

FEASIBILITY STUDY OF JATROPHA CURCAS AS A BIOFUEL FEEDSTOCK IN KENYA



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1.0 EXECUTIVE SUMMARY

This report of a study designed to assess the feasibility of development of Jatropha industry in Kenya. Though Jatropha has generated enormous excitement in the country, there is little information on its feasibility. The scope of the study was to assess the opportunities available in Kenya for production and manufacturing of Jatropha. The study looked at the geographic and climatic conditions, environment and land use, economic condition, infrastructure and policy environment. In addition and feasibility study was also meant to come up with recommendations that will provide an enabling environment for the production of biodiesel as a commercial fuel in Kenya.

The term bioenergy is used to refer to energy derived from one of three sources: Bioresources (natural wood growth), Biowaste (by-products from human Agricultural and Industrial Processes) and Biofuel (crops purpose grown for energy). Biodiesel is a liquid substitute for petroleum-based diesel fuel made using vegetable oil derived from a wide variety of oil-bearing plants such as castor, coconut, croton, Jatropha, rapeseed (canola), and sunflower. Waste vegetable oil can also be used for biodiesel. Unlike ethanol, which has several markets aside from energy, biodiesel's only use is as an alternative source of fuel for transport and stationary power.

The feasibility study was motivated by the growing interest in biofuel worldwide fuelled by the demand from developed and developing countries for a number of reasons, but mainly increasing fossil fuel prices and the demand for reduced Greenhouse Gas (GHG) emissions. In addition, the fact that biofuels have the potential to alleviate poverty, stem rural urban migration, increase income generation for poor family, create employment and reverse environmental degradation, makes biofuel much attractive. A full grown shrub or tree absorbs around 18 pounds (8 kilograms) of carbon dioxide every year. 2500 shrubs can be planted in a hectare (about 2.5 acres), resulting in more than 20 tons of greenhouse gas sequestration per year. The fact that some biodiesel producing plants such as Jatropha (*Jatropha curcas* L.) grow in unproductive and marginal lands has made biodiesel production more appealing in Kenya for diversification rural livelihoods and environmental conservation.

Methodology

The study was conducted through literature review, interview with stakeholders and on-the ground assessment in part of Kenya designed to understand the national enabling environment and the industry's supply chain. Tools utilized on the field study included: site visits, interviews of local producers, entrepreneurs, intermediaries, service providers, export agencies, government officials, and non-governmental organizations.

World Environment and Trends

The world biofuels market has been growing at an accelerated pace in the last twenty years, and this trend is expected to continue in the future. This market can be divided into two broad categories: biodiesel and ethanol. Biodiesel is manufactured from natural oils, whether they are from animal or vegetable matter. Ethanol is produced from sugars, either harvested directly or broken down from starches. Both sectors of the industry have

grown significantly. It is estimated that the United States produces 44%, Brazil 41%, the European Union 13% and South East Asia 2% of the world's total supply of biofuel, which is about 16Mtoe (million ton oil equivalent comprising 80% ethanol and 20% biodiesel).

There are many crops that can be used for producing biodiesel, but the choice normally depends on local availability, affordability and government incentives. For example, rapeseed oil is preferred in Western Europe, while the United States favors refined soybean oil as a feedstock. Although Brazil is the world's second-largest producer of soybeans, its government is fostering a castor oil-based biodiesel industry. Both India and China have large *Jatropha* (physic nut) plantations under development. The most important feedstocks by 2010 are expected to be soybean, rapeseed and palm oil, in descending order. Nevertheless, *Jatropha* and cottonseed oils will show the highest growth rates. In terms of the market size, the biodiesel industry reached 3,524 million liters in 2005, with Western Europe having the largest share of the market.

Opportunities for *Jatropha* Industry Development

Geographical Condition and Climate

Geography

Kenya lies astride the equator in Eastern Africa between Somalia and Tanzania and bordering the Indian Ocean with a total area of 582,650 square kilometers, which includes 13,400 square kilometers of water. Kenya's land boundaries total 3,477 kilometers.

