's Agreement through a letter with Ref. No. JC/D.30/52/37 of 1 st July 2008	
• Approval by Kilombero District through a letter with Ref. No. A.20/34/186 of 25 March 2009	
B. Certificate of Incorporation	
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- E. Minutes of Village Meetings, May 2009
- F. Mngeta Farm Squatter Survey Report. Claude G. Mung'ong'o, Phd. & Juma Kayonko, MSc. February 2009.
- G. Distribution of Two endemic Cisticolas (Kilombero cisticola *Cisticola sp. nov.* and White-tailed cisticola *Cisticola sp. nov.*) of the Kilombero Valley, Tanzania. A Rapid Assessment. Jasson John and Trevor Jones, Environmental Sciences Research Centre, Anglia Ruskin University, Cambridge, UK January-February 2008. Final Report May 2008.
- H. Stakeholders Consultation Report for the Environmental Impact Assessment on Proposed Oil Palm and Rice Project at Mngeta, Kilombero, Tanzania. C.G. Mung'ong'o PhD, James Lyimo, PhD. September 2007.
- I. Rapid Assessment of Biodiversity (Birds and Mammals) on Mngeta Farm, Kilombero District, Morogoro Region. Trevor Jones, Environmental Sciences Research Centre, Anglia Ruskin University, Cambridge, UK. 29-31 March 2007
- J. Brief Botanical Inventory report for Ihongole & Isagu Forest patches in Rubada Farm Kilombero, Morogoro Region. Moses A. Mwangoka, Tanzania Forest Conservation Group. March 29-31, 2007.
- K. Revised Scoping Report submitted to NEMC, March 2008

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ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
AGRA	Alliance for Green Revolution in Africa
DC	District Commissioner
DNA	Designated National Authority
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ENATA	Environmental Association of Tanzania
ESMP	Environmental and Social Management plan
EWURA	Energy and Water Utility Regulatory Authority
FBD	Forestry and Bee keeping Division
HIV	Human Immunodeficiency Virus
GHG	Greenhouse Gases
GDP	Gross Domestic Product
IL	InfEnergy Ltd UK
ITL	InfEnergy Tanzania Limited
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
KPL	Kilombero Plantations Limited
KOTAKO	Korean Tanzania Agricultural Company
LKHP	Lower Kihansi Hydropower Project
MDG	Millennium Development Goals
MP	Monitoring Plan/Management Plan
NEMC	National Environment Management Council
NEP	National Environment Policy
NHP	National Health Policy
NSGRP	National Strategy for Growth and Reduction of Poverty
NSSF	National Social Security Fund
PAYE	Pay As You Earn
Pb	Lead (plumbate)
PPP	Public Private Partnership
RUBADA	Rufiji Basin Development Authority
STDs	Sexually Transmitted Diseases
SUA	Sokoine University of Agriculture
TAZARA	Tanzania and Zambia Railways Authority
TFCG	Tanzania Forest Conservation Group
TIC	Tanzania Investment Centre
TPRI	Tanzania Pesticide Research Institute
TTSA	Tanzania Tree Seed Agency
TSS	Total Suspended Solids
UK	United Kingdom
UNDP	United National Development Project
UN	United Nations
US	United States
VAT	Value of Added Tax
VEO	Village Executive Officer
WB	World Bank
WHO	World Health Organisation

Chapter 1: INTRODUCTION

1.1 BACKGROUND

Kilombero Plantations Limited (KPL) was formed in July 2007 as a public-private partnership between the Rufiji Basin Development Authority (RUBADA) and InfEnergy Tanzania Limited (ITL, a subsidiary of InfEnergy Limited, Great Britain) to redevelop Mngeta Farm, Kilombero District.

Mngeta Farm originates from a joint venture between the governments of North Korea and Tanzania, the Korea Tanzania Agricultural Company (KOTACO). Started in the mid-1980s, KOTACO was a personal project between President Julius K. Nyerere and Kim Il-sung to develop the Mngeta Division of the Kilombero Valley. President Nyerere envisioned 5000 ha of irrigated rice and 10,000 ha of oil palm.

KOTACO cleared the entire 5,818 ha Mngeta Farm by 1989 but only 2500 ha was ever farmed. It was abandoned in 1993 at the time of widespread famine in North Korea after the collapse of the Soviet Union. Following the liquidation of KOTACO, RUBADA took possession the Mngeta Farm assets on behalf of the Government of Tanzania. Between 1993 and 2007, the farm was leased to a series of tenants who failed to develop it, the last tenant even failing to pay RUBADA rent for 5 years.

When KPL began preliminary operations at Mngeta in November 2007, only 400 ha was being farmed mechanically; elephant grass had reclaimed most of the farm area; and squatters were scattered over approximately 2500 ha of titled area.

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- b) Construct large-scale rice factory for drying, milling and storing

Years 3 - 7 Oil Palm Plantation

- c) Construct sub-surface irrigation for 5,000 ha
- d) Convert Mngeta Farm to oil palm plantation
- e) Develop 2500 ha of smallholder oil palm within 45 km radius of the farm
- f) Shift rice and bean production to another 5,000 ha in the Kilombero Valley

However, given, (i) 2.5 years of obstruction in the completion of land title transfer (primarily by an insolvent tenant who refused to vacate) (ii) District and Regional Government resistance to oil palm at Mngeta Farm, and (iii) the global financial crisis, ITL directors have decided to develop only Phase 1, an approximate \$36.5 million investment, for the foreseeable future.

KPL has received formal approval from the Cabinet, the Ministry of Agriculture, the Ministry of Finance (Treasury Registrar), the Ministry of Justice (Attorney General's Office) and the Tanzania Investment Centre. (*See Annex A for Approvals*).

This Report for the Environmental Impact Statement will address only Phase 1, the redevelopment of Mngeta Farm for commercial rainy season rice and dry season bean crops. The project is large-scale cultivation and therefore falls under list of projects requiring an EIA (mandatory list) in accordance to the Environmental Impact Assessment and Audit Regulations, 2005-GN No. 349 of 2005.

In November 2006, ITL first commissioned the Environmental Association of Tanzania (ENATA) to commence the EIA after signing a sales agreement with RUBADA to purchase Mngeta Farm. Further site visits and stakeholder consultations were carried out by Dr. James Lyimo and Dr. Claude Mung'ong'o (September 2007) and Dr. Rocio Diaz-Chavez of the Centre for Environmental Policy, Imperial College, London (February 2008), who also reviewed the Guidance on the EIA for Agriculture (No. 2) in England (Regulations 2006).

Consultation was conducted with key stakeholders including RUBADA, Kilombero District Authority, Local Community leaders, the neighbouring residents close to the project area and the squatters who have invaded the farm.

In addition, a biodiversity survey of the farm was completed in March 2007 and an avifauna survey of the entire Kilombero Valley in January and February 2008 to ascertain the range of rare cisticola bird species recorded on the farm. Finally, a study of the squatters who continue to occupy the farm was completed in February 2009 and a GPS map of the squatters was completed in September 2009.

1.2 OBJECTIVES OF THE EIA STUDY

Environmental Impact Assessment provides an independent assessment and identification of the potential environmental impacts of a proposed project. It is a formal study process which enables planners to determine the socio economic and environmental consequences of a proposed development project. The EIA collects data on the biophysical and socio-economic environment and the information is used to predict the potential impacts of the proposed activities in order to develop appropriate mitigation measures and to plan programs to monitor any changes that may result from the proposed development.

Furthermore, the EIA concentrates on stakeholder problems, conflicts, or resource constraints that could affect the viability of a project program or policy. It also examines how the project might cause harm to people, their property, livelihood, or to other nearby developments. After the potential problems are identified, the EIA identifies measures to minimize the problems and outlines ways to improve the sustainability of the project.

To achieve this aim, the assessment's findings in a form of Environmental Impact Statement (EIS) are communicated to all the various stakeholders who will make decisions about the proposed project (i.e. project developers, investors, regulators, planners and politicians). After evaluating the EIS conclusions and recommendations, the project planners and design engineers can shape the project so that its benefits can be achieved and sustained without causing or minimising negative impacts.

The EIA of the redevelopment of Mngeta Farm will include environmental monitoring and a management plan to be incorporated into the implementation of the project.

1.3 NEED FOR EIA

The project is in the agricultural sector and being large-scale cultivation, it falls in the category of projects for which EIA is mandatory according to the Environmental Management Act No. 20 of 2004 and Environmental Impact Assessment and Audit Regulations 2005.

Mngeta Farm is well suited for rain-fed cropping. Rainfall is sufficient for over 4 ton/ha rice yields in the rainy season, and the 5-month dry season is suitable for growing beans.

The only source of irrigation water for the farm is the Mngeta River, which has no other large-scale end users. However, studies have shown that in the dry season, the water volume is sufficient only for 2000 ha of flood irrigation for rice. An approximately \$20 million investment would be required to build a diversion weir, reservoir, and canals to flood irrigate the farm. The return on an investment of \$20 million for only 2000 hectares would be too low to secure financing. Therefore, the project is not currently planning to construct large-scale irrigation.

The project uses a variety of inputs such as fertilizer and agrichemicals which can have a detrimental impact on environment. These have been taken into account in the Environmental and Socio-Management Plan (ESMP) and the Environmental Monitoring Plan (EMP)

1.4 METHODS USED

Different methods and tools were used for the present Environmental and Social Impact report. Besides the Laws and Regulations, the Guidance on the EIA for Agriculture (No. 2) in England (Regulations 2006) were reviewed.

A review of crop production and market options for rice and palm oil was also conducted in order to review the options presented for the community, the region, the national level and the investors.

Scoping

ENATA consultants together with officials from RUBADA head office in Dar es Salaam carried out a scoping exercise which included a site visit at Mngeta from 19th – 22nd November 2006. The scoping exercise was to ensure that the stakeholders participate through meetings in order that the interested and affected parties are well informed of the project. An amended Scoping report was presented in March 2008 and approved by the National Environmental Authorities in order to accept the Terms of Reference for the Environmental Impact Assessment which is presented in this Environmental Impact Statement (EIS).

Consultation

During the Scoping exercise and for the EIA formal and informal consultation with different stakeholders was conducted. The consultation process was conducted in the form of semi-structured interviews and short survey with local smallholders. Table 1.1 presents the list of stakeholders interviewed and a summary of the survey is presented on Chapter 5 on the Consultation with stakeholders.

Table 1: Stakeholder's Consultation

Consultee	November 2006
The Kilombero District Commissioner	
Kilombero District Administrative Officer	
Mchombe Ward Executive Officer	
Mchombe Village Executive Officer	
Njage Village Executive Officer	
Lulologi Village Executive Officer	
Ag. Head leader Mchombe Primary School	

From 7 to 12 November 2008, in the field visit for the Mngeta Farm Squatter Survey Report, in addition to 100 squatters who were interviewed and completed questionnaires, 31 key informant interviews included the following:

Consultee (age in brackets)	November 2008
Erasto K. Mbilinyi	Hamlet Chairperson – Isago, Mngeta
Mzee Esio Ngogolo (70)	Former Village Chairperson – Mngeta (1984-04)
Patrus Mwampinzi	Village Chairperson - Mngeta
Leonard Mwamwezi	Village Executive Officer - Mngeta
Nicolaus Ngwega	Member of Village Committees - Mngeta
Edwin Kayuni	Member of Village Committees - Mngeta
Mzee Gervas Raphael Mkuni (68)	Village Chairperson - Mkangawalo
Athman Waziri Kijazi (32)	Village Executive Officer - Mkangawalo
Mathias Kihoma (40)	Hamlet Chairperson – Mbasa, Lukolongo
Ahmed Ally Kambenga (65)	Ten-cell Leader – Mbasa, Lukolongo
Trantus Leonard Mdenya (38)	Hamlet Committee Member - Mbasa
Frank Pesambili Kitochi (39)	Mbasa resident
Asiya Hasani Ngwega (29)	Mbasa resident
Mr. Ndulu	Village Chairperson - Lukolongo
Dright Mwinyi	Village Executive Officer - Lukolongo
Moses Kisugite	Farm Operation Manager – MFP/KPL
Yose H. Kabwanga	Surveyor - RUBADA
Mr. Shelele	Mbasa/Lukolongo resident

Environmental Survey and Investigations

As determined in the Scoping Report and by initiative of KPL different studies have been conducted or reviewed order to provide information for the environmental impact assessment and due to the lack of information in the area.

- Rapid Assessment of Biodiversity (Birds and Mammals) on Mngeta Farm, Kilombero District, Morogoro Region.. Trevor Jones Environmental Sciences Research Centre, Anglia Ruskin University, Cambridge, UK. 29-31 March 2007
- Brief Botanical Inventory report for Ihongole & Isagu Forest patches in RUBADA Farm Kilombero, Morogoro Region. Moses A. Mwangoka. Sponsored by Tanzania Forest Conservation Group. March 29-31, 2007.
- Stakeholders Consultation Report for the Environmental Impact Assessment on Proposed Oil Palm and Rice Project at Mngeta, Kilombero, Tanzania. C.G. Mung'ong'o PhD, James Lyimo, PhD. Consultants. September 2007.
- Distribution of Two endemic Cisticolas (Kilombero cisticola *Cisticola sp. nov.* and White-tailed cisticola *Cisticola sp. nov.*) of the Kilombero Valley, Tanzania. A Rapid Assessment. Trevor Jones and Jasson John. January-February 2008. Final Report May 2008.
- Mngeta Farm Squatter Survey Report. C.G. Mung'ong'o, PhD and Juma Kayonko, MSc, February 2009

Further details of these surveys are presented within the appropriate sections of this report.

1.5 TERMS OF REFERENCE

The following ToR were proposed in the scoping report and approved by the NEMC:

1. Describe the proposed projects and reasons for the under taking.

2. Describe the local environment including the site of the project, Socio-Economic, biophysical aspects etc.
3. Describe the legislative and regulatory frameworks.
4. Describe the impacts that the proposed project may cause to the environment.
5. Proposed measures to prevent or mitigate the impacts.
6. Prepare an Environmental Management Programme (EMP) from construction phase, operations and decommissioning.
7. Develop a Monitoring Plan (MP) from construction to decommission indicating parameters, responsible institutions, costs, frequency etc.
8. Analyze project alternatives and “zero” option.
9. Identify Institutions that are relevant in the implementation of the Environmental Management and Monitoring Plan.
10. Produce the EIA.

1.6 REPORT STRUCTURE

The report is organized in eleven chapters.

Chapter 1 provides introduction of the project including the objectives of the EIA, Terms of References, Methodology used and the need for Environmental Impact Assessment.

Chapter 2 outlines details of the proposed project including promoters and source of funds, plant machinery and production processes. It includes an overview of the rice and palm oil production.

Chapter 3 describes related policies and regulatory framework relevant to the project at National and International level.

Chapter 4 gives baseline information on the Environment which in brief is a summary profile of Kilombero District in which the project is located.

Chapter 5 contains the results of the consultation process and views of stakeholders on the project and issues of environmental concern.

Chapter 6 has identification and assessment of impacts. They include long-term negative impacts, positive impacts as well as direct impacts.

Chapter 7 comprises mitigation measures for the identified impacts.

Chapter 8 contains Environmental and Social Management and Monitoring Plans including company organization charts.

Chapter 9 has incorporated risks assessment and contingency plans

Chapter 10 has consideration of alternatives including “Zero Option”

Chapter 11 has the decommissioning plan in case the activities being carried out by the project comes to an end. The plan includes rehabilitation of the land, disposal of machinery and equipment and issues related to unemployment as a result of decommissioning.

Chapter 12 encapsulates the common conclusions of the multiple consultants engaged in the Environmental and Social Impact Report.

Chapter 2: PROJECT DESCRIPTION

2.1 NAME AND LOCATION

The project title is “Redevelopment of Rice & Bean Cropping, Mngeta Farm.” The project is located at the northern edge of the Kilombero Valley in Tanzania, on the southwest bank of the Mngeta River. Figures 1 and 2 show the Mngeta Farm and the Kilombero Valley area in Tanzania.



Fig. 1. Mngeta Farm in Tanzania

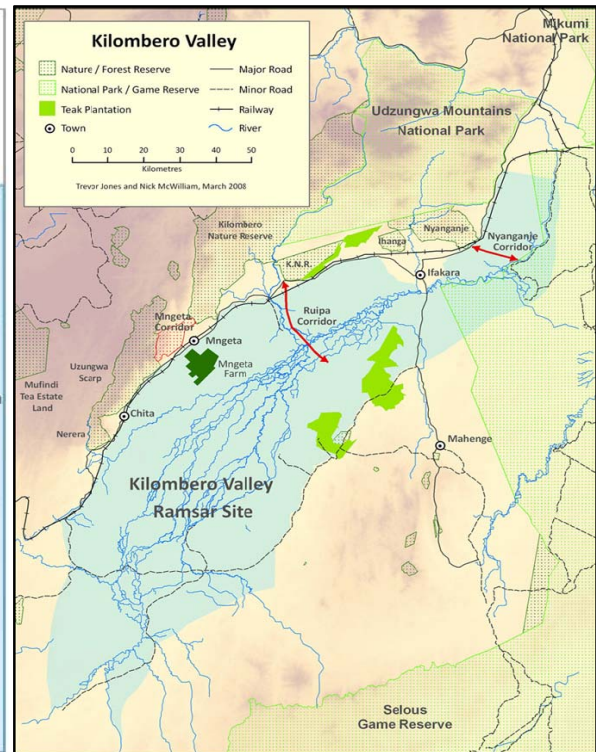


Fig. 2. Project Area in the Kilombero Valley

The project area of 5,818ha, known as Mngeta Farm, is owned by Kilombero Plantations Limited (KPL) and is being redeveloped as a rain-fed rice and bean farm after 14 years of abandonment. KPL is a public-private partnership between RUBADA and InfEnergy Tanzania Ltd (a subsidiary of InfEnergy Limited, Great Britain).

The project area is located at Mngeta at the edge of the Kilombero Valley Floodplain, which is one of five sites in Tanzania designated a Ramsar Wetland of International Importance on 25 April 2002. The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 154 Contracting Parties to the Convention, with 1674 wetland sites, totalling 150 million hectares, designated for inclusion in the Ramsar List.

The 5,818ha Mngeta Farm, cleared in 1989, represents less than 0.7% of the 7,967km² Ramsar Kilombero Floodplain area. It is unclear whether the farm actually lies within the Ramsar area as the area is large and only vaguely defined.

The Government of Tanzania identified Kilombero District as a model agricultural district and aims to utilise some 300,000 ha of the wetland areas to ensure sufficient national food production (*Kilombero Economic profile*).

2.2 MODEL CORPORATE MECHANIZED FARM

KPL is striving to be an internationally competitive producer, achieving low-costs through large-scale mechanized production, while at the same time abiding by the highest standards of social and ecological responsibility. Supporting the local communities makes sound business sense as the long-term success of the project relies on the strength of its relations with its neighbours, its source of labour and political support.

KPL is providing the three villages surrounding the farm an annual TSh. 50 million community development fund. This fund will be increased in 2013 when the company achieves positive cash flow if the community fund is producing tangible benefits.

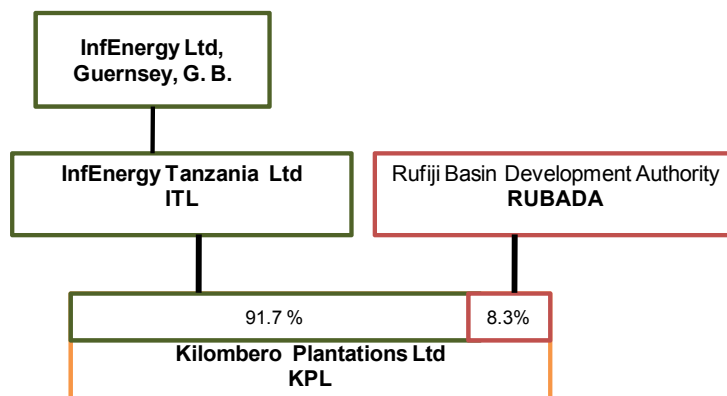
KPL will assist smallholder farmers through the provision at cost of:

- high-quality rice seed once varieties that flourish in the local area have been identified and multiplied; KPL, with the Ministry of Agriculture, is currently conducting trials of 26 new varieties on Mngeta Farm
- high-quality rice milling
- contract planting and harvesting to medium size farmers at cost

The company is working to catalyze the creation of an environmental off-set to the presence of a rice plantation at the edge of the Kilombero Valley Ramsar Site. The company has funded a socio-economic survey of an area in the mountains over the farm where conservationists are calling for the establishment of a forest corridor to connect the Udzungwa Scarp Forest Reserve with the newly gazetted Udzungwa Nature Reserve.

2.3 PROMOTERS AND SOURCES OF FUNDS

Kilombero Plantations is a public-private joint venture between the Rufiji Basin Development Authority (RUBADA) and InfEnergy Tanzania Limited. KPL is incorporated under the companies Act 2002 with a certificate of Incorporation No. 61179 dated 16 July 2007. KPL acquired Mngeta Farm from RUBADA for \$2.55 million, paying 50% in cash and converting the remainder into 8.3% shares in KPL. Below is a diagram outlining the KPL shareholding structure. *Fig. 3. Shareholding Structure of Kilombero Plantations Limited*



Directors of KPL include:

Carter Coleman, Managing Director, InfEnergy Tanzania Limited

Mr. Coleman lived in Tanzania between 1987 and 1996 and has maintained strong links with the country since, primarily through the Tanzania Forest Conservation Group (TFCG), a widely respected and successful community development and reforestation organization he established in 1991. Mr. Coleman built the TFCG from scratch into an organization that works in 120 villages in four mountain ranges. TFCG has planted 10.5

million trees, trained 10,000 villagers in agro-forestry, assisted hundreds of self-help groups in micro-enterprises, pioneered local forest management in Tanzania and prevented the deforestation of 1500 sq km of forest. Mr. Coleman is a former journalist and the author of two books.

John Paul Whyatt. Finance Director, InfEnergy Limited, Great Britain

Mr. Whyatt background is in strategy consulting and investment banking. Formerly a Director of Dresdner Kleinwort Benson and Bear Stearns, Mr. Whyatt spent six years in Russia advising Western multinationals on inward investment opportunities and then advising Gazprom and other major Russian oil & gas companies on raising funds from the global capital markets. Since returning to the UK in 1998, he has led over 20 M&A, LBO and capital market transactions primarily in the telecoms and media sectors and ranging in size from £18m to over \$50bn USD. Mr. Whyatt has a Masters degree in Public Administration, with a focus on Political Economy of International Development, and began his career as an intern in the US Environmental Protection Agency.

Graham Anderson. Acting General Manager, KPL

Mr. Anderson has been working on land selection and feasibility studies for this project since early 2005. From 1995 to 2001, Mr. Anderson worked for the Commonwealth Development Corporation (CDC) in Malawi and Tanzania, first as an irrigation engineer and finally as a tea plantation production manager. In 2001, he started his own floriculture business in Tanzania, growing and exporting tropical cut flowers to Europe. A UK citizen who grew up in Kenya, Mr. Anderson holds a MSc in Soil and Water Engineering from Cranfield University.

Director General, RUBADA

The Director General of RUBADA holds a seat on the KPL Board of Directors. Currently the Acting Director General of RUBADA, Aloyce Masanja occupies the seat. Previously the Director of Planning, Mr. Masanja joined RUBADA in 1993. Mr. Masanja holds an MSc in Development Planning and Management (Dortmund University, Germany, 1999), a MA in Agricultural and Rural Development (Institute of Social Studies, The Hague, Netherlands, 1996) and a BA in Economics (University of Dar es Salaam, 1993).

2.3.1 Rufiji Basin Development Authority

RUBADA

P.O. Box 9320

Dar Es Salaam

Tanzania

The Rufiji Basin Development Authority, established by a parliamentary act in 1975, is a parastatal organization under the Ministry of Agriculture and Food Security. Under the Rufiji Basin Development Authority Act, the functions of RUBADA are to promote and regulate the generation of hydro-electricity and flood control as well as industrial, agricultural and forestry activities in the Rufiji Basin development area. The RUBADA management team includes extensive experience in administration, finance, engineering, ecology and agriculture. The RUBADA board of directors includes members of parliament and officers from the ministries of agriculture and energy.

2.3.2 InfEnergy Tanzania Limited (ITL)

InfEnergy Tanzania Limited

6th Floor, NSSF Nyerere Pension Tower,

P.O. Box 78934, Dar Es Salaam

ITL was established in March 2006 to execute the project at Mngeta. InfEnergy Tanzania Limited is a subsidiary of:

InfEnergy Limited
Ogier House
St. Julian's Ave
St. Peter Port
Guernsey GY1 1WA
Great Britain

The directors of InfEnergy Limited include Mr. Coleman and Mr. Whyatt, described above, in addition to:

Alan Boyce. Non-Executive Director

Mr. Boyce is president of AdecoAgro, an integrated food and renewable energy company that farms more than 270,000 hectares of highly productive land in Argentina, Brazil and Uruguay. In five years, the firm has substantially increased volume while also adopting sustainable production technology and adding value through vertical integration. Until 2007 Mr. Boyce was Director of Special Situations at Soros Fund Management LLC and managed a portfolio of assets of the Quantum Funds. He also had principal operational responsibilities for the bulk of Soros' finance and agriculture investments in Latin America. Alan served as Managing Director of Fixed Income Arbitrage with Bankers Trust for 14 years and began his career at the Federal Reserve Board in Washington, D.C. He holds an MBA from Stanford University and a BA in Economics from Pomona College, where he graduated magna cum laude.

Ion Yadigaroglu. Non-Executive Director

Mr. Yadigaroglu is responsible for direct investments at Capricorn Investment Group, the principle investor in InfEnergy Ltd. From 2001 to 2004, Mr. Yadigaroglu executed a wide range of acquisitions and investments as a Director of Business Development at Koch Industries, the largest private company in the world by revenues. From 1998 to 2001, Mr. Yadigaroglu was CEO of Bivio, a company that provides services to retail investment partnerships. From 1985 to 1992, he was an analyst at Olsen & Associates, a Zurich-based foreign exchange analytics and trading company. Mr. Yadigaroglu serves on the boards of directors of SeaChange Maritime, Zag.com, InfEnergy Limited, Automatiks, Targeted Growth and Falcon Waterfree. He holds a BSc in Physics from ETHZ in Switzerland, and a PhD in Astrophysics from Stanford University.

Alan Chang. Non-Executive Director

Mr. Chang is a Principal and Managing Director, Asian Investments of the Capricorn Investment Group, overseeing their multi-asset class portfolio of investments in Asia as well as their global venture portfolio. Mr. Chang joined Capricorn in 2003 and is part of the leadership team. Prior to Capricorn, Mr. Chang was an Associate at DFJ New England, an early-stage venture capital firm. Previous to that, Mr. Chang advised technology companies on corporate finance and M&A transactions at Montgomery Securities (now Banc of America Securities). Mr. Chang received a MBA from Harvard Business School and a BSE from Duke University, graduating cum laude with a triple major in Electrical Engineering, Computer Science and Art History. Alan is a CFA charter holder and is fluent in Chinese.

