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## **Biofuel Industry Study, Tanzania**



***An Assessment of the Current Situation***

**November 2008**

**WORLD WIDE FUND FOR NATURE  
TANZANIA PROGRAMME OFFICE (WWF-TPO)  
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# Executive Summary

## *1 Background*

Biofuels remain a highly contentious issue in Tanzania. There has been a huge wave of foreign investors into the country since 2005. Many of these investors are proposing that they will be carrying out socially and environmentally responsible programmes, however details surrounding how precisely they will achieve these remain unclear.

The overall aim of this study is to highlight, with concrete examples, the challenges involved as large-scale biofuel investments are carried out in Tanzania. Following a previous WWF study into biofuels, this study aims to look at some of the major issues involved with biofuels in Tanzania and assess how investors can develop their businesses successfully, whilst simultaneously mitigating negative environmental impacts and maximising gains for rural development.

The aims of this consultancy therefore are to:

- Assess the current status of all biofuel investments in Tanzania
- Make a detailed assessment of the major investors

A method using the Inter-American Development Bank (IDB) scorecard was used to indicate the status of each investment in relation to the environment, food security and land issues amongst many others, and was based on the sustainability criteria drawn up by the Roundtable on Sustainable Biofuels (RSB) version 0, drawn up in 2008.

## *2 Discussion*

Although Tanzanian law does cover some of the areas that biofuel companies and investors are working in, there is currently no integrated policy framework surrounding this. The draft guidelines set by the National Biofuels Task Force (NBTF) do not specify how environmentally and socially sustainable biofuel investments should be carried out. The resulting vacuum has caused an unclear investment climate and a great deal of concern from many stakeholders about the negative impact an unregulated biofuel industry may have on rural development and the environment.

Currently a large amount of land is being set aside for investors for biofuel production. If not properly monitored and regulated, this activity could lead to a great number of rural populations being displaced.

In terms of consultation, the companies we approached were either in the process of negotiating for land or had just finished negotiating with village administrations for land. Many villagers we interviewed in Kilwa, Rufiji and Bagamoyo were pleased that companies were already working or about to commence work in their regions, due to the promise of jobs, infrastructure and health and educational benefits that their activities are expected to bring to the area. However many other stakeholders have commented that a lot of village land is being sold off primarily due to a lack of other opportunities available as well as a lack of knowledge about land rights amongst local people. Many Tanzanians fear that this change in land ownership could lead to the displacement of a large number of rural poor, which could have serious effects on the country's long-term political stability.

The majority of the companies interviewed have not yet completed their land acquisition processes and therefore have not yet paid compensation to locals. All companies that are buying village land will be given derivative title, which will be held by the Tanzanian

Investment Centre. This “leasing” of the land lasts 99 years. The land was being sold off at a very low price. In Kilwa district village land was being sold for around USD12 per acre.

Tanzania is a country of high biodiversity with many endangered ecosystems. One of these is East African Coastal Forest, which has many endemic species. The coast of Tanzania seen as one of the key areas for the establishment biofuel feedstock plantations and the lack of current data on endangered and rare species could lead to a great loss of biodiversity if areas of high conservation value are not set aside as “no-go zones”. Five out of the nine main investors assessed were already working or were planning to work in areas of high conservation value (HCV) which potentially have rare, threatened or endangered species on their land. Although many of the companies stated that they would make a concerted effort to help preserve HCV areas and minimise environmental impact, only one company produced a clear plan and detailed study surrounding this issue. Based on the precautionary principle, until more documentation is made surrounding the biodiversity in each area and management plans are written that mitigate their environmental impact, the establishment of biofuel plantations remain a threat to biodiversity. How indirect land use will affect biodiversity in a much larger question that companies also need to address.

Biofuel development has a huge potential to improve local livelihoods. There are large proposals for building infrastructure around the areas that large-scale plantations will be established and great opportunity for generating employment. All companies interviewed stated that they had written contracts with and social security provisions for their permanent employees.

The broad claims that the biofuel industry will be assisting with the alleviation of climate change remain to be substantiated. Most of the companies interviewed had either not carried out or not made public the actual (or predicted) greenhouse gas emission reductions of their operation.

Finally the link between food security and biofuels is highly complex and depends on many different factors. Many people involved in the biofuel industry were fairly positive that the increased agricultural activity around rural areas would in turn increase food production, which is currently very low. However this theory has not been examined in detail, and many villagers that we spoke to indicated that they may stop cultivating food crops in order to cultivate biofuel feedstock. Until more is known about the relationship between biofuels and food security and production within Tanzania increases, the potential consequences remain uncertain.

### ***3 Recommendations***

Having made a basic assessment of some of the largest biofuel investors in Tanzania, we hereby make the following recommendations;

- That a biofuels think tank is formed, consisting of a variety of stakeholders, which would examine how to properly and thoroughly address the concerns surrounding the biofuel industry in Tanzania.
- That the IDB Scorecard used in this study should be further developed in order to establish quantitative and qualitative indicators that can be used to address major social concerns particular to the Tanzanian context. This could aid the documentation of problems associated with biofuel development, and move the debate on from being based on “hear-say” evidence.
- That ecological research is carried out in all of the geographical areas that biofuel investors are proposing to work, primarily consisting of GIS studies and remote

sensing that can identify areas of High Conservation Value. Detailed follow up field studies are needed in each area.

- That a Tanzanian version of the Roundtable for Sustainable Biofuels should be formed that could involve all the major Tanzanian stakeholders, including NGOs, biofuel investors and the government.

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## Abbreviations and Acronyms

ABERC	African Biofuel & Emissions Reduction Company
CARE	CARE International
CSR	Corporate Social Responsibility
Ha	Hectares
HCV	High Conservation Value
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
FAO	Food and Agricultural Organisation
KAKUTE	Kampuni ya Kusambaza Tecknolojia
IUCN	International Union for Conservation of Nature
MEM	Ministry of Energy and Minerals
MDGs	Millennium Development Goals
NBTF	National Biofuel Task Force
NEMC	National Environmental Management Council
NGO	Non Governmental Organisation
NSSF	National Social Security Fund
RECOMAP	Regional Coastal Management Programme
RSB	Roundtable on Sustainable Biofuels
SEKAB	Swedish Ethanol Chemistry AB
SIA	Social Impact Assessment
TIC	Tanzania Investment Centre
VIPO	Vice President Office
USD	United States Dollar
TFCG	Tanzania Forest Conservation Group
TNRF	Tanzania Natural Resources Forum
TSH	Tanzanian Shilling
URT	United Republic of Tanzania
UNIDO	United Nation Industrial Development Organisation
VLFR	Village Land Forest Reserve
WCST	Wildlife Conservation Society of Tanzania
WWF	World Wide Fund for Nature

# Scope of Study

## *1 Background to the Study*

The biofuel industry in Tanzania is still in a nascent stage, with various companies, both Tanzanian and international, active at various stages. Tanzania has been inundated by foreign investors since 2006, most from the EU but also the United States and Asia. Most projects are still in the project planning stage and going through the land acquisition process. This has taken over two years for many of the companies.

In order to set biofuel policy guidelines, the Tanzanian government set up a National Biofuels Task Force (NBTF). This involves at least eight different government ministries and is spearheaded by the Ministry of Energy and Minerals (MEM). Draft guidelines were brought out in September 2008.

Biofuels have become a highly controversial topic and many Tanzanians are worried about the amount of land being given away to foreign investors. At the same time the government is seeking to attract more foreign investors to the country.

A WWF biofuel stakeholder's workshop was carried out in Morogoro in June 2008, at which a list of principles were put forward for a framework for how socially and environmentally responsible biofuel investments should be carried out in Tanzania. Government ministries, NGOs and other concerned parties attended the workshop.

## *2 Aims and Objectives of the Study*

The overall aim of this study is to highlight, with concrete examples, the challenges involved as large scale biofuel investments are carried out in Tanzania. Following a previous WWF study into biofuels, this study aims to look at some of the major issues involved with biofuels in Tanzania and assess how investors can develop their businesses successfully whilst simultaneously mitigating negative environmental impacts and maximising gains for rural development.

The aims of this consultancy are to:

- Assess the current status of all biofuels investments in Tanzania
- Make a detailed assessment of the major investors
- Produce a report outlining the consultancy findings

## *3 Outline of Study Methods*






The methodologies used in this study mainly consisted of semi-structured interviews with the following stakeholders:

- Company directors: A questionnaire was sent out to company directors and representatives, which covered principles and issues raised at the WWF stakeholders workshop.
- National, district and village government officials: Understanding the level of involvement by local community, benefit sharing and human right issues.
- Tanzanian NGOs

- Local communities: Assessing their level of understanding on biofuel issues and their expectations.
- Academics at universities in Tanzania
- National, district and village government officials

In addition, the Inter-American Development Bank (IDB) scorecard below was used to indicate the status of each investment in relation to the environment, food security and land issues amongst many others, and was based on the sustainability criteria drawn up by the Roundtable on Sustainable Biofuels (RSB). Much of the information about the biofuel industry so far has been based on “hear say” evidence. The IDB scorecard represents a start of how quantitative and qualitative data can be used to assess biofuel operations.

As many biofuel investors in Tanzania are still at the project planning stage, this coding system indicates their status at the moment, and it is hoped that their statuses will change as their projects grow and develop. The intention and aim of this method is not to judge biofuel companies on a pass/ fail basis but to assess how they each comply with each of the principles so as to identify problem areas within the development of socially and environmentally sustainable biofuel investments.

<b>Table 1: IDB Scorecard</b>	
<b>Keys</b>	
Excellent	
Good	
Satisfactory	
Partially unsatisfactory	
Unsatisfactory	
N/A	
Source: Inter-American Development Bank	
W W F	

# Industry Overview

## 1 Stakeholder Viewpoints

*“The media the world over has started to opine about this all-important subject, predicting the demise of the already hungry continent. They argue that land that may be used for biofuels agriculture will diminish food production.*

*I do not see it that way. Instead, I see it as a unique opportunity for the African continent to cut a niche for itself as the feeder of other continents and the one to oil the cogwheels of the world economies. I have in mind the vast unoccupied land in Tanzania which can feed the whole of East Africa without necessarily causing a glut if well utilized”*

**Bernadina Kayumbe, The Citizen (Dar es Salaam), published 28<sup>th</sup> October 2008**

*“..Overall my expectations for the future of the village are good and I am hopeful about the presence of the (biofuel) company here. If the company sticks to what they have agreed in their discussions with us, the income of our village will grow and everyone will benefit from their presence.”*

**Mohamed Osman Makau, Nyamage village, Rufiji Delta**

*“..Diesel from Sugarcane? I just can't believe it!! I know Sugarcane for a long time as they grow it locally in my own village in Mbeya region, I used to chew Sugarcane and I know they make sugar out of it- if you tell me they can also make fuel to run vehicles out of it - I don't believe it!! But thank God I am here working with a company - and I hope one day they can prove it to me.”*

**SEKAB employee, Bagamoyo.**

*“People are walking around with ‘promote biofuel’ T-shirts but nobody has a clue as to what this is all about.”*

**Researcher, Rufiji Delta**

*“Biofuels are good for our country and the huge capital and technical investment which the multinationals are bringing to us is vital to rejuvenate our struggling agriculture sector, but we need leadership, responsible leadership that is able to tell the investors where to go and put their money...*

*.....We cannot afford to repeat the serious mistakes we have made in the mining sector a few years ago and therefore central government officials and TIC must keep track of the rapid developments taking place in the sector. Otherwise if the laxity which can be noticed now is left unchecked, then seriously this country's countryside is under invasion.”*

**This Day (Dar es Salaam), published Thursday 13<sup>th</sup> November 2008**

## ***2 Biofuel investors in Tanzania***

### **2.1 Biofuel companies working in Tanzania**

Many biofuel companies are currently working in Tanzania. Many investors are applying for land, and their management capacity remains a large question. A situation has been created in which many companies are stating that they have already acquired land and have started plantations to attract more investment, but the veracity of all these claims is uncertain.

### **2.2 Business models**

The companies operating in Tanzania are all small players relative to those operating in countries such as Brazil, Germany and the USA. Both BP and D1 Oils had been looking to invest in Tanzanian biofuels, however at the time of writing both companies were looking at neighbouring countries such as Mozambique as places with more investment potential.

The companies listed below were found to be behind the main investors in Tanzania. The main factor determining market share at the moment is the point in time at which the company was set up.

The project plans and business models vary a great deal between companies depending on the feedstock and the region that they are working in. Each feedstock represents an opportunity to establish different production and value chains. One of the key issues for the companies' business plans is how the co-products are used. These represent spin off business opportunities that can generate more revenue, create jobs and help further diversify the energy sector in Tanzania. At the moment business models are being divided between companies that are setting up large-scale plantations to grow feedstock and investors that rely on all production to be carried out by out-growers.

The companies we looked at in detail included SEKAB, BioShape, SunBiofuels, Diligent, Africa Biofuel and Emissions Reduction Company, PROKON, and CAMS Agri-Energy Tanzania. In addition we collected information about Inf-Energy and African Green Oils, but neither of these companies are necessarily growing feedstock for biofuels but may do so in future depending on the market and the future Tanzanian tax on biofuels.

An important point to make is that the companies had the choice to grow crops like cotton, tobacco or sisal, none of which are food crops but still would not come under the same scrutiny as biofuels, but they have selected biofuels despite the risks. On the other hand it is likely that such investments would not receive the same level of government support. Regardless however, this level of scrutiny could represent a new step in evaluating agricultural projects for the future.

In this report we have tried to highlight the main issues for these investors in order for them to achieve responsible biofuel investments.

<b>Table 2: Companies behind investments</b>	
<b>Investor</b>	<b>Company behind investor</b>
Africa Biofuel and Emission Reduction Company	World Bank Funding of \$200,000 USD (in need of more investment)
BioShape	Kempen & Co (a merchant bank) and Eneco Energy
SEKAB	SEKAB Group
SunBiofuels	TEP Plc based in London and two Tanzanian investors
PROKON	PROKON, Germany
Diligent Tanzania Ltd	Diligent Energy Systems
CAMS Agri-Energy Tanzania	Major European Biofuel manufacturing & Trading Co. in joint venture with CAMS Agri-Energy Tanzania
Inf Energy	Capricorn LLC
Africa Green Oils	Tree Farms from Norway

Source: Kilimanyika research W W F

### ***Diligent***

Diligent Tanzania is based in Arusha and is the single most important player in the existing Tanzanian biofuel market, small as it is. Diligent is producing significant quantities of biofuel, with a capacity of 1500 litres per day although most of this is Jatropha oil rather than biodiesel. Diligent's business model of working with out-growers has led them to start production before other companies as they have not had to pass through the lengthy land acquisition process.

### ***SEKAB***

SEKAB Tanzania is owned by the SEKAB Group whose owners are from Övik Energi, Umeå Energi, Skellefteå Kraft, Länsförsäkringar i Västerbotten, OK Ekonomisk Förening and Eco Development. The company was formed following the signing of a Memorandum of Understanding between the Government of Tanzania and Swedish Ethanol Chemistry (SEKAB), BioAlcohol Fuel Foundation (BAFF), and Community Finance Company (CFC) to kick-start the development of a long term and sustainable bioenergy platform in Tanzania. The company is based in Dar es Salaam and is in the process of acquiring land in Bagamoyo, and in November of 2008 was negotiating with communities in Rufiji.

### ***BioShape***

BioShape is a Dutch company, and according to information gained from their website <http://www.BioShape.nl>, was founded in the late 1990s to produce biofuel in Tanzania for the Belgian and Dutch energy markets. A team was sent to Tanzania in 2006 to locate suitable sites for biofuel plantations, and a deal was most probably signed with the Kilwa District authorities by the end of 2006. According to the BioShape EIA, the investment is planned over a number of years, starting with 1000 ha in 2007 and eventually reaching 81,000 ha by 2017.

### ***SunBiofuels***

SunBiofuels Tanzania Ltd, a subsidiary of British company SunBiofuels PLC, is finalising a USD \$20m investment in an 8,211 ha concession in Kisarawe District in Tanzania. SunBiofuels Ltd is a biofuel company operating predominantly in emerging markets. Their strategy is to cover all areas of the biofuel industry, from growing and production to processing and marketing. SunBiofuels state on their website that they are “*committed to sustainable development within the countries that we operate; we strive to create minimal impact on the environment while bringing a high level of employment to what are often disadvantaged communities*”.

A London based investment company whose assets are worth over USD \$1 billion is behind the company. SunBiofuels aim to become a major producer and seller of biofuels. In addition to Tanzania they are working in Ethiopia and Mozambique.

SunBiofuels started to apply for land in Kisarawe in 2006 and are still in the process of land acquisition in order to set up a plantation of Jatropha. An EIA has been carried out and released for this land. About 11,000 people live in the villages surrounding the land, which is used by the villagers for charcoal making and which provides a major source of income. Other uses for the area include collecting clay for pottery and gathering firewood, as well as herbs for food and medicine. The land allocated to SunBiofuels also includes a swamp where the local people collect water in the dry season. SunBiofuels will acquire a 99 year lease on the land and the villagers hope they will continue to be able to access the land, and the water on it, into the future.

### ***CAMS Agri-Energy Tanzania***

CAMS Agri-Energy Tanzania is owned by CAMS group, a UK based trading company that specialises in energy production, power projects and agricultural products. CAMS Group report total sales volumes of USD \$50-100 million annually and are applying for land in Bagamoyo and Handeni in order to establish plantations of Sweet Sorghum.

### ***Inf Energy***

Inf Energy is owned by Capricorn LLC, a USD \$5 billion Silicon Valley SRI and a large UK based investor. Inf Energy Ltd was established in Tanzania in September 2005 to take advantage of the opportunity to create biodiesel businesses in developing markets. Given the current global debate about food security, the company is committed to only growing food crops (including vegetable oils) in the short term and will review the potential production of biofuels periodically. The company has started to cultivate rice.

The business intends to grow 7,500 ha of Palm Oil (net of infrastructure) over five years on an estate in a sustainable location, the Mngeta Farm in the Kilombero Valley. They also intend to establish a substantial outgrowers scheme to supplement estate production. The company, in conjunction with other investors, has assisted in the business’s initial development phase to acquire the Mngeta Farm and commence commercial operations and the establishment of the oil refinery<sup>1</sup>.

### ***Africa Green Oils***

Africa Green Oils is owned by the Norwegian company Tree Farms, and is in the process of establishing a Palm Oil plantation in Rufiji. They have two sites where they are working near Iqwiri and have established 100ha of Palm Oil plantation. They have applied for 2000ha of land but have not yet received a derivative title.

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<sup>1</sup> Information taken from <http://www.aac.co.ke/portfolio.html>

***PROKON Renewable Energy Tanzania Ltd.***

PROKON Tanzania is owned by PROKON Group, Germany. PROKON's mission in Tanzania is "to cultivate *Jatropha* under an agreement with contract farmers, to process *Jatropha* seeds in an own oil processing plant and to trade *Jatropha* oil in Tanzania and abroad<sup>2</sup>." Their vision is to contribute to sustainable development and to create employment and income in rural areas and establish *Jatropha* oil as a reliable and competitive fuel on the Tanzanian and international market. They are currently working with outgrowers in the Mpanda region.

***Africa Biofuel and Emission Reduction Company***

Registered in Dar es Salaam, Tanzania, in 2006, Africa Biofuel and Emission Reduction Company Ltd. state that they are dedicated to bringing a 'triple-bottom-line' biofuel business model to Africa. The company's vision is to identify a productive, environment-enhancing non-edible oil-bearing crop, and identified *Croton megalocarpus*, an indigenous tree, as its focus<sup>3</sup>. The Company's management team includes Tanzanian and non-Tanzanian professionals, and they are applying for land in SouthEast Biharamulo District, Kagera region.

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<sup>2</sup> <http://www.prokon-tanzania.com/tanzania.html>

<sup>3</sup> [http://www.africabiofuel.com/The\\_Company.aspx](http://www.africabiofuel.com/The_Company.aspx)



# Legislative Issues

## *1 Integrating biofuel policy in Tanzania*

Although the laws listed below do cover some of the areas that biofuel companies and investors are working in, the current lack of a clear policy framework has resulted in a climate of uncertainty.

For the development of a socially and environmentally sustainable biofuel industry to occur in Tanzania, there is a need for an integrated policy from the Tanzanian government. In order to develop this, the National Biofuel Taskforce (NBTF) was established featuring people from the following ministries; The Ministry of Energy and Minerals (MEM), the Vice President's Office, The Ministry of Labour, the Ministry of Finance, the Ministry of Water and Irrigation, the Ministry of Natural Resources and Tourism, and the Ministry of Agriculture, Food Security and Irrigation.

There have been many reasons why developing an integrated national biofuel policy has been problematic and complicated. The main ones are that most of the Task Force members do not have much free time as they are busy with their day jobs at the Ministries, and that the NBTF is chronically underfunded when one considers the level of policy integration needed.

The reshuffle of the Tanzanian cabinet, which happened not long after the formation of the NBTF, meant that MEM took over leading the process, resulting in some people feeling that the MEM have dominated the proceedings. However other parties have said that the work of the NBTF would not have continued had it not been for MEM spearheading the process and taking initiative.

All companies involved in the biofuel industry are keen to see guidelines in place so they can develop their businesses. However many questions are left unanswered and concerns remain about how the industry will be effectively monitored and regulated.

## *2 Critique of the draft guidelines released by the NBTF in September 2008*

Although the NBTF guidelines outline that the biofuel industry will promote sustainable development and improve the livelihoods of Tanzanians, they remain unspecific about how these goals will be achieved. The term "sustainable" is mentioned 11 times in the document but there is no specification of how it will manifest. The document also states that "*In order to reduce the anticipated risks and capture the opportunities it will be necessary to take into consideration issues of sustainability in tandem with principles of sustainable development*", however no principles are actually outlined.

The document does however emphasise that

*"The potential benefits of biofuels are immense, and they include among others, the following:*

- 1) Enhancing energy security, especially in the transport sector;*
- 2) Creation of employment and diversification of rural economy;*
- 3) Creation of market for agricultural energy crops;*
- 4) Saving of foreign exchange equal to the value of imports substituted;*
- 5) Contribution to cleaner environment through reduction of green house gases and*

- 6) *other vehicular emissions;*
- 7) *Potential to halt deforestation and desertification, as they include drought resistant crops like *Jatropha curcas*, *Sisal*, *Cassava* and *Sweet Sorghum*;*
- 8) *Renewability;*
- 9) *Replacing fossil fuels especially in vehicles;*
- 10) *Facilitates technology transfer;*
- 11) *Octane enhancement in petrol engines and hence replacing (toxic) lead through use of bioethanol; and*
- 12) *Enhancing food security”*

However none of the risks associated with each of these benefits are addressed. For example, how will issues of food security be enhanced if highly productive land is given over to large-scale plantations growing feedstock for agriculture? How may energy security be enhanced? What kind of tax system will be put into place to promote biofuels? How will deforestation be halted and greenhouse gas emissions be reduced if there are no comprehensive guidelines that state how clearing land for crops will not cause deforestation and the loss of standing carbon.