Climate

Kenya's climate varies from tropical along the coast to arid in the interior, especially in the north and northeast. Intermittent droughts affect most of the country. Less than 15 percent of the country receives somewhat reliable rainfall of 760 millimeters or more per year, mainly the southwestern highlands near Lake Victoria and the coastal area, which is tempered by monsoon winds. ASALs constitute about 80% of the country's land mass, host about 10 million people and approximately 70% of the national livestock herd.

Population

In 2007 Kenya's population was estimated at 36,913,721, up from 28.7 million reported in the 1999 national census and from 15.3 million in the 1979 census (Government of Kenya, 2007). Somewhat more than one-third of Kenya's population lives in urban areas, with the greatest concentration in Nairobi. The population is also heavily concentrated in areas of fertile land in the center and west of the country. *Jatropha* production is labour intensive may play a role controlling rural urban migration through employment creation in the ASALs.

Natural Resources and Land Use

Natural resources

Kenya's most valuable natural assets are rich agricultural land and a unique physiography and wildlife. Although closed forests cover just 1.7 percent of Kenya (Mutimba, 2008), they continue to play a critical role as water catchments, sources of fuel and food, and climate regulators. They slow the spread of deserts, promote rainfall, and serve as 'sinks' for manmade carbon dioxide. Wide planting of *Jatropha* contribute to the overall total land cover especially in the ASALs which have low land cover.

Land use

Of Kenya's land surface, between 7 and 8 percent is arable, while slightly less than 1 percent is in permanent crops. According to a 1998 estimate, irrigated land totaled about 670 square kilometers. About 80% of the total land mass in Kenya is categorized as ASALs which is host about 10 million people and approximately 70% of the national livestock herd. The economy of the dryland communities is dependent livestock production with semi-sedentary farming in some marginal agricultural areas. Most of these areas are suitable for *Jatropha* production.

Environmental factors

Kenya faces serious interrelated environmental problems, including deforestation, soil erosion, desertification, water shortage and degraded water quality, poaching, and domestic and industrial pollution. Water-quality problems in lakes, including water hyacinth infestation in Lake Victoria, have contributed to a substantial decline in fishing output and endangered fish species. Output from forestry also has declined because of resource degradation. Overexploitation over the past three decades has reduced the country's timber resources by one-half. This loss of forest aggravates erosion, the silting of dams and flooding, and the loss of biodiversity. *Jatropha* has been reported to control land degradation and reverse deforestation. As a perennial it can sequester carbon too.

National reserves

The national reserves are governed under Wildlife (Conservation and Management) Act. The Wildlife Act makes it an offence for any person to enter or resides in a national park otherwise than in the course of his duty as a park officer, cut or injure or set fire to any vegetation within a national park, collect or attempt to collect honey or bees wax in a national park, or knowingly introduce any animals or domestic animal into the national park without authorization. Due to the restrictive nature of the laws guiding, the use of land under national reserve, these areas are not candidate for *Jatropha* production and must be mapped out of the total land suitable for *Jatropha* production.

Agriculture

Agriculture remains the population's main occupation and source of income. Although only about 20 percent of Kenya receives sufficient rainfall to support cultivation, agriculture accounts for over 70 percent of the country's employment and, directly and indirectly, for over 50 per cent of GDP (Mutimba, The principal cash crops are tea, horticultural produce, and coffee; horticultural produce and tea are the main growth

sectors and the two most valuable of all of Kenya's exports. intermittent droughts. The Strategy for Revitalizing Agriculture (2006) offers development opportunities through the Agriculture Product Value Chain which aims at developing business linkages through new extension approaches between producers, suppliers, processors and the market. The country's vision 2030 aims at industrializing the agricultural sector through enhanced agro-processing and value addition to.