Nick Browne. Founder & Non-Executive Director

Mr. Browne has been a director of the Company since inception and along with a colleague at Dexion Capital provided the initial seed funding for the business. Mr. Browne joined Dexion Capital, a London and Guernsey based specialist consultant and investment manager in the hedge fund sector, shortly after its formation in 2000 and was

instrumental in its growth into the largest manager of exchange-traded hedge fund products globally. From 2007 he assumed a part time role within Dexion and devotes a part of his time to InfEnergy, assisting Mr. Coleman and Mr. Whyatt Prior to joining Dexion, Mr. Browne spent 15 years in the reinsurance industry and holds a degree from Oxford University.

2.3.3 Source of Funds

US \$13.5 million has been invested in KPL to date, (including over \$1 million in development costs, feasibility studies and business planning) by InfEnergy Limited. The principle shareholder of InfEnergy Limited is Pacific Sequoia Holdings, part of the Capricorn Investment Group, in their words, "a long-term focused global multi-asset class fund with a principled, thematic approach." Capricorn's clients are a select group of ultra-high-net-worth individuals and institutions, and its funds' assets total U.S. \$4 billion. Pacific Sequoia has invested \$17 million in equity in InfEnergy Ltd for KPL to date.

KPL is currently in discussions with development banks for a \$15 million debt facility (\$12 million of long term debt plus \$3 million overdraft facility to cover working capital) to complete the redevelopment of the 5,818 ha farm.

2.4 PROJECT OPERATION

The project consists of three central components:

- a) Re-clear and prepare 5818 ha by removing second-growth trees, elephant grass and harrowing
- b) Establish mechanized Zero Till farming of rainy season rice and dry season beans
- c) Construct large-scale rice factory for drying, milling and storing

2.4.1 Zero Till Agriculture

Zero tillage reaps cost savings through the elimination of tractor plowing and the gradual reduction of herbicide. One of a set of techniques the FAO describes as "conservation agriculture," Zero Till enhances and sustains farm production by conserving and improving soil, water and biological resources. A permanent or semi-permanent organic soil cover (e.g. a growing crop or dead mulch) protects the soil from sun, rain and wind and allows soil micro-organisms and fauna to take on the task of "tilling" and soil nutrient balancing - natural processes which are disturbed by mechanical tillage. Developed in the United States in the 1960 and adopted in Australia and South America in the 1980s, Zero Till agriculture has yet to be adopted widely in Africa.

On undeveloped land, after clearing of trees and tall grass, the area is ploughed and harrowed only once. Following the first crop, no-tillage methods are introduced:

- The harvested crop is mowed
- A seed drill injects seed and fertilizer through the plant litter into the soil
- The field is sprayed with a pre-emergent herbicide
- Midway through the crop, a post-emergent fertilizer is sprayed

- Further applications of fertilizer can be sprayed or spread.

Over time, the seedbed of the weeds diminishes with each crop rotation. The rotation of bean varieties, leguminous plants, in the dry season will also improve soil quality by fixing nitrogen.

2.4.2 Planting Plan

In December 2007, KPL started the rehabilitation of the farm and planted 640 ha of rice by mid-March 2008, using contractors and antiquated equipment that came with the farm. The harvest was delayed from the lack of available combine harvester capacity, resulting in a high quantity of broken rice, but over 800 tons of rice were harvested.

By mid-March 2009, KPL completed the planting of a 2000 ha rice crop, using contractors and the first of its own equipment to arrive on site. An additional 765 ha of rice cover crop was planted aerially on areas not accessible to machine planters (due to the atypically early arrival of heavy rains and equipment constraints), bringing all recently cleared and harrowed land into the rice/soya zero-till rotation. The 2009 crops are the first rotation in a 4-year plan to reach full area and yield targets across 5,000 ha, net of infrastructure.

Starting in May 2009, the soybean crop will be planted across the 2765 ha as the rice is harvested. An additional 1000 ha will be cleared between August 2009 and the next rice-planting season, which commences in December 2009. The final 1000 ha will be re-cleared and planted with rice by January 2011.

The map below illustrates the current cropping status on the farm:

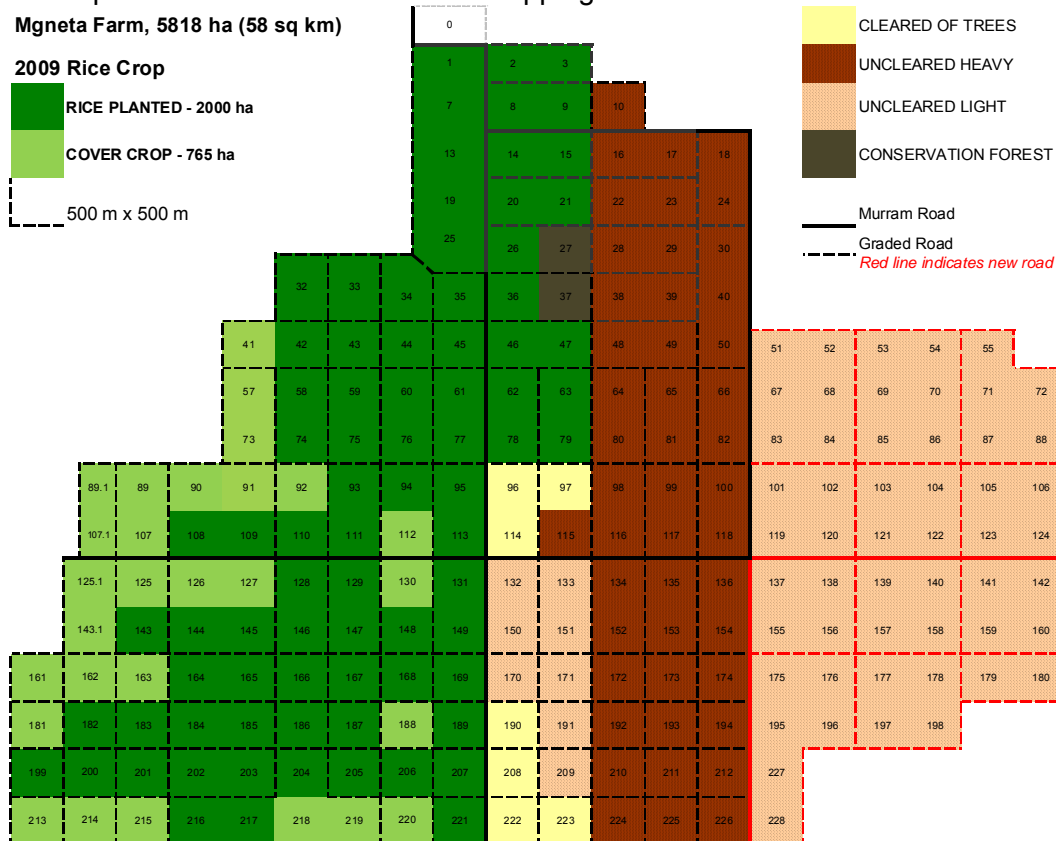


Fig. 4 2009 Rice Crop

The Table below sets the context of the map above in Year 2 of a 5-year plan to achieve full area and yield targets. *Table 2: KPL Planting Plan*

Year	Crop	Ha	Yield, t/ha	Yield, tons
2007/08	Paddy	641	1.26	807
	Milled rice			
2008/09	Paddy	2000	1.75	3,500
	Milled rice			
	Soya	2750	1.5	4,125
2009/10	Paddy	4000	2.5	10,000
	Milled rice			
	Soya	4000	2.0	8,000
2010/11	Paddy	5000	3.0	15,000
	Milled rice			
	Soya	5000	2.5	12,500
2011/12	Paddy	5000	4.0	20,000
	Milled rice			
	Soya	5000	3.0	15,000
2012/13	Paddy	5000	4.0	20,000
	Milled rice			
	Soya	5000	3.0	15,000

2.4.3 Employment

At full operations over 5818 ha (5000 net of infrastructure) the farm will employ approximately 180 people full time and up to 300 part-time workers.

2.4.4 Agriculture commodities

Tanzania is one of the poorest countries in the world. The population in 2006 was estimated as 38,329,000, with an estimated growth rate of 2.3% with a total area of near 1 million km², including some offshore islands. It consists of plains along the coast where rice is grown, a large central plateau separating the rift valleys, and highlands in the north and south. Three percent of the land is arable with an internal renewable water resource of 80 km³ and an incoming water flow of 9 km³ (IRRI, 2008).

The economy depends heavily on agriculture, which accounts for more than 40% of the GDP, provides 85% of exports, and employs 80% of the work force. The main agriculture products are coffee, sisal, tea, cotton, pyrethrum (insecticide made from chrysanthemums), cashew nuts, tobacco, cloves, corn, wheat, cassava (tapioca), bananas, fruits, vegetables; cattle, sheep, goats. Industry and services provide 18.9% and 38.5% of the GDP respectively (CIA, 2008).

The main agricultural constraints in Tanzania are the topography and climatic conditions limiting cultivated crops to only 4% of the land area. Industry traditionally featured the processing of agricultural products and light consumer goods. Multi- and bilateral donors (e.g. the World Bank and the IMF) provide funding to rehabilitate Tanzania's economic infrastructure and to alleviate poverty. Continued donor assistance and solid macroeconomic policies supported real GDP growth of nearly 7% in 2007 (CIA, 2008).

Rice production

According to the International Rice Research Institute (IRRI, 2008), the World rice production in 2007 was nearly 645 million tons. At least 114 countries grow rice and more than 50 have an annual production of 100,000 tons or more. Asia is the region producing nearly 90% of the total mainly in China and India.

For most rice-producing countries where annual production exceeds 1 million t, rice is the staple food. In Bangladesh, Cambodia, Indonesia, Lao PDR, Myanmar, Thailand, and Vietnam, rice provides 50-80% of the total calories consumed. Notable exceptions are Egypt, Nigeria, and Pakistan, where rice contributes only 5-10% of per capita daily caloric intake (IRRI, 2008).

The typical Asian farmer plants rice primarily to meet family needs. Nevertheless, nearly half the crop goes to market; most of that is sold locally. Only 6-7% of world rice production is traded internationally. The top 10 rice producing countries are: China, India, Indonesia, Bangladesh, Vietnam, Thailand, Myanmar, Japan, Philippines, and Brazil (IRRI, 2008).

Many factors, both long- and short-term, have contributed to the current rice crisis in the world. In the last seven years there has been an imbalance between demand and production partly masked by a reduction in rice stockpiles. This depletion of stock has moderated the rise in price that would have occurred otherwise (figure 6). This will have price risks in the near future (IRRI, 2008).

A major reason for the imbalance between the long-term demand and supply is the slowing growth in yield, which has decreased substantially over the past 10–15 years in most countries particularly in South Asia (figure 7). Globally, yields have risen by less than 1% per year in recent years. (IRRI, 2008).

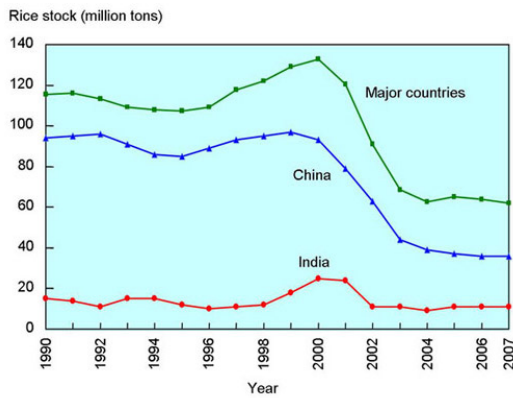


Figure 5. Rice stock (millions of tons). (Source: IRRI, 2008).

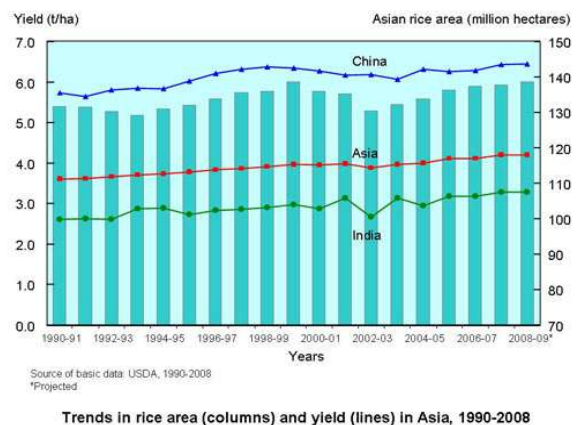


Figure 6. Trends in rice area (columns) and yield (lines) in Asia, 1990-2007. (Source: IRRI, 2008).

Some other problems encountered for increasing rice production is the limited expansion for the crop particularly in Asian countries. According to the International Rice Research Institute (IRRI) (2008) an important factor accounting for the slowdown in yield growth is the reduced public investment in agricultural research and development (R&D) as well as inadequate policy.

The rapid economic growth in large countries such as India and China has also pushed the demand for cereals for consumption and livestock production as well as the prices. This has been enhanced by the price of oil affecting specially those countries that import rice. The world price of fertilizers (which are essential for rice production) has as well increased significantly, with the price of urea almost doubling over the past four years (Figure 8).

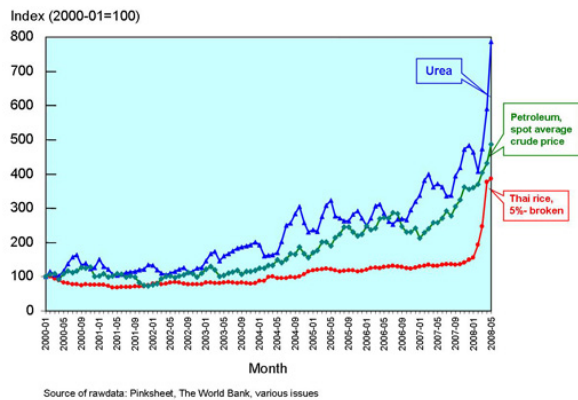


Figure 7: World prices of rice, urea, and diesel fuel, 2000-08 (IRRI, 2008)

According to the IRRI (2008), some other factors have also influenced the rising in prices such as oil price, climate change and agricultural problems (pests). The report suggests that rising oil prices and concerns about climate change have also produced investments in biofuels increasing pressure on international trade of grains and livestock feed, as well as on agricultural land in some countries. Nevertheless, until now, the direct impact of biofuels on rice production and rice trade has likely been small.

Extreme weather has produced natural disasters such as widespread drought in India and China in 2002, typhoons in the Philippines in 2006, and major flooding in Bangladesh in 2007 have contributed to the shortfall in production in recent years. Some evidence suggests that rising temperatures may have already contributed to lower rice yields in recent years. Pests such as plant hoppers, and the various virus diseases transmitted by them, are also major threats to rice production (IRRI, 2008).

The African Case

In Africa rice has become an increasingly popular food accounting for almost one-third of the total world trade in rice. This has increased over time as growth in rice production is far slower than growth in total demand. It is expected that demand from Africa will continue to grow. The rice planting season in Africa is from December to February and the harvesting time from May to July. Nevertheless, there is an off-season production which planting goes from June-July and the harvesting from November to December (IRRI, 2008).

Rice is important to the livelihoods of 100 million people in Southern Africa but still between 40 and 50% of all rice consumed is imported. It is expected that by 2015, around 10 million tons of rice annually will be needed to meet demand. (Wopereis, 2008). The Africa Rice Centre (<http://bulletin.iri.cgiar.org/bulletin/2008.40/bullimg/Lowlands.jpg>WARDA) is currently an association of 22 member states, with staff based in West and Central Africa (in Benin, Côte d'Ivoire, Nigeria, and Senegal) and in East and Southern Africa (Tanzania). IRRI currently operates in six countries in the ESA and has staff based in Mozambique and Tanzania. A strategy and implementation plan for rice research for the ESA region was developed during a joint WARDA-IRRI tour in the ESA region from 25 August to 5 September 2008 (Wopereis, 2008).

Tanzania has increased its rice production, rice area and consumption. Figure 8 shows the production, area dedicated and yields in Tanzania for over twenty years.

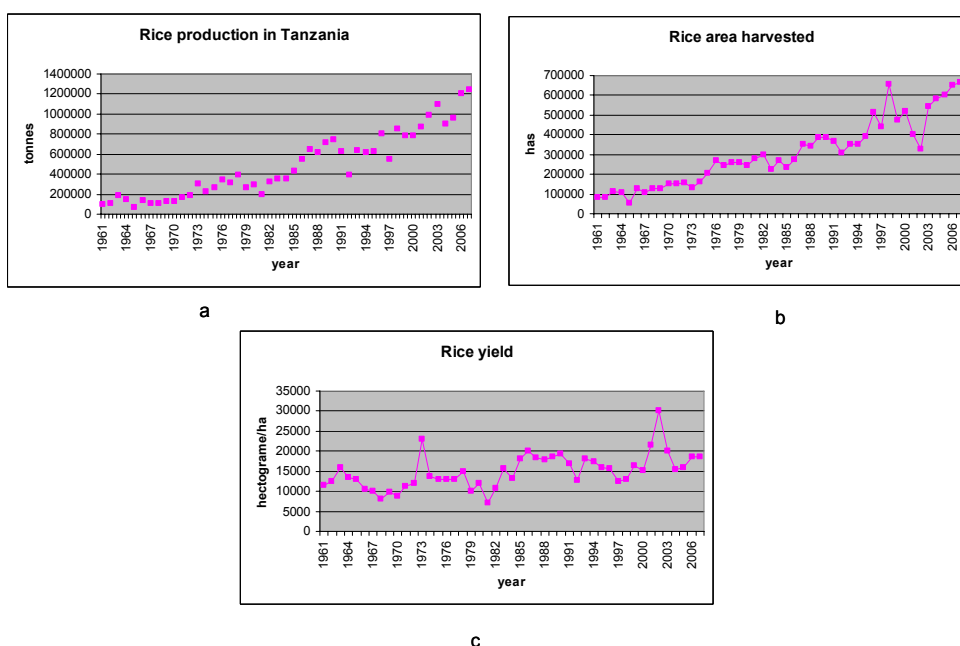


Figure 8. Rice production (a), area dedicated (b) and yields (c) in Tanzania (Data source: FAOSTAT, 2008).

Regarding the rice production in Tanzania, the IRRI (2008) states that some major constraints are also influencing its sustainable production including:

- Drought in upland areas and drought and flash flood in rain-fed lowland (or inland swamp) areas because of irregular weather
- Infestation of red rice in the irrigated schemes
- Inadequate and irregular input supplies: seeds, fertilizer, and credit
- Lack of small farm equipment, especially for postharvest operations
- Lack of effective farmers' organizations and cooperatives
- Poor maintenance of irrigation facilities
- Lack of a well-defined rice policy
- Poor road networks and marketing systems
- Labour shortage because of competition from other crops
- Weak research and extension support

Some production problems related to rice growth include water access and irrigation. Main water problems are referred to a looming water shortage, uneven distribution, nitrate and pesticide pollution, water logging in heavy soils and the increasing costs of irrigation systems. The water problems can be tackled by developing more efficient water management strategies and providing new rice (Ferrero, 2007). As rice plants originate from sub-tropical and tropical zones, they are easily damaged by low temperatures.

Rice is not the staple food for most of the European population; nevertheless, rice consumption in the continent has increased in the last years due to immigration and diversification of the diet of the Europeans. In the last two decades rice consumption has significantly increased in all European countries either rice producers (Southern Europe)

or non-rice producers (Northern Europe). It is presumable that this trend will continue in the next years particularly in northern European countries (CEC, 2002 in Ferrero, 2007).

Since 1995 the imports in the EU from third countries increased by about 30%, as a consequence of the Uruguay Round agreements. Market liberalization for rice will be applied starting from 2009. Tariff reductions will be phased in with a 20% cut in 2006, 50% in 2007 and 80% in 2008. In the meantime a duty-free quota, based on previous exports to the EU, has been established, with an increase by 15% each year until 2009, when all tariffs and quotas will be removed.

On 2003, EU Agriculture Ministers agreed on fundamental reforms to Common Agricultural Policy (CAP). Most relevant reform is the break in the link between subsidies and production. The primary aspects of CAP reform concerning rice are aimed at reducing the intervention price by 50%, and limiting the amount to 75,000 tons per year. These reductions are compensated by a subsidy devoted in part to environmental protection.

Chapter 3: POLICIES LEGAL AND ADMINISTRATIVE FRAMEWORK RELEVANT TO THE PROJECT

This chapter describes the regulatory framework applicable to the project. The project will utilise a substantial area of land which may have impacts on land for agriculture, animal husbandry, minerals, wildlife and sources of water. Furthermore, as the main product is palm oil the principles and criteria developed by the Roundtable on Sustainable Palm Oil are also envisaged for this commodity. Finally, the project lies in a Ramsar site and the regulations of the conventions have also been considered.

3.1 EXISTING POLICIES

3.1.1 National Environmental Policy (NEP) 1987

The National Environmental Policy, (NEP), which was formulated in 1997, provides guidelines and plans for managing the environment in Tanzania. The policy states inter alia that EIA as a planning tool shall be used to integrate environmental considerations in the decision process, in order to ensure that unnecessary damage to the environment is avoided. It shall be a mandatory requirement to ensure that environmental concerns receive due and balanced consideration in reconciling urgent development concerns and long-term sustainability before a final decision is made. Furthermore NEP emphasizes provision of community needs for environmental infrastructure, such as safe water supplies, sewage treatment and waste disposal services and promotion of other health related programmes such as food hygiene, separation of toxic wastes and pollution control at the household level. Hence among other things, the policy emphasizes the development of environmentally sound waste management systems.

3.1.2 National Energy Policy of 2003

The National Energy policy objectives are to ensure availability of reliable and affordable energy supplies and their use in a rational and sustainable manner in order to support national development goals. The National Energy policy, therefore, aims to establish efficient energy production, procurement, transportation, distribution and end-use systems in an environmentally sound and sustainable manner.

The role of the Government for the energy sector according to the policy is to facilitate development, provide stimulus for private investment initiatives and promote effective regulation, monitoring and co-ordination of the sector.

The Policy indicates that more than 40% of all imported petroleum is consumed within the transport sector. The development of the sector therefore has both direct and indirect implications for the total energy consumption and social-economic growth. The energy challenge within the transport sector is to ensure efficient and safe use of petroleum products.

The project is in line with the objectives of the National Energy Policy of 2003 and the Government has provided stimulus in accordance with Tanzania Investment Act 1997.

3.1.3 National Land Policy 1996

The National Land Policy among other things advocates the protection of land resources from degradation for sustainable development. The policy addresses several environmental issues such as, among others, observing land use planning. The project site is located in a designated agricultural area and thus does not contradict the

provisions of the policy. Land use planning takes into consideration the land capability, ensures proper management of land resources, and promotes resource sharing and multiple land use techniques.

3.1.4 National Human Settlements Development Policy (2000)

Development of the project will attract an influx of people in to the area of Mngeta village and Mchombe Ward. The policy may apply if a case arises due to the operation of the project.

3.1.5 National Water Policy 2002

The Water Policy of 1991 identifies the main problem in water resource management as destruction of water sources through agriculture, fire burning of forested land and overgrazing (section 9). The main uses of water in the rural areas are for domestic use, livestock, agriculture and wildlife. The real value of most rural land depends on the availability of water on or nearby that land.

Section 62 of the Water Policy empowers rural people to communally own water resources within their villages. The policy provides villages a mandate to plan, construct, manage, protect and open a water fund. Section 71 provides that the ministry will issue water rights to anyone who is interested. The policy does not explicitly state the tenure of water resource to individuals however; the community at large owns water resources and especially wells.

InfEnergy will have water rights for the project issued by the District Authorities – these are in the process.

3.1.6 National Health policy 2003

The National Health Policy (NHP) is aimed at providing direction towards improvement and sustainability of health status of all people by reducing disability, mortality and morbidity, improving nutritional status and raising life expectancy. The objectives of the policy among others, stipulate the reduction of the burden of disease, maternal and infant mortality, and increasing life expectancy through the provisions of adequate and equitable services. Furthermore the policy aims to facilitate the promotion of environmental health and sanitation, adequate nutrition, control of communicable diseases and treatment of common conditions.

The policy is relevant to InfEnergy Ltd because the project is situated along Mngeta River where fishing is a source of livelihood and therefore it should adhere to environmental standards to safeguard public health.

3.1.7 The Agricultural Policy of 1997

The new policy of 1997 addresses issues of the changed macro economy as Tanzania goes from a centralized economy to a market oriented or a liberalized economy. The policy is focused on the government being a facilitator, regulator and supporter while the private sector will deal with production, processing and marketing functions. Other features are that agricultural inputs and prices have been decontrolled, subsidies have been removed and monopolies of markets by cooperatives and marketing bodies have been eliminated.

3.1.8 Poverty Reduction Strategy of 2000

The strategy concentrates on efforts aimed at reducing income imbalances by improving human capabilities, survival and social well-being. The strategy has set medium term goals to be achieved by year 2010 through sustaining macroeconomic stability, rural sector development and export and private sector development. The project aims at supporting private sector development, which will increase employment in the country as well as supply of goods.

3.1.9 National Strategy for Growth and Reduction of Poverty NSGRP June 2005

The National Strategy for Growth and Reduction of Poverty (NSGRP) is a second national organizing framework for putting the focus on poverty reduction high on the country's development agenda. The NSGRP is informed by the aspirations of Tanzania's Development Vision (Vision 2025) for high and shared growth, high quality livelihood, peace, stability and unity, good governance, high quality education and international competitiveness. It is committed to the Millennium Development Goals (MDGs), as internationally agreed targets for reducing poverty, hunger, diseases, illiteracy, environmental degradation and discrimination against women by 2015. It strives to widen the space for country ownership and effective participation of civil society, private sector development and fruitful local and external partnerships in development and commitment to regional and other international initiatives for social and economic development.

Reduction of poverty requires a sustained high rate of GDP growth of at least 6-8% per annum over the next decade. Implementation of the project will create employment, avail energy and contribute to the growth rate of the GDP.

3.2 LEGISLATIONS

3.2.1 Environmental Management Act No. 20 of 2004.

This is a single comprehensive environmental law which became operational from 1st July 2005. According to Part VI Environmental Impact Assessment and other

assessments it is stated in section 81-(1) Any person, being a proponent or a developer of a project or undertaking of a type specified in the third schedule to this Act, to which environmental impact assessment is required to be made by the law governing such project or undertaking or in the absence of such law, by the regulations by the Minister responsible for Environment shall undertake or cause to be undertaken, at his own cost, an environmental impact assessment study.

An Environment Impact Assessment study shall be carried out prior to the commencement or financing of a project or undertaking. A permit or license for the carrying out of any project or undertaking in accordance with any written law shall not entitle the proponent or developer to undertake or cause to be undertaken a project or activity without an environmental impact assessment certificate issued under this Act.