The document then states that *“properly implemented biofuel projects will bring about a win-win situation to all involved parties.”* However exactly what these win-win situations are remains unclear. The social fuel seal is listed in the glossary. This is a progressive tax system that has been developed in Brazil to give tax breaks to companies that buy from small-scale farmers. However there is no further reference to this in the rest of the document.

Furthermore the document does not include the issue of transparency in regards to the process of decision making and granting of biofuel investments. At a minimum it should include the aspect of availability of documents/minutes in regards to admission.

It is stated that *“Biofuels one stop centre is responsible for coordination, endorsement and monitoring biofuels investments and development in the country. The biofuels one stop centre is also the source of information on biofuels development in the country.”*

It is not clear in the document of the roles/mandate between MEM, Biofuels One Stop & Biofuels Steering Committee (BSC). Reading the document MEM/Biofuel One Stop can endorse certain aspects without the support of the BSC. Since the BSC consists of representatives from all the relevant ministries, it should have the final say in the process of endorsing or not endorsing investments. There seems to be no role of other stakeholders in the process described, i.e. there is no opportunity to receive relevant input from the outside prior to endorsing investments.

### **3 Land Issues**

According to the Village Land Act of 1999, the term "land" refers to the surface of the earth and the earth below the surface and all substances other than minerals and petroleum forming part of or below the surface, things naturally growing on the land, buildings and other structures permanently affixed to land.

Land is therefore grouped into three categories namely

1. Village Land - This land occurs in the village area managed by the village council (the village must have to be registered and have certificate of customary right of occupation).
2. General Land - The land under the Central Government.

3. Reserve Land - Conservation areas such as national parks and game reserves.

The major land issues in Tanzania are:

- Lack of adequate security of tenure for majority of rural and urban people. In urban areas 70% of people live in unplanned settlements besieged by health hazards and insecurity.
- Conflicts of land use in rural areas especially between farmers and livestock keepers and persistent land disputes as a result of rapid expansion of towns encroaching on surrounding farming areas, tenure conflicts between customary and granted land rights.
- Land degradation and destruction of water sources.
- Absence of adequate and coordinated land information.
- Inadequate human, institutional and infrastructural capital.

#### ***4 Water Issues from the 2002 National Water Policy***

Water is a basic natural resource for socio-economic development. It is fundamental for various social-economic development activities such as industrial production, irrigated agriculture, livestock keeping, mineral processing, hydropower production, navigation, recreation and tourism (URT 2002).

The National Water Policy (URT, 2002) insists that water quantity and quality are the factors that determine how water should be used (This is therefore a factor that establishment of the biofuel irrigated farms should consider the aspect of water quality and quantity as insisted in the policy).

The previous 1991 Water Policy (URT, 1991) had a goal that by 2002 clean and safe water should be provided for all Tanzanians a maximum of 400 metres from their households, but by 2002 only 50% of the rural population had access to reliable water supply services (this indicates the need for biofuel companies to consider assisting the rural populations with water and sanitation in general in the areas whereby the company's farms are located in order to contribute to the goals stipulated in the policy).

The 2002 Water Policy insists on the proper utilization of water and water resources. In the policy it is stipulated that extensive irrigation during dry season drives up the rivers thus disturbing ecosystems and wildlife. This therefore implies that companies which need to use water from different rivers for irrigation should make sure that the ecosystems and wildlife depending on water resources in their respective areas are maintained. Situations where water is pumped out of rivers should consider the existence of the downstream ecosystems and wildlife. We can use the example of SEKABS' plan of using water from the Wami river, which is depended upon by wildlife in Wami Mbiki Wildlife Reserve and Saadan National Park.

The Water Policy further highlights inefficient water uses such as many irrigation schemes (estimated at 10 to 15%) which contributes to reduction of water availability. This therefore implies that companies that need to invest in irrigation should make sure that their investment should aim at increasing water use efficiency which will ensure availability of water to many other water users, the companies should aim at drip irrigation that will reduce water seepage and hence improve water use efficiency.

In the Water Policy it is mentioned that the irrigation potential in the country is estimated at one million hectares of which only 150,000 hectares are under irrigation, therefore many hectares are still suitable for irrigation. This implies that the Policy has a provision

of allowing more farms to be opened for irrigation, which favours the companies to establish farms that will depend on irrigation.

Equally the policy details that agricultural activities also contribute to pollution from the use of agrochemicals, which are washed by the rainwater and find their way to water sources. This therefore indicates that the companies need to make sure that the chemicals that will be used in their farms whether rain fed or irrigated should be point based. Precision agriculture which reduces water pollution should therefore be recommended.

The following principles in water resource management identified in the Water Policy are regarded to be pertinent to the biofuel irrigated farms:

- Water management and development should be based on a participatory approach, involving users, planners and policy makers ... ( This implies that the companies aiming at using water for irrigation should make sure that they apply participatory approaches to acquire water for irrigation)...
- Water is a common use resource and its use shall be determined by consistent laws ... (This implies that the companies should seek permission to use water from a river or aquifers as explained in this policy)...
- Water related activities should aim to enhance or to cause detrimental effects to the natural environment ... (This implies that the companies intending/using water for irrigation should make sure that the ecosystems are conserved and wildlife depending on the water are not suffocated)...
- The allocation and consumption of water for environmental purposes shall be recognized and given appropriate consideration.... (There is a need for the companies to develop water use plans)...
- A sound information and knowledge base including both data on surface and ground water (quantity and quality), socio-economic data are needed for effective actions within all water related activities ... (This forces the companies to carry out some basic baseline studies before using water for irrigation)...

## ***5 Issues from the 1998 Forest Policy***

The overall goal of the Forest Policy is to enhance the contribution of the forest sector to the sustainable development of Tanzania and the conservation and management of the natural resources for benefit of present and future generations. The four Forest Policy objectives are:

- Ensure supply of forest products and services by maintaining sufficient forest area under effective management
- Increase employment and foreign exchange earnings through sustainable forest based industrial development and trade
- Ensured ecosystem stability through conservation of forest biodiversity, water catchments and soil fertility
- Enhance national capacity to manage and develop forest sector in collaboration with other stakeholders.

Based on the forest Policy Objective One, biofuel companies should look at helping villagers to plant trees as a part of the benefits that the companies are intending to offer to the villages where their farms are located. This will help farmers to obtain forest goods and services.

This will help in addressing the Policy Objectives (one and two): with their directions given thereafter in the policy.

Policy Objective three exists to ensure ecosystem stability through conservation of forest biodiversity, water catchments and soil fertility.

In the Policy it is detailed that the current encroachment and shifting cultivation taking place in forested areas are reducing the natural forest cover and forest biodiversity. Moreover, repeated wildfires are hampering the regeneration of all types of forests. This implies that biofuel companies should take into consideration the maintenance of forest covers and that farms should not be established in the forested areas. Moreover, the use of fire in clearing vegetation for establishing different farms should be limited as it will be against the policy.

On watershed management and soil conservation, the Forest Policy insists on the sustainability of water sources as key prerequisites for local and national development. Furthermore, the policy insists that cultivation on riverbanks outside forests reserves has caused erosion. This implies that the biofuel companies should also make an effort with watershed conservation and should not establish farms in the areas very close to the river banks.

The Forest Policy identifies encroachment, wildfire, illegal logging and poaching in the reserved forest to have contributed to the deterioration of wildlife population. The directions given in the policy include setting aside corridors, grasslands, wetlands etc. This implies that biofuel companies should make sure that farms are not established in the areas where wild animals are crossing from one reserve to the other as establishing these farms on those areas goes against the policy.

Environmental Impact Assessments are insisted upon in the Forest Policy. It is explained in the policy that various types of investment projects in forests may cause adverse environmental impacts. An EIA must, therefore, be incorporated in the planning and decision-making processes in order to ensure beforehand that unnecessary damage to the environment is avoided and possible mitigation measures are identified. This therefore requires the biofuel companies to make sure that they carry an EIA before any farm is opened in any of the village areas.

# Compensation Issues

*“No land is unused so the whole concept of compensation is flawed – compensation for what – the potential the land holds? They are not aware of what they are letting go of. What the industry is really doing is redistributing the benefits from the land, centralizing it, removing the benefits from the local populations and focusing its potential through a few external investors...”*

**Anonymous Voice in Tanzania**

## ***1 Introduction***

Land compensation is one of the most hotly debated topics surrounding biofuels in Tanzania. Land is the greatest capital that rural Tanzanians have available to them. Currently most land in Tanzania (around 70%) is village land, owned by the local people. Many Tanzanians are concerned about the amount of land that is being bought up by foreign investors. There is a fear that local people could lose their most important asset and then be marginalised. Land is being sold off at a very low price as villagers have high expectations of what biofuel investors will be bringing jobs, infrastructure, and as out-growers gaining access to a secure market for biofuel crops.

The land acquisition process is highlighted in the previous chapter. Further to our research it appears that BioShape are the only company that have received derivative land title and pay compensation. Regarding land compensation, SEKAB have stated;

*“In Tanzania as well as in most Southern and Eastern Africa the land itself has limited or no nominal value. This has been one of the cornerstones of the socialist system that was implemented after independence. This is slowly changing and giving a nominal value to land in attractive areas, such as close to Dar es Salaam and other larger towns. In the case of Bagamoyo we are negotiating with the Government of Zanzibar the amount to be paid for the land where the company will be given a derivative right for 98 years from TIC (Tanzania Investment Centre). The amount will be fixed according to negotiations between seller and buyer.”*

<b>Company<sup>5</sup></b>	<b>Amount of land (hectares)</b>	<b>Area in Tanzania</b>	<b>Previous Ownership</b>
ABERC	20,000	Biharamulo District, Kagera Region	Village Land?
SunBiofuels	8,211	Kisarawe	Village Land
SEKAB	20,000	Bagamoyo	Government of Zanzibar
SEKAB	80,000 <sup>6</sup>	Rufiji	Village Land
BioShape	34,000	Kilwa	Village Land
CAMS	40,000	Bagamoyo & Handeni	Village Land
Inf Energy	7,500	Kilombero	Parastatal
Africa Green Oils	2000	Rufiji	Village Land

Source: Kilimanyika Research W W F

Looking at Table 3 it is important to note that both Inf Energy and SEKAB in Bagamoyo, have bought government or parastatal land as supposed to village land. The acquisition of village land has been highly controversial within Tanzania.

	PROKON	CAMS	ABERC	SunBiofuels	SEKAB	BioShape	Diligent	Inf Energy	African Green Oils
<b>Land ownership</b>									
Community-based / co-op									
Community involvement as shareholders									
Community leasing of the land			✓						
Concentrated ownership				✓					
Displacement with proper compensation		✓		✓	✓	✓			✓
Disputed land									
Involuntary displacement					?				
Involuntary displacement from indigenous territory									
N/A	✓						✓	✓	

Source: Kilimanyika Biofuel Investors questionnaire/ IDB scorecard W W F

<sup>4</sup> Only Inf Energy and BioShape have actually acquired land. All other companies are still going through the land acquisition process.

<sup>5</sup> Diligent and PROKON have not been included here as they are officially only working with outgrowers. Diligent have established demonstration plots in different villages but they the land has remained village land.

<sup>6</sup> Some discrepancy exists here between different targets set by SEKAB for land in Tanzania. On 20 Nov 2007- SEKAB stated plans for acquiring 200 000 ha in Rufiji and Kilwa. At a SEKAB workshop in Sweden 6 Feb 2008; SEKAB states plans on 400 000 ha in Tanzania with 300 000 ha in Rufiji and Matandu area. Here we have shown their most recent estimate.

## 2 Company Profiles

### 2.1 SEKAB

SEKAB are in the process of acquiring the Rajaba farm in Bagamoyo. They are buying this from the Government of Zanzibar, which acquired the land in the mid 1970s. There are reports that there are still controversies linked to the land stemming from this previous land acquisition, with some local people still claiming some rights to the land.

*“In Rufiji the land process of transferring village land to general land will be valued according to criteria for land valuation and compensation paid to villages accordingly. It may be worth mentioning that there will be a value for the forest resources and other investments on the land and that the cost of land mapping, soils sampling and all land process meetings etc. must be added as a cost for an investor in getting the land. In general the land process takes about two years in Tanzania and the cost of having staff and managing the process is another cost to the company.”* SEKAB

During the time of this study, SEKAB had not received land title, and had not paid compensation.

### 2.2 BioShape

Local communities in the areas BioShape are operating in are satisfied with the company’s approach to them. The company has apparently already paid the amount agreed for village land compensation, but as of the 16<sup>th</sup> October 2008, Mavuji village have still not received this money, which apparently is in the local District account, the village are not aware when they will actually receive it.

In Mavuji village, the land relocated to the company was unused land, which according to the Village Land Use Plan was planned as a farming area. The village still has spare land for Village Land Forest Reserves (VLFs) and for other uses, such as settlements.

The company compensated the village 15,000 Tsh (USD 12.09) per acre. The village attempted to suggest a sharing mechanism so that the village would receive 7,000 Tsh (USD 6.67), with the remaining 8,000 Tsh (USD 6.45) going to the District. However, according to the Mavuji village chairman, this idea was rejected by the District, who suggested that the village should receive 40%, with 60% going to the District for administration costs and to support the development of social services in other villages in the District. This deal was accepted by the Mavuji village council. The sums of money that were paid to the villagers for their land appear low, with some locals calling it “exploitative”.

S/N	Village name	Approx. Population	Amount to compensated
1	Mavuji	2,200	89,420,000
2	Nainokwe	2,100	49,800,000
3	Liwiti	1,600	95,605,600
4	Migeregere	2,000	170,284,000
Total amount to be compensated to village			<b>405,109,600</b>

Source: Kilwa District Council

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### 2.3 SunBiofuels

SunBiofuels came under heavy criticism in the (2008) Oxfam report “Another Inconvenient Truth”. In this Oxfam stated that 11 villages were entitled to a total compensation of 800m Tsh (about \$630,000) – equating to about USD \$77 per hectare.



The Oxfam report quoted a newspaper article which stated that SunBiofuels had confirmed compensation of USD \$220,000 to be shared between 152 people who had trees on their land, and a further \$10 per hectare – suggesting total compensation of less than half that reported in the press. SunBiofuels stated in our research questionnaire that they will be paying \$800,000 to the Ministry of Lands. During our interview with them, they examined their records of compensation (which they have not paid as they have not yet received derivative land title), and informed us that no one living in Mtamba village actually sold them land.

# Consultation

During the 2008 workshop held in Morogoro, there was an agreement that biofuel investors should be transparent about the way they carry out their business. The way in which investors carry out consultation with local communities is controversial to many Tanzanians.

## 1 Transparency

Out of all the biofuel companies interviewed, Inf Energy, Diligent, BioShape, Africa Biofuel and Emissions Reduction Company were the most organised, forthcoming and transparent about sharing their business plans. All four companies have carried out ESIA's. PROKON were the most difficult to contact although this may be due to the Tanzanian Director being away on business during the time of the study. CAMS also shared a great deal of information.

In order for the biofuel industry in Tanzania to be transparent in the future, it is important for all operators to be able to make public a list of documents.

Table 6: Consultation									
Consultation	PROKON	CAMS	ABERC	SunBiofuels	SEKAB	BioShape	Diligent	Inf Energy	African Green Oils
Conducted full ESIA, full transparency			✓			✓	✓	✓	
Free, prior, and informed consent from community									
No consultation									
N/A	?	?	?		?			?	?

Source: Kilimanyika research/ Inter-American Development Bank

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## 2 Consultation

*“Local people shall be fairly and equitably compensated for any agreed land acquisitions and relinquishments of rights. Free prior and informed consent and negotiated agreements shall always be applied in such cases.”*

### Roundtable on Sustainable Biofuels Version 0

For the IDB scorecard system to allow greater insight into the process of consultation that companies have carried out, it would be worth developing a list of criteria, which can help to properly assess this issue within a Tanzanian context. The great challenge with consultation between villagers and communities at the moment is that by its very nature, consultation tends to be based on “hear-say”. A company and a community can go away from the same meeting with a very different understanding of what occurred. For the process to be more open and transparent, a mechanism is needed to ensure that the agreement made with the villagers includes a mechanism for informing them of their land rights. This might involve an impartial third party being present at the meetings, which could be of great advantage to all parties involved including the investor, as it could allay fears that villagers are being unfairly “duped” into giving away their land.

Many stakeholders are highly concerned about the lack of knowledge that local people have about their land rights. Although all companies interviewed stated that they had or were in the process of consulting with local communities about the amount of land they were acquiring, it is hard to ignore the unequal power dynamic that exists between the two parties. District officials in Ikwiriri, Rufiji commented that they were very sceptical about the intentions of companies operating there. There were reports that SEKAB had been going directly to village councils to negotiate for land, rather than the going through the District Council, and setting up meetings in which the company provided ample catering, which was undoubtedly attractive to the local stakeholders.

The research team obtained the meeting minutes documenting the consultation that was carried out between SEKAB and Nyamage village. The meeting agenda was to discuss the investor's request for land, in order to establish a sugarcane plantation.

*“Our company- SEKAB is requesting the land for sugarcane farming; the sugarcane will be used as raw material for oil production which will be used to run machinery such as vehicles, electricity production and other different machines. This project will involve two districts which are Bagamoyo and Rufiji. A village which will be involved in this project at Rufiji district is Nyamwage.”*

This conversation proceeded to examine the benefits that the villagers would receive as a result of the company's presence. However no mention was made of the amount of land that was being negotiated for. SEKAB did state that the villagers had a good idea of the size of land they were giving away from physical boundaries (i.e. rivers and trees).

However the villagers still seem unsure about the outcome:

*“In terms of where we are at with the company's activities, I can tell you that the process of them acquiring the land has not yet completed therefore we are unsure whether they will be acquiring the actual title deeds for the land or not. We are a little nervous about this....*

*...we are hoping that the company will pay 'taxes' or 'levees' to the village when they start to earn money from the land. This is not something that has been formally discussed, so we do not know how much money this will be, but this is something we are hopeful about.”*

**Villager, Nyamage village, Rufiji.**

# Food Security

## 1 *The issue of food security*

*"So it's a crime against humanity — it's a crime against humanity to convert agricultural productive soil into soil ... which will be burned into biofuel... ..what has to be stopped is ... the growing catastrophe of the massacre (by) hunger in the world."*

**Jean Ziegler UN independent expert on the right to food**

Food security is another contentious issue that has been linked to biofuels and been featured a great deal in the media internationally. Much of the media storm has focused on the issue of maize from the mid western United States, often called “the world’s bread basket”, being converted into ethanol. However the link between food security and bioenergy production is highly complex and not fully understood. This link has often been over simplified in shocking headlines and articles, that have not taken this complexity into consideration.

The FAO are currently carrying out a study called the ‘Bioenergy and Food Security Project (BEFS)’, which aims to mainstream food security concerns into national and sub-national assessments of bioenergy potential. In order to do this they are developing an analytical framework and guidance process to assess the bioenergy and food security nexus. After developing this framework they aim to assess bioenergy potential of four different countries and the implications that this has for food security. Tanzania is one of four countries this study is focusing on, the others being Peru, Thailand and Cambodia (Rommert Schram 2008). The project eventually aims to pilot sustainable and food secure bioenergy projects, exchange knowledge and strengthen institutional capacity in a way that can influence policies.

Bioenergy and food security scenarios differ in each country, depending on the selection of biomass chains and the policy instruments that are used to promote the bioenergy industry. Will food prices increase as a result of extra demand for food crops as biofuel? We are only beginning to understand how biomass potential (partially coming from the amount of land available) and the supply chains affect agricultural markets and income, welfare, prices and output in all sectors of the wider economy. One key concern is how much fertile land will be taken up by biofuel feedstock. In order to better understand this, more assessments are needed to estimate the land available for bioenergy production, taking into account forested and protected areas and evaluating food production.

The big question that remains is - how much land will be given to biofuels at a national level? What are the implications are of this for the whole country? More coordination is needed between government departments to make sure that bioenergy policy in Tanzania takes more of these issues into account.

## 2 *The food situation in Tanzania*

*“Food security is related to the farmer’s ability to produce food in an efficient way. As known the peasant farmers have a very low yield per hectare. By introducing a good outgrower scheme concept the same concept can be used on food cropping.”*

**Anders Bergfors, MD, SEKAB Tanzania.**

*“If jatropha farming cost less labour and resources than maize and at the same time has greater cash than maize, I will definitely turn my maize field into Jatropha. I know if many people do this, there will be a food shortage in our village but as long we have money we can buy food somewhere else!”*

**Mr. Mohamed Ali, Mavuji Village, Kilwa, Tanzania**

It is important to point out the high poverty level in Tanzania. An FAO survey from 2001-2003 found that 44% of the population was undernourished (Rommert Schram 2008). As fuel prices have increased by over 100% over the last two years, food prices have also increased as a result of the increased price of transporting food.

Rural subsistence farmers in Tanzania produce low yields. An example of this is cassava. In Thailand, cassava yields of as much as 25 tons per hectare have been produced, compared to 15 tons per hectare in Nigeria. In Tanzania yield of cassava, a highly important food crop for rural and urban people, is generally as low as three tons per hectare.

An argument that many investors are making is that their presence and long term aim to work with outgrowers once they establish their central plantations, will help to increase the productivity of agriculture in a country that has a large amount of fallow land. So by having outreach officers that will go into outgrower communities, skills will spread and food production and the production of biofuel feedstock will increase. However some villagers interviewed in Rufiji said that they were likely to replace their rice production with sugarcane as outgrowers. The new link to the cash economy does represent a risk to local livelihoods if prices of biofuel crops do not remain stable. If the price of sugarcane and ethanol decreases this may pose a threat to secure livelihoods. Diligent's policy of guaranteeing their outgrowers that they will pay 150 shillings per kilo of jatropha seeds for ten years may combat this and add greater security. However other parties have pointed out how low this minimum guaranteed price is.

BioShape and their in-house agricultural engineers have taken this one step further and have established a school vegetable garden in Mavuji. Here local children can learn about agricultural practices. The company also states that the land use planning they have carried out reserves enough land for the villagers to enable population growth (cropland and village forest) and that they have not used cropland for plantation. However we have no understanding of how they have calculated this.

### ***3 Local food security***

Food security issues differ a great deal depending on the areas where the biofuel investors are working. Certain areas, such as Karagwe where the Africa Biofuels and Emissions reduction Company plan to work, is a food surplus area and is farmed extensively. Other investors argue that there is plenty of land available for agriculture but no one is certain. How much land is available is an important question, and more studies are needed to identify suitable land for food crops and more marginal land that could be used for biofuels.