The agribusiness and its support institutions

Kenya has had a successful agricultural sector development since the early 50's. However it was not until mid 1960's, immediately after independence, that heavy interventions were injected in the agricultural sector. Policies covered every sphere of agriculture such as production, marketing, research, credit extension and price controls. Policies advocated the promotion of cooperatives and farmer based companies as well as promoting agro-industries for processing of agricultural products.

Land areas for *Jatropha* production

Jatropha can be cultivated in tropical Africa's semi-arid regions where the climate is harsh and soils are of relatively low physical and chemical quality. It does not need much water to survive - only about 10 inches (250 mm) of rainfall per year - thus can be grown in arid regions and will grow well on marginal land. The areas suitable for growth of *Jatropha* in Kenya range from the coastal lowlands, the vast ASALs to the midlands (0 – 1600m above sea level). Much breeding and agronomic work remains to be done on *Jatropha curcas* to maximize its soil production per hectare as well as the product quality and quantity.

Environmental impact of growing and manufacturing *Jatropha*

Generally speaking, transplanting a species from one part of the world to another - either accidentally or on purpose - has, on occasion, had some really negative consequences. A prime example in Kenya is *Prosopis* species that was introduced to Kenya beginning in the 1970's to solve fuelwood problem. It did that but now *Prosopis* spp. overgrows just about everything in its path and is almost impossible to get rid of. The questions in everyone's lips are: What would be the impacts, the consequences, of farming *Jatropha curcas* on a large scale? (It is already classified in Western Australia as an invasive species and its use in biodiesel production is banned). It is also considered poisonous (to some degree) as its seeds or nuts, and oil from them are non-edible.

Though *Jatropha* is not indigenous to Kenya, the species seems to have been introduced close to a century ago, judging from the age of the trees growing wild in the country. The history of its introduction however is not well known. From the natural stands in Kenya, the tendency to spread has not been observed and it is rare to find young trees. This by no means should be taken as a proof that it is not invasive but could give indications that the problem may not be to the scale reported such as in Australia. Long term observation, especially and large scale planting should be undertaken.

Current status of production of Jatropha in Kenya

In Kenya, Jatropha is mainly grown in Kitui, Thika, Namanga, Kajiado, Malindi, Nyanza, Nakuru, Marakwet, Naivasha, in the coastal regions and in Meru. In East Africa, Tanzania is said to have made the biggest strides in terms of growing the fuel tree on large scale. However, Kenya is said to be well ahead of other African countries in research on the same the biofuel funds come in through organizations like the World Bank, EC, WWF, etc. So far close to 3,860 acres of Kenyan land has been covered by the plant. The new entrants, Hydronet Energy Company Ltd., and Biwako Bio-Laboratory Inc., both from Japan could be the first to commence commercial biodiesel operation in Kenya.

Current Economy Economic Situation in Kenya

Kenya's economic performance has been hampered by numerous interacting factors: heavy dependence on a few agricultural exports that are vulnerable to world price fluctuations, population growth that has outstripped economic growth, prolonged drought that has necessitated power rationing, deteriorating infrastructure, and extreme disparities of wealth that have limited the opportunities of most to develop their skills and knowledge. Poor governance and corruption also have had a negative impact on growth, making it expensive to do business in Kenya. Kenyans, 23 percent of the population are living on less than US\$1 per day. Another large drag on Kenya's economy is the burden of human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS). Prospects brightened somewhat with the coming of the NARC government, in 2003, whose policy aims included budgetary reforms and debt restraint. The country's real GDP growth picked up to 2.3 percent in early 2004 and to nearly 6 percent in 2005 and 2006, compared with a sluggish 1.4 percent in 2003 and throughout. The recent violence which erupted following the disputed December 2007 elections slowed down the growth but the prospects looks bright with the formation of the grand coalition government.