Any person, who contravenes subsection (3), commits an offence. According to the Environmental Management Act No 20, 2004 section 16-(1).

3.2.2 The National Land Use Planning Commission Act, No. 3 of 1984

This is the principal advisory organ of the Government on all matters related to land use. The Commission formulates policies on land use planning, coordinating the activities of all bodies concerned with land use planning matters and evaluating existing and proposed policies and activities of the Government directed to safeguarding of land against its wrongful, wasteful or premature use or development. Therefore the Commission recommends policies and programmes for effective protection and enhancement of the land quality and better land use planning. The land use planning of the Kilombero District Council will incorporate the project development and management since the project will last for several years.

3.2.3 The Land Act No. 4 of 1999

The land Act no 4 of 1999 became effective from 1st May 2001. The basic principles of the Land Act are adopted from the Land Policy 1996. It is important to recognize that all land in Tanzania is public land vested in the President as trustee on behalf of all citizens.

- (i) This principle has removed the radical title from the Government and vested it to the citizens of Tanzania. In this way the citizens of Tanzania have absolute rights of land ownership.

The Village Land Act 1999 empowers the village council to manage village land as trustee managing property on behalf of the villagers and other persons resident in the village. In relation to other natural resource laws, the village council shall have regard to the principle of sustainable development in the management of village land and the relationship between land use, other natural resources and the environment in and contiguous to the village and village land. The village council is liable to consult with and take account of views of other local authorities having jurisdiction in the area where the village land is situated. The village council is required to report not less than once every two months and take account of the views of the village assembly and the district council having jurisdiction in the area where the village is situated.

The Village Land Act 1999 empowers the village assembly to divide the village land, occupied, used or available for occupation, community used and/or public used land, then to be known as communal village land. It will also identify land being occupied or used by an individual, family, or group of persons under customary law. Finally, the village council will identify land, which may be made available for communal or individual occupation and use, through allocation by the village council. The same Act provides mandate to the village assembly to further plan the land uses to be designated to the communal village land.

3.2.4 The Tanzania Investment (TIC) Act of 1997

TIC issued a Certificate of Incentives to Kilombero Plantations Limited on 14 September 2007.

3.2.5 The Occupational Health and Safety Act of 2003.

The Act deals with the protection of human health from occupational hazards. Among other provisions, it requires the employer to ensure the safety of workers by providing safety gear in work places.

Part IV on safety provisions, it is depicted in section 24- (1) that a thorough pre-placement and periodic occupational medical examination for fitness for employment of employees shall be carried out by a qualified occupational health physician and expenses shall be borne by the employer.

Part V of the Act emphasises on the provision of adequate clean, safe and wholesome drinking water, sufficient and suitable sanitary conveniences and washing facilities.

Part VI. Section 60 stipulates that, every factory or workplace where activities carried out involve hazardous processes or hazardous equipment or use of hazardous chemicals/substances, likely to result in adverse health effects to people or serious damage to property or environment in case of accidents, the employer shall ensure that:

- (a) Risk assessment annually or at any other time when a risk assessment is deemed necessary shall be done by an approved inspection authority;
- (b) Evidence of the risk assessment shall be furnished

Part VI. Section 63 stipulates that the employers shall provide protective equipment.

3.3 INTERNATIONAL AGREEMENTS AND STANDARDS

RAMSAR SITE

The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 158 Contracting Parties to the Convention, with 1755 wetland sites, totaling 161 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance (RAMSAR, 2008).

The definitions provided for wetlands use include:

- “Human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations.”
- “Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches , within the context of sustainable development .“

The Ramsar Convention on Wetlands was developed as a means to call international attention to the rate at which wetland habitats were disappearing, in part due to a lack of understanding of their important functions, values, goods and services. Governments that join the Convention are expressing their willingness to make a commitment to helping to reverse that history of wetland loss and degradation (RAMSAR, 2006).

Human impacts on water sources, such as agricultural, industrial or domestic pollution, may occur at considerable distances from wetland areas. Where this occurs, wetland habitats can be degraded or even destroyed, and the health and livelihood of local people put at risk. Many of the wetland fauna, for example some fish species, many waterbirds, insects such as butterflies and dragonflies, and mammals such as otters, are migratory species whose conservation and management also require international cooperation (RAMSAR, 2006).

In sum, wetlands constitute a resource of great economic, cultural, scientific and recreational value to human life; wetlands and people are ultimately interdependent. As such, the progressive encroachment on and loss of wetlands needs to be stemmed, and measures must be taken to conserve and make wise use of wetland resources. To achieve this at a global level requires cooperative, intergovernmental action. The Ramsar Convention on Wetlands provides the framework for such international, as well as for national and local action (RAMSAR, 2006).

Over the years, the Conference of the Contracting Parties has adopted a considerable body of scientific, technical, and policy guidance to assist the Parties in addressing the issues embodied in the Convention's "three pillars": the wise use of all wetlands, Wetlands of International Importance, and international cooperation. Since 2000 *The Ramsar Handbooks for the Wise Use of Wetlands*, or "**Ramsar Toolkit**" includes nine handbooks that blended the official guidelines with illustrative materials and case studies (RAMSAR, 2006)

In the second Strategic Plan of the RAMSAR convention, the Contracting Parties seek to deliver their commitments to wetland conservation and wise use through "three pillars" of action. The first pillars states:

*a) working towards **the wise use of their wetlands** through a wide range of actions and processes contributing to human well-being (including poverty reduction and water and food security) through sustainable wetlands, water allocation, and river basin management, including establishing national wetland policies and plans; reviewing and harmonizing the framework of laws and financial instruments affecting wetlands; undertaking inventory and assessment; integrating wetlands into the sustainable development process; ensuring public participation in wetland management and the maintenance of cultural values by local communities and indigenous people; promoting communication, education and public awareness; increasing private sector involvement; and harmonizing implementation of the Ramsar Convention with other multilateral environmental agreements;*

From this statement it is possible to conclude that human activities are carried out and can be conducted in RAMSAR sites but that a number of strategies need to be put in place in order to sustain these areas and comply with the regulations of the convention.

The project area is within the Ramsar Site of Kilombero Valley, described in Chapter 4. The *InfEnergy* developers are aware of this and have already contacted local authorities and the representative of RAMSAR organisation in Dar es Salaam to cooperate with the principles in the area.

Chapter 4: BASELINE INFORMATION OF THE ENVIRONMENT

4.1 DESCRIPTION OF THE KILOMBERO DISTRICT.

4.1.1 Location, Population and Administrative set up

The Kilombero District is situated in a vast flood plain between the Kilombero river in the South–East and the Udzungwa Mountains in the North-West in Morogoro region, Tanzania.

4.1.2. Population

According to the last census in 2002, the population of the Kilombero District is 321,611 out of which males are 162,214 and females are 159,397. The main ethnic groups are Wapogoro, Wandamba, Wabena, Wambungu and several others in small proportions.

4.1.3 Administrative set up

Kilombero District is administratively divided into 19 wards namely.

- Chisano, Chita, Idete, Ifakara, Kibaoni, Kiberege, Kidatu, Kisawasawa, Lumelo, Mang'ula, Masagati, Mbingu, Mchombe, Mkula, Mlimba, Mofu, Sanje, Uchindile and Utengule.

4.1.4 Economic Activities

Kilombero District is predominantly rural with the semi-urban district headquarter of Ifakara being a major settlement.

The majority of the villagers are subsistence farmers cultivating maize and rice. There are large plantations of teak wood in the Kilombero and the neighbouring Ulanga District. In the north-west of the district, Ilovo Sugar Company's sugar-cane plantations occupy most of the low lying area.

4.2 PHYSICAL AND BIOLOGICAL DESCRIPTION OF THE KILOMBERO VALLEY

The Kilombero Valley Floodplain, spread over Kilombero and Ulanga Districts in the Morogoro Region, has an area of 976,735ha at an elevation of 210m – 400m. The Kilombero Valley Floodplain was one of five sites in Tanzania designated a Ramsar Wetland of International Importance on 25 April 2002.

The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 154 Contracting Parties to the Convention, with 1674 wetland sites, totalling 150 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance.

The 5,818 ha Mngeta Farm, cleared in 1989, represents less than 0.7% of the 7,967 km² Ramsar Kilombero Floodplain area. It is unclear whether the farm actually lies within the Ramsar area as the area is large and only vaguely defined.

The area in the general vicinity of the farm is unique because it is a natural wetland which is part of the largest seasonal freshwater lowland plain in East Africa. The farm itself has already been cleared and drainage installed over 15 years ago.

Wetlands International (www.wetlands.org) manages and develops the Ramsar Sites Database (RSIS) under contract to the Ramsar Convention Secretariat. According to RSIS:

The Kilombero Valley Floodplain is of significant importance in terms of its ecology and biodiversity. The wetland is an important source of nutrients and sediment for downstream areas and the globally important Mafia-Rufiji mangrove, seagrass and coral reef complex. The valley is a key feature in the Selous-Kilombero seasonal wildlife migrations. The valley contains almost 75% of the world's population of the wetland dependent Puku antelope *Kobus vardonii*. This antelope is now only found in 18 locations in Africa and its survival, as a species, is dependent on the Kilombero Valley population. The Crocodile population of the Kilombero also links with that of the Selous, recognised as having one of the most significant populations of *Crocodylus niloticus*. Moreover, vulnerable populations of the endemic Colobus monkey *Procolobus gordonorum* exist in two fragments of forest within the valley (not at Mngeta). The valley also provides an important dry season habitat for large mammals, particularly *Loxodonta africana*, *Hippopotamus amphibius* and *Syncerus caffer*. Three endemic birds are known within the valley, the weaverbird *Ploceus burnieri* and two undescribed species of *Cisticola*. In the wet season it is an essential spawning area for many kinds of fish in the Rufiji River system of which two endemic species *Citharinus congicus* and *Alestes stuhlmanni* are dependent on the Kilombero floodplain. Due to the size of the Kilombero Floodplain, there is little doubt that it holds more than 20,000 waterbirds in the wet season. All Tanzanian species of egrets and herons occur in the floodplain. The site regularly supports over 1% of the eastern (& southern) African population of the waterbirds *Vanellus albiceps* and *Rhynchops flavirostris*.

Biological/Ecological notes: Vegetation follows a distinct graduation from river channel to mountain. The floodplain vegetation is dominated by 1-3 metre high *Panicum maximum* and *Pennisetum spp.* Small areas of flood resistant woodland contain species such as *Kigelia pinnata*, *Longocarpus capassa* and *Combretum spp.* Permanent swamps contain *Cyperus papyrus*. In the *Kibasira Swamp*, a new plant species has been discovered *Vigna sp.*, it is being described and named (2002). Other rare species include *Grauanthus parviflorus*, *Crotalaria polygaloides* and

Aframomum alpinum. Rare trees include *Swertia madagascariensis*, *Dalbergia melanoxydon*, *Sorindeia madagascariensis* and *Manilkara sp.* Fish species include *Oreochromis niloticus*, *Clarias gariepinus*, *Mormyrus kannume*, *Schilbe moebiusii*, *Anguilla bengalensis*, *Bagrus docmak*, *Distichodus petersii*, *Citharinus latus*, *Labeo congoro* and *Synodontis livingstonii*.

Hydrological/Physical notes: The site receives water from a number of important rivers in the south such as Ruhudji, Mnyera and Pitu and then divides into a myriad of tributaries in the central part of the floodplain valley. The seasonal change in water dynamics is huge and the plains may become totally flooded during the wet season, while it dries up during the dry season with the exception of rivers and river margins as well as the areas with permanent swamps and water bodies. The site is situated between the forested escarpments of the Udzungwa Mountains at the northwestern side and the Mahenge Mountains on the southeastern side which are important catchment areas crucial to the hydrology of

the wetland. Soils of the wetland complex are mainly heavy black cotton or montmorillonite soils that retain water over relatively long periods with isolated patches of lighter sandy soils. Rainfall tends to be bimodal and very heavy. Annual flooding is a crucial factor in the maintenance of the wetland habitats and the fertility of the soils for vegetation and fisheries. Flood peaks tend to occur during March-April.

Human Uses: The wildlife and land within the site is managed under District Councils. However, the utilisation of the site is controlled by the central government (Wildlife Division). There are 65 villages bordering the floodplain, 10 villages on raised ground and a number of hamlets and temporary camps on the floodplain itself. Large and small-scale agricultural development is being undertaken in both the wetland (for rice) and the Miombo buffer zone (for teak as well as food crops such as maize). Livestock keeping and fishing are undertaken on an artisanal basis by an increasingly larger number of people. There are three forms of hunting, tourist hunting, local (licensed) hunting and illegal hunting. Communities adjacent to the surrounding Forest Reserves are allowed (under special arrangements) to collect firewood and medicinal plants for local use. The surrounding area is woodland, farmland and agricultural; land, with sugar plantations (Illovu) to the north. Research activities include studies on poaching of wildlife, farmland expansion and increased intensity of fisheries.

Conservation Measures: The Kilombero Valley Ramsar Management Plan is being developed with the aid of Belgian Technical Cooperation through the District Government and the Wildlife Department. Both Kilombero and Ulanga Districts receive support from Ireland Aid to implement selected activities. These activities include bee keeping, development of fish ponds, the establishment of village environmental committees in an attempt to promote community based resource management and planning and a study to assess the causes of and the solutions to escalating land-use conflict in Kilombero District. Kilombero Valley has status as a Game Controlled Area, which means that only hunting is regulated. The site overlaps with the Selous Game reserve in the northeast. The Selous Game Reserve Management Project aims to create a buffer zone which will include the northern section of the floodplain.

Adverse Factors: There are several farms in the surrounding area that have cleared and drained floodplain areas for agriculture. The Kilombero Valley Teak Company is a Commonwealth Development Corporation that aims to plant at least 13,000 Ha of teak in a series of plantations in both Kilombero and Ulanga Districts. Some of these plantations are inside the site. The Government of Tanzania identified Kilombero District as a model agricultural district and aims to utilise some of the wetland areas to ensure sufficient national food production. In the surrounding area, the Kilombero Sugar Company has fields lying just north of the site. A number of outgrowers for the Sugar Company are based within the site. The Kihansi River was dammed for generating hydropower in the beginning of the 1990's. The effects of damming on the large swamp forest fed by the Kihansi River in the Kilombero floodplain and the site have not been investigated yet.

4.3. DESCRIPTION OF THE PROJECT AREA

The project area is at Mngeta. It is an area of 5,818ha on the southern bank of the Mngeta River, 180km South-West of Ifakara. The area is in the village of Chombe.

The farm is less than 0.7% of the Kilombero Floodplain Ramsar Site. It was cleared by the Korea Tanzania Company in 1989. A small area of the farm, less than 400 ha, has

been farmed continuously, while most of the farm has been subject to intermittent cultivation by squatters.

Transport communication to the project area in Mngeta is both by road and railway. The road from Mngeta to Ifakara (about 80km) is earth, and some sections are only passable by 4WD during heavy rains. From Ifakara to Mikumi, a distance of about 120km, the road is fairly good with the last portion of about 30km upgraded to tarmac road.

The TAZARA railway passes along side the project area and there is a railway station at Mngeta, with a small railway siding. Figure 9 presents a map of the farm layout.

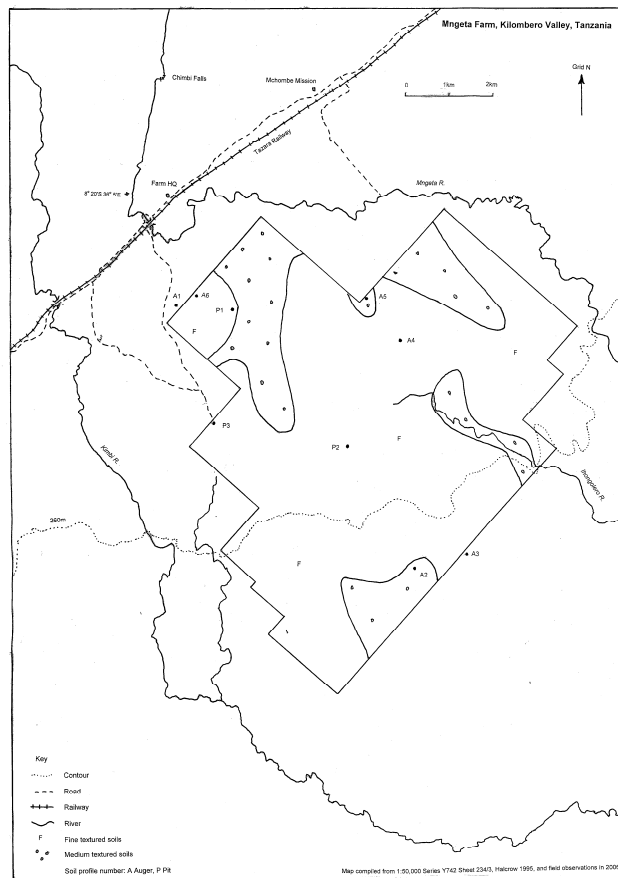


Fig. 9: Map of the farm

4.3.1 KOTAKO Project

The KOTAKO project was initiated in 1986 as a 50:50 joint venture between North Korea and the Tanzania Government. The company was known as Korean and Tanzanian Agricultural Company (KOTAKO) which was intended to develop an irrigated rice scheme at the project site, Mngeta Farm as part of their wider plans to develop some 15,000 ha of irrigated land on various tributaries of the Kilombero river basin. The KOTAKO project was originally planned as a reservoir storage scheme involving a 30m concrete gravity dam and an irrigation and drainage system covering some 5000 ha. Double-cropped paddy rice was envisaged on 1500 ha with the remainder of the area planned to be mainly cropped with maize.

KOTAKO substantially completed the main infrastructure works needed to support their project including farm buildings, project housing, offices and a hydropower station on the Mngeta River. Final design drawings were prepared by the Koreans for the dam and the irrigation and drainage system.

Land clearance was completed for the 5818ha command area and approximately 50% of the planned drainage system was implemented. No construction work was started for either the dam or the irrigation canal system.

In 1994, following the Government of Tanzania's decision to liberalise the economy and withdraw from running companies the Koreans withdrew from KOTAKO and its development programmes were abandoned, leaving the main civil works substantially uncompleted. However extant KOTAKO facilities include:

- KOTAKO offices and housing facilities
- Workshop facilities
- Mngeta farm compound
- Mngeta farm area
- Mngeta hydropower station
- Some construction equipment

The hydropower power station was constructed between 1991 and 1992 at the Chimbi Falls site on the Mngeta river some 4km upstream of the proposed Mngeta dam site.

4.3.2 Topography.

The Mngeta irrigation area lies on a smooth undissected alluvial fan which slopes very gently away from the foothills of the Udzungwa escarpment. The fall, from north to south is about 1m in 750m, with the northern end of the area lying at about +273m above mean sea level and falling to around +261m at its southernmost boundary. Further to the south, the slope decreases until the alluvial fan merges into the flat floodplain of the Kihansi River.

Within the irrigation area there are minor undulations and hollows but the amplitude of these is generally less than 0.5m. The hollow areas are naturally swampy, but the flood protection works and drainage system constructed by KOTAKO has now allowed most of these to be drained. However there remain two of these swampy areas which have been left with their dense forest uncleared.

4.3.3 Geology

The Mngeta irrigation area lies close to the foot of the 1500m Uzungwa Escarpment, a major fault line. The area lies on an undissected alluvial fan derived from gneisses and acid granulates exposed in the escarpment.

The edges of the potential irrigation area are influenced by alluvial silts of former courses of the Mngeta and Kimbe Rivers on its northern and western sides respectively. This material derives from the same escarpment rocks as the fan. The Mngeta River has a relatively low catchment, so there is a well varied rock source for its alluvium. Some ferruginous cemented sands are reported to be present in the banks of lower Mngeta River near the north eastern boundary of the irrigation area.

Warm and saline springs exist at various locations along the escarpment but none have been reported or identified in the vicinity of the Mngeta project area.

4.3.4 Climate

Rainfall data for the period 1960-1982 was available at Mchombe Mission approximately 5km East of the project area. The mean annual rainfall is 1902 mm. The rainfall season occurs from December to May with the dry season extending from June to November.

The temperature in the area ranges from a mean daily minimum of 17.2 °C in July to a mean daily maximum of 34°C in November. The mean monthly temperature varies by less than 4°C in July to 27.9°C in November.

The project area experiences high relative humidity with mean annual relative humidity of 83% it ranges from a mean of 71% in October to 90% in April. Mean wind speeds range from 45km /day in June to 174 km/day in November. An annual average of about 6.6 hours of sunshine per day has been recorded in the area. The maximum sunshine hours occur in November with an average of 8hours per day and reducing to 5.4 hours a day in June.

The mean annual evaporation in the area is of the order of 1779mm which compares with 1902mm of annual rainfall.

The peak average month for evaporation of 214mm occurs in November and coincides with high wind speeds, sunshine hours and low humidity.

4.3.5 Assessment of Biodiversity on Mngeta Farm

A rapid assessment of diversity among plants, birds and medium to large mammals was carried out within the boundary of Mngeta Farm in the Kilombero Valley, southern Tanzania, from 29-31st March 2007 by a team headed by Mr. Trevor Jones. The area of 5,800 hectares primarily comprises cultivated land for growing rice and maize, however there are also relatively undisturbed areas of marsh, grassland and two small patches of swamp forest. Ninety five percent of the farm was cleared by KOTACO and drainage channels installed throughout the farm.

The team employed reconnaissance transects (vehicle-based and on foot), ad hoc observation, audio recording of bird calls, and interviews with local people to assess the avifaunal and mammalian diversity of the farm, and generate recommendations for conservation. Mammalian diversity is poor, though some species still inhabit or make use of the two forest patches. The avifauna is rich, and includes species dependant on the area of swamp forest, marsh and grassland. In these latter habitats are found two endangered and as yet undescribed species of cisticola, and it was recommended that efforts should be made to ensure that these habitats persist to support these important populations.

However, as the species have also been sighted in Ifakara, in all probability these cisticola bird species are found across much of the entire 7,967 km² of the Kilombero Floodplain, but no surveys have been undertaken.

Other vertebrate taxa, especially amphibians, should also be surveyed. In general, from a biodiversity conservation point of view, it is important that the farm is managed to maintain the variety of habitats currently found on the land.

The report on the Assessment of biodiversity recommends:

- Significant areas of undisturbed marsh and grassland should be left 'set-aside' in order to maintain the diversity of the farm, and in particular the populations of the two endangered cisticola species.

- The remaining forested areas should be protected and a total non-utilisation policy agreed and enforced, in order to preserve these remnants of disappearing habitat and prevent local extinction of several bird, mammal and tree species.
- A survey of the herpetofauna of the farm is recommended. The farm is also an excellent potential site for ecological research into the two endemic bird species.

The report on the rapid assessment of Biodiversity is appended with this study.

4.3.6 Socio-Economic Profile

The main tribes of the area are Wandamba and Wahehe and are referred to as the Wadzungwa. However recently there has been high immigration of the Maasai, Wasukuma and Wanyakyusa to the area.

Agriculture and fishing are the main source of employment for most of the population of the area. Farming is generally undertaken for subsistence with the sale of produce being a secondary objective. However the Kilombero valley is known as a rice and maize producing area.

Table 4 presents a summary of the statistics of the surrounding villages in terms of available infrastructure and social structure. Table 5 presents a summary of the education infrastructure in the project's area.

4.3.7 Health

Health services are provided by both the Government and local church missions with the main medical centre for the area being Ifakara.

Table 3. Statistics of the surrounding villages

	Villages	No. of Households	No. of people	Toilets	Water wells	Rivers	Food kiosks	Traditional healers	Denominations	Local Bars /clubs	Shops	Guest houses	Vichanja- Vyombo	Rural Medical Officers	Institutions	Pharmacy kiosks	Health centers	Dispensaries	Traditional latrines
I	Mchombe	1498	5870	50	4	2	7	4	8	5	20	3	1126	2	11	2	-	2	1062
II	Mngeta	1147	4236	95	7	2	4	5	4	8	14	1	925	2	6	1	-	-	902
III	Lukolongo	1301	4439	12	1	2	1	2	3	2	3	-	1189	2	5	-	1	-	1007
IV	Mkangawalo	1261	11158	94	22	6	2	6	7	5	11	-	1129	2	10	1	-	-	971
V	Njage	750	2153	25	3	7	1	1	6	2	4	-	722	2	7	-	-	-	720
VI	Ikule	773	3096	24	2	3	3	1	8	3	5	-	604	2	8	2	-	-	630
	Total	6730	30925	300	39	16	18	18	36	25	57	4	5695	12	47	6	2	2	5292

Table 4. Education structure in the area

	Names of Schools	No. of teachers	Classes			Offices			Teacher houses			No. of pit Latrines			Stores			Libraries			Pupils	
			Requirements	Present	Deficiency	Requirements	Present	Deficiency	Requirements	Present	Deficiency	Requirements	Present	Deficiency	Requirements	Present	Deficiency	Requirements	Present	Deficiency	Males	Females
1	Mchombe	20	26	12	14	2	2		20	6	14	47	18	29	2	2		1		1	605	622
2	Lukolongo	25	21	9	12	2	2		17	2	15	45	8	37	2	1	1	1		1	95	99
3	Mngeta	7	17	9	8	2	2		7	3	4	32	9	23	2	1	1	1		1	366	347
4	Itongowa	11	17	9	8	3	2	1	11	1	10	30	10	20	2	1	1	1		1	353	399
5	Ilole	6	8	6	2	2	2		3	3	5	10	5	5	2		2	1		1	192	169
6	Ikule	11	16	8	8	2	1	1	12	4	8	31	2	29	3		3	1		1	370	381
7	Mkangawalo	6	9	7	2	2	1	1	10	6	4	18	6	12	2	1	1	1		1	256	258
8	Njage	5	13	7	6	2	2		6	4	2	20	12	8	1		1	1		1	226	230
9	Ngai	3	9	2	7	2	1	1	3	1	2	21	6	15	2	1	1	1		1	225	201
10	Mkusi																					
11	Luvilikila	2	3	1	2	2		2	3	2	1	6	6		2		2	1		1	83	86
12	Ilungusha																					
13	Kidete	1	2	2		2		2	2	1	1	6		6	1		1	1		1	55	42
14	Nakaguru	2	1	1		1		1	1		1	4		4	2		2	1			36	26

Chapter 5: STAKEHOLDERS CONSULTATION AND PUBLIC PARTICIPATION

5.1 Overview

One of the essential components of EIA process is stakeholder's participation which connote that interested and affected parties are well informed of the proposed development project. This enables them to present their views either in support of or against the project in question. Information gathered from stakeholder consultations provide views, concerns and suggestions for identifying and analyzing environmental and social impacts that should be integrated in the implementation of the project. The consultations helps to draw effective enhancement and mitigation measures for both project positive and negative impacts respectively. This section outlines the process of stakeholder identification and a range of stakeholder concerns that ensued through the consultations.