Diligent's jatropha out-growers are not seen as any threat to food security by the company, as they are just planting jatropha for fencing. Jatropha has been planted and grown in this way for many years in Tanzania and it has only recently become apparent to farmers that the plant is actually valuable. Diligent have also been encouraging farmers not to stop food production by promoting intercropping. The company also takes photographs and visits every outgrower every year, each outgrower's position being marked down by field officers with a GPS, allowing the company to have a good idea of the status of its outgrowers' farms for food and jatropha. Intercropping is also being seen as a way of avoiding food security issues in areas where *Croton megalocarpus* will be grown as the trees have an open canopy architecture that also allow food crops to be grown.

Another biofuel crop, sweet sorghum produces grains and as well sugar. The grains could be used as for food. CAMS Energy Group plan to meet with their outgrowers every year in order to decide how much grain will be needed by the community, and also plans to

help them to establish a grain storage building. The local people in Bagamoyo and Handeni already grow more traditional varieties of sorghum for their own consumption. The surplus grains will then be sold off by the company who will find a market to sell them on behalf of the outgrowers. However, the FAO and other organisations still question the validity of this crop as it has not been grown at a large scale in the same way that sorghum has. There is likely to be a trade off between the amount of grain that can be produced and the amount of sucrose that is in the stem.

The current capacity of many companies in evaluating local food security issues is unclear. By providing help in terms of general training in agriculture, food production can be increased leading some investors to conclude that little assessment of local food security is needed. However until the relationship between bioenergy production and food security are better understood, all stakeholders should be aware of the potential threat to food security.

One company that does have capacity in this regard are Africa Biofuel and Emission Reduction Company who have a former WFP Vulnerability Assessment and Mapping Officer, which helps the company's understanding of local circumstances. Other companies are in the process of making studies into this or state that they have made their own local food security studies. However none of these studies were available. It has been suggested that biofuels ESIA's should also include a local food security assessment in order to take this issue into account properly.

# Production

## 1 Farm Yields

Owing to the fear that land taken up for the production of biofuel feedstock may displace land for food production, the IDB scorecard favours biofuel production that gives a large yield. The results given by the companies on predicted yield per hectare is summarised in Table 7. CAMS, SEKAB and Inf Energy were predicting the greatest yields. This is partly a reflection of the fact that sugarcane and palm oil have been cultivated for a long period of time and have high yielding varieties. The fact that Africa Green Oils are predicting a much lower yield for palm oil is probably due to the fact that they are not currently planning an irrigation system. All the jatropha projects were predicting a much lower yield. Jatropha, like Croton megalocarpus, is untried on a large scale throughout the world and in Africa. Both represent a wild crop and there is a great deal of uncertainty about what kind of yield they will produce.

Table 7: Predicted Yield of biofuel in litres per hectare									
	PROKON	CAM	ABERC	SunBiofuels	SEKAB	BioShap	Diligent	Inf Energy	Africa Green Oils
Yield >= 6000		✓			✓			✓	
4000 ≤ Yield < 6000									
1000 ≤ Yield < 4000	✓		✓	✓		✓			
Yield < 1000							✓		✓
N/A									

Source: Kilimanyika research/ Inter-American Development Bank

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However this part of the IDB Scorecard is somewhat of an awkward comparison. It is difficult to compare Jatropha grown on dry and relative unfertile soils with potentially little competition with food production with high yielding sugar cane ,which need lots of water and fertile soils/fertilizers to give high yields and that would not survive in a more arid climate. It would also make more sense to carry out this comparison only within the same feedstock.

## 2 Processing

### 2.1 Energy Source for Processing Facility

The energy source for the processing facility is another indicator of how efficient a company plans to carry out the processing of its feedstock into biofuel. Through burning co-products such as bagasse from sugarcane, electricity can be created and used to power processing. CAMS, SEKAB and Inf Energy all plan to produce energy from their processing facility that can provide extra energy to the Tanzanian grid.

<b>Table 8: Energy Source for Processing Facility</b>		PROKON	CAMS	ABERC	SunBiofuels	SEKAB	BioShape	Diligent	Inf Energy	African Green Oils
Cogeneration with excess to sell to grid	?	✓			✓				✓	
Cogeneration to power facility only			✓	✓						
Other renewables										
Grid								✓		
Off-grid fossil fuel							✓	✓		
N/A										✓

Source: Kilimanyika research/ Inter-American Development Bank

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## 2.2 The importance of processing feedstock into biofuels within country

The processing of raw materials into a value added product is another key part of the debate in Tanzania and Africa in general. A great deal of revenue, jobs and opportunities will be missed if the processing is not carried out in-country. All biofuel companies interviewed do plan to carry out processing within Tanzania in the long term. The way processing is carried out depends on the feedstock that is used.

CAMS Biofuels, who plan to use sweet sorghum as their feedstock for biofuel, have a limited time period in which to carry out processing due to the short 24 hour sucrose peak when harvesting has to take place. In order to make the most of the 24 hour time period the company plans to have multiple smaller processing units. The liquids will then be transported to a central facility in Dar es Salaam. These processing units will create many new local jobs.

At present only Diligent are actually processing, although production of this varies with the season. Current production is estimated at 1,500 litres per day, although as they work with outgrowers, practically jatropha plants rely on rainfall. As there are two rainy seasons this means that they have two major periods of harvesting and high production.

The processing of pure vegetable oil (PVO) to biodiesel is an expensive process due to the large amount of energy and ethanol that is needed. Ethanol is an expensive bi-product of petroleum and has to be imported, but this may change over time as in-country ethanol production increases.

The EIA report made by NEMC for BioShape is ambiguous (and in places contradictory) as to whether the jatropha will ever be processed in Tanzania. The report claims that a benefit of the project will be 'curtailing of foreign resources through reduced import of fossil fuel.' However for at least the first five years, the project will export the raw material for processing in the Netherlands and Belgium and in various places, this is quoted as being the market for which the fuel is intended. Nowhere in the report does the developer make a firm commitment to construct the processing plant in Kilwa. As such it seems that there is a considerable risk that the developer will never build a processing plant in Kilwa and will continue to export the raw material thereby undermining one of the quoted benefits. Speaking to BioShape, they claimed that they would be establishing a processing plants in Kilwa Masoko within two years, however during the time of the study, no clear commitment had been made.



# Market Strategy

## *1 Burgeoning demand*

The market for biofuels is growing rapidly, with demand being fuelled by the rising cost of oil, concerns about climate change and blending mandates that are being introduced into the EU. As long as the price of crude oil remains above USD\$50 per barrel it is likely that biofuels will be economically viable to produce. Some investors estimate that the biofuels industry will steadily grow for the next 30 years and then decline as alternatives emerge from the research community. However for the time being as more countries introduce blending mandates, demand will continue to grow.

Whether biofuels are exported or sold within Tanzania is also an area that most investors are still debating. Although many are planning on selling to the domestic market, they are also waiting to see how the tax system is set up within country and for the establishment of a national blending policy. The amount of VAT and other taxes that will be placed on biofuel in Tanzania will determine the future of the industry. In 2004 petroleum imports accounted for 40 per cent of the country's and were responsible for a large share of its foreign exchange spending (Worldwatch Institute 2007). The reduction in costs of transport fuel would give a large boost to the national economy. There have been rumours that the tax on biodiesel may be the same as regular diesel, if this is the case, it is unlikely that the biofuel industry will thrive in Tanzania. All companies interviewed are now waiting to see what tax regime is put on biofuels and will then change their business plans accordingly.

## *2 Current uncertainties*

One of the main inhibitors of growth according to biofuels investors, is public opinion about biofuels combined with the current uncertain political frame work. This is often linked to the 'food versus fuel' debate that continues in the media. Inconsistent legislation is also seen as potential barrier. However uncertainties about biofuels also relate to many of the new crops that are being used. As mentioned earlier, exactly how successful a wild crop such as jatropha will be when grown on large, commercial plantations remains to be seen. The original industry hype surrounding jatropha attracted many investors and but it is still seen as a large gamble.

# Use of Energy Crops

## *1 Crop types*

The investors assessed were planning to use the following crops as potential feedstock for biofuels; jatropha, palm oil, croton megalocarpus, sugarcane and sweet sorghum.

### **1.1 Jatropha**

Jatropha remains a controversial biofuel crop. Although it was deemed a “miracle crop” a few years ago, as it can survive in hot and arid conditions, it will need a reasonable amount of nutrients and water in order to produce a profitable yield. Little data exists on large scale jatropha plantations, and most of the data that does exist comes from India.

A PhD student who assessed some of the plantations in India found that some of the data coming from BioShape was questionable. Based on the data available, in good conditions it takes 5kg of Jatropha seeds to produce one litre of oil (oil content in Arusha has been around 15%). Crude oil arriving at Dar es Salaam sells at USD 0.52 per litre. Others have calculated that the cost of producing the seeds should therefore not exceed USD 0.16 (because of other processing costs etc) in order to be competitive with diesel in Tanzania. Once the other costs of infrastructure etc. have been taken into consideration, it has been estimated that a producer can not afford to pay labour more than three to four USD cents per kg of seed. These figures are similar to what BioShape estimate that they will pay their workers i.e. TSh 3,000 for 80 kg however it seems highly unlikely that they will find 10,000 people willing to work under those conditions for any prolonged period. It also assumes that the oil content will be good which is not documented.

### **1.2 Palm Oil**

Palm Oil plantations are well known as causing extensive deforestation in South East Asia. As a result of this quite a few companies including SunBiofuels were not keen on working with the crop. Inf Energy were very enthusiastic about the possible high yield of oil from palm fruit.

### **1.3 Croton megalocarpus**

Croton megalocarpus is a dominant upper canopy forest tree reaching heights of 40 meters or more. It is widespread in the mountains of Arusha, Kilimanjaro and Kagera regions. Croton can grow at minimum altitude of 1300m and maximum of 2200m.

### **1.4 Sugarcane**

Sugarcane is one of the important commercial crops in Tanzania. It is primarily grown on four estates, namely those of the Kilombero Sugar Company, Mtibwa Sugar Estate, Tanganyika Planting Company and Kagera Sugar Limited. It is a water hungry crop, which is certainly a concern for SEKAB’s planned plantation in Bagomoyo.

### **1.1 Sweet Sorghum**

Sweet Sorghum is a highly drought resistant crop. Sorghum is grown in almost every region of Tanzania, but most commonly in Dodoma, Singuinda, Tabora, Shinyanga, Mwanza and Mara regions. Although this crop has great potential it has not been grown on a commercial scale in the same way as Sorghum, and there are therefore many uncertainties linked to it.

## Soils

Most companies were planning on manual harvesting rather or harvesting feedstock mechanically. None reported that they would be burning in order to clear land.

<b>Table 9: Harvesting Methods</b>									
	PROKON	CAMS	ABERC	SunBiofuels	SEKAB	BioShape	Diligent	Inf Energy	African Green Oils
Manual harvesting (feedstock other than Sugarcane)	✓	✓	✓			✓	✓	✓	✓
Mechanical harvesting					✓	✓			
Field burning with manual harvesting									
Field burning when mechanical harvesting feasible									
N/A									

Source: Kilimanyika research/ Inter-American Development Bank

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# Water

## 1 Introduction

Table 10 shows each company's proposed water requirements. The gross majority of outgrowers selling seeds to Diligent and PROKON are not going to have the capital to construct an irrigation system that will have any impact on local water resources. CAMS replied in the questionnaire that they will not need to irrigate, however to get more than two harvests a year, they may well set up irrigation. Sweet sorghum is a multi-annual crop and with irrigation there is the possibility of having three harvests per year.

Table 10: Water Requirements for Cultivation									
	PROKON	CAMS	ABERC	SunBiofuels	SEKAB	BioShape	Diligent	Inf Energy	Africa Green Oils
No irrigation required		✓	✓	✓		?			✓
Rain-fed	✓	✓		✓			✓		
Efficient irrigation					✓			✓	
Standard irrigation									
Irrigation in water scarce region									
Water scarcity caused by project					✓?				
N/A									

Source: Kilimanyika research/ Inter-American Development Bank

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## 2 Company Information

### 2.1 Inf Energy

If they cultivate palm oil in the future, Inf energy plan to use water from the Mngeta river. This will not reduce the river to below the 70% level of revival flow. They have been granted water rights. The EIA has judged that the off-take for irrigation will not have a negative impact. They will use sprinkler and sub surface irrigation techniques.

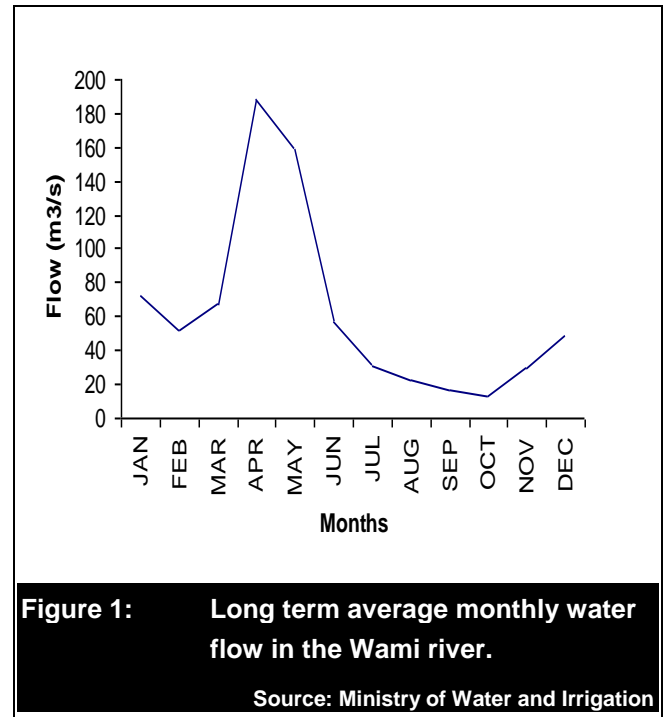
### 2.2 SEKAB

The Bagamoyo site the site is close to the Wami river. The Wami river sub-basin is divided into six hydrologic zones: Kinyasungwe, Mkondoa, Mkata, Diwale, Lukinga and Wami. The farm is close to the Wami hydrologic zone which includes main two tributaries namely the Tami and Kisangata rivers which are mostly perennial systems that flow all year round (Coastal Resource Centre 2008). In this area there is no information regarding the presence of the local aquifer. A detailed ground survey is needed to map the existing aquifers that can be used to substitute water from the Wami river if needed for irrigation purposes. There is no concrete information concerning how much water is used for irrigation in the SEKAB farms, as the farms are not yet at full capacity.

Average water flow in the Wami river recorded at Mandra for 15 years, indicates the flow to be at its peak in April. A recent environmental flow study carried out in the area observed similar trends where by the flow was in its peak in April/May and at its lowest in October (Coastal Resource Centre 2008).

**Risk of Salinisation**

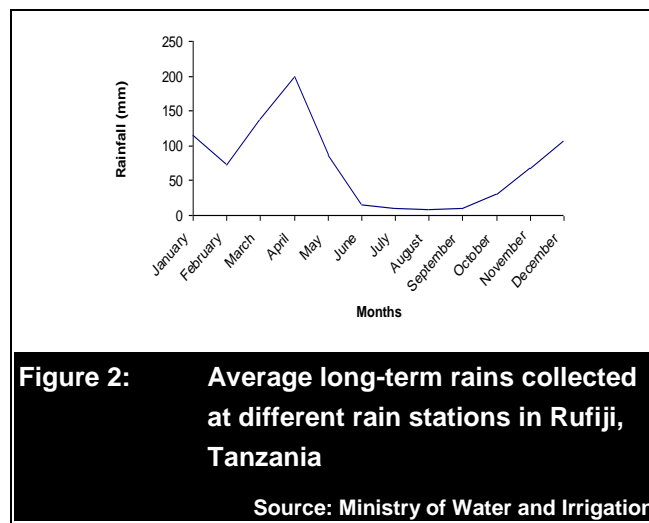
Representatives from the Tanzania Coastal Management Partnership for Sustainable Coastal Communities and Ecosystem in Tanzania were worried on the salinisation risks that affect the river ecosystem. They mentioned that the saline water does flow back to the river from the ocean to a distance up to 50 Kilometres. This means that, if more water is drawn out from Wami river for different purposes, the saline water may invade the river ecosystem to more than 50 Kilometres that has been mentioned. Flowing of the salt water to the river affects the wildlife in the Wami Mbiki Game Reserve as well as that in Saadani National Park. More hydrologic studies are needed in the area before more water is pumped out for irrigation so that the company can pump out water which is enough not to cause problems to both human and wildlife depending on the river ecosystem.



**Rainfall pattern**

Based on the rainfall data obtained from the Ministry of Water and Irrigation, the yearly pattern for the rainfall for this area has been generated. The average long term rainfall pattern for about 50 years indicates the peak rains to be in between April and May and the lowest rains to be between July and August.

**Rufiji**

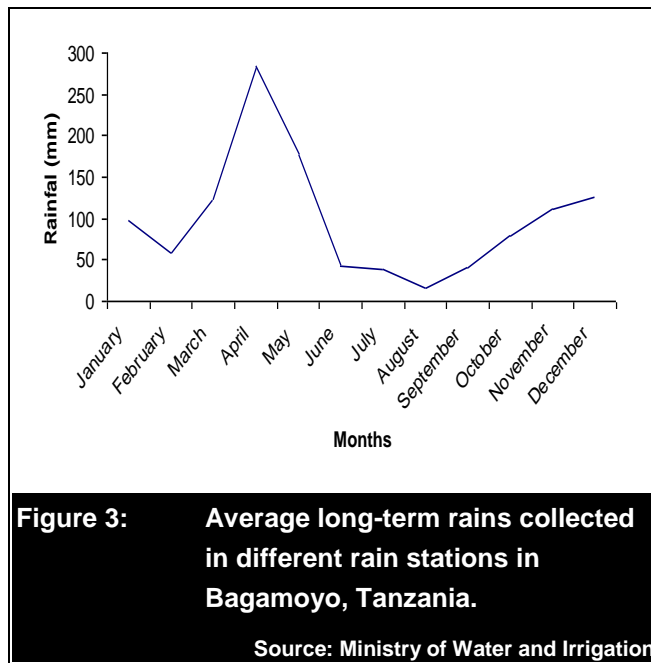


The site is within Rufiji river basin where the irrigation will depend on water from Rufiji river. The Rufiji floodplain is intensively used for agriculture and there are 13 permanent

lakes connected to it (REMP, 2001). Monthly water flow for the data collected at Stiegler Gorge station for 25 years, collected by the Ministry of Water and Irrigation, indicates high water flow between March and May and the lowest between August and November.

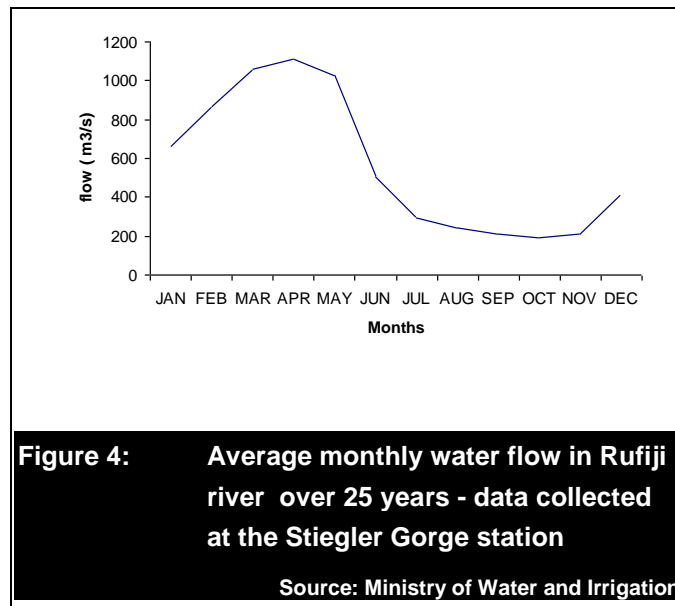
### ***Risk of Salinisation***

Although there is not much information on the risk of salinisation for the water in the Rufiji river, the risk of this occurring can not be ruled out. A detailed study is needed on salinisation levels. This will help determine the amount of water to be pumped out from the Rufiji river without affecting the river ecosystem.



### ***Rainfall pattern***

Rainfall pattern in Rufiji based on the data generated by the Ministry of Water and Irrigation show the period with the highest rainfall in the district to be between March and April and the months with the lowest rains to be June through September. This is essential information for the company when involving outgrowers on a scheme that depends on the rains for productivity.



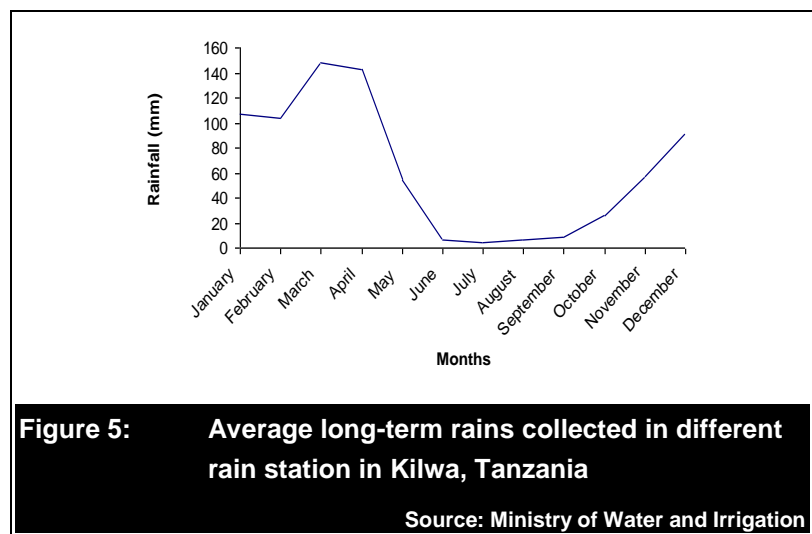
### 2.3 BioShape

#### Rivers and their status

BioShape intends to carry out biofuel production in Kilwa District in the areas of Mavuji, Nainokwe, Migeregere and Liwiti. No information was obtained on the existence of rivers and water flows in the Kilwa area from the Ministry of Water and Irrigation. However the River Mavuji crossing between Mavuji village, the water from Mavuji river use by local community for irrigation and domestic purposes. Currently BioShape are avoiding using water from Mavuji river as it will create water competition between the local community and the company. The company’s intention is to have boreholes that will help secure water for the nursery irrigation as well as their farm.

#### Rainfall patterns

Long term rainfall data obtained from the Ministry of Water and Irrigation suggests that the peak rain season is between February and May, and the dry season is between late May to early September. Thus the establishment of a nursery and the transplanting of *Jatropha* seedlings should take into consideration the rain patterns in the area.



## 2.4 SunBiofuels

### *Rivers and their status in Kisarawe*

In Kisarawe area, little information about rivers and their status is available. Based on the discussion held with officials in the Ministry of Water and Irrigation, there is a seasonal river named Mbezi at Bigwa but its water flow has not been assessed. On the presence of aquifers in the area, it was mentioned that a small lake called Lake Manze–Mkongo existed, but its water content and suitability have not been tested. There is little hydrological information on this area.