Tourism is now Kenya's largest foreign exchange earning sector, followed by flowers, tea, and coffee. In 2006 tourism generated US\$803 million, up from US\$699 million the previous year. In 2005 the combined value of these commodities was US\$1,150 million, about 10 times the value of Kenya's third most valuable export, coffee. Kenya's other significant exports are petroleum products, sold to near neighbors, fish, cement, pyrethrum, and sisal. The leading imports are crude petroleum, chemicals, manufactured goods, machinery, and transportation equipment. Africa is Kenya's largest export market, followed by the European Union. Kenya typically has a substantial trade deficit. The trade balance fluctuates widely because Kenya's main exports are primary commodities subject to the effects of both world prices and weather.

Post-election unrest and disruption, although fading, is having a negative impact on trade in 2008, leading to slippage in both exports and imports. Trade will rebound, provided that the political settlement holds, but damage already caused suggests that export growth in 2008 will be modest. The recovery in imports is likely to continue, given reconstruction needs and high oil prices, leading to a wider merchandise trade deficit. Tourism earnings are likely to recover (politics permitting) but perhaps only returning to 2007 levels.

Infrastructure

Road, rail, and air transport are all significant in Kenya, while water transport plays a minor role. All of Kenya's transportation sectors, but particularly road and rail, are in need of stepped-up investment for better maintenance and expansion. Other important infrastructure includes inland water ways (mainly Lake Victoria) and well developed civil aviation, port, pipelines and telecommunications.

Government and Politics

Kenya is a republic dominated by a strong presidency. The political system is in flux as contentious debate continues on efforts to adopt a new constitution. Besides the constitution, a pressing concern in Kenyan politics is corruption. Recent anticorruption efforts have led to the establishment of the Kenya Anti-Corruption Commission (KACC) and two laws requiring civil servants to disclose assets and mandating transparency in procurement. Kenya is run through three branches of the government. Executive Branch: Under Kenya's current constitution, the president is both the chief of state and head of government. Legislative branch: Kenya's National Assembly, is a unicameral legislature with 224 members, 210 of whom are elected by popular vote for five-year terms. Judicial Branch: Kenya's court hierarchy consists of the Court of Appeal, High Court, resident and district magistrates' courts, and kadhis courts, which adjudicate Muslim personal law concerning personal status, marriage, divorce, and inheritance among Muslims.

Administrative divisions: Kenya is divided into seven provinces and the Nairobi Area. The provinces are Central, Coast, Eastern, North-Eastern, Nyanza, Rift Valley, and Western. Lower-level administrative units include districts and further to divisions, locations and sub-locations. The seven provinces and the Nairobi Area are administered by provincial commissioners who are answerable to the president. Further, there are local governments represented by local councils operating under the Local Government Acts. These elective municipal, town, and county councils have limited powers delegated by the national government. The councils have the authority to allocate land for investment under the Trust Land Act.

Policy Framework

Land tenure laws

Land in much of the ASALs of Kenya is governed by the Trust Land Act. The Constitution of Kenya vests trust land in county councils to hold in trust "for the benefit of the persons ordinarily resident on that land" and to "give effect to such rights, interests or other benefits in respect of the land as may, under the African customary law for the time being in force and applicable be vested in any tribe, group, family or individual" (Constitution of Kenya). Another piece of legislation that affects land use in the drylands is the Land (Group Representatives) Act. This Act has attempted to incorporate elements of traditional land tenure systems into statutory law. It provides for the establishment of group ranches, bringing together community members who adopt a constitution and elect not more than 10 people and not less than three to act as group representatives. The impact of privatization of group ranches on livelihoods and biodiversity use and conservation has been well documented. Though *Jatropha* development can still be done

under the current system, there is a need for a set of national norms and standards to ensure efficient and effective use of public land as an asset in support of land reform.