5.2 Stakeholder identification and consultations

Section 89 of the EMA No. 20 of 2004 provides directives on public participation issues and its importance in EIA. The EIA Regulation 17 (URT, 2005) provides further details and procedures for public participation in the EIA process. The term *stakeholder* has now become common parlance in the EIA process. Howlett and Nagu (1997) have defined stakeholders as: "All those people and institutions that have interest in the design, implementation and sustainability of the project, including those positively and negatively affected by the project." *Stakeholder participation* involves processes whereby all those with a stake in the outcome of a project actively participate in decisions on planning and management. They share information and knowledge, and may contribute to the project, so as to enhance the success of the project and hence ultimately their own interests.

In this EIA the concept *stakeholder* was given a broad definition to encompass all key stakeholders including Local Government Authorities, the neighbouring residents close to the project area including the squatters who have invaded the farm, Kilombero District Authority, central government agencies such as RUBADA, Ministry of Natural Resources and Tourism and Ministry of Agriculture, Food Security and Cooperatives.



Fig.10 Public meetings in Villages neighboring Mngeta Farm in May 2009

A series of consultations have been made with key stakeholders between November 2006 and May 2009 mainly because of the impediment in the completion of land title transfer, and District and Regional government resistance to oil palm which required a revised EIA focusing on rice and bean cropping instead of irrigated oil palm for the manufacture of edible oil and biodiesel.

In November 2006, ITL first commissioned ENATA to commence the EIA after signing a sales agreement with RUBADA to purchase Mngeta Farm in May 2006. ENATA conducted two additional socio-economic studies as part of the amended Scoping report

(Amendment to the Scoping Report NEMC/179/INoI. 20 (2/03/2007): Socio-Economic considerations and Stakeholders preliminary Consultations Report) and a pilot survey with local farmers and smallholders March, 2008). In September 2007, further site visits and stakeholder consultations were carried out by Dr. James Lyimo and Dr. Claude Mung'ong'o and in February 2008 by Dr. Rocio Diaz-Chavez of the Centre for Environmental Policy, Imperial College, London, who also reviewed the Guidance on the EIA for Agriculture (No. 2) in England (Regulations 2006). Additional public meetings were held with the three villages surrounding Mngeta Farm in May 2009.

In addition, a biodiversity survey of the farm was completed in March 2007 and an avifauna survey of the entire Kilombero Valley in January and February 2008 to ascertain the range of rare cisticola bird species recorded on the farm. Finally, a study of the squatters who continue to occupy the farm was completed in February 2009, and a GPS map of the squatters was completed in September 2009.

5.2.1 Stakeholders Concerns

Major concerns, comments and suggestions arising from key stakeholder consultations on the development of Mngeta Farm project in Kilombero Valley, as elaborated in section 5.2, are presented in Table 5 below.

Table 5. Major Stakeholder's Concerns, Comments and Suggestions

Concerns, Comments and Suggestions		Stakeholder(s)
Local administration & Communities (Mchombe, Mkangawalo, Mngeta and Lukolongo)		
1	Redevelopment of the Mngeta Farm by a new investor (KPL) will have significant positive impacts to the surrounding villages provided that the interests of the local communities are considered and remaining salient issues (land rent, farm boundaries) are amicably resolved	Mchombe Ward and all three Village Leaders
2	Although a number of local people are already employed, it is important that the number get increased as KPL investment and production capacity increases. People are optimistic about the project despite the past misconception.	All three villages
3	Villagers are happy with the promises made by KPL as corporate social responsibility provided that they are fulfilled.	Mkangawalo and Mngeta
4	There are several negative impacts the communities have suffered after the closure of KOTAKO and then inadequate investment by its successor KIHOCO, thus the villagers and village leadership will be very supportive to the new investor including helping to end squatter occupation on the Farm.	Mkangawalo and Mngeta
5	The village government has no restrictions for successful KPL investment on the Farm but RUBADA is the main source of all misunderstanding emanating from boundary and associated squatter's saga. Its imperative that all the stakeholders sit together to resolve such misunderstandings	Lukolongo
6	Roads are now passable because KPL has improved the road network in and around the Farm	Mkangawalo and Mngeta
7	In order to resolve all remaining issues on the Farm (boundaries and squatters occupation) it is important to have a meeting of all key stakeholders	All three villages
8	People caught stealing any KPL's property should be taken to the court and sentenced reasonably so as to be an example to those stealing on the Farm	Mngeta
9	Herbicides and fertilizer application by plane have negatively affected some people's crops and raised health concerns because it also contaminated open wells that provide water for domestic purposes including drinking. For example, some people had to replant rice twice, while others got diarrhoea and none was compensated. There	Mkangawalo

	is also a fear that white ants have migrated into the village because herbicides have forced them out of the Farm which used to be their habitat. Additionally, the sprays were not done as per announced dates	
10	Drainage channels surrounding Mngeta Farm have created some insecurity and are limiting farming activities because even where culverts have been put they are not strong. In other parts the culverts are not yet constructed as agreed between KPL and the Village in February 2009. There is a fear among some villagers that the channels will cause some disasters in the near future because some of them are as big as rivers and they are already causing floods in Mgudeni hamlet	Mkangawalo
11	Casual labourers are overworked but paid meagrely (i.e. Tshs 2,500/= per day), this need to be increased	Mkangawalo
12	An alternative road should be constructed for villagers crossing the Farm because sometimes they are alleged as thieves by Farm Watchmen	Mkangawalo
13	Although oil palm was stopped but there are some few Blocks on the Farm in which they have been transplanted	Mkangawalo
14	Farm Operation Manager, Mr. Moses Kisugite subverts the relationship between the village and KPL because he prefers to employ outsiders than the local people	Mkangawalo
15	KPL is paying the minimum wage of Tshs. 60,000/= which is not the required one. Temporary employees are subjected to NSSF deductions without their concerts. They did not fill any forms	Mkangawalo
16	KPL should strive to abide to whatever agreement that it enters with the surrounding villages	Mkangawalo
17	KPL has cut down most of trees on the Farm, so it should do some tree planting including outside the Farm	Mkangawalo
Kilombero District Administration		
1	The Government is supportive of the new investor but KPL must show how it would be involved in rice production rather than production of palm oil for manufacture of bio-diesel. This would make KPL investment in line with FAMOGATA objectives that aim to make Morogoro Region become a national granary by producing both rain-fed and irrigated up-land rice.	Kilombero DC; District Agricultural and Livestock Development Officer
2	KPL investment could be a good source of diversifying household food crop production and improvement of household income through prospective employment opportunities. However, that the project must be clear on how it would address the issue of FAMOGATA	District Water Engineer; District Agricultural Extension Officer
National Level (RUBADA Administration & Ministries)		
1	Most of the households in the villages around the Mngeta Farm are poor subsistence farmers using poor technology and their agricultural productivity is very low. The village communities should be empowered, including extension support to increase their productivity and consequently enhancing their food security, farm income and livelihood improvement in line with MKUKUTA objectives. The investors must address such issues	Honorable Prof. R.B.B. Mwalyosi (MP) and Chairman of the RUBADA Board of Directors
2	<ul style="list-style-type: none"> Kilombero district is potential for irrigation. There are various projects established to exploit such potential. However, there is concern that water availability is variable depending on time of the season and year. Use of up-to-date and reliable hydrological data is important to make appropriate water use budgets which will support irrigated crop production and maintain environmental flow to sustain both flora and fauna in the ecosystem. For any irrigation related investment it must consider the 	Dr. Moses Mnzava, Assistant Director, Irrigation Services Division, MAFSC

	<p>socio-economic aspects of the surrounding communities.</p> <ul style="list-style-type: none"> Given high demand of irrigation and concern on low water availability it is important to use efficient water irrigation technologies, such as dripping system, as well as to grow crops which do not require much water for irrigation (e.g. bananas when compared to rice). 	
3	The Mngeta Farm is indeed within a Ramsar Site. However, since such sites accommodate multiple land use areas the farm's land use should take into consideration of this function and abide by any forthcoming Integrated Management Plan for the Site.	Ms Miriam Zakaria, Wetlands Unit, Wildlife Division, MNRT

Sources: Field visit May 2009; Mung'ong'o and Juma (2009); Diaz-Chavez (2008); Mung'ong'o and Lyimo (2007).

As it can be seen from Table 5, all the consulted stakeholders, the local communities in particular, had a positive attitude towards the redevelopment of Mngeta Farm project by KPL.

The following chapter uses Table 5 above to execute the identification and assessment of the expected positive and negative impacts from the proposed redevelopment of rice and bean cropping project.

Chapter 6: IDENTIFICATION AND ASSESSMENT OF IMPACTS

The Government of Tanzania is encouraging large scale cultivation in order to boost the agricultural sector which is the backbone of the country's economy. This particular project of establishing a mechanized rice/soya farm will have a number of significant impacts: relocation of migrant farmer plots (about 2238 people) who have invaded the property. The implementation of the project has several impacts both positive and negative which can be categorised into.

- I. Short Term Direct Impacts
These are apparent only during the development stage; i.e., organisational, design and construction.
- II. Long Term Direct Impact
These are apparent during the operation and decommissioning phases of the project.
- III. Indirect Impacts
These do not derive of activities of the rice farm itself but are impacts that ripple out from the existence of the enterprise in the area.

The project development phases include:

- I. Mobilization Phase
Completion of shareholding agreements with RUBADA (July 2008); establishment of joint-venture company office and financial controls in Dar Es Salaam (October 2007); completion of detail designs for rice factory and road infrastructure; etc.
- II. Construction Phase (over 2 years) of:
Rice Mill
Drainage Ditches
Field & Harvesting Roads
- III. Operation Phase
Planting, harvesting and milling of rice and soya crops (Year 1)
Assisting local rice farmers with the production & marketing of their rice crop (Year 2).
- IV. Potential Decommissioning Phase
Plant & Machinery Disposal
Land Reclamation

6.1 SHORT TERM DIRECT NEGATIVE IMPACTS

1. Relocation of Illegal Farming Plots

The Kilombero Valley is already an area of high immigration. This trend is in line with the pattern throughout the Rufiji Basin where the human population increased by 144.4% between 1988 and 2002 (1,250,000 to 3,055,051), representing an annual rate of increase of approximately 10% (GoT 2006). The great majority of this growth was due to immigrants seeking agriculture land (Harrison 2006, GoT 2006).

Mngeta Farm was originally mapped in 1986 at a time when no villagers were living or cultivating any of the titled area. Some 15 years before, in the 1970s, a

small number of families had been moved close to the TAZARA railway from Mbasa sub-village, which had been on one corner of the farm, about 50 ha.

Between 1986 and 1989 boundaries were cleared and roads constructed across the entire 5,818 ha mapped and cleared area. Following the liquidation of the Korea Tanzania Agricultural Company in 1993, only 400 ha of the farm was cultivated consistently.

From 2000, this vacuum of vacant cleared land was filled with migrants from across Tanzania. As well, the Mbasa natives and their descendants returned to the farm and encroached upon a wider area than the original Mbasa settlement.

Since the launch of operations, some 360 migrant households have moved elsewhere in the Kilombero Valley and to neighbouring districts. Another approximately 400 households, of local and migrant farmers, continue farming on the titled area.

KPL and RUBADA are working with the District Authorities to relocate the squatters with minimum environmental and social impact by funding Land Use plans for the 3 villages that surround Mngeta farm and another 2 villages in the vicinity to identify areas for resettlement. In addition, KPL will assist resettlement with the construction of road and drainage and the provision of improved seed varieties and fertilizer to initiate relocated farms.

Though this may be considered a negative impact, the relocation of the farmers for the more efficient use of the land may also be viewed as a positive impact.

The map on the following page illustrates the continued presence of squatters on the farm as of September 2009.

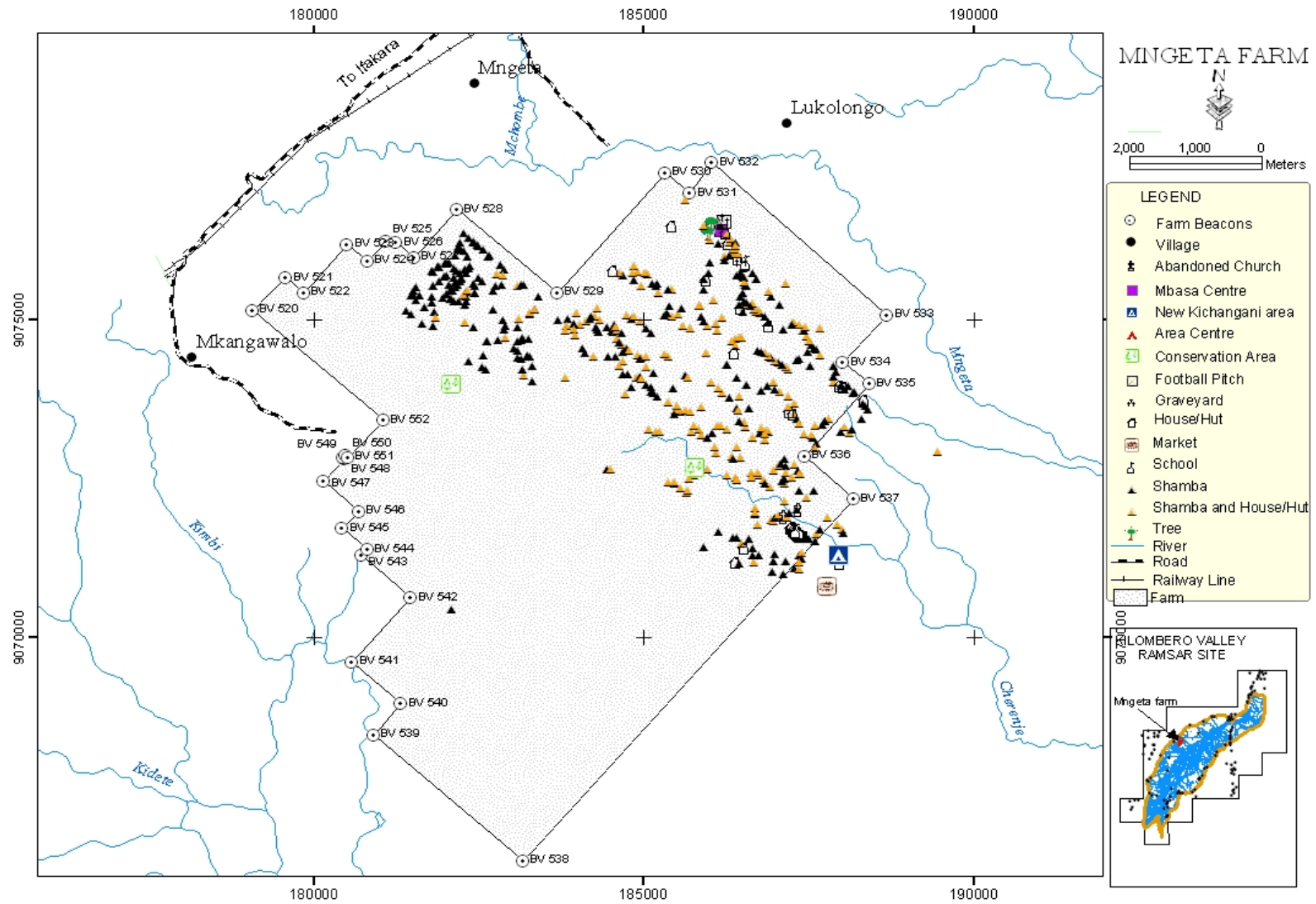


Fig. 11 Squatter Map, September 2009

2. Dust Emission

Clearing of the land for rice cultivation and for factory construction will generate debris and dust which will increase SPM in the air which may affect the construction workers and be a nuisance to the surrounding community.

6.2 SHORT TERM DIRECT POSITIVE IMPACTS

3. Employment Opportunities

During land clearance and construction of the rice factory, labour will be recruited mainly within the locality which will stimulate other economic activities associated with petty trading.

4. Economic Gains to Local Companies

Most of the construction materials required can be supplied by local companies. Materials such as fuels, cement, iron and steel, welding gases and roofing materials can be supplied locally.

5. Economic Gains to Local Rice Farmers

With a 6 ton per hour rice mill and strong management and financial capabilities in place at Mngeta Farm within 12 months of commencement, the project will be able to assist smallholders through a rice program that will (i) secure funding for high-yielding rice strains and fertilizers for local farmers, (ii) guarantee a fair price for milling their rice and (iii) ensure that they secure a fair market price for their produce.

6.3 LONG TERM NEGATIVE IMPACTS

6. Impact on Wetland of Global Importance – Ramsar Site

Part or the entirety of the farm may be located within the Kilombero Valley Floodplain Ramsar Convention site, designated a Wetland of Global Importance. Development activities at the site could possibly have long-term impacts on the area if not managed responsibly.

7. Impact on Loss of Fauna and Flora

Although the mammalian diversity is poor, the 5,818 ha project area is rich in avifauna including two endangered species of *cistocala spp.*, which are dependent on some areas of swamp forest, marsh and grassland. However, it is possible that the range of the *cistocala* bird species includes the entire 7,967 square km of the Kilombero Floodplain. The forests of Isagu and Ihongolero have endemic species of plants. Drainage channels are lined with big trees (*Ficus spp.*) which serve as a food source and corridor cover for several fauna species. However, all riparian forest and existing forest patches within the farm will be protected as nature reserves.

8. Impact on National Hydropower Plants

The project will have no impact on the hydro power generating schemes at Mtera and Kidatu which supply electricity to Dar es Salaam as it is located on a tributary whose confluence with the great Ruaha River is downstream of the two hydropower sites.

In addition, should there be considered development of a hydropower scheme in the Selous Game Reserve, contribution of Mngeta river is less than 1% of the total water resources and so the impact is negligible.

9. Impact on Decrease of Local Water levels

Flood irrigation for rice does not appear to be cost-feasible. There are no current plans for irrigation. However, should irrigation be used there are no Mngeta users downstream of the farm and the flow is sufficient to extract irrigation requirements without exceeding 50% of the dependable river flow. Further, 20% of the diverted flow will return to the Mngeta River through the drainage system.

10. Impact of Applications of Agri-Chemicals and Fertilizers

Herbicides, or chemical weed killers, and mineral fertilizers are one of the major achievements of modern agriculture. The rising food demand to feed the expanding population since the 1960's has been met from increased food production largely on existing agricultural land. This was made possible from more use of mineral fertilizers combined with other developments, including plant breeding, plant protection products, cultivation techniques and use of irrigation (Yara, 2005). In view of the limited scope for increasing the land area under cultivation, the optimum agricultural chemical application plays a key role in improving the productivity of various crops. However, prolonged agricultural use of these products may result in the presence of their compounds in soil and water, degrading the environment.

The chart below summarizes the agri-chemicals and fertilizers used on Mngeta Farm:

Table 6. Summary of Agri-Chemicals and Fertilizers for Mngeta Farm.

Chemical or Fertilizer	General Description and Use	Possible Environmental or Health Concerns	Remarks
<p>Roundup 2 liters/ha</p>	<p>a glyphosate ((N-phosphonomethyl-glycine)-organic phosphors based herbicide used worldwide including on most genetically modified plants in which it can be tolerated</p> <p>A non-selective weed control</p>	<p>Has long been considered to be safe for humans and the environment while effective in killing weeds, however, as new research suggest, Roundup is also a danger to other life forms and non-target organisms.</p> <p>It is "extremely lethal" to amphibians.</p> <p>Glyphosate is not mobile in soils, has a moderate persistence, and is not very toxic to animals.</p> <p>Human placental cells are very sensitive to Roundup at concentrations lower than the agricultural use.</p>	<p>On the Mngeta Farm itself, the mammalian diversity is poor but the project area is rich in avifauna including two rare species of <i>Cisticola SPP</i></p>
<p>Chlorpyrifos 100ml-500ml/ha</p>	<p>Chlorpyrifos is an organophosphorus insecticide that has been widely used in the home and on the farm. On the farm, it is used to control ticks on cattle and as</p>	<p>When applied to the soil generally stays in the area where it has been applied because it sticks tightly to soil particles. Because of this, there is a low chance that</p>	<p>Chlorpyrifos degrades rapidly in the environment.</p> <p>It is recommended that a 24-hour waiting period before entering fields where chlorpyrifos has been</p>

	<p>a spray to control crop pests</p> <p>Non-selective insecticide for common insect pests in rice and soya bean</p>	<p>chlorpyrifos will be washed off the soil and enter local water systems. Also, since it does not mix well with water, if it does get into the natural waters, it will be in small amounts and will remain on or near the surface and will evaporate.</p> <p>In people, short-term oral exposure (one day) to low (milligrams) levels of chlorpyrifos can cause dizziness, fatigue, runny nose or eyes, salivation, nausea, intestinal discomfort, sweating, and changes in heart rate. Short-term oral exposure to much higher (grams) levels of chlorpyrifos may cause paralysis, seizures, loss of consciousness, and death.</p>	<p>applied, and care should be taken to ensure that only a licensed applicator sprays chlorpyrifos, and that unnecessary or unprotected individuals remain away from the site of application during the spraying</p>
<p>Ronstar 3-6 liters/ha</p>	<p>Pre-emergent herbicide for control of grasses, broadleaves, vines, brambles, brush, and trees.</p> <p>Oxadiazon is the only active ingredient (50%) in the herbicides Ronstar 50 WSP and Ronstar G</p>	<p>Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema or bronchitis. While skin contact may aggravate existing skin diseases</p>	<p>Based on studies evaluated by U.S. Environmental Protection Agency (EPA): Oxadiazon is practically nontoxic to mammals; Oxadiazon is practically non-toxic to slightly toxic to birds; Oxadiazon is moderately to highly toxic to fish based on acute toxicity tests; and Oxadiazon is moderately toxic to aquatic invertebrates</p>

		Some Ronstar products contain ingredients that are considered to be probable or suspected human carcinogens	
Tiller gold/Cheetah gold 250ml/ha	Post emergent herbicide for use in rice	Dangerous to fish and other aquatic organisms. Harmful if absorbed by skin contact, inhaled or swallowed. Will irritate the eyes and skin. Repeated exposure may cause allergic disorders.	DO NOT contaminate streams, rivers or waterways with this product or the used container.
MCPA 1-2 liters/ha	Post emergent broadleaf herbicide for use in rice. MCPA (4-chloro-2-methylphenoxyacetic acid) is widely used to control annual and perennial weeds, mostly in cereals	MCPA is highly water soluble and has a low affinity for most soil types (hence very mobile in all the surface soils), which gives it the potential to leach and contaminate ground waters	It can undergo microbial degradation in aerobic conditions; therefore, it is only slightly persistent in soil and water
Apron star 500g/ton of rice	An insecticide and fungicide seed coating for use in rice. Its active ingredients are 20% thiamethoxam + 20% metalaxyl-M + 2% difenoconazole	Toxic to aquatic organisms. Should not be allowed to contaminate water used for irrigation or domestic purposes; or dispose of product wastes in water areas such as ponds, ditches, lakes, or in drainage systems	It is WHO's Class III hazard- for use in seed treatment only
Amistar 500m-1L/ha	A broad-spectrum, post-emergent foliar fungicide with systemic properties for the control of leaf and ear diseases in some cereals including rice. Azoxystrobin is the active	Azoxystrobin is of low acute and chronic toxicity to humans, birds, mammals, and bees but is highly toxic to freshwater fish, freshwater invertebrates, and estuarine/marine fish, and very highly toxic to	WHO Class IV - unlikely to cause acute hazard in normal use. It should not contaminate water used for irrigation or domestic purposes, or any source of water

	ingredient/constituent	estuarine/marine invertebrates.	
Alpha cypermethrin	For control of certain insect pests in cereals, rice, cotton, sunflowers, sweet corn, maize, soy, navy and mung beans, sorghum and tomatoes. Cypermethrin 100g/L is its active constituent	Very toxic to aquatic organisms. However, due to rapid loss from water, no toxic effects to fish are observed under field conditions. No adverse health effects expected if the product is handled in accordance with Safety Data Sheet and the product label.	Cypermethrin is rapidly degraded in the environment thus, it has a low potential for bioaccumulation.
Urea 50-200kg/ha	Nitrogen source in rice	Excess use of urea in rice fields promotes the growth and spread of vectors causing of human disease called Japanese Encephalitis. Children between the age group 4-14 years are mainly affected High application rates of <i>inorganic</i> nitrogen fertilizers leads to increased leaching of nitrates into groundwater due to their high solubilities. Eventually, nitrate-enriched groundwater makes its way into streams, lakes, bays and oceans where it accelerates acidification, and	These problems are eliminated or minimized by careful fertilizer-planning and use e.g. planting winter crops or cover crops to take up post harvest nitrate residues; and avoiding nitrogen applications when heavy rain is expected

¹ **Eutrophication:** This refers to the process of enrichment of surface water bodies such as lakes, reservoirs and streams by particularly P&N resulting into intense proliferation and accumulation of algae and higher aquatic plants in excessive quantities which can result in detrimental changes in water quality and can significantly interfere with man's use of the water resource.

		eutrophication ¹	
NPK 50 150kg/ha	Basal starter fertilizer source for many common crops supplying nitrogen, phosphorus and potassium in varying amounts	Generally, NPK is evidently biodegradable since it is nutrient for plants and microorganisms. As a consequence no environmental build-up problems exist	It is wise to avoid excessive use as it may result into eutrophication
Teprosyn 1L/ton rice	Macro and micro nutrient (such as copper, zinc, manganese and phosphorus) seed coating used in rice	Although toxic to aquatic organisms, there is little chance for bioaccumulation because the products are designed to accumulate such trace elements in crops to the benefit of their nutrition	Care should be taken not to contaminate water courses, with high concentration and local authorities should be consulted before disposal of significant quantities
Twin – N 50 ml/ha	Foliar applied nitrogen source gained from bacteria. TwinN is a mix of free-living, nitrogen-fixing endophytes that are capable of fixing atmospheric nitrogen both within the plant and around the root zone. Sprayed onto the leaf surface or root zone, TwinN microbes are effectively inoculated into the plant via stomata, leaf abrasions and lateral root cracks, diluting and multiplying through the plant via the vascular system	TwinN is certified organic by a number of international regulators such as the International Federation of Organic Agriculture Movements (IFOAM). It is an invaluable nitrogen source in organic farming. It can be sprayed on all crops, in both organic and conventional agriculture. This includes legumes where TwinN stimulates nodulation, monocots (grasses), dicots (broad leaved crops), vegetables, flowers, vines, fruiting trees, tea, coffee and forestry.	