# Biodiversity Conservation

## 1 Introduction

This section features a compilation of data collected from experienced biodiversity specialists working in Tanzania. Research was carried out after obtaining the geographical grid coordinates from each company. Biodiversity and botanical data was then obtained in relation to each grid square. The more coordinates companies were able to give us, the easier it was to obtain precise data on biodiversity value. The precautionary principle has been used here, so that if a company is working in an area of high biodiversity or if there has not been a detailed study of the area it has been assumed that the site may have High Conservation Value (HCV) forest.

The biodiversity of most of Tanzania (especially away from Ngorogoro Crater and the Serengeti) is poorly studied and unplanned land clearing that does not take into account HCV forest will have negative impacts on biodiversity. Inf Energy was the only company to have carried out detailed biodiversity surveys in the area they work. There is an urgent need for more studies to be carried out at each site before plantations are established. Capacity building is needed both for the companies and for the consultants at NEMC who do the ESIA's that companies are legally obliged to make.

Table 11: Biodiversity							
Biodiversity	PROKON	CAMS	ABERC	SunBiofuels	SEKAB	BioShapeDiligent	Inf Energy Africa Green Oils
Assessment conducted, no threatened species							
No assessment required given prior land use							
Threatened species adequately addressed						✓	
Threatened species, no plan	?	?	✓	✓	✓	✓	✓
N/A	✓					✓	

Source: Kilimanyika research/ Inter-American Development Bank

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Another indication of potential impact on biodiversity is the previous land use, as shown in Table 12. Again, until biodiversity specialists make a full assessment, it is difficult to guarantee that high conservation value areas are not present in the proposed sites. All of the companies interviewed expressed an interest in getting more studies carried out in the areas they are working.

Table 12: Former Land Use									
Former land use	PROKON	CAMS	ABERC	SunBiofuels	SEKAB	BioShape	Diligent	Inf Energy	African Green Oils
No land area required	✓						✓		
Degraded land			✓	✓	✓	✓			
Marginal land		✓	✓		✓	✓			
Under-utilized land			✓		✓				
Fallow fertile land			✓					✓	
Productive land			✓						
Rain forest or primary forest									
Peatland									
Wetlands								✓	
High conservation value areas (HCVAs) and protected areas		?	?	✓	✓	✓			✓

Source: Kilimanyika research/ Inter-American Development Bank

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## 2 Biodiversity value in biofuel investor areas

### 2.1 CAMS Energy

CAMS Energy only provided a degree specific grid location for their proposed concession near Handeni, which means that it is not possible to give a precise estimate of the biodiversity value of their locality as the given coordinates of 6°00'S, 37°00'E appear to be a rounded figure and could therefore range from anywhere between 5°31' - 6°59'S, and between 36°31' - 37°59'E. This represents an area of some 150 x 150 km, ranging from the arid Somali-Masai vegetation in the West as far as Dodoma, to moister vegetation of the coastal plain near Handeni. The upland massifs of the Nguru and Nguu mountains containing Eastern Arc montane forest are located within this block.

Given the dry nature of the Somali-Masaai vegetation in the rain shadow of the Eastern Arc Mountains, it must be reasonable to assume that CAMS Energy are focusing their interest on the moister area of relatively flat territory to the West or South West of Handeni where there is a lot of uncultivated land. The vegetation of this area varies between fallow farmland and a coastal variant of brachystegia (Miombo) woodland, with patches of East African coastal forest and scrub forest on the rise and at the base of the inselberg outcrops. Recent biodiversity surveys have discovered new species and range extensions in the remaining patches of montane forest on the Nguru and Nguu Mountains, but little is known about the biodiversity values of the lowland vegetation around these mountains, as the area is away from the main transport corridors in Tanzania. However, given its location at the edges of the Somali-Masaai and Swahilian regional centres of endemism, biodiversity values may be comparatively low.

<b>Table 13: Biodiversity in Handeni</b>		
District	Handeni	
Region	Tanga	
IBAs	Maasai Steppe IBA No. 80 (Baker and Baker 2002)	
Protected areas	There are no forest reserves or game reserves. Some Game Controlled areas exist. To the east is the Nguru (IBA 59) and Nguu Mtns. (IBA 60) and their associated Catchment Forest reserves.	
Biomes	Somali-Maasai biome	
Habitat types	Dry <i>Acacia-Commiphora</i> woodland with very little permanent surface water. To the east a few streams come off the Nguu and Nguru Mtns.	
Threatened species	Common name	Redlist category
	African elephant	Vulnerable
	Lesser Kestrel	Vulnerable
	Taita Falcon	Vulnerable
	Pallid Harrier	Near threatened
	Fiedman's lark	Near threatened
	Red-throated tit	Near threatened
	Pancake tortoise	Vulnerable
Endemic species	There are two Tanzania endemic species in this area; Ashy starling and the Yellow-collared love bird. The pancake tortoise is endemic to arid areas of Tanzania and Kenya but is heavily collected for the international pet trade.	
Species of scientific interest	Populations of big game move out of Tarangire NP east onto the Simanjiro plains at certain times of year to cave, some of which may reach the areas of proposed cultivation. Sable antelope and eland as well as other woodland large games species occur in the miombo woodlands.	
Conservation issues	The clearance of mature <i>Acacia tortilis</i> and <i>Commiphora</i> woodlands is threatening this once extensive landscape which unless protected will become a patch work of small fragments of habitat which will cut off traditional migration routes. The lack of a management plan for the area and a protected area network means that agriculturalists can plant where they wish without any government guidance.	
Source: Baker and Baker 2002, Andrew Perkin (unpublished data)		
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## 2.2 SEKAB

*“The present situation with a fast degradation of most lands in Tanzania makes it very hard for an investor to ‘guarantee’ that this (biodiversity and ecosystem services) are maintained. As an investor we will only be one large actor among thousands smaller in Rufiji. On our lands we will however protect important biodiversity areas and we believe strongly that protection against fires, that damage most areas annually, will assist in maintaining the biodiversity. Irrigation will also increase access to water throughout the year which in many cases will assist to bring more wildlife and create ‘evergreen’ areas in areas that otherwise get very dry and low in biodiversity during the dry season. We will collaborate with government and other stakeholders in promotion of good practices among outgrowers and other supporting services linked to the investment.”*

### **Bagamoyo**

SEKAB is in the process of acquiring land for Sugarcane production and have identified the Razaba farm in Bagamoyo district for the establishment of a bioethanol and biopower complex. No precise location was given by SEKAB for their plantation, but it will be within the coastal plain and therefore in the Swahilian regional centre of endemism. The vegetation of this area comprises a mosaic of coastal forest, coastal bushland, thicket, grassland, depauperate brachystegia (Miombo) woodland, fallow and cultivation. Of these, the remaining patches of coastal forest contain most of the rare and endemic plants species found in the district.

Bagamoyo District is one of the better-known districts in Tanzania. Most of the remaining patches of coastal forest in the Eastern and Southern parts of the District have been gazetted into forest reserves or are contained within the Sadaani National Park, while the Western part is sparsely inhabited and poorly known. Given that biodiversity in the coastal forests usually peaks within 70 km from the coast, these Western areas can be estimated to be of comparatively low biodiversity value.

SEKAB plans to plant irrigated sugarcane on a very large/extensive scale on coastal lands in two areas, one, near Bagamoyo, Bagamoyo district, Coast region and two, in Rufiji district, coastal region. The proposed plantations are in an area which is in the globally recognised East African coastal forest hotspot Myers et al (2000). The first Bagamoyo plantation is on a defunct cattle ranch, whilst the second (80,000 ha) is being acquired from village lands in Rufiji district, which contain woodlands and areas of unprotected coastal forest. No biological surveys have taken place here but surveys of the near by Zaraninge coastal forest reveal a rich faunal and floral diversity containing several endemic species. Forested habitat types within the area will probably hold similar biodiversity patterns. This profile will highlight the biodiversity values of the Rufiji coastal forests since the Bagamoyo farm is on already cleared farmland. However any farming activities in this area must be mindful not to clear any evergreen forest and thicket patches that may remain as they will contain coastal forest endemic species eg little yellow flycatcher, black and rufus elephant shrew and many plants (Burgess and Clarke 2001).

<b>Table 14: Biodiversity Profiles of Bagamoyo</b>			
District	Bagamoyo		
Region	Coast/Pwani		
IBAs	Bagamoyo District Coastal Forests IBA No. 47		
Protected areas	Pugu, Kazimzumbwe, Ruvu South		
Biomes	East African Coastal Forests		
Habitat types	Dry coastal forest, lowland rain forest, riverine forest, coastal thicket, and woodlands.		
Threatened species	<b>Scientific name</b>	<b>Common name</b>	<b>Redlist category</b>
	<i>Rhynchocyon Petersi</i>	Black and rufus elephant shrew (eng)	NT ver 3.1 (2001)
	<i>Beamys hindei</i>	Lesser hamster-rat	NT ver 3.1 (2001)
	<i>Galagoides rondensis</i>	Rondo galago	critically endangered
	<i>Loxodonta africana</i>	African elephant	VU A2a ver 3.1 (2001)
	<i>Anthreptes reichenowi</i>	Plain-backed sunbird	NT ver 3.1 (2001)
	<i>Circaetus fasciolatus</i>	Southern banded snake-eagle	NT ver 3.1 (2001)
	<i>Zoothera guttata</i>	Spotted ground thrush	Endangered
	<i>Anthus</i>	Sokoke pipit	Vulnerable

<b>Table 14: Biodiversity Profiles of Bagamoyo</b>			
	<i>sokokensis</i>		
	<i>Sheppardia gunningi</i>	East coast akalat	Vulnerable
Endemic species	<p><b>Mammal and reptile species endemic and near endemic to coastal forests recorded from Zaraninge</b></p> <p style="text-align: center;"><b>Species</b></p> <p>East African Collared fruit bat <i>Myonycteris relicta</i></p> <p>Black and white colobus <i>Colobus angolensis</i>  Garnett's galago <i>Otolemur garnettii</i> (ogilby, 1838)  Zanzibar galago <i>Galagoides zanzibaricus</i> (Matschie, 1893)  Rondo galago <i>Galagoides rondoensis</i>  Red bellied coast squirrel <i>Paraxerus palliatus</i> (Peters, 1852)  Lesser pouched rat <i>Beamys hindei</i> Thomas, 1909  Black and rufus elephant shrew <i>Rhynchocyon petersi</i> Peters, 1847  Unidentified shrew <i>Crocidura</i> sp.  Green Keel-bellied lizard <i>Gastropholis prasina</i>  Broadley's dwarf gecko <i>Lygodactylus broadleyi</i> Pasteur, 1995  Copal dwarf gecko <i>Lygodactylus viscatus</i></p> <p><b>Birds endemic and near-endemic to coastal forests found in forests of Zaraninge FR.</b></p> <p>Southern Banded Snake Eagle <i>Circaetus fasciolatus</i></p> <p>Livingstone's Turaco <i>Tauraco livingstonii</i>  Yellowbill <i>Ceuthmochares aereus</i></p> <p>Eastern Green Tinkerbird <i>Pogoniulus simplex</i>  Sokoke Pipit <i>Anthus sokokensis</i>  Little Greenbul <i>Andropadus virens</i></p> <p>Fischer's Greenbul <i>Phyllastrephus fischeri</i></p> <p>Pale-breasted Illadopsis <i>Illadopsis rufipennis</i></p> <p>East Coast Akalat <i>Sheppardia gunningi</i></p> <p>Kretschmer's Longbill <i>Macrosphenus kretschmeri</i></p> <p>Little Yellow Flycatcher <i>Erythrocerus holochlorus</i></p> <p>Uluguru Violet-backed Sunbird <i>Anthreptes neglectus</i>  Uluguru Violet-backed Sunbird <i>Anthreptes neglectus</i></p> <p><b>Plants</b>  At least 288 plant specimens have been collected in Zaraninge FR of which two are endemic to Zaraninge, at least seven are endemic to the coastal forests.</p>		
Species of scientific	Rondo galago is most endangered bushbaby in the world and is found in Zaraninge forest, it is possible that it can also be found in other coastal		

<b>Table 14: Biodiversity Profiles of Bagamoyo</b>	
interest	forests and thicket in the area, further surveys are required. There is an unusually isolated population central Africa tree hyrax found in coastal forest and thicket near the Wami River at the Kisampa wildlife conservancy. This requires further surveys to assess its status. There are migrant groups of elephant in the area.
Conservation issues	The city of Dar es Salaam as well as the town of Bagamoyo need charcoal as the major source of cooking fuel and coastal forest in the Bagmoyo area is being severely affected. Farming for cash crops such as pineapples is reasonable for clearing large areas of formerly forested land to the north of Bagamoyo.
Sources: Burgess and Clarke 2000, Baker and Baker 2002, Perkin unpub data.	

### **Conclusion**

Unlike other areas such as Kilwa district in Lindi region, coastal forests in Bagamoyo district are largely surrounded by cultivation and settlement and as such are clearly vulnerable since much has already been cleared. Clearing the remnants will threaten the biodiversity of this important area within the internationally recognised coastal forests hotspot. Thus all remaining coastal forest and thickets should be demarcated, surveyed and protected due to the extremely high likelihood of the presence of endemic and rare species.

### **Rufiji**

The Rufiji district contains a complex mosaic of woodlands, forests, floodplains and the largest mangrove delta in eastern Africa. The lower Rufiji valley starts downstream from Stiegler's Gorge, some 180 km from the Indian Ocean, in the Selous Game Reserve. Below the gorge the river fans out in an inner delta with numerous lakes and subsequently enters its lower floodplain, which gradually widens until the river branches out and forms the Rufiji Delta.

The floodplain, which covers approximately 1450 km<sup>2</sup>, comprises a mosaic of former river channels, levees and shallow depressions supporting sparse shrub, intensive cultivation (mainly rice), scattered tree crops (mango, banana) or tall grassland. The floodplain also has palm (*Borassus*, *Hyphaene* and *Phoenix*) and *Acacia* woodland while riparian forest is found on the higher riverbanks. There is also riparian/groundwater forest around the edges of a series of lakes that are connected to the river during the annual floods. The large floodplain lakes in the Lower Rufiji valley occupy roughly 2850 ha (or 56 %) of the surface of standing water bodies in the valley. The higher ground North of the floodplain is covered by a woodland/coastal forest mosaic. To the south of the Rufiji river are a series of hills with important forested areas, dense woodlands and coastal shrub (often referred to as "thicket"). There is an as yet undefined relationship between coastal forests found in Rufiji District and the forests of the Eastern Arc Mountains. The details are not fully understood but a number of endemic plant and animal species occur in both the Coastal and Eastern Arc Forests. Biodiversity values are detailed below.

<b>Table 15: Biodiversity Profiles of Rufiji</b>	
District	Rufiji
Region	Coast/Pwani
IBAs	Rufiji IBA No. 32&48
Protected areas	Over 10 forest reserves (see below).
Biomes	East African Coastal Forests
Habitat types	Dry coastal forest, lowland rain forest, riverine forest, coastal thicket, and woodlands.

Threatened species	<b>Threatened animals of Rufiji district.</b>		
	There are 24 mammals listed on the Redlist of threatened species (IUCN 2008), 10 birds species and 2 amphibians. Many rare and endemic species have yet to be fully assessed.		
	Scientific name	Species name	Redlist category
	<b>Mammals</b>		
	<i>Kerivoula africana</i>	Tanzanian woolly bat	EN B2ab(iii) ver 3.1 (2001)
	<i>Lycaon pictus</i>	Wild Dog	Endangered C2a(i) ver 3.1
	<i>Loxodonta africana</i>	African elephant	VU A2a ver 3.1 (2001)
	<i>Panthera leo</i>	African lion	VU A2abcd ver 3.1 (2001)
	<i>Circaetus fasciolatus</i>	Southern banded snake eagle	NT ver 3.1 (2001)
	<i>Beamys hindei</i>	Lesser hamster rat	NT ver 3.1 (2001)
	<i>Rhynchocyon cirnei</i>	Chequered elephant shrew	NT ver 3.1 (2001)
	<i>Crocuta crocuta</i>	Spotted Hyaena	Lower Risk - Conservation Dependent
	<i>Paraxerus palliatus</i>	Red Bush Squirrel	Vulnerable
	<i>Myonycteris relicta</i>	Collared Fruit Bat	Vulnerable
	<i>Pedetes capensis</i>	Spring Hare	Vulnerable
	<i>Syncerus caffer</i>	Buffalo	Lower Risk Risk - Conservation Dependent
	<i>Tragelaphus strepsiceros</i>	Greater Kudu	Lower Risk Risk - Conservation Dependent
	<i>Taurotragus oryx</i>	Eland	Lower Risk Risk - Conservation Dependent
	<i>Cephalophus natalensis</i>	Natal Duiker	Lower Risk Risk - Conservation Dependent
	<i>Cephalophus harveyi</i>	Harveys Duiker	Lower Risk Risk - Conservation Dependent
	<i>Neotragus moschatus</i>	Suni	Lower Risk Risk - Conservation Dependent
	<i>Aepyceros melampus</i>	Impala	Lower Risk Risk - Conservation Dependent
	<i>Connochaetes taurinus</i>	Wildebeest Brindled gnu	Lower Risk Risk - Conservation Dependent
	<i>Hippotragus niger</i>	Sable Antelope	Lower Risk Risk - Conservation Dependent
	<i>Galagoides zanzibaricus</i>	Zanzibar Galago	Lower Risk – Near Threatened
	<i>Heliophobius argenteocinereus</i>	Silky Blesmol	Lower Risk – Near Threatened
	<i>Hystrix cristata</i>	Crested Porcupine	Lower Risk – Near Threatened
<i>Nycteris aurita</i>	Slit-faced Bat	Lower Risk – Near Threatened	
<b>Birds</b>			
<i>Circaetus fasciolatus</i>	Southern Banded Snake Eagle	Lower Risk / near threatened	
<i>Torgos tracheliotus</i>	Lappet-faced Vulture	Vulnerable	
<i>Aquila heliaca</i>	Imperial Eagle	Vulnerable	
<i>Crex crex</i>	Corncrake	Vulnerable	
<i>Rynchops flavirostris</i>	African Skimmer	Lower Risk / near threatened	
<i>Gallinago media</i>	Great Snipe	Lower Risk / near threatened	
<i>Sheppardia gunningi</i>	East Coast Akalat	Vulnerable	
<i>Anthreptes reichenowi</i>	Plain-backed	Lower Risk / near threatened	

	sunbird	
<b>Amphibians</b>		
<i>Mertensophryne micranotis</i>		Vulnerable
<i>Stephopaedes loveridgei</i>	Loveridge's Earless Toad	Vulnerable
<b>Plants</b>		
There are 25 threatened plants species in the Rufiji district (see below). Stocks of <i>mninga Pterocarpus angolensis</i> , <i>mvule Melicia excelsa</i> African blackwood <i>Dalbergia melanoxylon</i> and <i>panga panga</i> <i>Millettia stuhlmannii</i> are also said to be close to commercial extinction in Rufiji District (Doody & Hammerlynck 2003).		
<b>Family</b>	<b>Species</b>	<b>Conservation Status</b>
Orchidaceae	<i>Microcoelia exilis</i> Lindl.	CITES II
Orchidaceae	<i>Microcoelia megalorrhiza</i>	CITES II
Sapindaceae	<i>Haplocoelopsis africana</i> F.O. Davies	DD
Tiliaceae	<i>Grewia goetzeana</i> K. Schum.	DD
Caesalpinaceae	<i>Baikiaea ghesquireana</i> J. Leonard	EN
Caesalpinaceae	<i>Tessmannia densiflora</i> Harms	EN
Fabaceae	<i>Dalbergia melanoxylon</i> Guill. & Perr.	LR/nt
Moraceae	<i>Milicia excelsa</i> (Welw.) C.C. Berg	LR/nt
Papilionaceae	<i>Pterocarpus angolensis</i>	LR/nt
Annonaceae	<i>Lettowianthus stellatus</i> Diels	VU
Annonaceae	<i>Uvariadendron gorgonis</i> Verdc.	VU
Caesalpinaceae	<i>Dialium holtzii</i> Harms	VU
Caesalpinaceae	<i>Isoberlinia scheffleri</i> (Harmns) Greenway	VU
Euphorbiaceae	<i>Milbraedia carpinifolia</i> (Pax) Hutch.	VU
Fabaceae	<i>Baphia kirkii</i> Bak.	VU
Fabaceae	<i>Erythrina saclexii</i> Hua	VU
Flacourtiaceae	<i>Xylothea tettensis</i> (Klotzsch)	VU
Mimosaceae	<i>Newtonia paucijuga</i> (Harms) Brenan	VU
Papilionaceae	<i>Millettia bussei</i> Harms	VU
Rubiaceae	<i>Rothmannia macrosiphon</i> (Engl.) Bridson	VU
Rubiaceae	<i>Rytigynia binata</i> (K. Schum.) Robyns	VU
Rubiaceae	<i>Tarenna drummondii</i> Breds.	VU
Rutaceae	<i>Zanthoxylum holtzianum</i> (Engl.) Waterm.	VU
Rutaceae	<i>Zanthoxylum lindense</i> (Engl.) Kokwaro	VU

Endemic species	<b>Species</b>	<b>Coastal Forest endemics</b>	<b>Coastal Forest near endemics</b>
	<b>Birds</b>		
	Southern Banded Snake Eagle <i>Circaetus fasciolatus</i>		1
	Eastern Green Tinkerbird <i>Pogoniulus scolopaceus</i>	1	
	Tiny Greenbul <i>Phyllastrephus debilis</i>	1	
	Fischer's Greenbul <i>Phyllastrephus fischeri</i>	1	
	East Coast Akalat <i>Sheppardia gunningi</i>	1	
	Livingstone's Flycatcher <i>Erythrocerus livingstonei</i>	1	
	East Coast Batis <i>Batis soror</i>	1	
	Chestnut fronted Helmet Shrike <i>Prionops</i>		1