Energy policy and regulation

The relevant legislation includes the Energy Act 2006. Other legislation expected to impact on the industry include Forest Act 2005, Agriculture Act, Forest Act, Trade & industry Act and the Water Act. The Sessional Paper No. 4 of 2004 on Energy seeks to encourage wider adoption of renewable energy technologies, thereby enhancing their role in the country's energy supply matrix. The Policy recognizes the potential for production of biodiesel from locally grown crops, and in order to utilize biodiesel, observes that a system for production, distribution and use will need to be put in place. It recognizes the need to set aside land for the production of energy crops from which biofuels can be produced, and to formulate strategies to optimize land use and to harmonize the existing land use policy with the energy policy. It also calls for resources to be mobilized for research and development to facilitate its introduction as a motor blend in the medium term.

The Energy Act 2006 was operationalized in July 2007. This legislation embraces petroleum, electricity and other forms of energy to enhance incentives to the private sector and ensure prudent regulation of the energy sector. It allows duty free importation of energy hardware to promote widespread usage. It also allows renewable energy systems not exceeding 3MW or if operating in hybrid mode, in which the oil fired component does not exceed 30% of the total capacity to operate in any area of the country without any license, irrespective of any other existing distribution license.

The policy on Arid and Semi Arid Lands (ASALs) indicates that available opportunities for investment in these areas have not been utilized (Government of Kenya, 2005). Mainstreaming the *Jatropha* value chain initiatives into ongoing activities in the ASALs will be pursued with a view to achieving the objectives of this strategy. The Strategy for Revitalizing Agriculture (2006) offers development opportunities through the Agriculture Product Value Chain which aims at developing business linkages through new extension approaches between producers, suppliers, processors and the market (Government of Kenya, 2006). The country's vision 2030 aims at industrializing the agricultural sector through enhanced agro-processing and value addition to.

Policies supporting direct foreign investment (DFI)

Kenya has had a long history of economic leadership in East Africa as one of the largest and most advanced economies in the region. Kenyan policies on foreign investment generally have been favorable since independence, with occasional tightening of restrictions to promote the "Africanization" of enterprises. Foreign investors have been guaranteed ownership and the right to remit dividends, royalties, and capital. In the 1970s, the government disallowed foreign investment unless there was also some government participation in the ownership of an enterprise. Notwithstanding some restrictions, between 60% and 70% of industry is still owned from abroad. A new investment code, the Investment Promotion Act 2004, is expected to streamline the administrative and legal procedures to achieve a more effective investment climate. The

legislation replaces the government's Investment Promotion Center with the new Kenya Investment Authority (KIA).

The Kenyan government has introduced various incentives to attract foreign investors to Kenya. Such measures include:

- An investment allowance is offered on buildings, equipment and plant machinery
- Loss carried forward option whereby a company is allowed to carry forward their losses to future taxable profits
- VAT waiver for all plants set up and machinery
- Depreciation of assets based on book value
- Removal of exchange controls
- Laws in place against expropriation
- Rationalized trade licences regime which requires less licences than before
- Decontrolled prices
- Importation of agricultural products attracts zero duty

In addition to these incentives;

- Kenya is a member of ICSI (International Centre for Settlement of Investment disputes) with its headquarters in London. This membership allows foreign investors to have their investment disputes judged impartially
- Kenya is a member of ATIA (African Trade Insurance Agency) which enables the foreign investor to insure against political risk.

Funds available for Jatropha investments

Possible funds for Jatropha development in Kenya include local financial agencies and foreign investors. Locally among the possible source of funds are loans from Agricultural Farcers Co-operative (AFC). Equity bank has also recently initiated low interest rates loans to farmers. Over 100 organizations, including about 50 NGOs, practice some form of microfinance business in Kenya. About 20 of the NGOs practice pure microfinancing, while the rest practice microfinancing alongside social welfare activities. Major players in the sector include Faulu Kenya, Kenya Women Finance Trust (KWFT), Pride Ltd, Wedco Ltd, Small and Medium Enterprise Programme (SMEP), Kenya Small Traders and Entrepreneurs Society (KSTES), Ecumenical Loans Fund (ECLOF) and Vintage Management (Jitegemee Trust).