<p>Super phosphate 50 50 – 150 kg/ha</p>	<p>Source of phosphorus and calcium for various crops</p>	<p>Excess amounts of phosphorus have been associated with algal blooms and the eutrophication of lakes and waterways. Algae may deplete the water of the dissolved oxygen that is vital to other aquatic life Has low toxicity, thus may only present a hazard with eye contact, prolonged and repeated skin contact or with dust inhalation at high levels</p>	<p>Phosphorus is relatively immobile in the soil, so conservation and cultural practices which reduce soil erosion can significantly reduce phosphorus inputs into water bodies and the water table</p>
<p>Zinc sulphate Hepta hydrate 2 kg/ha</p>	<p>Source of both sulphur and zinc for various crops</p>	<p>May cause long-term adverse effects in the aquatic environment because it is very toxic to aquatic organisms</p>	
<p>Copper 1 L/ton rice</p>	<p>Foliar and seed treatment for rice. Several different forms of copper are suitable for use but copper sulphate is the most widely used for soil amendment while copper oxychloride and EDTA (Ethylene Diamine TetraAcetate) - chelated copper are widely used for foliar application</p>	<p>Copper is accumulated by plants and animals but biomagnifications has not been shown to occur in either aquatic or terrestrial food chains. Dissolved copper can be highly toxic to aquatic life at relatively low concentrations with pH, hardness and dissolved organic compounds being factors that regulate the degree of toxicity. In soil, copper can be particularly toxic to invertebrates and phytotoxic to plants at elevated concentrations with soil properties being regulating</p>	<p>EDTA is biodegradable, but slowly. It also breaks down in the presence of light. It does not accumulate in the environment</p>

		factors	
<p>Sources: TWN (2005); Le Monde (2005); ATSDR, NCEH and Draggan, S (2008); Certis (2007); Caux, P. –Y et al., (1995); Hiller et al., (2006); Kaushik (2004); Yara (2005); TriaChem (2009); Mapleton International (2007);</p> <p>REFERENCES</p> <p>Certis (2007), Safety Data Sheet: Ronstar Liquid, Wiltshire, United Kingdom</p> <p>Caux, P. –Y., Kent, R. A., Bergeron, V., Fan, G. T. and MacDonald, D. D (1995); Environmental fate and effects of MCPA: A Canadian perspective, <u>Critical Reviews in Environmental Science and Technology</u>, Volume 25, Issue 4 November 1995 , pages 313 – 376</p> <p>FAO (2001), Zero tillage: when less means more, Spotlight / 2001 available at http://www.fao.org/Ag/magazine/0101sp1.htm accessed 8 June 2009</p> <p>Hiller, E., Khun, M., Zemanová, L., Jurkovič, L and Bartal, M (2006); Laboratory study of retention and release of weak acid herbicide MCPA by soils and sediments and leaching potential of MCPA, <u>Journal of PLANT SOIL ENVIRON.</u>, 52, 2006 (12): 550–558</p> <p>Kaushik, V (2004), Problem Posed by Fertilizers and Pesticides, chapter 6 in Chemical Fertilizers and Environment Management, IES- ENVIS <i>Newsletter</i>, Vol. VII, No. III, 2004</p> <p>Mapleton International (2007), TwinN Frequently Asked Questions, available at http://www.mapletoninternational.com/faqs.php# accessed on 2 June 2009</p> <p>TWN (Third World Network Biosafety Information Service) (2005), Worrying Effects of Roundup on Humans, <u>Environment</u>, http://www.twinside.org.sg/title2/service185.htm May 15, 2009.</p> <p>TriaChem (2009), Fungicides, Seed dressing, available at http://www.triachem.com/ accessed on 2 June 2009</p> <p>Le Monde, H.M (2005), Roundup Doesn't Poison Only Weeds; http://www.truthout.org/issues_05/032805HB.shtml accessed on May 15, 2009.</p> <p>Agency for Toxic Substances and Disease Registry and National Center for Environmental Health (Content Partners); Sidney Draggan (Topic Editor). 2008. "Public Health Statement for Chlorpyrifos." In: <u>Encyclopedia of Earth</u>. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the <u>Encyclopedia of Earth</u> September 13, 2007; Last revised April 23, 2008; Retrieved May 15, 2009]. <http://www.eoearth.org/article/Public_Health_Statement_for_Chlorpyrifos></p> <p>Yara (2005), important questions on fertilizer and the environment, available at www.yara.com accessed 30 May 2009</p>			

From the above table, it can be seen that Mngeta Farm chemicals poses some environmental and health concerns that in absence of judicious application of such chemicals adverse effects are likely to occur. Excessive application of chemical fertilizers affects physical properties of soil such as infiltration, soil aeration, soil structure and bulk density etc. However, KPL's intention to adopt *zero tillage* will help to mitigate such adverse effects by reducing the requirements for fertilizer and herbicide over time as the land benefits from zero till conservation. Additionally, to avoid risks to people and the environment, KPL will always have to ensure compliance with the instructions for use (including operator safety) of each agrochemical and fertilizer.

11. Impact of Fertilizer Runoff on Riverine and Wetland Vegetation

During the rainy season, fertiliser run off by storm water will drain into the river Mngeta. The increase in minerals may cause growth of water weeds down stream creating an environmental problem of consequences to the ecosystem. However, fertilizer run-off can be controlled by timing major fertilisation outside of the rainy season and following international best practises.

12. Impact on Rufiji Basin Water Resources

Diversion of Mngeta River for the irrigation scheme will only marginally decrease the total water resources in the Rufiji basin but may affect water flows in the Kilombero River with potentially negative consequences on flora and fauna. However as the contribution of Mngeta river is less than 1% of the total water resources of the Floodplain, and water will be diverted only over the five month dry season, never extracting more than 40% (including the irrigation water returned to the river), the total extraction is less than 0.6% of the water resources of the floodplain.

13. Impact On Soil Fertility

Management of soil nutrients require utilisation of fertilizers which hold potential adverse impacts to the ecology of the area. Whereas the commercial plantation can avoid fertility loss, the out growers may be more challenged to manage fertilizer application, which could result in the loss of soil fertility.

14. Impact on Soil Erosion

Zero tillage is one of a set of techniques used in conservation agriculture (CA), which aims to enhance and sustain farm production by conserving and improving soil, water and biological resources. Essentially, it maintains a permanent or semi-permanent organic soil cover (e.g. a growing crop or dead mulch) that protects the soil from sun, rain and wind and allows soil micro-organisms and fauna to take on the task of "tilling" and soil nutrient balancing - natural processes disturbed by mechanical tillage (FAO, 2001). *Zero tillage* (also known as no-till or direct seeding) is a method of plowing or tilling a field in which the soil is disturbed as little as possible by, essentially, not plowing the field. The crop is planted directly into a seedbed which has not been tilled since the harvest of the previous crop.

15. Impact on Water Pollution

Agrichemicals and fertilizers can be washed by rainwater into the nearby Mngeta River and other streams and the surrounding seasonal wetland, causing incremental increases of phosphates, nitrates and sulphates to unwarranted levels. However, through careful application, runoff can be drastically reduced. Smallholders will face greater challenges in controlling fertilizer runoff.

16. Impact on Greenhouse Gas Emissions

Rice production currently accounts for about 10 to 16 per cent of global methane emissions (IRRI). Flooded rice paddies emit methane, a greenhouse gas that contributes to global-warming damage on a scale that eclipses coal-fired power plants, vehicular exhaust, and other sources of carbon dioxide. (A molecule of methane has 21 times the heat-trapping potency of a molecule of carbon dioxide.) Although carbon dioxide comprises 70 percent of warming potential in the atmosphere, rising levels of methane now make up 23 percent, according to the U.S. Environmental Protection Agency (EPA). Although, irrigated rice produces 2.64 times the methane than rain-fed (University of Queensland, Australia) rain-fed rice farming at Mngeta Farm will increase Tanzania's GHG emissions.

MILL OPERATIONS

17. Impact of Factory Noise & Vibration

The noise and vibration of the grain dryers and the mill are not of the magnitude that carry at high levels beyond the boundary of the plant. Nor will noise because any damage to properly construct civil works.

18. Impact of Potential Dryer Fire

The Vietnamese Dryers, which use husk furnaces, could potentially cause a fire though the negligence of the operator, causing damage to the warehouse and loss of life.

19. Impact on Air pollution

The husk burning furnaces produce little visible smoke, and only low-levels of SPM that does not exceed international standards.

The movement of bulk rice produces high levels of dust. However international standards will be followed to protect the health of the workers and surrounding community.

20. Impact of Sewage disposal

The project will employ an average of 200 full and part time workers over the farm of 5,000 ha. Inadequate sewage facilities would cause poor hygienic conditions detrimental to public health and marine life. Adequate sewage facilities will be constructed.

21. Impact of Potential Fire Outbreak

An electrical fault, operator negligence or vandalism could cause the rice warehouse to catch fire. Proper security, electrical maintenance, training and fire protection equipment, such as high-pressure hoses and fire extinguishers

22. Impact of Tanker Accidents During Transportation

Fuel spillages may occur during transportation of diesel and aviation fuel to the farm.

6.4 LONG TERM DIRECT POSITIVE IMPACTS

23. Impact on Food Security

At maturity, the project will produce 20,000 tons of paddy (about 1.6% of Tanzania's current production) adding substantially to the self-sufficiency of Tanzania's rice production (which stands at about 86%.)

The project will also produce 15,000 tons of soybeans, a crop being promoted by the Ministry of Agriculture, and other bean crops.

24. Impact on Employment & Economic Development

The mature project will produce:

- 3 billion TSh. in corporate tax revenues to the government
- Over 160 full-time employees
- Over 300 part-time employees
- 665 million TSh. in staff salaries
- 110 million TSh. in annual NSSF contributions
- 100 million TSh. in annual PAYE income tax on employees

25. Impact on Rural Electrification

Mngeta Farm will require the current 320kW, now produced by the two turbines of the mini-hydro station after extensive rehabilitation by KPL, to run the rice dryer fans and rice mill.

KPL is seeking approx. 1 billion Tanzania shilling from donors to install additional turbines to supply reliable and cheap electricity to the local community. KPL has discussed the project with the Rural Energy Agency.

26. Forest Conservation

In November 2008, KPL sponsored the Mngeta Participatory Forest Management Group and Ward Forest Officer to participate in the annual national gathering of the Tanzania Community Forest Conservation Network, MJUMITA, in Morogoro

In July 2008, to assist the establishment of the Mngeta Corridor proposed by the Forestry & Beekeeping Division and NGOS to connect the Udzungwa Scarp Forest Reserve with the newly gazetted Kilombero Nature Reserve, KPL commissioned a socio-economic survey of people living or farming in the mountains above the farm.

KPL will continue to support civil and government efforts to protect the remaining natural forest in the neighbouring Udzungwa Mountains and the Kilombero Floodplain.

27. Community Development

In June 2009, KPL is disbursing the first grant from an annual 50 million Tanzania shilling Community Development for the three villages surrounding the farm, Mkangawalu, Mngeta and Lukolongo.

These funds, divided among the three villages by population as requested by the village leadership, are being used for the construction projects of their choice, and represent the first time these villages have a budget for community development. The annual fund will be increased in 2013 if KPL meets its targets and achieves positive cash flow.

6.5 INDIRECT IMPACTS

28. Impact on Growth of Local Economic Development & Companies

The purchasing power of employed workers will stimulate the local economy, and the surrounding community will economically benefit from vending and provision of services. Local companies will benefit from various tenders, services and other supplies required by the project.

6.6 SUMMARY OF IMPACTS

	Environmental Impact	Phase	Duration	Rating	Significance
1	Relocation of Illegal Farming Plots	MOB	STD	+/-	Harm/Beneficial
2	Dust Emission	CON	STD	-	Harmful
3	Employment Opportunities	ALL	STD	+	Beneficial
4	Gains to Local Companies	C/O	STD	+	Beneficial
5	Gains to Local Rice Farmers	C/O	STD/LTD	+	Beneficial
6	Wetland of Global Importance	C/O	STD/LTD	-	Harmful
7	Loss of Flora & Fauna	C/O	LTD	-	Harmful
8	National Hydropower Plants	OP	LTD	0	NIL
9	Decrease of Local Water Levels	OP	LTD	-/Nil	Nil/Harmful
10	Applications of Agrichemicals & Fertilizers	OP	LTD	-	Harmful
11	Fertilizer Runoff	OP	LTD	-	Harmful
12	Rufiji Basin Water Resources	OP	LTD	0	NIL
13	Soil Fertility	OP	LTD	-	Harmful
14	Soil Erosion	OP	LTD	-	Harmful
15	Water Pollution	OP	LTD	-/Nil	Nil/Harmful
16	Greenhouse Gas Emissions	OP	LTD	-	Harmful
17	Factory Noise & Vibration	OP	LTD	-	Harmful
18	Potential Dryer Fire	OP	LTD	-	Harmful
19	Air Pollution	OP	LTD	-	Harmful
20	Sewage Disposal	OP	LTD	-	Harmful
21	Fire Outbreak	OP	LTD	-	Harmful
22	Tanker Accidents During Transport	OP	LTD	-	Harmful
23	Food Security	OP	LTD	+	Beneficial
24	Employment & Economic Development	OP	LTD	+	Beneficial
25	Rural Electrification	OP	LTD	+	Beneficial
26	Forest Conservation	OP	LTD	+	Beneficial
27	Community Development	OP	LTD	+	Beneficial
28	Local Economic Development	OP	ID	+	Beneficial
29	Decommission Risk	DC	LTD	-	Harmful

Table 7 Summary of the Environmental Impacts, Key below:

Phase	Duration	Impact Rating	Significance
MOB Mobilization	STD Short Term Direct	0 Nil	Harmful
CON Construction	LTD Long Term Direct	+ Positive	Beneficial
OP Operation	ID Indirect	- Negative	Harm/Beneficial
DC Decommission			Nil/Harmful
C/O CON/OP			

Chapter 7: MITIGATION MEASURES

The mitigation measures have taken into consideration several risks associated with the implementation of the project.

The project falls under the jurisdiction of multiple ministries—the Ministry of Energy and Minerals, EWURA, Ministry of Water, Ministry of Industries, Cooperatives and Trade, the Ministry of Agriculture and Food Security, the Ministry of Land and Human Settlement, etc. Hence implementation of the project has required detailed discussions all ministries. KPL has received formal approval from the Cabinet, the Ministry of Agriculture, the Ministry of Finance (Treasury Registrar), the Ministry of Justice (Attorney General's Office) and the Tanzania Investment Centre.

The key agricultural risk is the drought or torrential rains. While there has been no recorded shortfalls of rainfall in the Kilombero Valley, torrential rain has already damaged soya crops at Mngeta and can delay planting and harvesting operations which can result in crop failure.

7.1 SHORT TERM NEGATIVE IMPACT

7.1.1 RELOCATION OF ILLEGAL FARMING PLOTS

Impact

The Kilombero Valley is already an area of high immigration. This trend is in line with the pattern throughout the Rufiji Basin where the human population increased by 144.4% between 1988 and 2002 (1,250,000 to 3,055,051), representing an annual rate of increase of approximately 10% (GoT 2006). The great majority of this growth was due to immigrants seeking agriculture land (Harrison 2006, GoT 2006).

Implementation of the project operations has led to the relocation of 360 migrant households to elsewhere in the Kilombero Valley and to neighbouring districts. Another approximately 400 households, of local and migrant farmers, continue farming on the titled area.

The land is legally owned by KPL but remained undeveloped for 16 years. Some local people and immigrants (estimated to be around 2238) are cultivating areas of the farm with seasonal crops such as rice and potatoes. Relocation of numerous plots may cause anger on the part of the part of farmers and result in the cultivation of more open land in the Kilombero Valley Floodplain. Though this may be considered a negative impact, the relocation of the farmers for the more efficient use of the land may also be viewed as a positive impact.

Mitigation

- KPL and RUBADA are working with the District Authorities to relocate the squatters with minimum environmental and social impact by funding Land Use plans for the 3 villages that surround Mngeta farm and another 2 villages in the vicinity to identify areas for resettlement.
- In addition, KPL will assist resettlement with the construction of road and drainage and the provision of improved seed varieties and fertilizer to initiate relocated farms.

7.1.2 DUST EMISSION

Impact

Clearing of the land for rice cultivation and for factory construction will generate debris and dust which will increase SPM in the air which may affect the construction workers and be a nuisance to the surrounding community.

Mitigation

Workers to use protective gear such as dust protection muffs and water spraying to be used during land clearance and compaction of canals to avoid dust generation.

7.2 SHORT TERM POSITIVE IMPACTS

7.2.1 EMPLOYMENT OPPORTUNITIES

Impact

During land clearance and construction of the rice factory, labour will be recruited mainly within the locality, which will stimulate other economic activities associated with petty trading.

Mitigation

- KPL will try to employ mainly from the local community, and minimize the number of migrant workers.
- KPL to use as much as possible service providers within the locality such as food, refreshments catering etc. provided they are competitive and meet necessary standards.

7.2.2 ECONOMIC GAINS TO LOCAL COMPANIES

Impact.

Most of the construction materials required can be supplied by local companies. Materials such as fuels, cement, iron and steel, welding gases and roofing materials can be supplied locally.

Mitigation

The project to give priority of tenders for supply of goods to locally competitive registered companies which comply with environmental regulations within Kilombero district or Morogoro region to stimulate local income earning through entrepreneurship development.

7.2.3 ECONOMIC GAINS TO LOCAL RICE FARMERS

Impact

With a 6 ton per hour rice mill and strong management and financial capabilities in place at Mngeta Farm within 12 months of commencement, the project will be able to assist smallholders through a rice program that will (i) secure funding for high-yielding rice strains and fertilizers for local farmers, (ii) guarantee a fair price for milling their rice and (iii) help ensure that they secure a fair market price for their produce.

Mitigation

The project should strive to work with programs such as AGRA (Alliance for Green Revolution in Africa) and the Rice Research Institute at Ifakara to provide access to high quality seeds and fertilizer for local farmers. The project should strive as well to mill locally produced rice at a fair price and assist the local farmers in attaining the best possible price for their produce. Increased efficiency by local farmers reduces land pressure and a prosperous local community is conducive for the long-term viability of the commercial plantation.

7.3 LONG TERM NEGATIVE IMPACTS

7.3.1 IMPACT ON WETLAND OF GLOBAL IMPORTANCE—RAMSAR SITE

Impact

Part or the entirety of the farm may be located within the Kilombero Valley Floodplain Ramsar Convention site, designated a Wetland of Global Importance. Development activities at the site could possibly have long term impacts negative impacts on the biodiversity of the area if not managed responsibly.

Mitigation

If the entire farm is within the vaguely defined Ramsar site, it constitutes less than 0.7 % of the entire wetland. By following best international practises in applying fertilizer to prevent runoff, water management and wastewater treatment, and by preserving the forest and swamp patches on the farm, the project will limit its impact on the wetland to a degree in which the impact is negligible. If there are operational guidelines for implementing agricultural activities within a Ramsar site, these should be adhered to.

7.3.2 IMPACT ON LOSS OF FLORA & FAUNA

Impact

Although the mammalian diversity is poor, the 5,818 ha project area is rich in avifauna including two endangered species of *cistocala spp.*, which are dependent on some areas of swamp forest, marsh and grassland. The forests of Isagu and Ihongolero have endemic species of plants. Drainage channels are lined with big trees (*Ficus spp.*) which serve as a food source and corridor cover for several fauna species. However, all riparian forest and existing forest patches within the farm will be protected as nature reserves.

Mitigation

- Some areas of undisturbed marsh and grassland to be left to maintain the diversity of the farm and in particular the population of the two *cisticola* species. However, a KPL-sponsored survey of the Kilombero Valley determined that the *cistocala* bird species range across much of the 7,967 square km of the Kilombero Floodplain.
- The management of the project to ensure that the two remaining forested area of Isagu (47.7ha) and Ihongolero (31.7ha) are protected in order to preserve remnants of disappearing habitat and prevent local extraction of several bird, mammal and tree species.
- The riverine and valley vegetation should be left intact to offer refuge to wildlife to improve biodiversity and protect the areas from erosion. The vegetation will also protect the rivers and streams.
- To alleviate fuel wood and building materials local population should be assisted with the establishment of wood lots comprising of indigenous species to restore genetic diversity.

7.3.3 IMPACT ON NATIONAL HYDROELECTRIC PLANTS

Impact

The project will have no impact on the hydropower generating schemes at Mtera and Kidatu which supply electricity to Dar es Salaam as it is located on a tributary whose confluence with the great Ruaha River is downstream of the two hydropower sites.

In addition, should there be considered development of a hydropower scheme in the Selous Game Reserve, contribution of Mngeta river is less than 1% of the total water resources and so the impact is negligible.

Mitigation

No mitigation is necessary.

7.3.4 DECREASE OF LOCAL WATER LEVELS

Impact

Flood irrigation for rice does not appear to be cost-feasible. There are no current plans for irrigation. However, should irrigation be used there are no Mngeta users downstream of the farm and the flow is sufficient to extract irrigation requirements without exceeding 50% of the dependable river flow. Further, 20% of the diverted flow will return to the Mngeta River through the drainage system.

Mitigation

- At the point of irrigation diversion, the project to ensure that the criteria of allowing 0.5m³/s for downstream users is always satisfied as per previous studies during the critical dry months of January to February to September to October.
- The project to encourage plantation of natural water conserving species in areas close to rivers, streams and swamps close to oil palm plantation area.

7.3.5 SPRAYING OF INSECTICIDES AND HERBICIDES.

Impact

Some pesticides and herbicides sprayed on the crops may fall on the ground and enter either surface or ground water.

Mitigation

- The project to use appropriate Integrated Pest Management (IPM) techniques for effective management of pest, disease, weeds and invasive species.
- Only pesticides and insecticides approved by TPRI or meeting standards approved by WHO or WB will be used.

7.3.6 FERTILIZER RUNOFF ON RIVERINE & WETLAND VEGATATION

Impact

During the rainy season, fertiliser run off by storm water will drain into the river Mngeta. The increase in minerals may cause growth of waterweeds down stream creating an environmental problem of consequences to the ecosystem. However, fertilizer run-off can be controlled by timing major fertilisation outside of the rainy season and following international best practises.

Mitigation

- Agrochemicals to be used are those categorised as World Health Organisation type 1A or 1B or are listed by the Stockholm or Rotterdam conventions.
- Fertiliser to be applied at correct times i.e. not when heavy rain expected
- Runoff volumes and velocities to be controlled through use of cover crops

7.3.7 IMPACT ON RUFUJI BASIN WATER RESOURCES

Impact

Diversion of Mngeta River for the irrigation scheme will only marginally decrease the total water resources in the Rufiji basin but may affect water flows in the Kilombero River with potentially negative consequences on flora and fauna. However as the contribution of Mngeta river is less than 1% of the total water resources of the Floodplain, and water will be diverted only over the five month dry season, never extracting more than 40% (including the irrigation water returned to the river), the total extraction is less than 0.6% of the water resources of the floodplain.

Mitigation

Considering the dry months of October and November the mean water flows in Mngeta river at Mchombe are 9.1m³/s (October) and 10.8m³/s (November) whereas water flows in river Kilombero at Swero are 162.5m³/s, the irrigation diversion will extract less than 5% of the total in the Kilombero River, the project will treat effluents from the plant to WHO Standards and drain the treated water to river Mngeta to further minimise the impact.

7.3.9 IMPACT ON SOIL FERTILITY

Impact

Management of soil nutrients require utilisation of fertilizers which hold potential adverse impacts to the ecology of the area. Whereas the commercial plantation can avoid fertility loss, the out growers may be more challenged to manage fertilizer application, which could result in the loss of soil fertility.

Mitigation

- KPL will carefully manage fertilizer application in the context of zero-till farming, which reduces fertilizer input requirements over time. *Zero tillage* is one of a set of techniques used in conservation agriculture (CA), which aims to enhance and sustain farm production by conserving and improving soil, water and biological resources. Essentially, it maintains a permanent or semi-permanent organic soil cover (e.g. a growing crop or dead mulch) that protects the soil from sun, rain and wind and allows soil micro-organisms and fauna to take on the task of "tilling" and soil nutrient balancing - natural processes disturbed by mechanical tillage (FAO, 2001).

7.3.10 SOIL EROSION

Impact

Mechanized farming can contribute to soil erosion.

Mitigation

- Zero tillage eliminates soil erosion through the maintenance of an organic soil cover.
- Use irrigation practices that are designed and implemented to minimize erosion.
- Maintain riparian areas to minimize erosion of river banks.

7.3.11 WATER POLLUTION

Impact

Agrichemicals and fertilizers can be washed by rainwater into the nearby Mngeta River and other streams and the surrounding seasonal wetland, causing incremental increases of phosphates, nitrates and sulphates to unwarranted levels. However, through careful application between irrigation cycles, runoff can be drastically reduced. Smallholders will face greater challenges in controlling fertilizer runoff.

Mitigation

- Application of fertilizers to be avoided during the very wet or very dry weather except when irrigation in progress.
- Leave water sources (rivers, swamps) with a buffer zone of 100 meters with natural vegetation, water-conserving species, fruit trees for fertilizer sequestration.
- Carry out periodic testing of soil to determine quality and quantity of fertilizers to be applied.
- Quantity - do not exceed optimum dose, through soil and leaf analysis, and fertilising for realistic yield potential.
- Recycling - recycle nutrients from processing plant(s) back to the field, and allow for these inputs in the fertilizer calculations.

- Runoff - minimise through correct placement, timing (i.e. do not apply during very wet months), and use of buffer strips along watercourses.

7.3.12 GREEN HOUSE GAS EMISSIONS

Impact

Rice production currently accounts for about 10 to 16 per cent of global methane emissions (IRRI). Flooded rice paddies emit methane, a greenhouse gas that contributes to global-warming damage on a scale that eclipses coal-fired power plants, vehicular exhaust, and other sources of carbon dioxide. (A molecule of methane has 21 times the heat-trapping potency of a molecule of carbon dioxide.) Although carbon dioxide comprises 70 percent of warming potential in the atmosphere, rising levels of methane now make up 23 percent, according to the U.S. Environmental Protection Agency (EPA). Although, irrigated rice produces 2.64 times the methane than rain-fed (University of Queensland, Australia) rain-fed rice farming at Mngeta Farm will increase Tanzania's GHG emissions.

Mitigation

- A study carried out at the International Rice Research Institute (IRRI) in the Philippines has shown that rice paddies — a major source of the gas — produce less methane when yields are high. Attempts to boost yields through improved seed varieties and optimizing the timing of fertilizer application, could therefore reduce methane emissions.

7.3.13 IMPACT OF FACTORY NOISE & VIBRATION

Impact

The noise and vibration of the grain dryers and the mill are not of the magnitude that carry at high levels beyond the boundary of the plant. Nor will noise because any damage to properly construct civil works.

Mitigation

- The project to provide protection ear equipment if there are areas where noise levels require such protection.
- At the boundary of the milling and refinery plants, the noise levels not to exceed 70dB (A) day time and 55dB (A) night time.
- Engines to be mounted with appropriate isolators to minimize vibrations.

7.3.14 IMPACT OF POTENTIAL DRYER FIRE

Impact

The Vietnamese Dryers, which use husk furnaces in the proximity of husk fuel could potentially cause a fire though the negligence of the operator or an accident, causing damage to the warehouse and loss of life.