<i>scopifrons</i>		
Kretschmer's Longbill <i>Macrosphenus kretschmeri</i>		1
Uluguru Violet-backed Sunbird <i>Anthreptes neglectus</i>		1
Green-headed Oriole <i>Oriolus chlorocephalus</i>		1
<b>Mammals</b>		
Deckin's horseshoe bat <i>Rhinolophus deckenii</i>		1
Tanzanian Woolly bat <i>Kerivoula africana</i>	1	
<i>Myonycteris relicta</i>		1
Grant's galago <i>Galagoides granti</i>		1
Zanzibar galago <i>Galagoides zanzibaricus</i>		1
Garnett's galago <i>Otolemur garnetti</i>		1
Red bellied sun squirrel <i>Paraxerus palliatus</i>		1
Lesser pouched rat <i>Beamys hindei</i>		1
Chequered elephant shrew <i>Rhynchocyon cirnei</i>		1
Black and Rufus elephant shrew <i>Rhynchocyon petersi</i>		1
Scarlet-snouted frog <i>Spelaeophryne methneri</i>		1
Total	7	15
<b>Birds</b>		
<p>25 of the species are forest dependent, a further 231 species may be found in forest edges but also use other habitats such as woodland and wooded grasslands. 172 species are Non-forest species, many of these are wetland species utilising lakes, rivers, mudflats, sandbars and coastline. 6 species are endemic to coastal forests and 5 are near endemics.</p> <p>Special mention should be made of the record of the puguensis race of the Pale-breasted Illadopsis <i>Illadopsis rufipennis</i> in Ngumburuni forest. This race is likely to become a full species when genetic analysis of this complex group with a patchy distribution and long isolation gets underway, In that case the species would most likely immediately be upgraded to threatened status. Previously it had only been recorded in the Pugu and Kazimzumbwi Forests. The latter has already almost entirely been converted to charcoal in spite of efforts by a variety of individuals and organisations.</p>		
<b>Mammals</b>		
<p>In total 117 mammal species from 39 families and 16 orders have been recorded in Rufiji District.. 19 of the mammal species are bats, these are listed in At least 11 Rufiji mammal species are forest dependent and a further 34 species may use the forest edge and other habitats such as woodlands. Only nine species are listed as non-forest species. 11 species are endemic and near endemic to the coastal forests.</p> <p>It should be noted that the presence of a small population of a Red Colobus species, most likely the Iringa RC, was confirmed in the Mtanza Msona forest. It would seem this population is now extinct as there have been no sightings since 1999 (Butynski, T. pers.comm.). There are rumours that another population might exist around Mangwi, in or close to the Ngumburuni forest block.</p>		
<b>Reptiles</b>		

	In total, 87 species (from 25 families/subfamilies from 5 orders) are recorded. Of these, eight species are forest dependent, and thus are vulnerable to forest loss. Of these forest dependent species five species are also endemic to Coastal Forests or Tanzania. A further 60 species may use forest edges and other habitats including woodland and wooded grassland.		
	<b>Species</b>	<b>Common Name</b>	<b>End. Status</b>
	<i>Philothamnus macrops</i>	Usambara Green Snake	Coastal Forest endemic
	<i>Cnemaspis uzungwae</i>	Udzungwa Forest Gecko	Coastal Forest endemic
	<i>Leptotyphlops macrops</i>	Large-eyed Worm Snake	Coastal Forest endemic
	<i>Sepsina tetradactyla</i>	Four-toed Fossorial Skink	Coastal Forest endemic
	<i>Typhlops rondoensis</i>	Rondo Plateau Blind Snake	Coastal Forest endemic
	<i>Crotaphopeltis tornieri</i>	Tornier's Cat Snake	Near Endemic
	<i>Loveridgea ionidesi</i>	Liwale Round-snouted Worm Lizard	Tanzanian Endemic
	<i>Ambylodipsas katangensis</i>	Ionides' Purple-Glossed Snake	Tanzanian Endemic
	<i>Aparallactus weneri</i>	Usambara Centipede-eater	Tanzanian Endemic
	<i>Lygodactylus viscatus</i>	Copal Dwarf Gecko	Tanzanian Endemic
	<i>L. broadleyi</i>	Broadley's Dwarf Gecko	Tanzanian Endemic
	<i>L. luteopicturatus</i>	Yellow-headed Dwarf Gecko	Tanzanian/Kemba End
<b>Amphibians</b>			
A total of 27 amphibian species from nine families and two orders have been recorded in Rufiji District. Of these six are forest dependent, two of the forest dependent species are also endemic to coastal forests; <i>Mertensophryne micranotis</i> , <i>Stephopaedes loveridgei</i> Loveridge's Earless Toad			
Source: Burgess and Clarke 2000, Mwasumbi et al (2000), Baker and Baker 2002, Doody, K. and Hamerlynck, O. (2003), Perkin (2003).			

### Conclusion

The Rufiji delta contains the largest area of estuarine mangrove in East Africa (approx. 532 km<sup>2</sup> in 1990 but increasingly cleared for rice farming). The deltaic plain formed at the Indian Ocean by the Rufiji river is approximately 23 km wide and 70 km long. The wealth of natural resources in this area supports the livelihoods of some 150,000 people. The lower Rufiji and delta area has been identified as one of the most important wetland areas in East Africa, owing to its rich biodiversity and its high productivity.

While illegal, logging and charcoal manufacture has led to land degradation in the district, further extensive large scale (irrigated) monocrop agriculture could impact negatively on the biodiversity and the natural ecosystem of the area. This is primarily due to the large amounts of land, water and human resources required by the investors. Areas of particular importance are the forests and woodlands in and around Ngumburuni FR, the Matumbi and the Kichi Hills as well as the Rufiji Delta.

### 2.3 SunBiofuels, Kisarawe

The concession is located on the coastal plain at 07°05'S, 38°50'E within the Swahilian regional centre of endemism. Much of this area has already been degraded by the dense human population close to Dar es Salaam, although areas of natural coastal bushland, grassland and thicket are still present. The severe charcoal crisis is the major source of

forest clearance both in and outside forest reserves. Land in the area is of poor quality for farming. Clearance of forest patches for farm land to gain access to the more fertile forest soils is a major source of forest clearance. The population and final pressures on these forests areas from the city of Dar es Salaam is great and growing such that local communities have great difficulties trying to manage there local natural resources. This is despite great efforts of NGO's (WWF, TFCG, CARE and WCST) over the last 15 years, but efforts must continue to be made.

<b>Table 16: Basic information about habitat types around Kisarawe</b>	
District	Kisarawe
Region	Coast/Pwani Baker and Baker (2000)
IBAs	Kisarawe District Coastal Forests IBA No. 47
Protected areas	Pugu, Kazimzumbwe, Ruvu South
Biomes	East African Coastal Forests and Zambebian biomes
Habitat types	Dry coastal forest, lowland rain forest, riverine forest, coastal thicket, woodland and swamp

Source: A Perkin W W F

Any evergreen forest patches in this area (including the SunBiofuels concession) are highly likely to contain coastal forest endemic plant and animals species. Some of these plants are only endemic to the Pugu Hills. The Rondo galago is a critically endangered primate and the rarest of all bushbaby species. More populations may occur in any forest fragments remaining in Ruvu South Forest Reserve and outside the forest reserves and further surveys are needed.

Conserving forest cover is essential for this species survival. There is some connectivity to the Selous Game Reserve where large game moves. There used to be a resident population of elephants in Ruvu South Forest Reserve, current data suggests their numbers are greatly reduced but there are still small groups present at certain times of year. Hunting dog and lion have also been reported. The rare tree *Foetidia africana* is likely to be found in the SunBiofuels concession. Migrant populations of hunting dog, elephant and lion are present in the area.

<b>Table 17: Threatened animal species of the Pugu Hills</b>		
<b>Scientific name</b>	<b>Common name</b>	<b>Redlist category</b>
<i>Rhynchocyon Petersi</i>	Black and rufus elephant shrew (eng)	NT ver 3.1 (2001)
<i>Beamys hindei</i>	Lesser hamster-rat	NT ver 3.1 (2001)
<i>Galagoides rondensis</i>	Rondo galago	critically endangered
<i>Loxodonta africana</i>	African elephant	VU A2a ver 3.1 (2001)
<i>Anthreptes reichenowi</i>	Plain-backed sunbird	NT ver 3.1 (2001)
<i>Circaetus fasciolatus</i>	Southern banded snake-eagle	NT ver 3.1 (2001)
<i>Zoothera guttata</i>	Spotted ground thrush	Endangered
<i>Anthus sokokensis</i>	Soko pipit	Vulnerable
<i>Sheppardia gunningi</i>	East coast akalat	Vulnerable

Source: Clarke & Dickinson 1995, Burgess & Clarke 2000, Baker & Baker 2002, Perkin unpub. data. W W F

### **Botanical Information**

The SunBiofuels concession is located next to the large patch of scrub forest/thicket of the Ruvu South Forest Reserve and close to the patches of coastal forest in the Pugu and Kazimzumbwi forest reserves. The Pugu forest reserve has been heavily studied due to its proximity and ease of access from Dar es Salaam, and some seven plants species *Rhynchosia hotzii*, *Humbertochloa greenwayi*, *Lasiodiscus holtzii*, *Grumilea rufecens*, *Annonaceae indet.*, *Aspilia sp.* and *Euphorbiaceae* are still only known from this reserve, and may even have become extinct following the heavy degradation of the forest over the last 30 years.

A further eight plant species are only known from the Pugu/Kazimzumbwi area, including *Uvaria pandensis*, *Xylopi* sp. B of FTEA, *Combretum harrisii*, *Tragia acalyphoides*, *Baphia puguensis*, *Multidentia castanae* and *Millettia puguensis*. In addition, the rare tree *Foetidia Africana* is endemic to the vicinity and has been found nearby in a patch of thicket on the Dar Es Salaam to Chalinze/Morogoro main road at Vigwasa ca. 80km West of Dar es Salaam. This is an endemic genus and may well be in the thickets/scrub forest on the SunBiofuels concession. Apart from the Pugu forest, there have only been a few botanical collections in Kazimzumbwi, Ruvu South and elsewhere in the vicinity.

The presence of so many endemic plant species in this area demonstrates the highly sensitive nature of the SunBiofuels site, and it is recommended that a botanist with expert knowledge of East African coastal forest flora be employed to conduct the EIA of the remaining patches of natural vegetation. In addition an estimated 50 elephants were present in the Ruvu South Forest Reserve in 1991.

Table 18: Endemic Species Found around Pugu hills/ Kisarawe		
Mammals <sup>7</sup>	Forest dependent birds <sup>8</sup>	Plants
Wahlberg's fruit bat <i>Epomophorus wahlbergi</i> (Sundevall, 1846)	Southern Banded Snake Eagle <i>Circaetus fasciolatus</i>	<i>Rhynchosia holtzii*</i>
Black and white colobus <i>Colobus angolensis</i>	Livingstone's Turaco <i>Tauraco livingstonii</i>	<i>Humbertochloa greenwayi*</i>
Garnett's galago <i>Otolemur garnettii</i> (ogilby, 1838)	Yellowbill <i>Ceuthmochares aereus</i>	<i>Lasiodiscus holtzii*</i>
Zanzibar galago <i>Galagoides zanzibaricus</i> (Matschie, 1893)	Green Barbet <i>Stactolaema olivacea</i>	<i>Grumilea rufescens*</i>
Rondo galago <i>Galagoides rondoensis</i>	Eastern Green Tinkerbird <i>Pogoniulus simplex</i>	<i>Eragrostis</i> sp. - probable +new species
Pangolin <i>Manis temminckii</i> Smuts, 1832	Sokoke Pipit <i>Anthus sokokensis</i>	<i>Pycreus</i> sp. - probable new species+
Red bellied coast squirrel <i>Paraxerus palliatus</i> (Peters, 1852)	Little Greenbul <i>Andropadus virens</i>	<i>Aristogeitona magnistipulata +</i>
Lesser pouched rat <i>Beamys hindei</i> Thomas, 1909	Fischer's Greenbul <i>Phyllastrephus fischeri</i>	<i>Aspilia</i> sp. - probable new species+
Black and rufus elephant shrew <i>Rhynchocyon petersi</i> Peters, 1847	Pale-breasted Illadopsis <i>Illadopsis rufipennis</i>	Annonaceae genus indetermined sp. - probable new species+
	White-chested Alethe <i>Alethe fuelleborni</i>	<i>Diospyros engleri</i> (possibly extinct) +
	East Coast Akalat <i>Sheppardia gunningi</i>	<i>Tragia acalyphoides+</i>
	Spotted Ground Thrush <i>Zoothera guttata**</i>	<i>Millettia puguensis+</i>
	Kretschmer's Longbill <i>Macrosphenus kretschmeri</i>	<i>Uvaria pandensis</i> Verdc. +
	Little Yellow Flycatcher <i>Erythrocerus holochlorus</i>	<i>Galactia argentifolia</i> S. Moore+
	Little Yellow Flycatcher <i>Erythrocerus holochlorus</i>	<i>Garcinia acutifolia</i> Δ
	Uluguru Violet-backed Sunbird <i>Anthreptes neglectus</i>	<i>Coccinia</i> sp. B of FTEA Δ
		<i>Diospyros capricornuta</i> F. White Δ
		<i>Sapium trilochulare</i> Pax & K. Hoffm. Δ
		<i>Tapinanthus longipes</i> (Bak. & Sprague) Polhill & Wiens Δ
		<i>Acridocarpus pauciglandulosus</i> Launert Δ
		<i>Brachiaria lindiensis</i> (Pilg.) W.D. Clayton Δ
		<i>Rytigynia binata</i> (Schum.) Robyns Δ
		<i>Tricalysia allocalyx</i> Robbrecht Δ
		<i>Afroseralisia kassneri</i> Hemsl. Δ

Source: (Clarke & Dickinson 1995, Clarke and Burgess 2000, Perkin unpub data) W W F

\* Pugu Forest Reserve endemic species, + Pugu Hill endemics, Δ Coastal Forest endemic species

<sup>7</sup> Mammal species endemic and near endemic to coastal forests recorded from Pugu/Kazimzumbwi,

<sup>8</sup> Birds endemic and near-endemic to coastal forests found in forests of Pugu Hills. Over 61 forest dependent bird species have been recorded for Pugu Kazimzumbwe. Many more non forest dependant species (upto 300) have been recorded for the area as a whole.

### Conclusions

As indicated above, biologically any remaining coastal forest/thicket patches that remain however small, are important for biodiversity conservation. Surveys need to be conducted on the proposed plantation to assess the presence of any threatened and endemic species.

## 2.4 Africa Biofuel and Emission Reduction (Tanzania) Ltd.

Africa Biofuel and Emission Reduction (Tanzania) Ltd. have acquired a concession in the South East of Biharamulo District in Kagera Region of Tanzania. Their core plantation area is adjacent to the Biharamulo Forest Reserve near 3°05'S, 31°30'E, which they hope will act as a buffer zone against further encroachment activities in the Reserve.

There is a complex mosaic of different vegetation types in this area, due to its position at the edge of the Zambesian, Sudanian and Guineo-Congolian regional centres of endemism. Much of the natural vegetation of this area is characterized by wooded grassland of the Acacia-Combretum type with grass-swamp areas in the valleys. To the East the land slopes towards Lake Victoria where large stands of Acacia Xanthophloea dominate on the poorer soils. On the higher ground the woodland is largely Zambesian *Brachystegia speciformis* (rather stunted at its Northern limits) and *B.boehmii* in the East, with *Protea-Combretum* on the drier ridges in the West. On the slopes there are considerable areas of open grassland and, in the steeper valleys and gullies, remnants of Guinea-Congolian forest. There is relict sclerophyll forest on some hill-slopes suggestive of more extensive forest cover historically.

Given its position at the intersection of the transitional zones between three regional centres of endemism, this area can be expected to be poor in endemic species. However, recent collections in remnant patches of Guineo-Congolian forest to the East of Lake Tanganyika, as well as in the Miombo woodlands to the West of Tabora, have found a number of new plant species therefore others may have been overlooked in the South East of Biharamulo District which has not received much attention from botanists. The neighbouring Burigi-Biharamulo Game Reserve is important for large mammals such as elephants.

The refugee crisis from the Rwanda conflict(s) has meant that these game reserves (especially Burigi) have been under heavy pressure and large game populations have been much reduced as well as forest/woodland cover. High populations outside protected areas have severely impacted natural habitats around the lake shores. There is a breeding population of shoebills in the undisturbed papyrus swamps of the area.

Species of scientific interest include populations of Oribi and the most northern populations of Sable in Tanzania. The patches of Guineo-congolese contain many species of interest notably Tanzania only populations of Demidoff and Thomas's galagos (bushbabies) and the acacia woodlands contain an unusual population of the greater thick tailed galago of which an unusually high proportion are black due to melanism.

<b>Table 19: Biodiversity present in Biharamulo district</b>	
District	Biharamulo
Region	Kagera
IBAs	Part of Biharamulo District falls within IBA No. 14.
Protected areas	Burugi-Biharamulo game reserves
Biome	Lake Victoria Regional moosaic
Habitat types	Biharamulo contains patches of Guineo-congolean evergreen forest, Zambezian type woodlands, riparian and lakeside habitats such as papyrus swamps of the Kagera river system.
Threatened species	Shoebill – near threatened Red faced barbet – near threatened Elephant Lion
Endemic species	Red faced barbet – endemic to Lake Victoria Regional mosaic. In the area in-between L. Victoria and the borders of Uganda, Ruwanda and Burundi. <i>Papyrus gonalek</i> – endemic to Lake Victoria Regional mosaic. In the papyrus swamps east of L. Victoria. Papyrus yellow warbler - endemic to Lake Victoria Regional mosaic. In the papyrus swamps in a few scattered populations around L. Victoria

Source: Baker and Baker 2002

W W F

### **Conclusion**

Any agricultural projects must take care to not clear natural wooded habitats especially evergreen forest patches and papyrus swamps as these contain species of conservation and scientific interest. The papyrus swamp habitat is of particular interest in the districts they contain many restricted range bird species. Water abstraction for irrigation must be carefully evaluated and monitored. Over all the area is poorly known scientifically and the feeder rivers of Lake Burigi and the lake itself may qualify as a Ramsar site due to its function as a an important wetland area for humans (eg fishery values) and biodiversity.

### **2.5 Diligent**

Diligent operates in Arusha, Mwanza, Pwani and Mbeya regions. *Jatropha* is principally through an out grower networks of small local farmers. The potential impact on biodiversity values will arise if natural habitats such as forests, woodlands and indigenous grasslands are cleared. There are important bird areas in all regions, which are significant for their resident populations of restricted range and/or endemic birds species as well as migrant populations. There are national parks and numerous forest reserves in each region. Significant areas of natural habitat also occur outside protected areas, which is important for biodiversity.

In Arusha region the dry acacia woodlands, wetlands and small patches of forest occur out side the main protected areas eg Kilimanjaro NP. In Mwanza region little groundwater evergreen forest remains and the area is heavily settled so remnant forest patches must be conserved. The swamps and reed beds bordering the Lake Victoria are very important sites for birds and farming must be avoided in these areas (IBAs 40 and 42, Baker and Baker 2002).

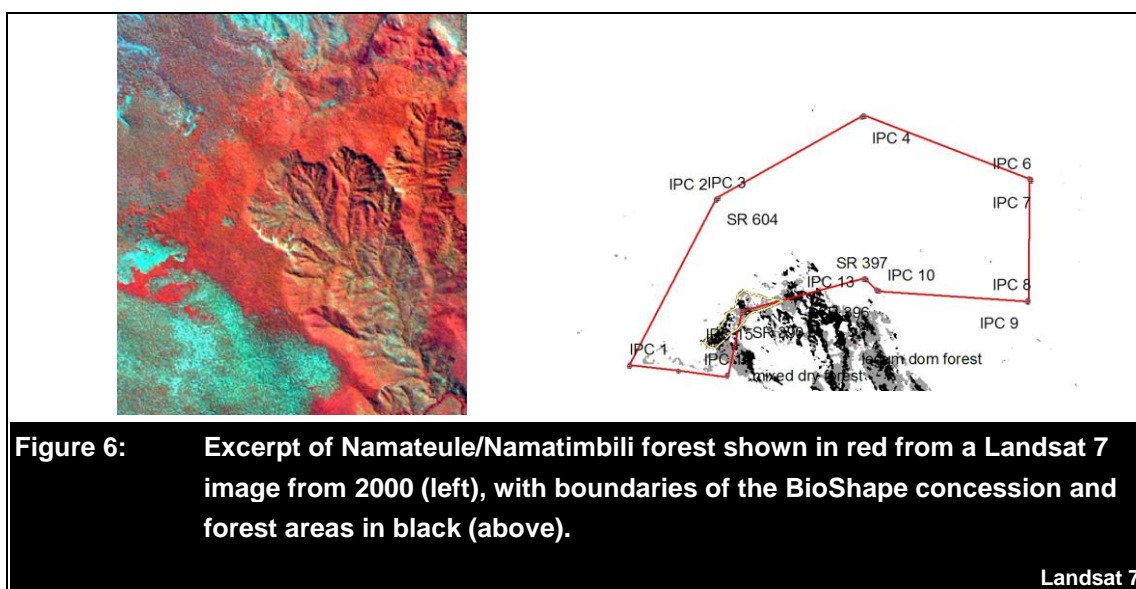
In Pwani region the predominant natural vegetation comprises of the coastal forest mosaic and miombo *Brachystegia* woodland. The coastal forest hotspot is an internationally recognised region due to the high levels of endemism of plant and animal species. There is severe pressure on the remaining areas of coastal forest both in and outside reserves. Any proposed agricultural activity leading to the clearing of coastal

forest will impact negatively on biodiversity. In Mbeya region there are several distinct habitat types depending on the altitude and local rainfall patterns. There are miombo woodlands towards L. Tanganyika and L. Rukwa, the upland grasslands and evergreen forests of the southern highlands and the wetlands of the Usangu flats. The area is heavily farmed especially in mountainous zones and pressure on the very rare and unique montane grasslands as well as the evergreen forests is very high. *Jatopha* farming must try to avoid impacting on the forested areas as well as upland grasslands as this is one of the most endangered habitats in all Africa.

## 2.5 BioShape

### *Namateule/Namatimbili coastal forest*

BioShape's concession includes the Northern end of the Namateule/Namatimbili Forest, which was first discovered by satellite survey in 2001 and visited shortly afterwards by a Danish expedition sent out by OrnisConsult, a Danish ornithological consultancy company which wound up in 2002. Satellite mapping was conducted by Erik Prins of Prins Engineering <http://www.prinsengineering.com>.