Mitigation

- Operators to be properly trained to monitor husk furnace.
- Fire fighting equipment, hoses and extinguishers, to be installed for each dryer
- The rice facility will have a well designed laid fire suppression system for effectively fighting all classes of fire risks.
- Smoking and carrying of fire lighter/matches to be prohibited in the project premises (unless at designated areas).
- Ensure the plant has adequate water reservoir tanks specifically for fire fighting.
- The project to ensure high level training for fire unit personnel and ensure periodical fire emergencies.

7.3.15 IMPACT OF AIR POLLUTION

Impact

The husk burning furnaces produce little visible smoke, and only low-levels of SPM that does not exceed international standards.

The movement of bulk rice produces high levels of dust. However international standards will be followed to protect the health of the workers and surrounding community.

Mitigation

- The soot number maximum average to be kept within the acceptable international norms of 4 on a Non- IC smoke gauge.
- Workers will be issue protective masks

7.3.16 SEWAGE DISPOSAL

Impact

The project will employ an average of 200 full and part time workers over the farm of 5,000 ha. Inadequate sewage facilities will cause poor hygienic conditions detrimental to public health and aquatic life.

Mitigation

- Provide each block with sanitary facilities e.g. toilets, washrooms and garbage containers.
- Construct separate sewage drainage system to sewage oxidation ponds

7.3.17 FIRE OUTBREAK

An electrical fault, operator negligence or vandalism could cause the rice warehouse to catch fire or the farm itself.

Mitigation

- The rice facility will have a well designed laid fire suppression system for effectively fighting all classes of fire risks.
- Smoking and carrying of fire lighter/matches to be prohibited in the project premises (unless at designated areas).
- Ensure the plant has adequate water reservoir tanks specifically for fire fighting.
- The project to ensure high level training for fire unit personnel and ensure periodical fire emergencies.
- Around the plantation, the area is prone to annual burning during the dry season. The drainage ditches and roads along the perimeter provide a firebreak of over 20 meters.
- Installation of the irrigation system to consider provision of fire fighting.
- Involvement of the workers and community is crucial in fire reporting and fighting. The project is establishing strong communication between the villagers around the farm. Security, field and plant personnel can communicate quickly though provision of radio calls, walkie-talkie receivers or use of sirens.

7.3.18 TANKER ACCIDENTS DURING TRANSPORTATION

Impact

Fuel spillages may occur during transportation of diesel and aviation fuel to the farm.

Mitigation

- Assign a transport company with responsibility for the product delivery up to the point of safe delivery to the farm.
- The transport company has trained drivers on procedures to handle a truck on the road and fires. The following steps will be taken in case of road vehicle incident:
 - Move the truck (if possible) to the most convenient place to avoid obstructing traffic.
 - Place warning signs around the truck.
 - Report to police.

7.4 LONG TERM POSITIVE IMPACTS

7.4.1 FOOD SECURITY

Impact

At maturity, the project will produce 20,000 tons of paddy (about 1.6% of Tanzania's current production) adding substantially to the self-sufficiency of Tanzania's rice production (which stands at about 86%.)

The project will also produce 15,000 tons of soybeans, a crop being promoted by the Ministry of Agriculture, and other bean crops.

Mitigation

- KPL should conduct extensive seed trials to identify and multiply varieties which will flourish in the Kilombero Valley for the farm itself and smallholders.
- The Ministry of Agriculture should assist KPL in fast-tracking substantial quantities of improved seed varieties from around the world for large-scale rain-fed rice and soya trials

7.4.2 EMPLOYMENT & ECONOMIC DEVELOPMENT

Impact

The mature project will produce annually:

- 3 billion TSh. in corporate tax revenues to the government
- Over 160 full-time employees
- Over 300 part-time employees
- 665 million TSh. in staff salaries
- 110 million TSh. in annual NSSF contributions
- 100 million TSh. in annual PAYE income tax on employees

Mitigation

- The project to give priority of employment to the members of the surrounding community if possible.
- The District & National Government should support and help facilitate the project to ensure the production of the tax revenues for the government coffers.

7.4.3 RURAL ELECTRIFICATION

Impact

Mngeta Farm will require the current 320kW, now produced by the two turbines of the mini-hydro station after extensive rehabilitation by KPL, to run the rice dryer fans and rice mill.

KPL is seeking approx. 1 billion Tanzania shilling from donors to install additional turbines to supply reliable and cheap electricity to the local community. KPL has discussed the project with the Rural Energy Agency.

Mitigation

- KPL should work with the appropriate sponsors and authorities to develop the required infrastructure and provide a reliable and cheap supply of electricity to the local community.
- TANESCO and appropriate GoT agencies should avail themselves to assist KPL and the local communities in establishing rural electrification in the area.

7.4.5 FOREST CONSERVATION

Impact

The Udzungwa Mountains, part of the Eastern Arc Mountains, one of the global biodiversity hotspots, is in need of strengthened conservation efforts to arrest deforestation through local community development.

Mitigation

- In November 2008, KPL sponsored the Mngeta Participatory Forest Management Group and Ward Forest Officer to participate in the annual national gathering of the Tanzania Community Forest Conservation Network, MJUMITA, in Morogoro
- In July 2008, to assist the establishment of the Mngeta Corridor proposed by the Forestry & Beekeeping Division and NGOS to connect the Udzungwa Scarp Forest Reserve with the newly gazetted Kilombero Nature Reserve, KPL commissioned a socio-economic survey of people living or farming in the mountains above the farm.
- KPL will continue to support civil and government efforts to protect the remaining natural forest in the neighbouring Udzungwa Mountains and the Kilombero Floodplain.

7.4.6 COMMUNITY DEVELOPMENT

Impact

The three villages bordering the farm—Mkangawalu, Mngeta and Lukolongo—have no reliable community development fund to support their communal efforts to establish schools and dispensaries.

Mitigation

- In June 2009, KPL is disbursing the first grant from an annual 50 million Tanzania shilling Community Development for the three villages surrounding the farm, Mkangawalu, Mngeta and Lukolongo.
- These funds, divided among the three villages by population as requested by the village leadership, are being used for the construction projects of their choice, and represent the first time these villages have a budget for community development.
- The annual fund will be increased in 2013 if KPL meets its targets and achieves positive cash flow.

7.5. INDIRECT IMPACTS

7.5.1 LAND USE

Impact

As Mngeta Farm was already developed as a farm between 1986 and 1993 and then abandoned for 14 years, the direct land use change impacts are not envisaged.

Mitigation

- The project should achieve record rice production for Mngeta Farm.
- The project will help to resettle some the local farmers and migrants to continue growing rice.

7.5.2 RELOCATION OF MIGRANTS

Impact

The Kilombero Valley has been an area of high immigration. This trend is in line with the pattern throughout the Rufiji Basin where the human population increased by 144.4% between 1988 and 2002 (1,250,000 to 3,055,051), representing an annual rate of increase of approximately 10% (GoT 2006). The great majority of this growth was due to immigrants seeking agriculture land (Harrison 2006, GoT 2006).

Implementation of the project operations has led to the relocation of 360 migrant households to elsewhere in the Kilombero Valley and to neighbouring districts. Another approximately 400 households, of local and migrant farmers, need to be relocated.

Mitigation

- KPL and RUBADA are working with the District Authorities to relocate the squatters with minimum environmental and social damage. KPL will fund land-use plans for 5 villages in the neighbourhood of the farm to identify areas for resettlement.
- KPL will collaborate with local government with the allocation of farms for migrants, and with programs such as AGRA (Alliance for the Green Revolution for Africa) to assist local farmers in extension education and fair-price inputs to increase their agricultural productivity, thereby increasing per unit yields and decreasing land pressure.
- KPL should strive to provide health services and counselling to the workers and labourers on communicable diseases such as HIV/AIDS.

7.5.3 LOCAL ECONOMIC DEVELOPMENT

Impact

The purchasing power of employed workers will stimulate the local economy, and the surrounding community will economically benefit from vending and provision of services. Local companies will benefit from various tenders, services and other supplies required by the project. The local economy will grow through what is generally recognized as the “trickle down effect.”

Mitigation

- KPL should grant priorities to competitive local companies, which are complying with environmental policies and regulations for tendering, provision of services, supplies and distribution of goods.

7.5.4 POTENTIAL DECOMMISSION RISK & PHASE

The project may come to an end due to the successive crop failures or the unlikely events of a government appropriation of the predominantly foreign-owned business in

contravention of bi and multilateral treaties, or an improbable *force majeure* such as war, or a long period of severe drought due to climate change.

There will be various impacts depending on the causes for decommissioning. The notable impacts include:

- Unemployment due to decommissioning
Over 100 full-time and 200 part-time employees and vendors will lose a reliable source of income.
- Loss of revenue to Local Government and the Treasury
Annually about 3.8 billion Tanzania shillings in tax revenue to the Government and District through various taxes including corporate tax, land rent, PAYE, and VAT will be lost if the project achieves full production and then fails.
- Abandoned Rice Farm
Squatters will re-invade the farm.
- Equipment and infrastructure
The abandoned equipment and infrastructure can be a cause of safety hazards.

Mitigations measures

- The company to ensure that regulations of National Social Security Fund (NSSF) are followed. Employees will be prepared for forced retirement by providing skills for self-employment and others with special skills will be availed jobs at other plantations.
- The abandoned farm would be a boon to local and migrant farmers already experiencing land pressure
- The buildings can be retained for community use or availed to private developers.
- The machinery and equipment will be disposed of in an agreeable manner such as public auction and the unusable equipment to be sold to smelters as scrap.

Conclusions

The mitigation measures have been described according to the temporality and significance of the impacts identified. It can be concluded that most of the negative impacts (environmental and social) present the possibility for mitigation measures.

The number of benefits that the project may contribute with in the area and overall as part of a strategic development plan for the area may help local authorities to develop further plans for rural development in the region.

The mitigation measures have been additionally considered for the Environmental and Social Management Plan (ESPM) and the Environmental Monitoring Plan (EMP), which are described in the following chapter.

Chapter 8: ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN (ESMP), & ENVIRONMENTAL MONITORING PLAN (EMP)

After advertising locally for specific skill sets in large-scale mechanized zero till agriculture, KPL has employed international agricultural experts in key management positions of General Manager, Crop Production Manager and Deputy General Manager.

The project has also recruited experienced Tanzanian senior and mid-level plantation managers for the positions of Environmental (Human Resources) Manager, Administration Manager, Financial Controller, Field Management, Equipment Maintenance, Building Management and Electrical Infrastructure Management.

The Environmental Manager, formerly a senior estate manager and human resources manager at commercial tea plantations in Tanzania, will be responsible for implementing and monitoring the ESMP and EMP.

Figure 12 illustrates KPL management structure:

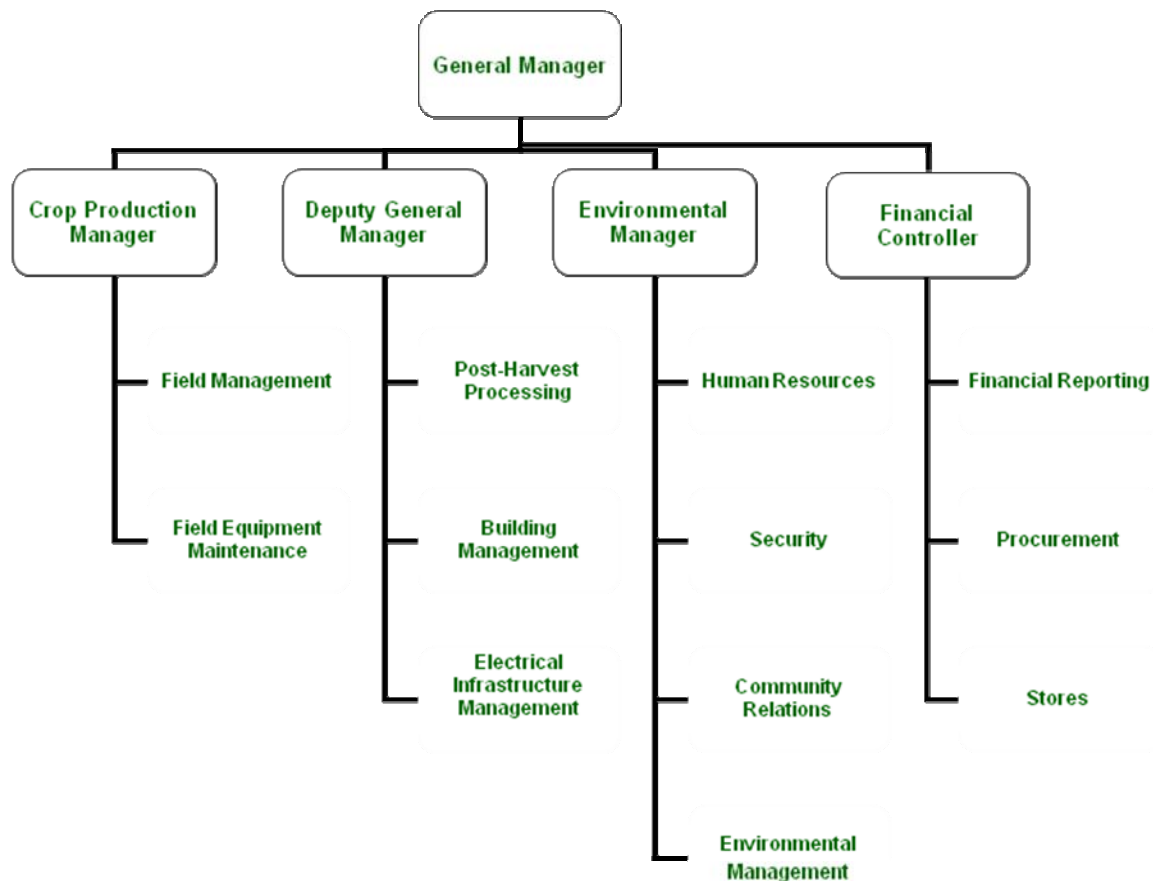


Fig. 12 KPL Organizational Structure

8.2 PERSONNEL AND TRAINING

Due to absence in Tanzania of expertise in Zero Till agriculture, international experts are training Tanzania field managers the technology.

Tractor and combine drivers are being trained in operating large scale equipment.

Personnel are being trained to operate the Vietnamese flat-bed dryers and will be trained to operate the 6 ton per hour rice mill.

8.3 SUMMARY OF ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

KPL is putting in place the administrative capability to implement environmental management and the recommended monitoring plans.

Table 8. Summary of Environmental and Social Management Plan

Environmental Impact	Phase	Mitigation Measures	Authority	Cost TSHs /US\$
<p>1. Relocation of Illegal Farming Plots</p> <p>The Kilombero Valley is already an area of high immigration. This trend is in line with the pattern throughout the Rufiji Basin where the human population increased by 144.4% between 1988 and 2002 (1,250,000 to 3,055,051), representing an annual rate of increase of approximately 10% (GoT 2006). The great majority of this growth was due to immigrants seeking agriculture land (Harrison 2006, GoT 2006).</p> <p>Mngeta Farm was originally mapped in 1986 at a time when no villagers were living or cultivating any of the titled area. Some 15 years before, in the 1970s, a small number of families had been moved close to the TAZARA railway from Mbasa sub-village, which had been on one corner of the farm, about 50 ha.</p> <p>Between 1986 and 1989 boundaries were cleared and roads constructed across the entire 5,818 ha mapped and cleared area. Following the liquidation of the Korea Tanzania Agricultural Company in 1993, only 400 ha of the farm</p>	MOB	<ul style="list-style-type: none"> KPL and RUBADA are working with the District Authorities to relocate the squatters with minimum environmental and social impact by funding Land Use plans for the 3 villages that surround Mngeta farm and another 2 villages in the vicinity to identify areas for resettlement. In addition, KPL will assist resettlement with the construction of road and drainage and the provision of improved seed varieties and fertilizer to initiate relocated farms. 	<p>KPL</p> <p>Kilombero District Authority</p> <p>Village Government</p>	Dependant on compensation requirements

<p>was cultivated consistently.</p> <p>From 2000, this vacuum of vacant cleared land was filled with migrants from across Tanzania. As well, the Mbasa natives and their descendants returned to the farm and encroached upon a wider area than the original Mbasa settlement.</p> <p>Since the launch of operations, some 360 migrant households have moved elsewhere in the Kilombero Valley and to neighbouring districts. Another approximately 400 households, of local and migrant farmers, continue farming on the titled area. Though this may be considered a negative impact, the relocation of the farmers for the more efficient use of the land may also be viewed as a positive impact.</p>				
<p>2. Dust Emission Clearing of the land for rice cultivation and for factory construction will generate debris and dust which will increase SPM in the air which may affect the construction workers and be a nuisance to the surrounding community.</p>	CON	<ul style="list-style-type: none"> Workers to use protective gear such as dust protection muffs and water spraying to be used during land clearance. 	KPL	Included in construction costs
<p>3. Employment Opportunities During land clearance and construction of the rice factory, labour will be recruited mainly within the locality, which will stimulate other economic activities associated with petty trading.</p>	CON OP	<ul style="list-style-type: none"> KPL will try to employ mainly from the local community, and minimize the number of migrant workers. KPL to use as much as possible service providers within the locality such as food, refreshments catering etc. provided they are competitive and meet necessary standards. 	KPL Village Government	Nil cost
<p>4. Gains for Local Companies Most of the construction materials required can be supplied by local companies. Materials such as fuels, cement, iron and steel, welding gases and roofing materials can be supplied locally.</p>	CON OP	<ul style="list-style-type: none"> The project to give priority of tenders for supply of goods to locally competitive registered companies which comply with environmental regulations within Kilombero district or Morogoro region to stimulate local income earning through 	KPL Local Companies	Nil cost

		entrepreneurship development.		
<p>5. Economic Gains to Local Rice Farmers With a 6 ton per hour rice mill and strong management and financial capabilities in place at Mngeta Farm within 12 months of commencement, the project will be able to assist smallholders through a rice program that will (i) secure funding for high-yielding rice strains and fertilizers for local farmers, (ii) guarantee a fair price for milling their rice and (iii) help ensure that they secure a fair market price for their produce.</p>	OP	<ul style="list-style-type: none"> The project should strive to work with programs such as AGRA (Alliance for Green Revolution in Africa) and the Rice Research Institute at Ifakara to provide access to high quality seeds and fertilizer for local farmers. The project should strive as well to mill locally produced rice at a fair price and assist the local farmers in attaining the best possible price for their produce. Increased efficiency by local farmers reduces land pressure and a prosperous local community is conducive for the long-term viability of the commercial plantation. 	KPL Village Government AGRA & other NGOs	Mill included in capital costs. Seed research included in operating costs. AGRA or NGO to provide funds for fertilizer credits
<p>6. Wetland of Global Importance (Ramsar Site) Part or the entirety of the farm may be located within the Kilombero Valley Floodplain Ramsar Convention site, designated a Wetland of Global Importance. Development activities at the site could possibly have long term impacts negative impacts on the biodiversity of the area if not managed responsibly.</p>	CON OP	If the entire farm is within the vaguely defined Ramsar site, it constitutes less than 0.7 % of the entire wetland. By following best international practises in applying fertilizer to prevent runoff, water management and wastewater treatment, and by preserving the forest and swamp patches on the farm, the project will limit its impact on the wetland to a degree in which the impact is negligible. If there are operational guidelines for implementing agricultural activities within a Ramsar site, these should be adhered to.	KPL Village Government Ministry of Tourism and Natural Resource	Undetermined
<p>7. Loss of Fauna and Flora Although the mammalian diversity is poor, the 5,818 ha</p>	CON OP	<ul style="list-style-type: none"> Some areas of undisturbed marsh and grassland to be left to maintain the diversity of the 	KPL	10mil. For assisting set up of wood

<p>project area is rich in avifauna including two endangered species of <i>cisticola spp.</i>, which are dependent on some areas of swamp forest, marsh and grassland. The forests of Isagu and Ihongolero have endemic species of plants. Drainage channels are lined with big trees (<i>Ficus spp.</i>) which serve as a food source and corridor cover for several fauna species. However, all riparian forest and existing forest patches within the farm will be protected as nature reserves.</p>		<p>farm and in particular the population of the two <i>cisticola</i> species. However, a KPL-sponsored survey of the Kilombero Valley determined that the <i>cisticola</i> bird species range across much of the 7,967 square km of the Kilombero Floodplain.</p> <ul style="list-style-type: none"> • The management of the project to ensure that the two remaining forested area of Isagu (47.7ha) and Ihongolero (31.7ha) are protected in order to preserve remnants of disappearing habitat and prevent local extraction of several bird, mammal and tree species. • The riverine and valley vegetation should be left intact to offer refuge to wildlife to improve biodiversity and protect the areas from erosion. The vegetation will also protect the rivers and streams. • To alleviate fuel wood and building materials local population should be assisted with the establishment of wood lots comprising of indigenous species to restore genetic diversity. 	<p>Village Government Ministry of Tourism and Natural Resource National NGOs such as TFCG and WWF</p>	<p>lots</p>
<p>8. National Hydropower The project will have no impact on the hydropower plants at Mtera and Kidatu as it is located on a tributary whose confluence with the great Ruaha river is downstream of the hydropower sites. In addition, should the hydropower scheme be developed in the Selous, contribution of Mngeta river is less than 1% of the total resources and so the impact is negligible.</p>	<p>OP</p>	<p>No mitigation is necessary.</p>	<p>KPL Vice president office</p>	<p>Nil cost</p>
<p>9. Decrease of Local Water Levels Flood irrigation for rice does not appear to be cost-feasible. There are no current plans for irrigation. However, should irrigation be used there are no</p>	<p>OP</p>	<ul style="list-style-type: none"> • At the point of irrigation diversion, the project to ensure that the criteria of allowing a minimum 0.5m³/s for downstream users is always satisfied as per previous studies during the critical dry 	<p>KPL RUBADA</p>	

<p>Mngeta users downstream of the farm and the flow is sufficient to extract irrigation requirements without exceeding 50% of the dependable river flow. Further, 20% of the diverted flow will return to the Mngeta River through the drainage system.</p>		<p>months of January to February and September to October.</p> <ul style="list-style-type: none"> The project to encourage plantation of natural water conserving species in areas close to the rivers, streams and swamps that are near to the oil palm plantation area. 		
<p>10. Applications of Agri-Chemicals and Fertilizers Prolonged agricultural use of these products may result in the presence of their compounds in soil and water, degrading the environment.</p>	OP	<ul style="list-style-type: none"> The project to use appropriate Integrated Pest Management (IPM) techniques for effective management of pest, disease, weeds and invasive species. Only pesticides and insecticides approved by TPRI or meeting standards approved by WHO or WB will be used. Zero Till Farming reduces the reliance on chemicals and fertilizers over time 	KPL Village Government	IPM part of operating costs
<p>11. Fertilizer Runoff on Riverine & Wetland Vegetation During the rainy season, fertiliser run off by storm water will drain into the river Mngeta. The increase in minerals may cause growth of waterweeds down stream creating an environmental problem of consequences to the ecosystem. However, fertilizer run-off can be controlled by timing major fertilisation outside of the rainy season and following international best practises.</p>	OP	<ul style="list-style-type: none"> Agrochemicals to be used are those categorised as World Health Organisation type 1A or 1B or are listed by the Stockholm or Rotterdam conventions. Fertiliser to be applied at correct times i.e. not when heavy rain expected Runoff volumes and velocities to be controlled through use of cover crops. 	KPL TPRI NEMC	Part of Operating Costs
<p>12. Impact on Rufiji Basin Water Resources Diversion of Mngeta River for the irrigation scheme will only marginally decrease the total water resources in the Rufiji basin but may affect water flows in the Kilombero River with potentially negative consequences on flora and fauna. However as the contribution of Mngeta river is less than 1% of the total water resources of the Floodplain, and water will be diverted only over the five month dry season, never</p>	OP	<ul style="list-style-type: none"> Considering the dry months of October and November the mean water flows in Mngeta river at Mchombe are 9.1m³/s (October) and 10.8m³/s (November) whereas water flows in river Kilombero at Swero are 162.5m³/s, the irrigation diversion will extract less than 5% of the total in the Kilombero River. The project will treat effluents from the plant to WHO Standards and drain the treated water to river Mngeta to further 	KPL	No Cost

extracting more than 40% (including the irrigation water returned to the river), the total extraction is around 0.2% of the water resources of the floodplain.		minimise the impact.		
13. Soil Fertility Management of soil nutrients require utilisation of fertilizers which hold potential adverse impacts to the ecology of the area. Whereas the commercial plantation can avoid fertility loss, the out growers may be more challenged to manage fertilizer application, which could result in the loss of soil fertility.	OP	<ul style="list-style-type: none"> • Zero Till 	KPL	Part of Operating Costs
14. Soil Erosion Mechanized farming can contribute to soil erosion.	OP	<ul style="list-style-type: none"> • The project to ensure adequate ground cover and avoid over spraying of herbicides. • Zero Till • Maintain riparian areas to minimize erosion of river banks. 	KPL Village Government	Part of Operating Costs
15. Water Pollution Agrichemicals and fertilizers can be washed by rainwater into the nearby Mngeta River and other streams and the surrounding seasonal wetland, causing incremental increases of phosphates, nitrates and sulphates to unwarranted levels. However, through careful application between irrigation cycles, runoff can be drastically reduced. Smallholders will face greater challenges in controlling fertilizer runoff.	CON OP	<ul style="list-style-type: none"> • Application of fertilizers to be avoided during the very wet or very dry weather except when irrigation is in progress. • Leave water sources (rivers, swamps) with a buffer zone of at least 100 meters with natural vegetation and water conserving species for fertilizer sequestration. • Carry out periodic testing of soil and trees to determine quality and quantity of fertilizers to be applied. • Quantity - do not exceed optimum dose, through soil and leaf analysis, and fertilising for realistic yield potential. • Recycling - recycle nutrients from processing plant(s) back to the field, and allow for these inputs in the fertilizer calculations. 	KPL Village Government NEMC	Annual testing included in growing costs

		<ul style="list-style-type: none"> • Runoff - minimise through correct placement, timing (i.e. do not apply during very wet months), and use of buffer strips along watercourses. 		
<p>16. Greenhouse Gas Emissions Rice production currently accounts for about 10 to 16 per cent of global methane emissions (IRRI). Flooded rice paddies emit methane, a greenhouse gas that contributes to global-warming damage on a scale that eclipses coal-fired power plants, vehicular exhaust, and other sources of carbon dioxide. (A molecule of methane has 21 times the heat-trapping potency of a molecule of carbon dioxide.) Although carbon dioxide comprises 70 percent of warming potential in the atmosphere, rising levels of methane now make up 23 percent, according to the U.S. Environmental Protection Agency (EPA). Although, irrigated rice produces 2.64 times the methane than rain-fed (University of Queensland, Australia) rain-fed rice farming at Mngeta Farm will increase Tanzania’s GHG emissions.</p>		<ul style="list-style-type: none"> • A study carried out at the International Rice Research Institute (IRRI) in the Philippines has shown that rice paddies — a major source of the gas — produce less methane when yields are high. Attempts to boost yields through improved seed varieties and optimizing the timing of fertilizer application, could therefore reduce methane emissions. 	KPL	Included in Operating Costs
<p>17. Factory Noise & Vibration The noise and vibration of the grain dryers and the mill are not of the magnitude that carry at high levels beyond the boundary of the plant. Nor will noise because any damage to properly construct civil works.</p>	CON OP	<ul style="list-style-type: none"> • The project to provide protective ear equipment if there are areas where noise levels require such protection. • At the boundary of the milling and refinery plants, the noise levels not to exceed 70dB (A) day time and 55dB (A) night time. • Engines to be mounted with appropriate isolators to 	KPL Local Community	Included in operating costs

		minimize vibrations.		
<p>18. Potential Dryer Fire The Vietnamese Dryers, which use husk furnaces in the proximity of husk fuel could potentially cause a fire though the negligence of the operator or an accident, causing damage to the warehouse and loss of life.</p>	OP	<ul style="list-style-type: none"> • Operators to be properly trained to monitor husk furnace. • Fire fighting equipment, hoses and extinguishers, to be installed for each dryer • The rice facility will have a well designed laid fire suppression system for effectively fighting all classes of fire risks. • Smoking and carrying of fire lighter/matches to be prohibited in the project premises (unless at designated areas). • Ensure the plant has adequate water reservoir tanks specifically for fire fighting. • The project to ensure high level training for fire unit personnel and ensure periodical fire emergencies. 	KPL	Included in plant operating costs
<p>19. Air Pollution The husk burning furnaces produce little visible smoke, and only low-levels of SPM that does not exceed international standards.</p> <p>The movement of bulk rice produces high levels of dust. However international standards will be followed to protect the health of the workers and surrounding community.</p>	OP	<ul style="list-style-type: none"> • The soot number maximum average to be kept within the acceptable international norms of 4 on a Non- IC smoke gauge. • Workers will be issue protective masks 	Local Government authorities	Monitoring costs to be included in operating costs.
<p>20. Sewage The project will employ an average of 200 full and part time workers over the farm of 5,000 ha. Inadequate sewage facilities will cause poor hygienic conditions detrimental to public health and aquatic life.</p>	OP	<ul style="list-style-type: none"> • Provide each farm block with sanitary facilities e.g. toilets, washroom and garbage containers. • Construct separate sewage drainage system to sewage oxidation ponds. 	KPL	Costs incl in operating costs
<p>21. Fire Outbreak An electrical fault, operator negligence or vandalism could cause the rice warehouse to catch fire or the farm itself.</p>	OP	<ul style="list-style-type: none"> • The rice facility will have a well designed laid fire suppression system for effectively fighting all classes of fire risks. • Smoking and carrying of fire lighter/matches to be prohibited in the project premises (unless at designated areas). • Ensure the plant has adequate water reservoir tanks 	KPL	Costs included in plant construction costs and annual operating costs

		<p>specifically for fire fighting.</p> <ul style="list-style-type: none"> • The project to ensure high level training for fire unit personnel and ensure periodical fire emergencies. • Around the plantation, the area is prone to annual burning during the dry season. The drainage ditches and roads along the perimeter provide a firebreak of over 20 meters. • Installation of the irrigation system to consider provision of fire fighting. • Involvement of the workers and community is crucial in fire reporting and fighting. The project is establishing strong communication between the villagers around the farm. Security, field and plant personnel can communicate quickly through provision of radio calls, walkie-talkie receivers or use of sirens. 		
<p>22. Tanker Accidents During Transportation Fuel spillages may occur during transportation of diesel and aviation fuel to the farm.</p>	OP	<ul style="list-style-type: none"> • Assign a transport company with responsibility for the product delivery up to the point of safe delivery to the farm. • The transport company has trained on procedures to handle a truck on the road and fires. The following steps will be taken in case of road vehicle incident: <ul style="list-style-type: none"> ○ Move the truck (if possible) to the most convenient place to avoid obstructing traffic. ○ Place warning signs around the truck. ○ Report to police. 	KPL	Nil cost
<p>23. Food Security At maturity, the project will produce 20,000 tons of paddy (about 1.6% of Tanzania's current production) adding substantially to the self-sufficiency of Tanzania's rice production (which stands at about 86%.)</p> <p>The project will also produce 15,000 tons of soybeans, a crop being promoted by the Ministry</p>	OP	<ul style="list-style-type: none"> • KPL should conduct extensive seed trials to identify and multiply varieties which will flourish in the Kilombero Valley for the farm itself and smallholders. • The Ministry of Agriculture should assist KPL in fast-tracking substantial quantities of improved seed varieties from around the world for large-scale rain-fed rice and soya trials 	KPL	No additional cost

of Agriculture, and other bean crops.				
<p>24. Employment & Economic Development The mature project will produce annually:</p> <ul style="list-style-type: none"> • 3 billion TSh. in corporate tax revenues to the government • Over 160 full-time employees • Over 300 part-time employees • 665 million TSh. in staff salaries • 110 million TSh. in annual NSSF contributions • 100 million TSh. in annual PAYE income tax on employees 	OP	<ul style="list-style-type: none"> • The project to give priority of employment to the members of the surrounding community if possible. • The District & National government should support and help facilitate the project to ensure the production of the tax revenues for the government coffers. 	KPL Ministry of Finance	Nil cost
<p>25. Rural Electrification Mngeta Farm will require the current 320kW, now produced by the two turbines of the mini-hydro station after extensive rehabilitation by KPL, to run the rice dryer fans and rice mill.</p> <p>KPL is seeking approx. 1 billion Tanzania shilling from donors to install additional turbines to supply reliable and cheap electricity to the local community. KPL has discussed the project with the Rural Energy Agency.</p>	OP	<ul style="list-style-type: none"> • KPL should work with the appropriate sponsors and authorities to develop the required infrastructure and provide a reliable and cheap supply of electricity to the local community. • TANESCO and appropriate GoT agencies should avail themselves to assist the PPP and the local communities in establishing rural electrification in the area. 	KPL Rural Energy Agency Donor Community	\$US 1.5 million required from donor community and REA to establish hydropower & mini-grid
<p>26. Forest Conservation The Udzungwa Mountains, part of the Eastern Arc Mountains, one of the global biodiversity hotspots, is in need of strengthened conservation efforts to arrest deforestation through local community development.</p>	OP	<ul style="list-style-type: none"> • In November 2008, KPL sponsored the Mngeta Participatory Forest Management Group and Ward Forest Officer to participate in the annual national gathering of the Tanzania Community Forest Conservation Network, MJUMITA, in Morogoro. • In July 2008, to assist the establishment of the Mngeta Corridor proposed by the Forestry & Beekeeping Division and NGOS to connect the Udzungwa Scarp Forest 	KPL Forestry & Beekeeping Division TFCG MJUMITA	KPL contribution US \$5,000 to date

		<p>Reserve with the newly gazetted Kilombero Nature Reserve, KPL commissioned a socio-economic survey of people living or farming in the mountains above the farm.</p> <ul style="list-style-type: none"> • KPL will continue to support civil and government efforts to protect the natural forest in the Udzungwa Mountains and the Kilombero Floodplain. 		
<p>27. Community Development The three villages bordering the farm—Mkangawalu, Mngeta and Lukolongo—have no reliable community development fund to support their communal efforts to establish schools and dispensaries.</p>	OP	<ul style="list-style-type: none"> • In June 2009, KPL is disbursing the first grant from an annual 50 million Tanzania shilling Community Development for the three villages surrounding the farm, Mkangawalu, Mngeta and Lukolongo. • These funds, divided among the three villages by population as requested by the village leadership, are being used for the construction projects of their choice, and represent the first time these villages have a budget for community development. • The annual fund will be increased in 2013 if KPL meets its business targets 	<p>KPL Ward Government Local Villages</p>	TSh. 50 million annually
<p>2. Local Economic Development The purchasing power of employed workers will stimulate the local economy, and the surrounding community will economically benefit from vending and provision of services. Local companies will benefit from various tenders, services and other supplies required by the project. The local economy will grow through what is generally recognized as the “trickle down effect.”</p>	OP	<ul style="list-style-type: none"> • KPL should grant priority to competitive local companies, which are complying with environmental policies and regulations for tendering, provision of services, supplies and distribution of goods. 	<p>KPL Village Community</p>	Nil additional cost
<p>35. Decommission phase The project may come to an end due to the successive crop failures or the unlikely events of a government appropriation of the predominantly foreign-owned business in contravention of bi</p>	DEC	<ul style="list-style-type: none"> • The company to ensure that regulations of National Social Security Fund (NSSF) are followed. Employees will be prepared for forced retirement by providing skills for self 	<p>KPL NSSF Ministry of Labour and</p>	NSSF costs included in operating costs

<p>and multilateral treaties, or an improbable <i>force majeure</i> such as war, or a long period of severe drought due to climate change. The notable impacts include:</p> <p>Unemployment due to decommissioning Over 100 full-time and 200 part-time employees and vendors will lose a reliable source of income.</p> <p>Loss of revenue to Local Government and the Treasury. Annually about 3.8 billion Tanzania shillings in tax revenue to the Government and District through various taxes including corporate tax, land rent, PAYE, and VAT will be lost if the project achieves full production and then fails.</p> <p>Abandoned Rice Farm Squatters will re-invade the farm.</p> <p>Equipment and infrastructure. The abandoned equipment and infrastructure can be a cause of safety hazards.</p>		<p>employment and others with special skills will be availed jobs at other plantations.</p> <ul style="list-style-type: none"> • The unattended plantation would provide a source of sustenance and income to the local people who would utilize the fruit and oil. • The buildings can be retained for community use or availed to private developers. • The machinery and equipment will be disposed of in an agreeable manner such as public auction and the unusable equipment to be sold to smelters as scrap. 	<p>Youth Develop.</p>	
<p>Total</p>				<p>\$1.6 million excl. normal operations</p>

8.4 ENVIRONMENTAL MONITORING PLAN

Overall responsibilities of Environmental Management will rest with the Environmental Manager (whose remit also includes Human Resources, Security, and Community Relations). The Environmental Manager will oversee implementation of environmental aspects during mobilization, construction operations and decommissioning of the plant.

Duties of the Environmental Manager will include:

- 1) Liaise with relevant authorities on issues of environmental concerns.
- 2) Ensure the specifications for separate drainage systems for mills, waste water, sewage and storm water are adhered to during construction and operation phases.
- 3) Monitoring conflicts of shared resources between the village communities and the project.

- 4) Ensure that workers and drivers have adequate protective equipment/training and other environmental protection specifications are followed.
- 5) Ensure protection of water bodies by planting and sustaining water-conserving species and ensure maintenance of the biodiversity in the earmarked areas of valley bottoms, riverine vegetation and buffer zones.
- 6) Liaise with workers and local communities to create awareness of the fire season and emphasize the provision of training to both workers and villagers on fire prevention/monitoring and fighting methods.

Table 9. Environmental Monitoring Plan

Parameter to be monitored	Sampling frequency	Indicator	Standards	Baseline data	Responsibility	Cost annual
Soil quality	Once a year/dry and rainy season	pH, electrical, conductivity, nitrates, sulphates, phosphates, borates hydrocarbon Permeability Texture/struct.	WHO STD or Tanzanian Standards	Ambient levels established during pre-construction phase	KPL	2mil
Water quality	Twice a year dry and rainy season.	pH, Conductivity, Oil content, TSS, N, SO ₄ , Cr, Pb, BOD ₅ , COD TKN, Plankton	WHO STD or Tanzanian Standards	Ambient levels established during Pre-construction phase.	IKPL Ministry of Water Rufiji Basin Water Board	3mil.
Water resources monitoring	Twice a year	Water flow m ³ /min			KPL Rufiji Basin Water Board	0.3mil
Collection of meteorological data	Daily	Wind pattern rainfall	Established standards	Baseline existing information	KPL	2 mill
Status of both natural and planted vegetation/trees in the project area	Once a year	Vegetation cover tree species composition		Existing baseline information	KPL District Council Forestry and Beekeeping Division	1mil.
MONITORING OF SOCIAL ECONOMIC AND CULTURAL ISSUES/ACTIVITIES						
Public relation	Twice a year	Number conflicts, court cases, grievances	Labour laws		KPL District Council Ministry of Youth & Labour	1mil.

Workers safety, health and occupation rights	Quarterly	Salary levels safety measurements and disease control		Existing work regulations and labour laws	Workers unions Ministry of Youth & Labour District authorities	0.5mil.
Economic impact	Once a year	Economic activity to villagers around the company econ. gains by District through service charges		Economic performance prior to establishment of the project	Village Government Kilombero District	0.5mil.
Effect on culture	Once a year	Changes in behaviour		Current state	Village Gov. District	0.5mil.
Health occupation	Twice a year	Prominent disease trend in STD's and HIV/AIDS.		Health data prior to the establishment of the project	Village Gov. District Ministry of Health	1mil.
Total						11.8mil

Chapter 9: RISKS ASSESSMENT AND CONTINGENCY PLANS

The risks analysed in this chapter can be divided into two categories: Agricultural and Business. This is mainly due to the characteristics of the proposal. The Agricultural risks may not only affect the developer but also the locals and the local government. The Business risks affect directly the developer considering mainly the investment that the project requires to be operating in a sustainable form. The risks are therefore described in the following sections as well as the proposed contingency plans.

9.1 AGRICULTURAL RISKS

Drought

Drought is typically the major agricultural risk. Drought risk appears to be non-existent in the Kilombero Valley as shown by records of the Kilombero Valley Sugar Company, 120 km northeast of Mngeta Farm:

Kilombero Valley Sugar Company Annual Rainfall

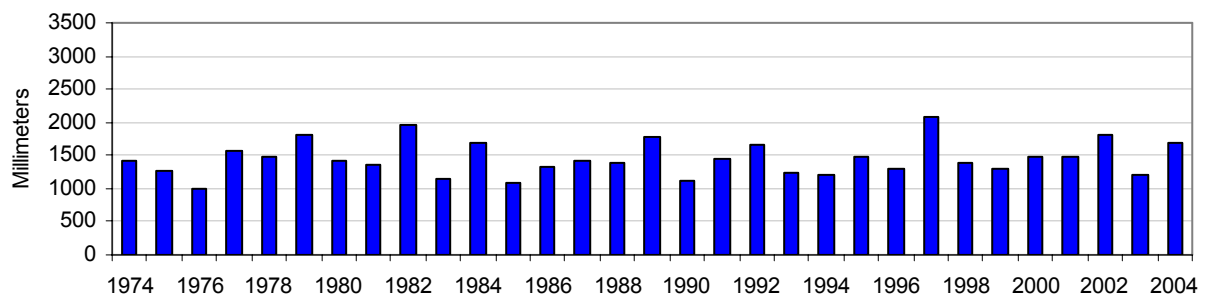


Fig. 13 Kilombero Valley Sugar Co. Rainfall

The mean annual rainfall between 1974 and 2004 at Kilombero Sugar was 1449 mm. While drought has affected much of northern Tanzania, there have been no years of substantial rainfall deficit in the Kilombero Valley. The Mngeta area receives more rain than areas in the northern part of the valley which is illustrated in the records from the Mchombe Mission station 5 km from the farm where the mean annual rainfall between 1963 and 1982 at Mchombe was 1902 mm.

Torrential Rain

Torrential rains pose a great threat. Thermal currents from the high mountains can trigger large fronts to precipitate heavily, resulting in substantial rain over a short period. These torrential rains can:

- Delay planting, causing production targets to be missed
- Damage dry season crops, lowering their yields and quality
- Delay harvesting of rice and dry season crops, lowering yields and quality

Pests & Diseases

Pests and diseases include the African Rice Gall Midge (AfRGM) (*Orsylvia oryzivora*) is the most common insect pest on rainfed and irrigated wetland rice. Other pests include striped (*Chilo zacconius*), white (*Maliarpha* spp.), and yellow (*Schirpophgaga* spp.) borers and stalk-eyed fly (*Diopsis macrophthalma*); grain-sucking bugs (*Aspavia* sp., *Stenocoris claviformis*); case worm (*Nymphula depunctalis*); and whorl maggot (*Hydrellia* sp.). Incidence of stem borers and stalk-eyed fly is severe in all (humid and dry) zones, while that of grain-sucking bugs, case worm, whorl maggot and AfRGM is more severe in humid forest and Guinea.

The major diseases of rice in Africa include blast (*Pyricularia oryzae*), glume discoloration (fungal complex: *Sarocladium* sp. & *Curuvularia* sp.), rice yellow mottle virus (RYMV), sheath rot (*Sarocladium* sp.), leaf scald (*Rhynchosporium oryzae*), sheath blight (*Thanetophorus cucumeris*), and bacterial leaf blight (*Xanthomonas campestris* p.v. *oryzae*). Other pests such as rodents and birds attack rice in all ecosystems.

The red-billed Quelea (*Quelea quelea*), the world's most abundant bird species and a native of sub-Saharan Africa, can occur in flocks of hundreds of thousands which can potentially devastate cereal farms.

9.1.1 Contingency Plans

Torrential Rains

Torrential rains can be mitigated by good drainage, all weather roads and spare planting and harvesting capacity to complete operations in a reduced time frame. Further, crop insurance can provide cover for unusual weather events.

Pests & Diseases

Pests and diseases can be managed through careful fertilizer regimens and seed spacing, rigorous monitoring, Integrated Pest Management, and timely application of pesticides, fungicides and foliar chemical. Integrated Pest Management (IPM) is a decision-support system for the selection and use of pest control strategies that minimize dependence on chemical pesticides and improve human health and environmental quality. Growing a healthy crop is the key to good IPM. Other IPM technologies for rice are (a) deployment of pest-resistant varieties, (b) field sanitation, (c) no early spraying against leaf folders and trips, (d) use of predators such as spiders and wasps to control insects, (e) an active barrier system for rat control, (f) silica application for blast control, and (g) timely and judicious use of fast-acting bio- or synthetic pesticides when pest infestation is serious, threatening the crops.

The Quelea quelea threat requires constant vigilance by KPL, working in collaboration with local villages. Should a large-scale outbreak occur, the company must collaborate with the District and Plant Protection authorities to destroy nesting and roosting areas with as little environmental impact as possible.

9.2 BUSINESS RISKS

Price Risk

The East African Community's Common External Tariff (EACCET) of 75% on imported rice provides solid protection against a fall in the rice price. In cases of acute food shortage, a vote by the Council of Ministers of the community will lower the tariff, typically to 25% for 90 days and a specific quantity. These limited imports do not appear to visibly affect market prices. Nor has the EACCET been temporarily lowered in Tanzania since its adoption in 2005.

The term of the EACCET is indefinite. The Tariff is meant to protect sensitive industries in which the countries are striving for self-sufficiency or food security as well as to maintain a viable rural economy. Even if the 75% tariff were lowered to the 25% import duty levied by Tanzania prior to 2005, the internal price would not drop substantially, given the fact that the rice price in Tanzania averaged over 73% higher than the world price through the decades of the 25% duty.

At peak production, KPL will add 20,000 tons of paddy, or about 1.3%, of the 2007 market (last period of available data, undoubtedly smaller than current market) which included 1.2 million tons of Tanzania paddy production and 200,000 tons of imported milled rice

(representing about 307,000 tons of paddy). Other commercial producers, rehabilitating irrigated farms, are planning an estimated total increase in production of 40,000 tons or 2.6% of the 2007 production. Meanwhile annual growth in consumption is conservatively estimated at 2.1 to 2.9% (growth of the population), which equals 31,647 to 43,703 tons of paddy. The increase in production is just enough to out-pace consumption growth but short of bridging the import gap to bring Tanzania closer to 100% rice self-sufficiency. Therefore KPL considers the risk that the EACCET will be abolished in the next 10 years negligible, especially given the greater shortfalls of rice production in Uganda and Kenya. Moreover, even were self-sufficiency to be obtained, tariffs will remain in place to protect smallholder producers from more efficient Asian farmers.

Squatters

Approximately 2238 people continue to live or farm on about 25% of the titled area, some who have been there since 1999. They have no legal right to occupy the farm but they are resisting relocation. Their continued occupation would jeopardize the financial viability of the project as commercial farm smaller than 5000 ha cannot achieve economies of scale. Furthermore, continued occupation is jeopardizing further equity investment and debt finance from development banks.

Logistics

It is assumed that all materials required for the development will be available at a reasonable price. The viability of the project is heavily dependent on irrigation and fertilizer costs being controlled.

The project is situated in an isolated area and transport links are not well established. There is a risk that transport costs will be excessive and that it may be difficult to transport finished products to markets at economic rates.

Fire

The area is prone to annual burning during the dry season. Palms could be affected especially during the immature phase. Furthermore eruption of fire at the bio fuel plant and storage tanks will result in colossal economic loss and can lead to loss of lives.

9.2.1 Contingency plans

In order to mitigate the business risks, KPL will:

- (i) Resettle squatters in a socially responsible manner.
- (ii) Collaborate with TAZARA on the usage of their wagons as the principal means of transport of rice to Dar es Salaam
- (iii) Minimize fire risk by ensuring firebreaks are in place and well maintained, collaborate with local villages for mutually beneficial fire-fighting preparations, and train and equip a fire-fight team.

It can be concluded that the contingency plans need the involvement of local authorities and local population. Therefore, the stakeholder participation should be encouraged in all stages of the project development.

Chapter 10: COST BENEFIT ANALYSIS

In accordance to the EIA guidelines, project options have to be provided within constraints of the aim and broad economic, technical and environmental factors.

10.1 AVAILABILITY OF ALTERNATIVE SITES

Choices of alternative sites are constrained by:

1. Availability of suitable large area for large-scale commercial rice cropping. To be economically viable, commercial farms require 5000 hectares with sufficient rainfall or sufficient water sources to ensure a successful irrigation scheme. In addition specific soil types are required together with specific climatic variables such as minimum temperatures, wind speed and humidity.

The area should be free from other national protection zones e.g. Wildlife reserves, military, mining activities, natural forest reserves or International conventions.

The area should be as much as possible free from human settlements to avoid huge compensations and areas with low pastoral activities to avoid conflict over shared resources.

Therefore the areas suitable for commercial rice farming in Tanzania are limited in terms of suitable weather (minimum temperatures, humidity) and land. Therefore KPL has few other viable options.

2. The area selected for rice cultivation is owned by KPL, a joint venture between RUBADA and ITL.

Mngeta River is sufficient for only 2500 ha of dry season flood irrigation, about half the farm size, but rainfall is sufficient for rain-fed rainy season rice and dry season bean cropping

3. Although the 80 km of road stretch from the district headquarter Ifakara to the project site has to be improved to an all weather road, the project site is quite close to TAZARA - about 6km, which will ensure safe haulage of company requirements.

10.2 ZERO OPTION

The other option is to maintain the "status quo" of the area. *Not to develop it.* The local community will remain under a subsistence economy which has been prevailing in the area for since pre-Independence without meaningful impact to the National economy. The areas of grassland will continue to be burned every year by indigenous people hence contributing to the rising levels of atmospheric carbon dioxide (CO₂) and other green house gases.

The numerous contributions to socio-economic, environmental benefits as well as technology transfer to the country and the local community of which the project is designed will not be realized.

The socio-economic development to be missed in the "Zero Option" in the country will be revenue, employment opportunities, alleviation of poverty among the rural poor through

out growers programme, improved social services such as dispensaries, schools and construction of roads.

The technological benefits include transfer of Zero Tillage agriculture, Vietnamese rice drying, and improved seed varieties that lend themselves to local adoption and diffusion to the rural poor.

Chapter 11: DECOMMISSION PLAN

Should the project fail due to agricultural risk or business risk, a thorough decommissioning plan should be prepared and approved by the relevant authorities before actual decommissioning starts.

In the event of the project closure, there will be potential impacts emanating from abandoned land and infrastructure and loss of jobs. The governing principles to be applied in the event of decommissioning of the project include

- **LAND**
According to the Land Act No. 4 of 1999, it remains vested in the President on behalf of citizens of Tanzania. Implementation of the Act requires that the land should be returned into a state that would be usable by others after completion of the project. This implies that all contaminated sites should be rehabilitated and revegetated and all the cleared areas should be revegetated.
- **MACHINERY AND EQUIPMENT**
The machinery and equipment of useful value should be publicly auctioned. The machinery and equipment with no useful values should be sold to smelting companies as scrap. Items which the public need for community use such as buildings could be donated for communal ownership free-of charge. The plant site should be rehabilitated and revegetated.
- **UNEMPLOYMENT AS A RESULT OF DECOMMISSIONING**
At the end of the project, employment of workers ceases. The workers have to be prepared for forced retirement. It is possible that the skilled workers will find alternative jobs. Others will require provision of skills for self employment. The company should ensure that all employees are members of the National Social Security Fund and workers contributions to the fund through salary deductions and employer obligations are remitted on time in order for the workers to be eligible to retirement benefits.
- During the decommissioning phase the area should be strictly placed under qualified personnel to supervise the restoration process and trespassing should be forbidden.

Chapter 12: GENERAL CONCLUSIONS

A number of conclusions have arisen from the EIS which are as follows:

- Implementation of the project will increase national rice production by approx. 1.6%, contributing to food security.
- Implementation of the project will create employment to local community, generate revenue to the Government, and contribute numerous socio-economic and environmental benefits as well as technological transfer to the country.
- The cleared farm represents less than 0.7% of the Ramsar-designated wetland, and KPL plans to employ best water-conservation and waste-treatment practices and technologies.
- The project will seek Sustainable Agriculture Certification from the Sustainable Agricultural Network
- It is therefore recommended that the project be implemented taking into consideration the environmental impacts and mitigation measures identified during the EIA study and the monitoring programme to be followed after the approval by the Government.

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<http://www.tanzania.go.tz/census/districts/kilombero.htm>

Consultants Names and Addresses

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Signature

ANNEXES

A. Government Approvals

- Approval by the Cabinet of the Sales Agreement, a letter with Ref. No. CEA.449/515/01 of 3 Nov. 2007
- Approval by the Ministry of Finance & Economic Affairs (Treasury Registrar), a letter with Ref. No. TYC/T/200/725/114 of 5th May 2008
- Approval by the Ministry of Agriculture, Food & Cooperatives, a letter with Ref. No. CEA 499/515/01 of 24th June 2008
- The Ministry of Constitutional Affairs & Justice vetted the addendum of the Shareholder's Agreement through a letter with Ref. No. JC/D.30/52/37 of 1st July 2008
- Approval by Kilombero District through a letter with Ref. No. A.20/34/186 of 25 March 2009

B. Certificate of Incorporation

C. Tanzania Investment Centre Certificate of Incentives

D. KPL's Title Deed of Mngeta Farm

E. Minutes of Village Meetings, May 2009

F. Mngeta Farm Squatter Survey Report. Claude G. Mung'ong'o, Phd. & Juma Kayonko, MSc. February 2009.

G. Distribution of Two endemic Cisticolas (Kilombero cisticola *Cisticola sp. nov.* and White-tailed cisticola *Cisticola sp. nov.*) of the Kilombero Valley, Tanzania. A Rapid Assessment. Jasson John and Trevor Jones, Environmental Sciences Research Centre, Anglia Ruskin University, Cambridge, UK January-February 2008. Final Report May 2008.