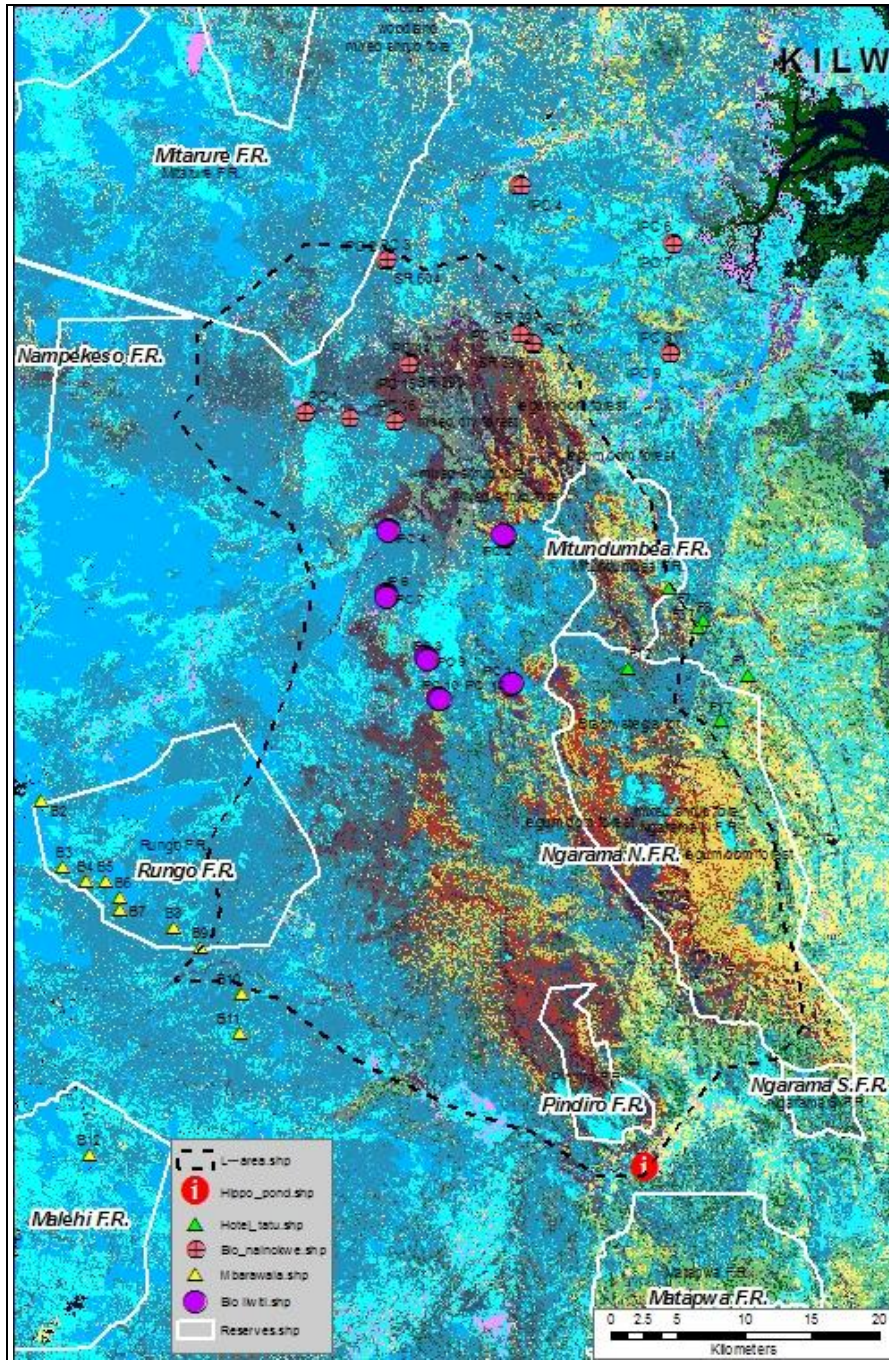


**Figure 6:** Excerpt of Namateule/Namatimbili forest shown in red from a Landsat 7 image from 2000 (left), with boundaries of the BioShape concession and forest areas in black (above).

Figure 6, Namateule/Namatimbili Forest is one of the largest known coastal forests remaining in Tanzania, and part of an ecosystem known as the coastal forests of Eastern Africa. Over the last 20 years, these have been recognised as forming the most important part of a distinct eco-region and one with a particularly high level of species endemism. Although small, this eco-region is regarded as being a globally important conservation priority. The Eastern Africa coastal forests eco-region extends from Southern Somalia to Southern Mozambique, with the most important section being that from Southern Kenya through Tanzania and into Northern Mozambique. Particularly high levels of endemism are recorded from Southern Tanzania.

Within the whole Eastern Africa coastal forests eco-region, which covers around 260,000 km<sup>2</sup>, only 6260 km<sup>2</sup> – or 2% – comprises forest, which is also highly fragmented. Found within over 400 separate patches, they form a chain of relict forests and thicket patches set within savannah woodlands. Although typically small and fragmented, the forests contain high levels of biodiversity, often varying dramatically between patches.





**Figure 7:** Map of Kilwa district, Tanzania. Satellite image of part of Kilwa District, Tanzania, showing the locations of the limits of the two BioShape concessions (red and purple dots and dashed lines). Coastal Forest areas are shown in dark brown, miombo woodland in yellow. Forest Reserves in white.

Source: Prins Engineering [www.prinsengineering.com](http://www.prinsengineering.com)

<b>Table 20: Biodiversity values of Kilwa</b>																																																																								
District	Kilwa																																																																							
Region	Lindi																																																																							
IBAs	Bioshape plantations situated near and in IBA No. 50																																																																							
Protected areas	Bioshape plantations are located to the east on the coastal plane, north and west of the Uchungwa (also called Namatimbili)-Mitundumbea massif. And includes the northern tip of the Uchungwa.																																																																							
Biome	East African Coastal Forests (Burgess and Clarke 2001)																																																																							
Habitat types	<p>Natural vegetation found in the Kilwa landscape is a variable and includes: scrub forest, dry evergreen forest, woodland, riverine forest, and transition woodland, wooded grassland and coastal thicket. The Ruwawa (including Ngarama N &amp; S), Mitundumbea (including Mitundumbea FR) and Mbalawala (including Pindirola FR) plateaux contain the bulk of the coastal forests. On the westerly landscape boundary is Rungo FR and the east is delineated by Ngarama North FR and Ngarama south FR, Mitundumbea FR and Namatimbili, an area of ungazetted forest. To the east of the plateaux on the coastal plain are areas of coastal thicket and dry forest as well as woodlands.</p> <p>The northerly extension of Mtundumbea FR is an ungazetted forest mosaic known as Namatimbili by people of the Mavuji area but it is also known as Uchungwa by the villagers of Migeregere. The eastern facing escarpment of Namatimbili is massive formation of ancient coral rag that continues into Mitundumbea FR. Where the Mavuji river cuts through the escarpment on its easterly course to the ocean it forms a spectacular gorge some 80-100m deep. To the west of the escarpment the geology changes to soft friable Miocene sands and clays.</p>																																																																							
Threatened species	<p>The threatened animal species of the Kilwa Landscape (IUCN 2008). EN – endangered, VU – vulnerable and NT – near threatened.</p> <table border="1"> <thead> <tr> <th>Scientific name</th> <th>Common name</th> <th>Redlist category</th> </tr> </thead> <tbody> <tr> <td><i>Lycaon pictus</i></td> <td>African Wild Dog (Eng)</td> <td>EN C2a(i) ver 3.1 (2001)</td> </tr> <tr> <td><i>Loxodonta africana</i></td> <td>African Elephant (Eng)</td> <td>VU A2a ver 3.1 (2001)</td> </tr> <tr> <td><i>Beamys hindei</i></td> <td>Lesser Hamster Rat (Eng)</td> <td>NT ver 3.1 (2001)</td> </tr> <tr> <td><i>Rhynchocyon cirnei</i></td> <td>Checkered Elephant Shrew (Eng)</td> <td>NT ver 3.1 (2001)</td> </tr> <tr> <td><i>Panthera leo</i></td> <td>African Lion (Eng)</td> <td>VU A2abcd ver 3.1 (2001)</td> </tr> <tr> <td><i>Anthreptes reichenowi</i></td> <td>Plain-backed Sunbird (Eng)</td> <td>NT ver 3.1 (2001)</td> </tr> <tr> <td><i>Circaetus fasciolatus</i></td> <td>Southern Banded Snake Eagle (Eng)</td> <td>NT ver 3.1 (2001)</td> </tr> </tbody> </table> <p>Plants within the Kilwa landscape listed as threatened on the IUCN Redlist (2008)</p> <table border="1"> <thead> <tr> <th>Site</th> <th>Family</th> <th>Species</th> <th>Habitat</th> <th>Habitat</th> <th>RL cat</th> </tr> </thead> <tbody> <tr> <td>Namatimbili</td> <td>Fabaceae (Caes.)</td> <td><i>Cynometra filifera</i></td> <td>F</td> <td>T</td> <td>CR B1+2abcde ver 2.3 (1994)</td> </tr> <tr> <td>Namatimbili</td> <td>Fabaceae (Caes.)</td> <td><i>Cynometra gillmanii</i></td> <td>F</td> <td>T</td> <td>CR B1+2abcde, C2b ver 2.3 (1994)</td> </tr> <tr> <td>Namatimbili</td> <td>Tiliaceae</td> <td><i>Grewia goetzeana</i></td> <td>F, W,</td> <td>T</td> <td>DD ver 2.3 (1994)</td> </tr> <tr> <td>Namatimbili</td> <td>Ebenaceae</td> <td><i>Diospyros magogoana</i></td> <td>F</td> <td>T, S</td> <td>EN B1+2bc ver 2.3 (1994)</td> </tr> <tr> <td>Namatimbili</td> <td>Fabaceae (Pap.)</td> <td><i>Erythrina schliebenii</i></td> <td>F</td> <td>T</td> <td>EX ver 2.3 (1994)</td> </tr> <tr> <td>Namatimbili</td> <td>Moraceae</td> <td><i>Milicia</i></td> <td>F</td> <td>T</td> <td>LR/nt ver 2.3</td> </tr> </tbody> </table>						Scientific name	Common name	Redlist category	<i>Lycaon pictus</i>	African Wild Dog (Eng)	EN C2a(i) ver 3.1 (2001)	<i>Loxodonta africana</i>	African Elephant (Eng)	VU A2a ver 3.1 (2001)	<i>Beamys hindei</i>	Lesser Hamster Rat (Eng)	NT ver 3.1 (2001)	<i>Rhynchocyon cirnei</i>	Checkered Elephant Shrew (Eng)	NT ver 3.1 (2001)	<i>Panthera leo</i>	African Lion (Eng)	VU A2abcd ver 3.1 (2001)	<i>Anthreptes reichenowi</i>	Plain-backed Sunbird (Eng)	NT ver 3.1 (2001)	<i>Circaetus fasciolatus</i>	Southern Banded Snake Eagle (Eng)	NT ver 3.1 (2001)	Site	Family	Species	Habitat	Habitat	RL cat	Namatimbili	Fabaceae (Caes.)	<i>Cynometra filifera</i>	F	T	CR B1+2abcde ver 2.3 (1994)	Namatimbili	Fabaceae (Caes.)	<i>Cynometra gillmanii</i>	F	T	CR B1+2abcde, C2b ver 2.3 (1994)	Namatimbili	Tiliaceae	<i>Grewia goetzeana</i>	F, W,	T	DD ver 2.3 (1994)	Namatimbili	Ebenaceae	<i>Diospyros magogoana</i>	F	T, S	EN B1+2bc ver 2.3 (1994)	Namatimbili	Fabaceae (Pap.)	<i>Erythrina schliebenii</i>	F	T	EX ver 2.3 (1994)	Namatimbili	Moraceae	<i>Milicia</i>	F	T	LR/nt ver 2.3
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<i>Namatimbili</i>	<i>Rubiaceae</i>	<i>Gardenia transvenulosa</i>	<i>F, W,</i>	<i>T, S</i>	VU B1+2b ver 2.3 (1994)																								
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<i>Namatimbili</i>	<i>Rutaceae</i>	<i>Zanthoxylum holtzianum</i>	<i>F,W</i>	<i>T</i>	VU B1+2d, D2 ver 2.3 (1994)																								
Endemic species	<p><b>Animal endemism</b></p> <p>Overall there are nine species that are endemic to the Coastal Forests. A further eight species can be considered Coastal Forest near-endemics as they have also been recorded from the neighbouring Eastern Arc Mountains.</p> <p>Levels of faunal endemism within the Kilwa landscape are high (Table 1.). The landscape is an important area for coastal forest birds. Namatimbili, Mitundumbea, Ngarama N&amp;S and Pindirol contain populations of Plain backed sunbird (<i>Anthreptes reichenowi</i>), and Southern-banded snake eagle (<i>Circaetus fasciolatus</i>). Other forest dependant species present in the landscape include African Broadbill <i>Smithornis capensis</i>, Little Greenbul <i>Andropadus virens</i> (only in Litipo), Tiny Greenbul (<i>Phyllastrephus debilis</i>), Yellow-streaked Greenbul (<i>P. flavostriatus</i>). The near endemic subspecies, the Rondo Green Barbet (<i>Stractolaema olivacea</i> spp. <i>hylophona</i>) is only present in Namatimbili, Mitundumbea and Ngarama N&amp;S, whilst Reichenow's Batis (<i>Batis mixta reichenowi</i>) occurs in Namatimbili, Mitundumbea, Ngarama N&amp;S and Pindirol.</p> <p>Namatimbili, Mitundumbea, Ngarama N&amp;S and Pindirol FR is important for the near endemic Grant's galago (<i>Galagoides granti</i>), the lesser pouched rat (<i>Beomys hindei</i>) and the Chequered elephant shrew (<i>Rhynchocyon cirnei macrurus</i>). Elephant (<i>Loxodonta Africana</i>) and lion (<i>Panthera leo</i>) occur in low numbers. There is an interesting isolated population of bush hyrax (<i>Heterohyrax</i> sp) in Namatimbili and Mitundumbea.</p> <p>The number of endemic vertebrate species in the Kilwa Landscape.</p> <table border="1"> <thead> <tr> <th>Total/Endemism level</th> <th>Number of Kilwa Landscape endemic vertebrates</th> <th>Number of CF endemic Vertebrates (not including landscape endemic)</th> <th>Number of CF Near endemic vertebrates</th> </tr> </thead> <tbody> <tr> <td></td> <td>0</td> <td>9</td> <td>8</td> </tr> <tr> <td>Total for landscape</td> <td>17</td> <td></td> <td></td> </tr> </tbody> </table> <p>The coastal forest endemic and near endemic species found in the Kilwa landscape.</p> <table border="1"> <thead> <tr> <th>Species</th> <th>Kilwa CF endemics</th> <th>Kilwa CF near endemics</th> </tr> </thead> <tbody> <tr> <td>Southern Banded Snake Eagle <i>Circaetus fasciolatus</i></td> <td>1</td> <td></td> </tr> <tr> <td>Green Barbet <i>Stactolaema olivacea woodfordii</i></td> <td></td> <td>1</td> </tr> <tr> <td>Tiny Greenbul <i>Phyllastrephus debilis</i></td> <td></td> <td>1</td> </tr> </tbody> </table>					Total/Endemism level	Number of Kilwa Landscape endemic vertebrates	Number of CF endemic Vertebrates (not including landscape endemic)	Number of CF Near endemic vertebrates		0	9	8	Total for landscape	17			Species	Kilwa CF endemics	Kilwa CF near endemics	Southern Banded Snake Eagle <i>Circaetus fasciolatus</i>	1		Green Barbet <i>Stactolaema olivacea woodfordii</i>		1	Tiny Greenbul <i>Phyllastrephus debilis</i>		1
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<b>Table 20: Biodiversity values of Kilwa</b>		
Pale-breasted Illadopsis <i>Illadopsis rufipennis</i>		1
White-chested Alethe <i>Alethe fuelleborni</i>		
Spotted Ground Thrush <i>Zoothera guttata</i> **		
Livingstone's Flycatcher <i>Erythrocerus livingstonei</i>	1	
East Coast Batis <i>Batis soror</i>	1	
Black-throated Wattle-eye <i>Platysteira peltata</i>	1	
<i>Epomophorus wahlbergi</i> (Sundevall, 1846)	1	
<b>Galagoidea granti (Matschie, 1893)</b>		1
<i>otolemur garnetti</i> (ogilby, 1838)		1
<i>Manis temminckii</i> Smuts, 1832		1
<i>Paraxerus palliatus</i> (Peters, 1852)		1
<i>Beamys hindei</i> Thomas, 1909		1
<i>Rhynchocyon cirnei</i> Peters, 1847	1	
Fischer's Greenbul <i>Phyllastrephus fischeri</i>	1	
East Coast Akalat <i>Sheppardia gunningi</i>		
Reichenow's Batis <i>Batis reichenowi</i> **	1	
Plain-backed Sunbird <i>Anthreptes reichenowi</i>	1	
<b>Total</b>	<b>9</b>	<b>8</b>

An interim report by the Mpingo Conservation Project: Mpingo Bird Conservation: impacts of harvesting on Tanzanian forest avifauna. (Maclean *et al* 2008) highlights the bird values of the coastal plain of Kilwa district:

“Of the 13 biome-restricted species known to be present within the Kilwa District Coastal Forest Important Bird Area (IBAs) (Baker & Baker 2002), we were able to locate all but the Zanzibar Red Bishop. We also confirmed the presence of Kretschmer's Longbill and Brown-breasted barbet, two species thought maybe to be present, but not known to be present with certainty. Additionally, we recorded Mangrove Kingfisher, in mangrove swamps around Kilwa Town. This species was not thought to be present within the area encompassed by the IBA. Two additional species are worthy of mention: Rondo Green Barbet and Reichenow's Batis. The taxonomy surrounding these species is uncertain, but should they prove to be separate species from the closely related African Green Barbet and Forest Batis respectively, the area would qualify as an Endemic Bird Area.

Our surveys also highlighted the importance of several forest blocks within Kilwa District that are not currently included as part of the Kilwa District Coastal Forests IBA. Foremost amongst these is the Uchungwe Forest Block located between the Mitaurure and Rungo Forest Reserves shown on the Kilwa District Coastal Forests IBA map in Baker & Baker (2002). This forested area was the only one in which Rondo Green Barbet was found and was one of only two areas in which Reichenow's Batis was found. It also hosts the near-threatened Southern-banded Snake Eagle and Plain-backed Sunbird. The Nainokwe Coastal Forest area adjoining Uchungwe is also important, hosting Reichenow's Batis as well as other biome-restricted species such as Brown-headed Parrot, Green Tinkerbird and Chestnut-fronted Helmet-shrike. We also highlight the importance of Migeregere and Kisangi Forests. These two sites host seven and five biome-restricted species respectively. Both host the near-threatened Southern-banded Snake Eagle and the former also hosts the near-threatened Plain-backed Sunbird. Ruhatwe and Kikole also hosted the former species and Ruhatwe the latter also. “

**Plant endemism**

<b>Table 20: Biodiversity values of Kilwa</b>	
	<p>Comparatively large areas of Coastal Forest and Coastal Scrub Forest are present on the plateaus of the Kilwa Landscape. The biological importance of these forests is still poorly known, but the few studies which have been carried out indicate that the area may be rich in endemic and restricted range species. Seeds of the tree <i>Karomia gigas</i> have been found in a tiny patch of forest in the Mitundumbea Forest Reserve – the species was thought to be extinct after the only known individual tree in Kenya was chopped down in 1983. A rapid botanical survey of the Uchungwa forest by TFCG found the tree <i>Erythrina schliebenii</i>, thought to be extinct from its original collection locality beside Lake Lutamba near Lindi. Further collections may well discover African Violets in the Rudadonga gorge system, given its similarity to the now deforested limestone gorges at Tanga where the genus <i>Saintpaulia</i> was first collected, as well as the proximity to the African Violet populations in the Kiwengoma forest in the nearby Matumbi Hills.</p> <p>There are six plants that are strictly endemic to the Kilwa Landscape (data from Prins &amp; Clarke 2007; Clarke 2001):</p> <p><i>Karomia gigas</i> – effectively endemic to Ngarama North Forest Reserve following the extinction of the only known individual from Kenya  <i>Erythrina schliebenii</i> – effectively endemic to Uchungwa forest following its probable extinction from the lake Lutamba area.  Pterygota sp. nov. – Uchungwa forest  <i>Trichilia</i> sp. nov. a ff. <i>lovettii</i> – Uchungwa forest. Probably the same <i>Trichilia</i> sp. nov found in Chitoo Forest Reserve in 1995.  <i>Baphia</i> cf. <i>keniensis</i> – Ruwawa Plateau (Ngarama North and South Forest Reserves)  <i>Leptactina</i> cf. <i>oxyloba</i> - Ruwawa Plateau (Ngarama North and South Forest Reserves)</p> <p>During the brief surveys carried out by TFCG, the team recorded 110 plant species of which 89 are considered forest species. This includes six plant species which are endemic to the Lindi landscape (<i>Erythrina schliebenii</i>, <i>Monathotaxis trichantha</i>, <i>Cynometra gillmannii</i>, <i>Cynometra filifera</i>, <i>Cincinnotrys pulchella</i> and <i>Diospyros magogoana</i>).</p> <p>In addition to Coastal Forest, there are large areas of miombo woodlands which are important sources of the timber trees <i>Pterocarpus angolensis</i> and African Blackwood <i>Dalbergia melanoxylon</i>. SE Tanzania is one of the most important sources of African Blackwood, which was heavily extracted from the Mitarure Forest Reserve during the late 1980s (Ball 2004).</p>
Species of scientific interest	<p>Populations of bush hyrax occur in the Uchungwa massif which may turn out to be new species.</p> <p>There are significant holdings of large game including elephant and buffalo that move between the Selous and the Namatimbili massif. Namatimbili massif may also hold a permanent population of elephant due to the presence of permanent water supplies if the Mavuji river.</p> <p>Survey intensity has generally been very low for this landscape and has mostly focused on birds and mammals with limited focus on reptiles and amphibians. Almost nothing is known about the invertebrate fauna of the landscape apart from a few butterfly surveys.</p>
Conservation issues	<p>The Kilwa Landscape contains two of the larger extant blocks of Coastal Forest on the Mbwawala Plateau and at Uchungwa, neither of which is under any form of legal protection. These forests need to be gazetted and protected as soon as possible, particularly as Kilwa District is beginning to see new investment and development initiatives that could pose a new threat to its forests. Large areas of previously uncultivated land have been tied up as concessions for plantations, including the northern part of the Uchungwa forest which is now owned by the Tanzania Investment</p>



**Table 20: Biodiversity values of Kilwa**

Centre on behalf of the Dutch bio-fuel company BioShape Holdings B.V.

### *Conclusions*

The Kilwa landscape comprises of mixture of woodland and coastal forest of various types. Much of the coastal forests are ungazetted as reserves which in turn host a rich diversity of flora and fauna of which a high proportion are endemic species to the coastal forests or even just within the Kilwa ecological landscape (Burgess and Clarke 2001). The planned areas for clearance for biofuel plantations by Bioshape could potentially impact on the biodiversity values of Unchungwa and Nainokwe coastal forests. The forests on the coastal plane are ungazetted and protected and the Mpingo bird surveys (Maclean et al 2008) have shown that these areas are rich in coastal forest bird species that are in turn predictive indicators for the likely presence of other coastal forest fauna.

Floristically Lindi region and the Kilwa ecological landscape is rich in endemic species (Clarke 200, Prins and Clarke 2007), especially the Uchungwa area. Almost no botanical surveys have been completed on the coastal plain eg around Mavuji area. Apart from endemic species large landscape species such as elephant, buffalo, hunting dog and hippo occur. Bioshape plantations need to be very sensitive as which vegetation types they clear since potential biodiversity loss particularly of endemic plant species is high. They are not helped by the lack of data and biodiversity surveys and vegetation mapping is urgently required to guide planners and agriculturalists as well as gazetted new forest reserves.