H. Stakeholders Consultation Report for the Environmental Impact Assessment on Proposed Oil Palm and Rice Project at Mngeta, Kilombero, Tanzania. C.G. Mung'ong'o PhD, James Lyimo, PhD. September 2007.

I. Rapid Assessment of Biodiversity (Birds and Mammals) on Mngeta Farm, Kilombero District, Morogoro Region. Trevor Jones, Environmental Sciences Research Centre, Anglia Ruskin University, Cambridge, UK. 29-31 March 2007

J. Brief Botanical Inventory report for Ihongole & Isagu Forest patches in Rubada Farm Kilombero, Morogoro Region. Moses A. Mwangoka, Tanzania Forest Conservation Group. March 29-31, 2007.

K. Revised Scoping Report submitted to NEMC, March 2008, and NEMC Approval of the Scoping Report, 30 April 2008

ANNEX A

Government Approvals

1. Approval by the Cabinet of the Sales Agreement, a letter with Ref. No. CEA.449/515/01 of 3 Nov. 2007
2. Approval by the Ministry of Finance & Economic Affairs (Treasury Registrar), a letter with Ref. No. TYC/T/200/725/114 of 5th May 2008
3. Approval by the Ministry of Agriculture, Food & Cooperatives, a letter with Ref. No. CEA 499/515/01 of 24th June 2008
4. The Ministry of Constitutional Affairs & Justice vetted the addendum of the Shareholder's Agreement through a letter with Ref. No. JC/D.30/52/37 of 1st July 2008
5. Approval by Kilombero District through a letter with Ref. No. A.20/34/186 of 25 March 2009

RUFIJI BASIN DEVELOPMENT AUTHORITY

Telegram: "RUBADA"
Telephone: 0255 22 2460962 / 2461492
Fax: (0255) 22 2461492
Email: info@rubada.org
In reply please quote



P.O. Box 9320
Dar es Salaam, Tanzania

Ref. No: RBDA/C/P.27/Vol.1/26

2nd September, 2008

Managing Director,
InfEnergy (T) Ltd,
DAR ES SALAAM.

Re: **Authorization of the Mngeta farm transaction (Farm No. 411)**

We are writing to confirm that, the relevant authorities authorized the transaction regarding the Mngeta farm between RUBADA and InfEnergy (T) Ltd.

The following are written authorization by various authorities in the government of the United Republic of Tanzania.

1. Approval by the Cabinet of the Sales agreement, a letter with Reference Number. CEA.499/515/01 of 03rd November, 2007.
2. Approval by the Ministry of Finance and Economic Affairs (Treasury Registrar) a letter with Reference Number. TYC/T/200/725/114 of 5th May, 2008
3. Approval by the Ministry of Agriculture Food and Co-operatives a letter with Reference Number CEA 499/515/01 of 24th June, 2008
4. The Ministry of Constitutional Affairs and Justice vetted the addendum of the shareholder's Agreement through a letter with Reference Number. JC/D.30/52/37 of 1st July, 2008
5. The RUBADA Board of Director's approved the addendum and shareholding Agreement on 4th July, 2008 by signing the Agreement.

I am attaching copies of authorization letters for your ease reference.

Yours faithfully,
RUFIJI BASIN DEVELOPMENT AUTHORITY


A. L. Masanja
for: **DIRECTOR GENERAL**

All correspondences should be addressed to the DIRECTOR GENERAL

SIRI

JAMHURI YA MUUNGANO WA TANZANIA

WIZARA YA KILIMO CHAKULA NA USHIRIKA

Anwani ya Simu: "Kilimo Dar Es Salaam"
Simu Namba: 2862064
Fax: 2862077
E-mail: psk@kilimo.go.tz
Unapojibu tafadhali taja:



Idara ya Utawala
S. L. P. 9192
Dar Es Salaam
Tanzania

Kumb. Na: CEA.499/515/01

03 Novemba, 2007

Bw. B. J. Kabuzya,
Mkurugenzi Mkuu,
RUBADA,
S.L.P. 9320,
DAR ES SALAAM.

**YAH: TAARIFA YA UTEKELEZAJI WA MAAMUZI YA SERIKALI KUHUSU
SHAMBA LA MNGETA (MNGETA FARM NO 411) LILILOKUWA
LIKIENDESHWA NA KAMPUNI YA KOREA TANZANIA COMPANY
(KOTACO) LTD – HATI YA KAMATI (FT) NA 13/2007**

Tafadhali rejea somo hilo hapo juu.

Kama unavyoelewa Hati iliyotajwa hapo juu ilijadiliwa na Kamati tarehe 9 Oktoba, 2007. Ninawasilisha kwako "extract" ya uamuzi wa Kamati kuhusu Hati hii ambao ni:- "Kwa kuwa mkataba baina ya Shirika la Maendeleo ya Bonde la Mto Rufiji (RUBADA) na Kampuni ya InfEnergy ya Uingereza kuhusu uendeshaji wa Shamba la Mngeta ni halali kisheria, Serikali ikubali na iruhusu utekelezaji wa mkataba huo".

Nawasilisha uamuzi huu kwako kwa utekelezaji kwa kuzingatia sheria na taratibu zinazostahili.

A handwritten signature in black ink, appearing to read 'Peniel M. Lyimo'.

Peniel M. Lyimo
KATIBU MKUU

Nakala:

Bw. P. L. Luhanjo,
Katibu Mkuu Kiongozi,
Ofisi ya Rais,
IKULU
DAR ES SALAAM.

S I R I

72

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA FEDHA NA UCHUMI

Anwani ya Simu "Hazina"
DARES SALAAM.
Simu Nambari: 111174-6.



SANDUKU LA BARUA 9111,
DAR ES SALAAM.

(Mawasiliano yote ya kiofisi
yaandikwe
kwa Katibu Mkuu wa Hazina na siyo
kwa mtu binafsi)
Unapojibu tafaahali taja:
Kumb. Na. TYC/T/200/725/14

Mkurugenzi Mkuu,
RUBADA,
S.L.P 9320,
DAR ES SALAAM



5 Mei, 2008

**YAH: UENDELEZAJI WA SHAMBA LA MGETA, WILAYA YA
KILOMBERO.**

Tafadhali rejea barua yako yenye Kumbukumbu Na.
RBDA/C/P.27/59 ya tarehe 21 Februari, 2008 kuhusu somo hilo hapo
juu.

Baraza la Mawaziri liliridhia utekelezaji wa mkataba wa
mauzo pamoja na **addendum** inayobainisha utaratibu wa
Shareholding. Kwa misingi hiyo, napenda kukufahamisha kuwa
mmeruhusiwa rasmi kuendelea na utekelezaji wa **Private Public
Partnership**. Ni vyema tupate taarifa ya utekelezaji kila kota kwa
kila hatua inayofikiwa.

Tunashukuru kwa ushirikiano wako na tunakutakia kazi
njema.

E. Mlaki (Bibi)
Kny: KATIBU MKUU

Nakala:

**Katibu Mkuu,
Wizara ya Kilimo, Chakula na Ushirika,
S. L. P. 9192,
DAR ES SALAAM**

S I R I

13

JAMHURI YA MUUNGANO WA TANZANIA
WIZARA YA KILIMO CHAKULA NA USHIRIKA

Anuani ya Simu: "Kilimo Dar es Salaam"
Nambari: 255 (022) 2862480/1
Email: psk@kilimo.go.tz
Fax: 255 (022) 2862077
Unapojibu tafadhali taja:

Idara ya Utawala,
Kilimo House I,
P.O. Box 9192,
DAR ES SALAAM.

Ref. No. CEA. 499/515/01



24 Juni, 2008

Bw. B.J. Kabuzya,
Mkurugenzi Mkuu,
Mamlaka ya Uendelezaji wa Bonde la Mto rufiji,
S.L.P. 9320,
DAR ES SALAAM.

YAH: UENDELEZAJI WA SHAMBA LA MNGETA (SHAMBA NA. 411)
LENYE HEKTA 5818 WILAYANI KILOMBERO

Tafadhali rejea barua yako yenye Kumbukumbu Na. RBDA/P. 27/Vol. 1/9 ya tarehe 5 Juni, 2008 kuhusu somo tajwa, ambapo uliwasilisha rasmi matokeo ya Mkutano wa pamoja kati ya uongozi wa juu wa InfEnergy na Bodi ya RUBADA. Aidha, katika barua hiyo uliwasilisha "Addendum" ambayo inarejea makubalianao yaliyofikiwa katika Mkutano huo. Napenda kukufahamisha kwamba Wizara ya Kilimo Chakula na Ushirika inaridhia makubaliano hayo na inaruhusu kuingia Mkataba wa kuanzisha Kampuni ya pamoja na Infenergy katika uendelezaji wa shamba la Mngeta. wizara ipatiwe taarifa za mara kwa mara za utekelezaji wa Mkataba huo.

S.E. Kaduma
S.E. Kaduma
KAIMU KATIBU MKUU

Nakala: Katibu Mkuu,
Wizara ya Fedha na Uchumi,
S.L.P. 9111,
DAR ES SALAAM.

Prof. R.B. Mwalyosi (Mb),
Mwenyekiti wa Bodi,
RUBADA.

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THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF CONSTITUTIONAL AFFAIRS AND JUSTICE

Telegrams "LEGAL" Dar es Salaam
Telephone 2118178/81
Fax Number: 113236
In reply please quote.



P.O. Box 9050
Dar es Salaam
TANZANIA

Ref. No. JC/D.30/52/37

1 July 2008

Director General,
Rufiji Basin Development Authority,
P.O. Box 9320,
DAR ES SALAAM.

(Attn: Aloyce La. Masanja)

**RE: ADDENDUM TO THE SALE AGREEMENT AND AMENDMENT OF
SHAREHOLDERS' AGREEMENT FOR MNGETA FARM**

Please, revert to the heading above and your letter with Ref. No. RBDA/C/P.27/VOI.1/12, dated 25th June, 2008.

We had an opportunity to peruse the draft Addendum document that was to us for vetting and we found it legally sound, except for the following:-

- (1) Insert "**semi-colon**" after the word "**WHEREAS**" wherever it appears, and insert the word "**and**" after the last but one "**WHEREAS**".
- (2) Insert letter (A) – (H) after every paragraph of the recitals.

Upon effecting the proposed amendment you may sign the Contract as intended.

D. L. Chidowu
for: **ATTORNEY GENERAL**

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T

Infenergy

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*Noted
Anya
8/11/2008*

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF JUSTICE AND CONSTITUTIONAL AFFAIRS

Telegrams "LEGAL" Dar es Salaam
Telephone 118178/81
Fax Number: 113236
In reply please quote.

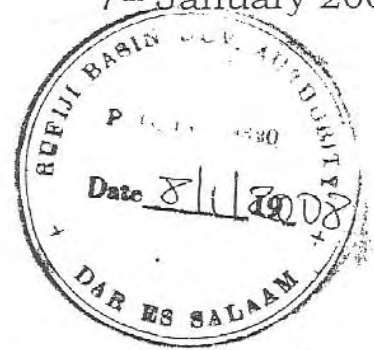


P.O. Box 9050,
Dar es Salaam
TANZANIA

Ref. No. JC/D.30/52/32

7th January 2008

Director General,
Rufiji Development Authority,
P.O. Box 9320,
DAR ES SALAAM.



(Attn: A. L. Masanja)

**RE: SHAREHOLDERS AGREEMENT BETWEEN RUBADA
AND INFENERGY TANZANIA LIMITED FOR DEVELOPMENT
OF MNGETA FARM (FARM NO. 411)**

Please, revert to the heading above and your letter with Ref. No. RBDA/C/P.27/44 dated 28th December, which was received on 3rd January 2008.

We had an opportunity to peruse the draft contract document, and we found it legally sound, except for the following:

1. On the cover, the date and month should reflect 2008.
2. In page 1 line 1, the line is to read: **"THIS AGREEMENT is made on the.....day of.....2008"**.
3. In paragraph 2 prior to the preamble, insert the words, **"(R.E. 2002)"** between the words **"138"** and **"of"** in line 2, and then insert the words, **"of the one part"** after the word **"shareholder"**, and delete **"semi-colon"**.

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4. In paragraph 3, prior to the preamble, insert the words **"of the other part"** after the word **"company"** in brackets.
5. In the preamble, insert, **"colon"** after the word, **"WHEREAS"**.
6. In the paragraphs **"(A)" "(B)", "(C)" "(D)" "(E)" and "(F)"** of the preamble delete **"full stops"** and they be replaced by **"semi-colons"**, then insert the word, **"and"** after paragraph **"(F)"**.
7. In clause 4.7 line 1, the word, **"agreement"** be deleted and replaced by the word **"consent"**, and delete the word, **"the"** after the word, **"without"** in the same line.
8. In clause 5.5 line 2, insert the word, **"aspect"** after the word, **"integral"**.
9. In clause 6.2, lines 5, 7 and 8 the word, **"designee"** to read **"designate"**, and insert the word, **"by"** after the word, **"replacement"** in line 8.
10. In clause 26.5 delete the word, **"London"** and insert the words, **"agreed by the parties"**.

Upon effecting the proposed amendment, you may proceed to sign the contract as intended.

Be so advised.


D. L. Chidowu

For: **ATTORNEY GENERAL**

THE UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT



District Commissioner's Office,
P.O. Box 34,
IFAKARA.

Ref. No. A.20/34/186

25 March 2009

Mr. Carter Coleman
Director,
Kilombero Plantations Ltd.
P.O. Box 23294,
DAR ES SALAAM.


RE: DISTRICT APPROVAL FOR ENVIRONMENTAL IMPACT ASSESSMENT

We acknowledge receipt of your letter dated 23rd February, 2008 on the above captioned subject.

I do confirm to have met Dr. Njau, Dr. Mung'ong'o and Dr. Lyimo during their respective visits in Kilombero regarding the rehabilitation of Mngeta Farm. The project is in line with our District Agricultural Development Programmes which is, among others, to ensure that Morogoro Region becomes a National Granary. We are optimistic that when fully developed, Mngeta Farm will produce surplus food crops to our nation.

In view of the above we approve the rehabilitation of Mngeta Farm Project.

Yours Sincerely,


Eng. Evarist Welle Ndikilo
DISTRICT COMMISSIONER
KILOMBERO

ANNEX B

Certificate of Incorporation

TANZANIA



Certificate of Incorporation

Section 15

No 61179

I HEREBY CERTIFY THAT

KILOMBERO PLANTATIONS LIMITED =====

is this day incorporated under the Companies Act, 2002 and that the Company is Limited

Given under my hand at Dar es salaam

this **16TH** day of **JULY****TWO THOUSAND AND SEVEN**


Princ. Asst. Registrar of Companies

ANNEX C

Tanzania Investment Centre Certificate of Incentives



No 00213783

17/9/07
Port Executive Director,
Tanzania Investment Centre

THE UNITED REPUBLIC OF TANZANIA

Certificate of Incentives

(Section 17 of the Tanzania Investment Act, 1997)

No: 010253

This is to certify that

KILOMBERO PLANTATION LIMITED

of address P.O. BOX 78934

MOROGORO

has been granted a Certificate of Incentives to invest in a ~~new~~ rehabilitation /expansion or equity of the enterprise known as

KILOMBERO PLANTATION LIMITED

Which is located at FARM NO. 411. MNGETA FARM

IFAKARA - MOROGORO

Further particulars required by Section 17 of the Tanzania Investment Act are set out overleaf.

[Signature]

Executive Director


Tanzania Investment Centre
P.O. Box 938, Dar es Salaam





Dated 14TH SEPTEMBER 2007

ANNEX D

Title Deed of Mngeta Farm

TITLE No. 54580
 REGISTERED 17-10-03
 At 1.09 PM

 Senior Asst. Registrar of Titles



TANGANYIKA STAMP DUTY ACT
 Stamp Duty Shs. 100/-
 and Revenue Receipt No. 15683
 of 28-8-03

 Stamp Duty Officer

Land Form 23.

THE UNITED REPUBLIC OF TANZANIA

THE LAND ACT, 1999
 NO. 4 OF 1999

CERTIFICATE OF OCCUPANCY
 (Under Section 29)

TITLE NO. 54580
 L. O. NO. 179359.
 KB/LD. NO. 91

The 17th day of October, 2003.

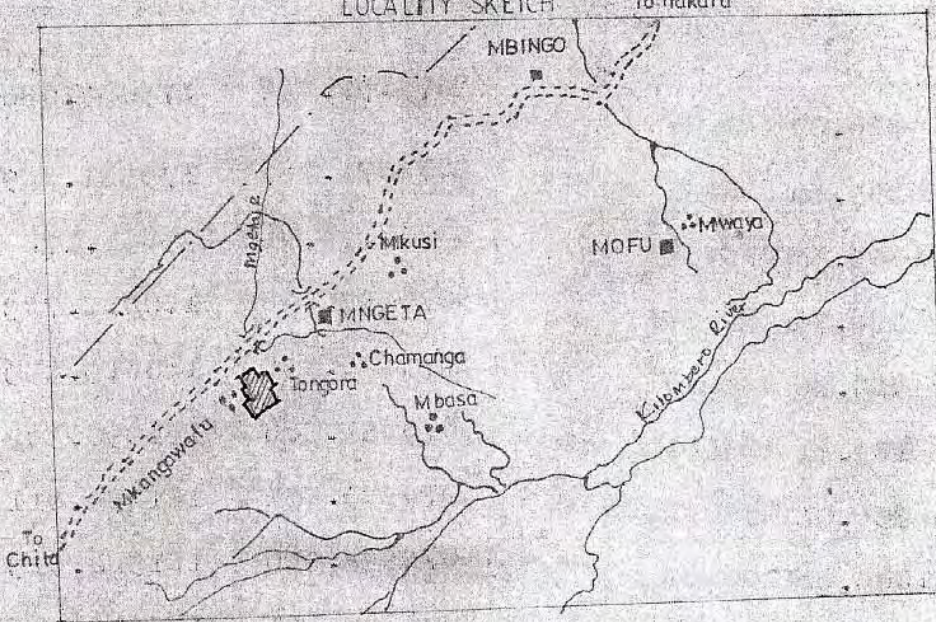
THIS IS TO CERTIFY that THE RUFJI BASIN DEVELOPMENT AUTHORITY established under Act, 1975 having its Registered Officer of P. O. Box 9320, DAR ES SALAAM; (Hereinafter called "the Occupier is entitled to a Right of Occupancy) Hereinafter called "the Right in and over the land described in the Schedule hereto (Hereinafter called "the Land") for a term of Ninety nine years from the first day of July Two thousand and three according to the true intent and meaning of the Land Act and subject to the provisions thereof and to regulations made thereunder and to any enactment in substitution therefor or amendment thereof and to the following conditions:-

1. The Occupier(s) having paid rent up to the thirtieth day of June, 2004, shall thereafter pay rent of Shillings Two million eight hundred seventy five thousand two hundred (Shs. 2,875,200) a year in advance on the first day of July in every year of term without any deduction PROVIDED that the rent may be revised by the Commissioner for Lands.
2. The land shall be used for FARMING AND LIVESTOCK KEEPING.
3. The Occupier (s) shall:-
 - (a) Demarcate the boundaries of the land to the satisfaction of the Kilombero District Council (Hereinafter called "the Authority") and thereafter to maintain such demarcation that the boundaries are always easily identifiable.

TANGANYIKA STAMP DUTY ACT.
 Stamp Duty Shs. 104,990/-

KILOMBERO DISTRICT

LOCALITY SKETCH To Ifakara



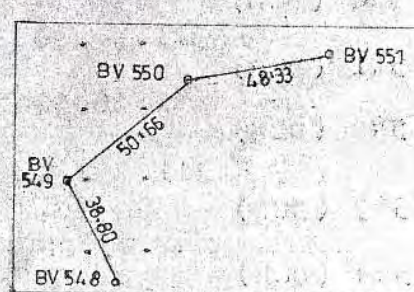
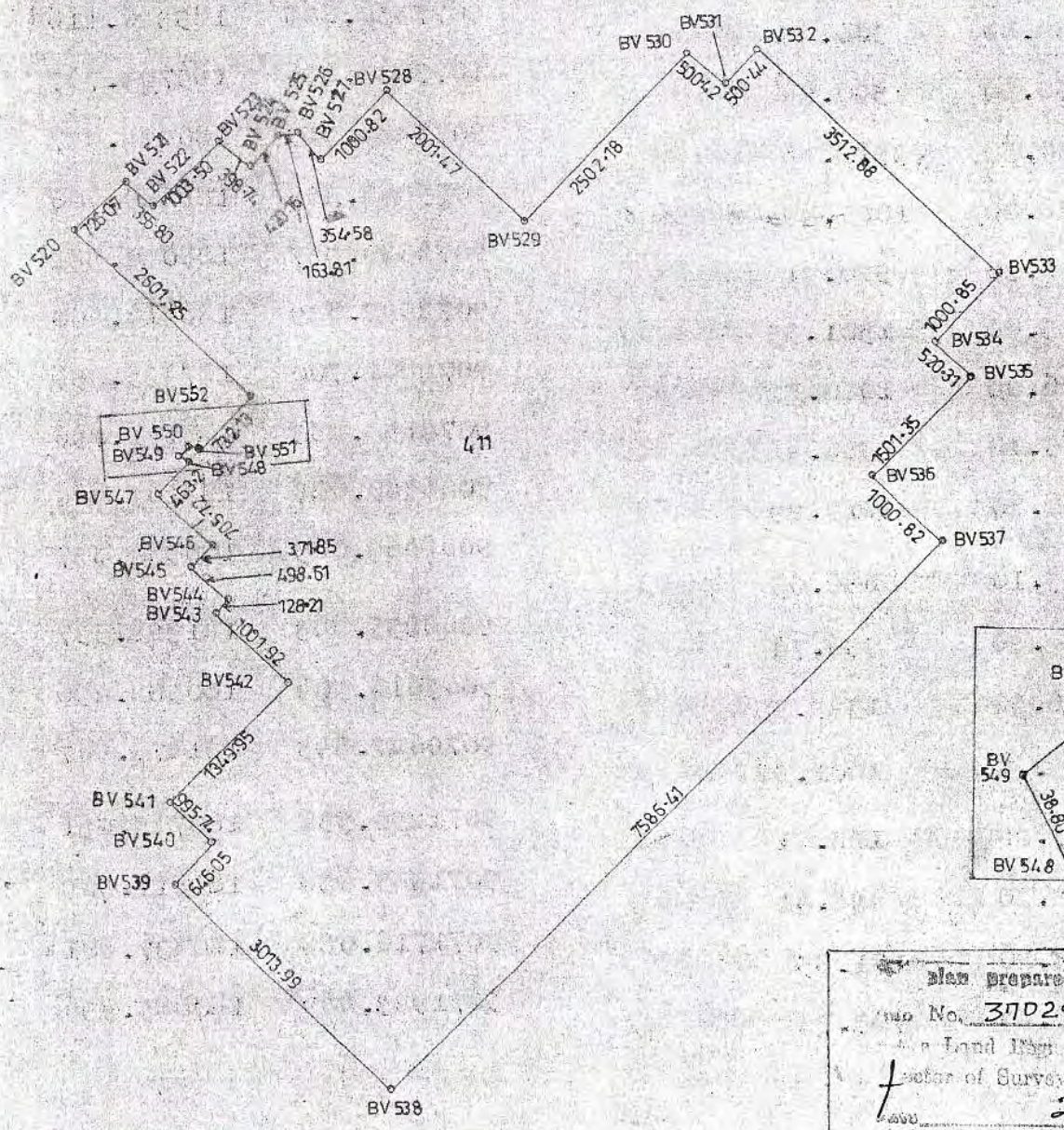
LOCATION MNGETA

FLOCK FA2M

PLANT No. 411

LO. No. 179359

AREA 5818 HA.



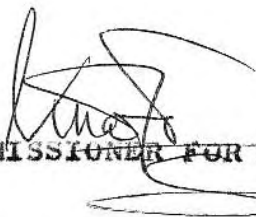
No line of this plan implies no general admission of title by the Government.

Plan prepared in accordance with English Ordinance No. 37029 as approved to the purpose of the Land Registration Ordinance.

Factor of Survey and Mapping

28-08-2003

Survey and Mapping Division Ministry of Lands and Urban Development Dar-es-Salaam


COMMISSIONER FOR LANDS

The within named RUFJI BASIN DEVELOPMENT AUTHORITY
HEREBY accept the terms and conditions contained in the
foregoing Certificate of Occupancy.

SEALED with the COMMON SEAL of)
the said RUFJI BASIN DEVELOPMENT)
AUTHORITY and DELIVERED in the)
presence of us, this 5)
day of SEPTEMBER 2003.)

Signature: B Kabuzya)
Postal Address: P.O. Box 9320,)
DAR ES SALAAM)
Qualification: DIRECTOR GENERAL)

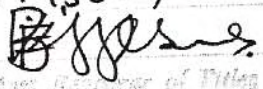
Signature: [Signature])
Postal Address: P.O. BOX 63154)
DAR-ES-SALAAM)
Qualification: CHAIRMAN RUBA BOARD)

REKORSA PERUSAHAAN
TRANSFER

119789.

24.07.08 12:55P

KILOMETERS PLANTATIONS
LIMITED OF BOX 232940JALAM
(Incms of USD 994,500.)



Senior Asst. Receiver of Titles

ANNEX E

Minutes of Village Meetings, May 2009

ANNEX F

Mngeta Farm Squatter Survey Report. Claude G. Mung'ong'o, Phd. & Juma Kayonko, MSc. February 2009.

ANNEX G

Distribution of Two endemic Cisticolas (Kilombero cisticola *Cisticola sp. nov.* and White-tailed cisticola *Cisticola sp. nov.*) of the Kilombero Valley, Tanzania. A Rapid Assessment. Jasson John and Trevor Jones, Environmental Sciences Research Centre, Anglia Ruskin University, Cambridge, UK January-February 2008. Final Report May 2008.

ANNEX H

Stakeholders Consultation Report for the Environmental Impact Assessment on Proposed Oil Palm and Rice Project at Mngeta, Kilombero, Tanzania. C.G. Mung'ong'o PhD, James Lyimo, PhD. September 2007.

ANNEX I

Rapid Assessment of Biodiversity (Birds and Mammals) on Mngeta Farm, Kilombero District, Morogoro Region. Trevor Jones, Environmental Sciences Research Centre, Anglia Ruskin University, Cambridge, UK. 29-31 March 2007

ANNEX J

Brief Botanical Inventory report for Ihongole & Isagu Forest patches in Rubada Farm Kilombero, Morogoro Region. Moses A. Mwangoka, Tanzania Forest Conservation Group. March 29-31, 2007.

ANNEX K

Revised Scoping Report Submitted to NEMC, March 2008
NEMC Approval, 30 April 2008