### *The Environmental Impact Assessment*

A copy of the EIA by M/S Environmental Management Consultants (EMAC) has been examined by conservationists in Tanzania some of the following<sup>9</sup> observations were made regarding the references made to biodiversity in the report. Please see appendix 2 for the complete review.

- Throughout the document, the area is characterised as ‘disturbed Miombo’. There is no mention of the fact that the project is within the coastal forest biodiversity hotspot and that the project might pose a risk to some of the coastal forest endemic species. Coastal forests are not mentioned anywhere.
- There is no detailed description of the methodology used to assess the vegetation and therefore provide a basis for concluding that it is mostly low-value Miombo. It appears that field visits were made to the site but that the main focus for these was on stakeholder consultation. There is no mention of any detailed study of the vegetation either using ground surveys or remote sensing. Thus all conclusions about the vegetation type found in the area appear to be unsubstantiated., especially when compared to actual satellite images.
- No basis is given for concluding that the buffering approach that they propose is suited to the ecology of the area, and no attempt is made to map elephant trails to prevent planting on these.
- No scientific references are provided for any the ecological claims made in the reports. The only references listed relate to the various policies and to EIA methodology.
- The impact of 10,000 people moving to such a sensitive area is not addressed by the report. In addition this is an unrealistically large number of people to manage adequately.
- In particular the report does not consider the impact that such a population will

<sup>9</sup> Email from Nike Doggart of the Tanzania Forest Conservation Group, 22<sup>nd</sup> May 2008, and Steve Ball of the Mpingo Project, 1<sup>st</sup> July 2008.

have on the surrounding environment bearing in mind that labour is likely to be seasonal. In Arusha, they have found that *Jatropha* only produces seeds when it rains. This means that there will be a peak demand for labour to harvest the seeds at particular times of the year. For the rest of the year, the workers will either have to find alternative forms of employment or migrate elsewhere. The inevitable additional pressures on the forests from logging and charcoal production are obvious.

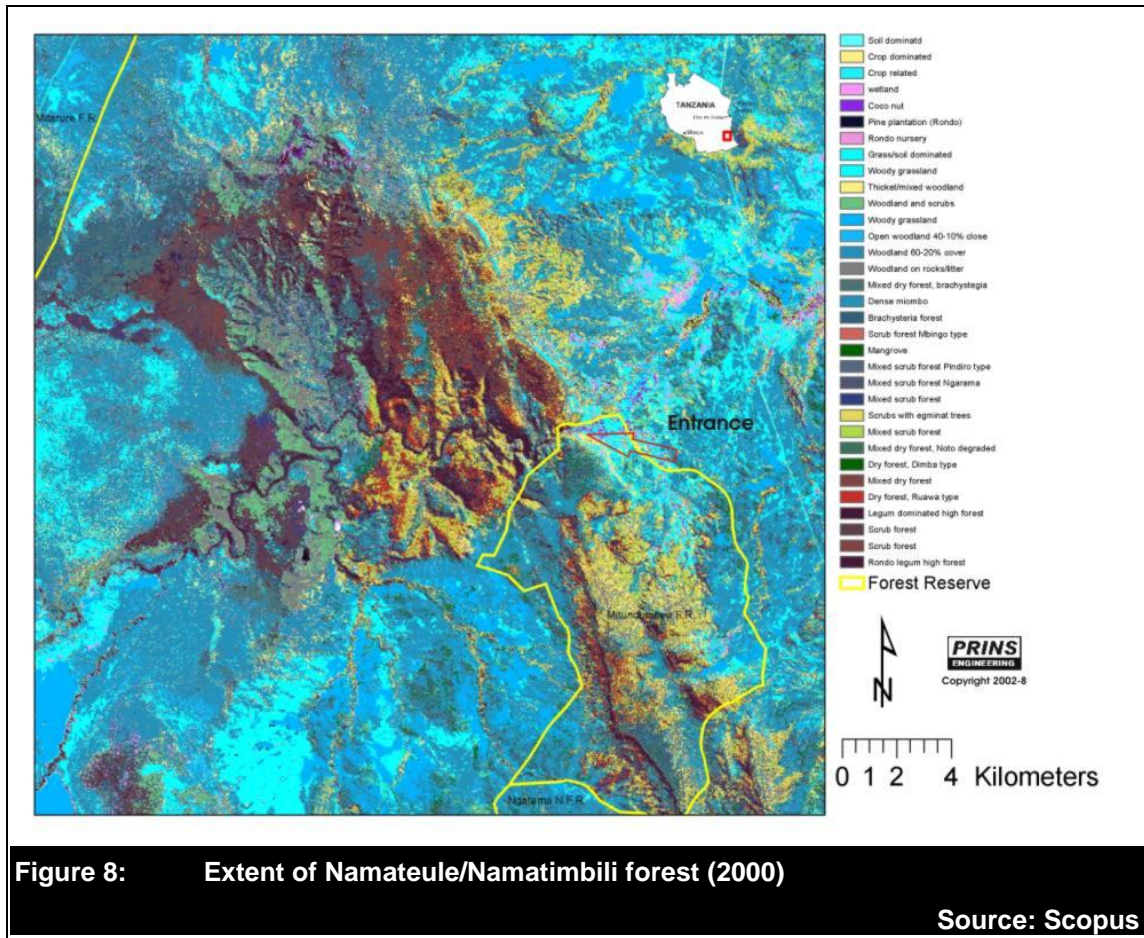
- The report makes no mention of uncertainties in the biofuel market particularly given the (likely) about-turn in Europe regarding member state's obligation to adopt biofuels.
- Overall it seems that 81,000 ha of land are being allocated to an investor for very little money to largely clear its natural vegetation without a logging permit from the District Forest Officer in order to produce a crop whose economic viability is unproven.

According to BioShape's director Will Hermans, the Dutch consultancy company AIDEnvironment <http://www.aidenvironment.org> also conducted a 'Strategic Impact Assessment' for them, and a consultant from AIDEnvironment has visited Tanzania because they considered the EMAC EIA to be wholly inadequate. A request to AIDEnvironment to view this Strategic Impact Assessment was refused on the grounds of client confidentiality<sup>10</sup>, with a later clarification that it was not an Environmental Impact Assessment (hence the 'Strategic Impact Assessment' label) and therefore outside the disclosure requirement according to EU Directive 2003/35/EC<sup>11</sup>.

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<sup>10</sup> Email from Michiel C. de Wilde, Director of AIDEnvironment, to Phil Clarke on the 25<sup>th</sup> June 2008.

<sup>11</sup> Email from Joost van Montfort, AIDEnvironment, 26<sup>th</sup> June 2008.



In the above image from 2000 the extent of Namateule/Namatimbili forest may be seen as the darker red/purple tones. The best-developed forest was present on the plateau edges, and along a river at the Southern end. Surrounding areas were grassland (pale blue) or Miombo woodland (mid-blue). Degraded scrub forest is presented as the orange/red tones.

Namateule/Namatimbili forest appears to have been overlooked during the colonial era when most forest reserves were demarcated and gazetted in Tanzania. This may be due to its location in the most remote and unpopulated area of the Tanzanian coastline. As a result, the Namateule/Namatimbili forest is probably the largest contiguous block of unprotected coastal forest remaining in Tanzania.

The known biological values of Namateule/Namatimbili forest are given in an ornithological survey published in the journal 'Scopus' in December 2005 :

[http://www.bi.ku.dk/staff/aptottrup/Scopus25\\_pp1\\_22.pdf](http://www.bi.ku.dk/staff/aptottrup/Scopus25_pp1_22.pdf)

while the vegetation survey was published online in July 2006 :

<http://www.springerlink.com/content/f303752th0j2441h/>

These reports flag up immediately when one enters "coastal forests" and "kilwa district" on Google. The consultants who wrote the EIA for the BioShape Kilwa investment should therefore have known about these reports and should be asked to account for this omission.



Namateule/Namatimbili Forest may be the only known location of the tree *Erythrina schliebenii*, collected in the nearby Litipo forest during the 1930s but never since recollected despite frequent visits by botanists to Litipo. A sterile specimen was collected at Namateule/Namatimbili in 2001, together with two other possible new plant species and the tree *Cynometra gillmannii*, which is only known from a single other location. Further collections in Namateule/Namatimbili would undoubtedly yield many new plant species to science, given the richness of the forests inland of Lindi some 100 km to the South, which are host to some 150 endemic species.

#### ***Vegetation clearance within the BioShape concession***

In April 2008 a group of conservationists decided to seek UN Global Environment Facility (GEF) funding to demarcate and gazette the Namateule/Namatimbili forest as national forest reserve. In the process it was discovered that BioShape has acquired a concession that included part of the forest, and that 70 ha from an area of 1000 ha within the concession near the village of Mavuji had already been clear-felled to create a trial plot for a *Jatropha* oil plantation.

Investigations of recent satellite images from May 2008 revealed that the Namateule/Namatimbili forest was however still untouched, although a number of trees had been logged during the clearance of the trial plot area.

#### ***BioShape's Response***

When contacted about the presence of part of the Namateule/Namatimbili Forest within their concession, BioShape proved willing to engage in dialogue and promised to protect the coastal forest vegetation type. In his email of the 20<sup>th</sup> May 2008 (see Annex B), BioShape's director Will Hermans stated :

*'We only clear degraded Miombo woodland, and only if we can replant directly, to avoid erosion. Coastal forest will not be touched by our activities, on the contrary: within our plans we have promised to the authorities that we will maintain and preserve an equal amount of this landtype, as we will use for our activities.'*

BioShape also demonstrated a willingness to provide buffer zones / wildlife corridors :

*'Our business plan takes into account biodiversity (It will eventually be several small scale plantations), divided by buffer zones to allow animals to travel and to allow access to water at all times. Also we will take into account ecological zones to protect the landscape, to leave enough space for elephants etc. and to spread the activity in order not to lean on the natural environment to much. We will only clear if and when canopy cover is below 30%, as described in the draft European Directive.'*

However, the EU directive says;

*"Biofuels and other bioliquids taken into account for the purposes referred to in paragraph 1 shall not be made from raw material obtained from land with high carbon stock, that is to say land that had one of the following statuses in January 2008 and that no longer has this status: ... continuously forested areas, that is to say land spanning more than 1 hectare with trees higher than 5 metres and a canopy cover of more than 30%, or trees able to reach these thresholds in situ..."*

Therefore solely referring to 30% canopy cover is not adequate.

This information is supported by BioShape's site selection criteria. In a follow up email on the 3<sup>rd</sup> July 2008, Will Hermans added :

*“If there really is coastal forest in our direct area, I want to know. We will see that it is reserved. We are planning to protect as large an area as we occupy anyhow.”*

BioShape were also willing to allow conservationists to visit their offices in Tanzania and the Netherlands to examine their EIA and certain other project documents, although it was not possible to receive copies of these by email. It is not however possible to view the ‘Strategic Impact Assessment’ by AIDEnvironment because it is ‘commercially sensitive’.

Despite the promising words and apparent willingness of BioShape to mitigate the potential harm caused by their biofuel investment, the limited knowledge by BioShape of the actual biodiversity values within their concession and the inadequate safeguards to prevent uncontrolled clearance mean that the ongoing development of the *Jatropha* plantation and its impact on the coastal forests remain a real concern. Furthermore, for all the promises to only clear degraded land with less than 30% tree cover, it is not clear whether the project intends to clear 81,000 ha (810 km<sup>2</sup>) or 34,000 ha within the next 10 years both of which would very likely necessitate clearing areas with a higher tree cover.

The BioShape investment’s impact on the environment should therefore be regularly monitored.

## Climate Change & Greenhouse Gases

Climate change is an important issue for all the investors, as alongside oil prices, it has been cited as one of the main reasons why there is increased demand for biofuels. Most of the investors as of yet have not carried out a green house gas assessment in order to calculate how much they may be saving in emissions. This does leave a large question mark over the industry as a whole. If the industry is not meeting the demand of one its main drivers – reducing the amount of greenhouse gases - then there is a large uncertainty linked to its future.

<b>Table 21 Greenhouse gas emission savings of biofuels Investors in Tanzania</b>									
<b>Greenhouse gas emissions</b>	PROKON	CAMS	ABERC	SunBiofuels	SEKAB	BioShape	Diligent	Inf Energy	Africa Green Oils
	?	?	?	?	?	?		?	?
<b>Savings ≥ 60%</b>							✓		
<b>35% ≤ Savings &lt; 60%</b>									
<b>0% ≤ Savings &lt; 35%</b>									
<b>Savings &lt; 0</b>									
N/A									

Source: Kilimanyika research/ Inter-American Development Bank W W F

The EIA carried out by NEMC for BioShape did not include either a life cycle analysis or an analysis of greenhouse gas emissions reduction. The report makes repeated claims that biofuels can reduce carbon dioxide emissions and that this is a justification for their development. Although the company told the writers that a Dutch firm was hired to carry out a carbon biomass balance, this document was not made available. It is therefore difficult to substantiate claims that the transporting the raw materials to Europe and replacing natural vegetation with jatropha plants will result in positive net carbon sequestration.

## Human and Labour Rights

During the time of the study, most of the companies assessed were planning on following labour laws and had signed contracts with all of their permanent employees and have short term contracts with their short term workers. Some of the workers working in the factory or farm have provided with safety gear like helmets, uniforms and were also providing lunch for their day staff . Some companies were also planning to provide National Social Security Fund (NSSF) to all staff, as required by Tanzanian law. In addition, permanent staff are provided with NSSF which is the retirement benefit. Other staff benefits include medical support to workers and their families, and funeral services/cost in case of accident whilst on duty.

# Socioeconomic Development and Livelihoods

*'I sometime feel ashamed going to the biofuel office and ask their help for my people; they have been so good to us and I now feel that it is too much! They have been involving us in every step they take in their farm, I just feel that, if they continues like this, our community will benefit so much from BioShape.'*

**Mr. Yusuph Mohamed Tangi-Mavuji Village Chairman**

## ***1 Introduction***

There are many different ways in which rural communities can benefit from biofuels. However at the moment there is also a great deal of concern in Tanzania, and worldwide, about the activities of biofuel investors in Africa as a whole.

Media have called the advancing industry activities the “new scramble for Africa” as many investors are deliberately targeting available land around the African continent which has been deemed as ideal for biofuel development. Another concern is that once the larger plantations are established, rural Africans will just be employed as manual labourers with low wages. As a result of the previous colonial experience there is a fear that the vast majority of jobs that will be created will be “ma namba” plantation jobs. The Swahili term “ma namba” is used to refer people working in plantation jobs during the colonial period. They were called this because they were referred to by a number rather than their name, and worked all their life in the plantation, living a hand to mouth existence.

## ***2 Employment***

Biofuel investors aim to create a large amount of jobs in Tanzania, in particular in rural areas. The creation of jobs is vital in order to stimulate growth in the economy and improve livelihoods.

Depending on the market chain, work will be created by the large-scale biofuel plantations and outgrower schemes, and additional employment will be created by the need for seed distributors who distribute seed amongst local farmers. Diligent have around 200 seed collectors working for them around Northern Tanzania.

SEKAB foresee that managerial positions will go to people with more education but see this as necessary “*in order to bring the best technologies and methods*”. They are currently assessing what skills staff will be required to have and expect that they may need to start off by employing less educated staff initially, and train them up themselves. They are planning a serious dialogues with the villages adjacent to the areas they are working concerning recruitment. They have also started looking at a number of training institutions ranging from the University, VETA (Vocational Education and Training Authority), research organisations etc, in order to adjust the training given to the demand of the labour market. One concrete response of this for VETA has included a Vocational Training Centre (VTC) in Bagamoyo on the list of planned new VTCs. A similar discussion has just started in Rufiji.

Most of the companies have plans to carry out outgrower schemes. These can be complicated to run depending on the crop and the scale of the project. CAMS Energy Group have one of the most ambitious outgrower scheme plans which stipulate that for every hectare that they buy from communities, they will set up an equivalent size sweet sorghum outgrowers plantation. The company will provide seeds, help with bush clearing, and give out agricultural chemicals such as fertilizer, herbicides and pesticides

(which they have stated will be organic), an irrigation facility and extension services. As the community are already experienced in growing sorghum the company feel that they already have the knowledge and skills that they need to make a success of this.

Diligent and PROKON are already paying outgrowers for seeds of jatropha. Diligent reported that they guaranteed all farmers a minimum of 150 shillings per kilo of jatropha seeds for the next ten years. PROKON apparently pay 300 shillings per kilo (Carter Coleman personal communication) . 150 shillings per kilo of jatropha is a rather low profit for the farmers compared with elsewhere. However although outgrowers sign contracts with companies such as Diligent, they may still sell their jatropha seeds for more elsewhere if they can find the market and Diligent report that this has taken place. Ultimately there is little companies can do about this apart from paying farmers a higher price, which Diligent report they will do once they can develop further value added products from the seeds.

BioShape are not planning on carrying out jatropha outgrower schemes in the near future and are instead initially aiming to increase agricultural productivity in the areas in which they are working. They are planning jatropha outgrower schemes in the long term.

SunBiofuels are considering outgrower schemes too in the long term. An initial initiative in which local communities were encouraged to grow *maringa* as a cash crop did fail, causing some scepticism about the whole thing with the locals, however they are open to trying again.

If Inf Energy decides to grow palm oil, they are considering starting a large out grower scheme and are looking for a donor to help fund this. Under this scheme, the company would provide seedlings and then buy the fruits back at a fair trade price. They are looking at setting up savings and credit cooperative organisations in order to do this. The International Fund for Sustainable Development (IFAD) are a potential donor. A single hectare of palm oil could act as a cash cow for local communities and once mature (after seven years), they could produce USD \$1600 net annually for the next 10 – 15 years for only 20 days of labour per year.

KAKUTE, which is principally a consulting firm, looks into processing and marketing, the directors are concentrating on cogeneration and all the potential market chains that can arise from a variety of products for all oil crops. This is one of the largest areas needing research in order to diversify the amount of jobs and opportunities available both to private investors and local communities.

### ***Infrastructure***

One of the greatest obstacles to rural development in Tanzania is a lack of good infrastructure. All biofuels investors have stated that they intend to invest in local infrastructure in order to make their business ventures profitable. However, only BioShape have made legally binding commitments and have already built a school kitchen.

### ***Rural electrification***

Co-products from biofuel feedstock have the potential to provide electricity to many areas in Tanzania. UNIDO currently has a project in which they are using biogas created from sisal plantations.

## **Biotechnology**

No companies reported plans to use genetically modified organisms of any kind in their activities.

# Recommendations and Conclusions

## *1 A Tanzanian biofuels think tank*

Progressive steps need to be taken based on the research that has been carried out on Tanzanian biofuels so far. It would be highly advisable for the Tanzanian NGO community to form a think tank to decide on a strategy of how socially and environmentally sustainable biofuels can be promoted in the near future. An agenda and a timeframe for the think tank should be set up for the end of 2008, in order that meetings can start to take place in the first few months of 2009. The think tank could look into and debate the following recommendations that we are making in this report.

## *2 The Formation of a Roundtable for Sustainable Biofuels Tanzania*

The Roundtable for Sustainable Biofuels is an internationally recognised body that is setting social and environmental sustainability standards for biofuel production. A branch of the RSB should be set up for Tanzania. This could be advantageous to all the parties involved. The remit of a RSB Tanzania would be to work with the existing legal framework, and not undermine government efforts that have been carried out by bodies such as the NBTF but to help build on these. If Tanzanian biofuel investments do have large negative social and environmental impacts the whole industry will suffer, and all stakeholders involved – government, the investors themselves and rural people will be worse off.

Setting up sustainability standards within the country could end up in a win-win situation. The government will have support in identifying good biofuel investors. The investors will have a much more stable investment climate, and will be assured that they will be able to export their product and potentially receive a premium for their high sustainability standards, and local people will benefit from a well-regulated biofuel industry, which potentially could help Tanzania achieve its Millennium Development Goals (MDGs).

A steering board could be set up similar to the current RSB, which would consist of government ministries, TIC, environmental and social NGOs working with biofuels, UN departments, academics and industry representatives.

Within a RSB Tanzania there could then be four working groups whose remit would be to look into detailed ways in which the biofuel industry can be carried out. Each working group would create certification standards that both achievable and make the most amount of sense within a Tanzanian context. Here we propose the following working groups:

- **Land** – This would look at land issues in detail including the compensation and the consultation process that the biofuel companies carry out with local communities.
- **Socioeconomic development** – This working group would look into how the biofuel industry can help Tanzania achieve its Millennium Development Goals. This could look into all the benefits that can be achieved for rural development and the most effective, practical ways in which this could be achieved in Tanzania. Areas looked at would be job creation, food security, rural electrification, infrastructure, and progressive tax systems that could reward investors for buying feedstock from small-scale farmers.



- **Environmental impacts** – This working group could look at issues relating to water, biodiversity, soil health and air quality. The biodiversity issues looked at would include the protection of HCV areas, and the potential effects of indirect land use change resulting from biofuel projects.
- **Implementation** - The implementation-working group could look into how certification standard can be practically realised for a variety of stakeholders within Tanzania. This would include both large-scale investors and small farmers. This working group could also be involved in capacity building of organisations such as NEMC, and strengthen systems such as the EIA process. This working group could also look into what information companies should make public in order to guarantee greater transparency.

### ***3 Engagement with the biofuels industry***

It is important that NGOs such as WWF engage with the biofuel sector to ensure it is developed in a conscientious and sustainable way. Despite many of their Corporate Social Responsibility (CSR) claims, most of the companies have very little understanding of how sustainable biofuels can be realised. Constructive and positive engagement is necessary in order to help companies move their sustainability policies on from good intentions and incorporating them into practical management and business plans.

A key question for all NGOs who want to engage with the biofuel industry in the long term - is what is the role that they will play? One option would be to liaise closely with companies and help them step by step as a partner in order to develop detailed and effective sustainability standards. However within this role many NGOs may fear that an unequal power dynamic between them and the company may result in them compromising their social or environmental agenda. The other alternative is for NGOs to have more of a monitoring and evaluation role.

### ***4 Creation of a Tanzanian Biofuels Communications Network***

Intelligent and informative communication is key if we are to see the formation of a responsible Tanzanian biofuel industry. In order to promote greater understanding on these issues, more communication is needed between NGOs and civil society internationally and in Tanzania. Part of this could be web based, and the organisation Tanzania Natural Resources Forum (TNRF) has already offered to host this on their website. A Tanzanian biofuel communication network could collate accurate information on biofuel development, and also be involved in disseminating this information to people internationally and within Tanzania.

The greatest priority here is that information about biofuels and related issues goes out to people living in rural areas where biofuel investors are working. Most of the villagers interviewed during the study still did not know what biofuels were. More informed villagers could lead to better deals being made with biofuel companies.

### ***5 Ecological research and monitoring***

Research needs to be carried out into the geographical areas where biofuel companies are operating. Little is known or understood about many of the habitats (especially coastal areas) where plantations are being set up. The coastal region is becoming a focal area for biofuel investment and has understudied East African Coastal Forest (EACF) and HCV areas containing high levels of endemism. Detailed studies into these regions **urgently** need to be carried out. Studies would consist of the following steps:

- The first priority is a large scale GIS assessment that documents biodiversity areas across Tanzania focusing on areas that are being looked at for biofuel investments.
- Experienced biodiversity specialists should then carry out fieldwork in order to properly document biodiversity in areas that have been designated for biofuel production.
- HCV areas identified should be set-aside as “no-go zones” for the planting of biofuel crops.

## ***6 Applied research into cogeneration***

The cogeneration of additional value added products has massive potential for the improvement of rural livelihoods. A great deal of work needs to be carried out with each crop and the potential value chains that could be created from all the different bi-products. Market chain analyses should be made of the many different spin-off businesses could be created. The result of this research could pave the way for many new more jobs and opportunities that could improve the livelihoods of many Tanzanians.

## ***7 Generate greater transparency for biofuel investors***

A set of criteria should be established for documents that biofuels companies should make public. This includes:

- Detailed business plans (excluding information that is commercially sensitive).
- All EIAs/ESIAs.
- Studies into energy balance and greenhouse gas emission reduction.
- Meeting minutes from the consultation process that went on with communities in order to obtain land.
- Basic management plans for farms and processing facilities.

## ***8 Support current government institutions and the evolving framework***

There is a danger that an opportunity to support democracy and good governance in Tanzania and Africa could be lost if authority is undermined. The development of a sustainable biofuel industry in Tanzania relies heavily on how the present political structure within the country is able to promote the industry. However this is a two way process and the actions of biofuel companies will also have a large impact on the present political structure. There has been a call both from investors and NGOs that a watchdog should be created to closely monitor biofuels investors within Tanzania. However the formation of an external body to do this risks undermining existing government structures.

The challenge today is how it is possible to incorporate more voices from civil society into this process, while at the same keeping it moving forward. There is a great deal of expectation from the government, NGOs and villagers themselves about the potential benefits of biofuels investments for rural development, poverty alleviation and combating climate change. However positive dialogue that keeps the process moving forward is needed rather than combative approaches that could scupper the current process.

## ***9 Adding food security to ESIA's***

Local food security assessments should be made in order to avoid any threat to local food security. ESIA's carried out should include a detailed local food security assessment. In order to start this, work should be carried out with FAO in order to identify indicators of current and future food security scenarios.

## Activity Schedule

A briefing meeting was held at the WWF-TPO, between Kilimanyika and WWF TPO in 30/09/2008 in order to come to a common understanding on the nature of the assignment and agree on the ToR.. The assignment was discussed and planned in detail between Kilimanyika's consultants and WWF staff, in particular Dr. Hussein Sosovele, who provided us with information and important contacts on 9<sup>th</sup> October during 10<sup>th</sup> October 2008 and Kilimanyika began the field aspect of the assignment in Dar es Salaam on 10<sup>th</sup> October 2008, with a visit to some Bagamoyo communities in the vicinity of SEKAB's test site there.

<b>Table 22: Summary Activity Schedule</b>						
<b>Period</b>	<b>Activity</b>					
	Background reading planning and design of assessment strategy	Interviews with companies and assessment of policy and business plan	Interviews with national government and NGOs	Field assessment (including site visits and interviews with district officials)	Submission of information for communication materials in Sweden	Analysis and report writing
18 - 26						
September						
29 September– 3 October						
6 – 10 October						
13-17 October						
17-Oct						
24-Oct						
27 October – 5 November						

Source: WWF/Kilimanyika Research

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## Appendix 1: Key Informants

<i>Name</i>	<i>Position</i>	<i>Organisation</i>
Dr CM Shayu		Vice Presidents office
Janske van Ejick	Managing Director	Diligent Tanzania
Mr Wilfred Onyoni	Managing Director	Bioshape Tanzania
Mr. Piuse Chehe	Assistant Managing Director	BioShape, Tanzania
Mr Rommert Schram	Agricultural Officer	FAO
Mr Peter Auge	General Manager	SunBiofuels, Tanzania
Mr Richard Morgan	CEO	SunBiofuels
Mr Rama Segul	Managing Director	CAMS Energy, Tanzania
Mr Livinus	Managing Director	KAKUTE
Mrs Maria Stridsman	Social Sustainability Officer	SEKAB Tanzania
Mr Anders Bergfors	Managing Director	SEKAB Tanzania
Miss Josephine Brennan	Business Adviser	SEKAB Tanzania
Mr Paul Kiwele	Principal Forest Officer	MEM
Mr Mfangavo	District Forestry Officer	Kilwa district council
Miss Kristen Kurzac	Business Advisor	BP
Dr Kalindwa	Economist	UDSM
Dr Bashiru Ali	Researcher	UDSM
Mr Victor Akim		UNIDO
Mr Emmanuel Sule	Research Associate	TNRF
Dr Hussein Sosovele		WWF/ UDSM
Mr Silas Olang	Researcher	Oxfam
Mr Kassim Mchurumba	Village Executive Officer	Nyamage Village Council
Mohamed Athuman Makui		Nyamage Village Council
Mrs Fatima Salum Mpendo	Local farmer	Nyamage Village
Mrs Chico Kimwake	Primary School teacher	Nyamage Village
Juma Ramadani Mnaula	Village Executive Officer	Marumbo Village Council
Sudi Omali Songo		Marumbo Village Council
Huthma Ramadani Bofa	Local farmer	Marumbo Village
Muantu Mlawa	Local farmer/ artisan	Marumbo Village
Mtoro Ramadani Nfaume	Village Executive Officer	Matimbwa Village, Bagamoyo
Hassan Ramadan Mbena	Tractor Operator	SEKAB
Anthony Mwakensha	Casual labourer	SEKAB
Baracka Kaluguie	Tanzania Integrated Coastal Management Officer	RECOMAP
Carter Coleman	Managing Director	InfEnergy
Graham Anderson	Business Development Director	InfEnergy
Mr Dai Saba	Economist	Ministry of Labour
Christine Adamow	Managing Director	Africa Biofuel and Emissions Reduction Company

# Appendix 2: Further Information on major biofuel investors in Tanzania

## 1 BioShape

### *The Environmental Impact Assessment*

An Environmental Impact Assessment for the BioShape Kilwa project was conducted by the Tanzanian consultancy company M/S Environmental Management Consultants (EMAC), PO Box 974, Moshi Tanzania, and has been approved by the Tanzanian National Environment Management Council (NEMC) despite its many omissions (see below). Mr Obadiah M. Ndosu of EMACO was the Team Leader, while Mr Canisius J. Kayombo, Botanist and Herbarium Technician at the National Herbarium, Tanzania and Mr Joshua Mushy, of the College of African Wildlife Management in Moshi carried out the survey.

A copy of the EIA by M/S Environmental Management Consultants (EMAC) has been examined by conservationists in Tanzania and demonstrates the following<sup>12</sup> :

1. Throughout the document the area is characterised as disturbed miombo. There is no mention of the fact that the project is within the Coastal Forest biodiversity hotspot and that the project might pose a risk to some of the Coastal Forest endemic species. Coastal Forests are not mentioned anywhere.
2. There is no detailed description of the methodology used to assess the vegetation and therefore provide a basis for concluding that it is mostly low-value miombo. It appears that field visits were made to the site but that the main focus for these was on stakeholder consultation. There is no mention of any detailed study of the vegetation either using ground surveys or remote sensing. Thus all conclusions about the vegetation type found in the area appear to be unsubstantiated., especially when compared to actual satellite images.
3. No basis is given for concluding that the buffering approach that they propose is suited to the ecology of the area, and no attempt is made to map elephant trails to prevent planting on these.
4. No analysis is made of the change in carbon balance following clearance of natural vegetation and replacement by *Jatropha* plants.
5. No scientific references are provided for any the ecological claims made in the reports. The only references listed relate to the various policies and to EIA methodology.
6. The report makes repeated claims that biofuels can reduce carbon dioxide emissions and that this is a justification for their development. No life cycle analysis is provided to substantiate that for the Kilwa *Jatropha* example and given that the raw materials are going to be transported by ship from Tanzania to Europe and that large swathes of natural vegetation are going to be cleared, it seems unlikely that this will result in a positive net carbon sequestration.
7. The report is ambiguous (and in places contradictory) as to whether the *Jatropha* will ever be processed in Tanzania. The report claims that a benefit of the project will be 'Curtailling of foreign resources through reduced import of fossil fuel. ' However for at least the first five years, the project will export the raw material for processing in the Netherlands and Belgium and in various places, this is quoted as being the market for which the fuel is intended. Nowhere in the report does the developer make a firm commitment to construct the processing plant in Kilwa. As such it seems that there is a considerable risk that the developer will never build a processing plant in Kilwa and will continue to export the raw material thereby undermining one of the quoted benefits.
8. The sums of money that they are planning to pay the villagers for their land and trees is nothing short of exploitative - TSh 8000 / ha (USD 6.67) including the trees (plus TSh 7000 to the District).
9. A biofuel expert has questioned the economic viability of the plan which seems to be based

<sup>12</sup> Email from Nike Doggart of the Tanzania Forest Conservation Group, 22<sup>nd</sup> May 2008, and Steve Ball of the Mpingo Project, 1<sup>st</sup> July 2008.



on some key assumptions which are not well proven and are not explored in the EIA. In general, most of the data on *Jatropha* comes from India. A PhD student who assessed some of the plantations in India found that some of the data was questionable. However based on the data available, in good conditions it takes 5 kg of *Jatropha* seeds to produce 1 litre of oil (oil content in Arusha has been around 15 %). Crude oil at Dar es Salaam sells at USD0.52 per litre. Others have calculated that the cost of producing the seeds should therefore not exceed USD 0.16 (because of other processing costs etc) in order to be competitive with diesel in Tanzania. Once the other costs of infrastructure etc. have been taken into consideration, it has been estimated that a producer can not afford to pay labour more than 3 - 4 US cents per kg of seed. These figures are similar to what BioShape estimate that they will pay their workers i.e. TSh 3000 for 80 kg however it seems highly unlikely that they will find 10,000 people willing to work under those conditions for any prolonged period. It also assumes that the oil content will be good which is not documented in the report.

10. The business plan (not seen) may therefore be based on a significant income from the timber that is being harvested. The report itself states that the sale of the timber will help to pay the costs of establishing the plantation (although it is unclear how selling off its timber for a pittance to establish a potentially uneconomical biofuel plantation will really benefit the District or Villages in the long run).
11. The impact of 10,000 people moving to such a sensitive area is not addressed by the report. In addition this is an unrealistically large number of people to manage adequately.
12. In particular the report does not consider the impact that such a population will have on the surrounding environment bearing in mind that labour is likely to be seasonal. In Arusha, they have found that *Jatropha* only produces seeds when it rains. This means that there will be a peak demand for labour to harvest the seeds at particular times of the year. For the rest of the year, the workers will either have to find alternative forms of employment or migrate elsewhere. The inevitable additional pressure on the forests from logging and charcoal production are obvious.
13. The report makes no mention of uncertainties in the biofuel market particularly given the (likely?) about-turn in Europe regarding member state's obligation to adopt biofuels.
14. Overall it seems that 81,000 ha of land are being allocated to an investor for very little money to largely clear its natural vegetation without a logging permit from the District Forest Officer in order to produce a crop whose economic viability is unproven.

According to BioShape's director Will Hermans, the Dutch consultancy company AIDEnvironment <http://www.aidenvironment.org> also conducted a 'Strategic Impact Assessment' for them, and a consultant from AIDEnvironment has visited Tanzania because they considered the EMAC EIA to be wholly inadequate. A request to AIDEnvironment to view this Strategic Impact Assessment was refused on the grounds of client confidentiality<sup>13</sup>, with a later clarification that it was not an Environmental Impact Assessment (hence the 'Strategic Impact Assessment' label) and therefore outside the disclosure requirement according to EU Directive 2003/35/EC<sup>14</sup>.

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<sup>13</sup> Email from Michiel C. de Wilde, Director of AIDEnvironment, to Phil Clarke on the 25<sup>th</sup> June 2008.

<sup>14</sup> Email from Joost van Montfort, AIDEnvironment, 26<sup>th</sup> June 2008.

## *Appendix 3: Consultants' Terms of Reference*

### **Assess biofuel investments within Tanzania**

Delivered to Peter Roberntze, Forest & Bioenergy Officer WWF-Sweden

#### **Outcome and Objectives**

The overall aim of the study is to highlight, with concrete examples, the challenges involved as large scale biofuel investments are made in Tanzania. Following a previous WWF study into biofuels, this study aims to look at some of the major issues involved with biofuels in Tanzania and assess how investors can develop their businesses successfully while mitigating negative environmental impacts and maximising gains for rural development.

The aims of this consultancy therefore will be to:

- Assess the current status of all biofuels investments in Tanzania
- Make a detailed assessment of the major investors
- Produce a report outlining the consultancy findings

#### **Background**

The biofuels industry began in the early 1970s and was pioneered in Brazil. It is only in the last five years, however, that biofuels have started to be seen as a serious alternative to oil worldwide. Their reduced carbon emissions compared to fossil fuels, their positive impacts on rural development, together with escalating oil prices from \$64 per barrel in 2006 to over \$140 in 2008, are driving forces behind their market development worldwide.

Today, there is a rapid expansion of global biofuels markets as many countries introduce ambitious policies to increase the proportion of biofuels in their energy portfolio. If this is to be met, considerable increases in production are rapidly required to satisfy greater global demand. The most important example is the EU's goal of 5.75 percent biofuels content in the fuel transportation blend by 2010, and their aim to extend this to 10% by 2020. Global biofuels production is estimated to be over 35 billion litres, dominated by the USA and Brazil.

There are also ethical issues to be considered in promoting the development of biofuels. The growing of crops for energy and opposed to food is seen by many as a major threat to global food security. The price of corn has more than doubled in the last two years, boosted in part by the demand for Ethanol. World Bank President Robert Zoellick acknowledged that the demand for Ethanol and other biofuels is a "significant contributor" to soaring food prices around the world. However, droughts, financial market speculators, increased demand for food and especially skyrocketing world oil prices are also major contributors.

A second critical ethical concern is the clearing of forest for the cultivation of biofuels. This is important in Tanzania, where we see many investors targeting land currently covered by coastal forest. Forests are natural carbon sinks, locking carbon in place for decades or centuries. When forests are cleared and the wood consumed as a biomass fuel, the carbon is released into the atmosphere as carbon dioxide. The question of energy balance is one of many important factors in determining whether biofuels are environmentally-friendly.

A scoping study was carried out in May and June 2008 which looked into biofuels development in Tanzania in terms of the environment, biodiversity and socio-economic issues. This highlighted some of the main concerns, carried out a SWOT analysis and put forward policy suggestions and guidelines. A WWF biofuels stakeholders workshop was held at Morogoro from the 9<sup>th</sup> to the 11<sup>th</sup> June 2008 in which difficulties and challenges in developing a socially and environmentally sustainable biofuels industry were highlighted. Biofuels investors have been buying up large quantities of land and have started up their businesses, however little exists in Tanzania in terms of regulations and procedures that provide the investors with guidelines. This leads to an uncertain investment climate, and raised anxiety about the effect that an unregulated biofuels industry may have.

The target market of Tanzanian biofuels will predominantly be the European Union. However the EU is currently drawing up high sustainability standards, which may result in the blocking of biofuels sourced from operations with low environmental and social standards. In addition the Roundtable on Sustainable Biofuels (RSB) has recently published its principles and criteria for certification. Certification of biofuels not only ensures that producers will be able to meet the EU's standards, it also adds value to the biofuels and a premium could be paid to producers. The tone of the study aims to be constructive – to highlight challenges associated with biofuels investments and suggest practical ways in which these can be mitigated.

Responsibilities and outputs

With Andrew Gordon-Maclean as the principal consultant, and the support of Paul Harrison and in conjunction with other consultants, the consulting company Kilimanyika will carry out the analysis into the main biofuels investors and would deliver a concise, illustrative and informative report outlining the main challenges and potential approaches in the development of sustainable biofuels investments in Tanzania. Confidential internal information will also be produced for WWF in order to help them engage with biofuels investors.

## **Activities**

### **4.1 Assessment of biofuels investors**

The assessment will be carried out in 3 stages.

#### **Stage 1**

First assess at what stage all biofuels investments in Tanzania are, including actual plans, contact with authorities, land appointed, EIA, activities going on etc. This will be done using the recent WWF Tanzania biofuels report as a guideline, although recent changes in the companies' operations will be taken into account.

Basic company information will include

- Which companies are behind the investment
- Does the investor have a project plan? What is the plan?
- What staff competence does the company have in Tanzania.
- Where the investor is exporting to if planning for export
- What socio-economic considerations do companies have for the communities that live around their farms?

#### **Stage 2**

A detailed assessment will be made of the 5 most advanced/potentially controversial projects. These investments will be assessed on the basis of the principles and criteria produced as a result of a WWF stakeholders' workshop held in June 2008.

The methodology to be used to assess each investment will include semi-structured interviews with;

- Biofuel company directors, managers, site managers and employees
- Company ownership, registered offices, branches and subsidiaries
- Company finances if available
- Academics at universities in Tanzania
- National, district and village government officials
- NGOs working in the area

In addition, site visits will be conducted with a biodiversity specialist to look at the farm practices and make a rapid assessment of the habitat types in the area.

The following check list has been produced in order to allow for a comprehensive study of the biofuels investors. This will not be judged on a pass/ fail basis but will be used to assess how companies are able to comply with each of these principles and identify problem areas for the development of socially and environmentally sustainable biofuels investments.

### **Full assessment of biofuels investment challenges**

<b>Principle</b>	<b>Criteria</b>	<b>Indicators and verifiers</b>
Legality	Biofuel producers should adhere to all laws (Tanzania), international treaties and agreements/contracts made.	<p>Compliance to Tanzanian policies, such as;            1997 National Land Policy            1997 Environmental Policy            1997 Agricultural and Livestock Policy            2003 Transport policy            1998 National Forest Policy            2002 National Water Policy            1996 National Investment Promotion Policy</p> <p>Acts and regulations such as;            1999 Land Act            1997 Tanzanian Investment Act            2004 Environmental Management Act            EIA process under NEMC            2002 Forest Act            2007 Land Use Planning Act</p>
Compensation	Land acquisition process	<p>Time taken for companies to receive land</p> <p>Amount of money (USD) paid to village and district officials</p> <p>Type of payment/compensation scheme used</p>
Consultation	Biofuels project is transparent, consultative and participatory	<p>How investment was put into place at national, district and village government</p> <p>Document transparency of the investor – depending on what documents are available/public</p> <p>Land use planning carried out in a participatory way</p> <p>EIA</p> <p>Village government understanding of agreements</p> <p>Legal obligations to local people</p>
Food Security	Biofuels should not be allowed to impair food security	<p>Local food security assessments in biofuel project areas – consultations with FAO/ WFP</p> <p>Suitability of land being taken up for biofuels for food crops</p>
Production	Biofuels companies aim to process biofuels within Tanzania so that added value products are made and profits are maximised within country	<p>Company business plans</p> <p>Interviews with investors</p>

	Farm management represents the most efficient use of resources	Plan of how to use waste products (such as bagasse for converting sugar to Ethanol) Plans for muticropping/ integrated farm management
Marketing strategy	Biofuels are utilized locally	Biofuels produced made available for local/ domestic market
Energy crops	Suitability of energy crops for local area and local climactic conditions	Specific needs of the crops being used and how this may affect the surrounding area
Soil	Feedstock production does not adversely affect soil health	Soil type in the area Potential impact of activities on the soil Data from EIA
Water	Biofuels production does not threaten the viability of the local water table	River status Status of local aquifers Amount of water used up for irrigation Information from previous hydrological studies Risk of salinisation Data from EIA
Biodiversity conservation	Biofuels processes should not be allowed to directly or indirectly endanger areas high conservation value areas	Bordering habitat assessed according to forest type Presence of rare, threatened or endangered species Plans for wildlife corridors Local environment described in terms of the HCV concept Indirect Land Use Change effects such as displaced agriculture and people Data from EIA
Climate change and greenhouse gases	Biofuels production should be carbon neutral or carbon negative	Net energy balance of production of feedstock GHG emissions from activities Life cycle analysis
Human/ Labour rights	Biofuels production should not violate human rights	Amount of people to be employed Conditions for labourers No. casual vs permanent labourers

Socioeconomic development and livelihoods	Feedstock production does not negatively affect local livelihoods. Development gains are maximised	Potential of progressive tax breaks for companies to support local farmers Outgrowers schemes
Bio-technology	Untested GMO crops should not be used	Presence of GM crops and provision for preventing genetic contamination

### Stage 3

Conclusions & recommendations to investors/authorities.

The production of a confidential report on biofuels companies for WWF. This would be an internal document that can be used by WWF Sweden for the development of communication materials.

A concise report on how socially and environmentally responsible biofuels investments can be carried out, highlighting the major issues, difficult areas to resolve and ways in which solutions can be found.

### Timetable of Activities

Activity	Andrew Gordon-Maclean	James Laizer	Riziki Shemdoe	Paul Harrison	Demetrius Kweka	Total man days
Background reading planning and design of assessment strategy	5	1		1		7
Interviews with companies and assessment of policy and business plan	5	1	2	1		9
Interviews with National government ministries	5	2	1			8
Field Assessments	10	10	2		7	29
Data analysis and report writing	5			2	1	8
<b>TOTAL</b>	<b>30</b>	<b>14</b>	<b>5</b>	<b>4</b>	<b>8</b>	<b>61</b>

### Timing of activities

	Background reading planning and design of assessment strategy	Interviews with companies and assessment of policy and business	Interviews with national government and NGOs	Field assessment (including site visits and interviews with district	Submission of information for communication materials in Sweden	Analysis and report writing

		plan		officials)		
18 - 26 September						
29 September– 3 October						
6 – 10 October						
13-17 October						
17 - Oct						
24 October						
27 October – 5 November						

Potential start date is the 18th of September. Final report will be delivered to WWF Sweden and WWF Tanzania on the 5<sup>th</sup> of November 2008.



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**Report compiled by Andrew Gordon-Maclean, James Laizer, Paul Harrison & Riziki Shemdoe**



Kilimanyika is a partnership of consultants promoting effective utilisation and sustainable management of natural resources in the developing world, in order to support both human livelihoods and environmental conservation. Kilimanyika offer consultancy services in project management, research and analysis, strategic guidance and capacity building, working with a range of stakeholders to plan, implement and evaluate initiatives. These include agrarian, pastoral and coastal communities and CBOs, local and international NGOs, businesses and governments.