Conclusions and Recommendations

Conclusions

Based on the research and findings, conclusions were reached and are outlined below.

The geographical position of Kenya in the tropic, abundant idle land in the ASALs (accounting for 80 percent of the total land mass), the relative political stability in the region, the infrastructure and policies demonstrate that there is a potential for the biodiesel industry in Kenya. With enough R&D jatropha can competitively meet both the national and even surplus for export.

The expansion and development of the biofuel industry will have positive developmental impacts on the economy, the people and the environment in Kenya. Jatropha production will create employment in rural areas that will not only reduce unemployment in these areas but will also reduce rural urban migration thus improving the rural economy. In addition, the biofuel industry has the potential to positively impact foreign reserves, because less oil will need to be imported. And finally, the use of biofuels decrease the amount of CO₂ emissions, thereby creating a sustainable industry that is friendly towards the environment.

The growth of biodiesel industry is hampered by lack of information, clear policy and regulatory frameworks and lack of institutions specifically charged with the role of developing it. There are a number of biodiesel initiatives throughout the country, however they are scattered, they are small and duplicated, and lack coordination.

Recommendations

1. In order for the industry to be successful, the productivity of jatropha needs significant R&D to improve productivity in order to reduce average costs of production. Also intensive research and development needs to be undertaken to increase potential yields, and decrease average production costs so as to lower farm gate price for the seed. Research is needed to develop other potential applications of the oil, which can include its use in rural electrification schemes. It is likely that for the industry to become competitive it will require initial support from the government not only to create a demand for the product, but to provide financial incentives (such as tax breaks), and if necessary subsidies like in the case of Brazil.
2. The present public land tenure management system in Kenya is fragmented, uncoordinated and non-transparent. The public land tenure as embodied in the Government Lands Act, Cap 280 of the Laws of Kenya lacks a coherent information system and is bedeviled by a lack of clarity in the roles, responsibilities and policies of different institutions in its administration, planning and disposal. Though Jatropha development can still be done under the current system, there is a need for a set of national norms and standards to ensure efficient and effective use of public land as an asset in support of land reform.
3. Despite this potential regarding biodiesel development in Kenya, the growth of biodiesel industry is hampered by lack of information, clear policy and regulatory frameworks and lack of institutions specifically charged with the role of developing it. There are a number of biodiesel initiatives throughout the country, however they are scattered, they are small and duplicated, and lack coordination. There is a need to create a specific institutional framework to address the development of industry in Kenya.
4. There is need to address the issue of access and delivery particularly with the view to ensure equity and benefits to rural communities. The question to be asked are: Is the industry going to adopt multilateral companies growing thousands of hectares and the local communities employed to provide labour as one of the models or are we opting for cluster farmers who are producers and selling to the processing companies?

5. There is need to generate scientific data on the issue of the environmental impact of *Jatropha* production and the question of its invasiveness. The debate must not be held purely in the scientific community or the developed world. It must involve the poor rural communities in the developing world where many of these biofuel crops will be grown. Their needs for improved living standards must be addressed and their involvement sought in achieving the best balance between revenue generation and long term sustainability.

6. Biodiesel may not always be economically competitive with petroleum fuels, especially as the industry is first getting established. The cost of production and the cost of petroleum will dictate the competitiveness of biodiesel at any given time. Tax policy can play a key role in either supporting or obstructing the development of a new biodiesel industry. Of particular importance is the issue of how fuel taxes will be imposed on biofuels. Tax holidays that reduce or eliminate the fuel tax on biofuels have been used very effectively to spur the growth in the industry in Europe and other parts of the world. These devices are often implemented for a set period of time – usually about 3-5 years – to enable the scale of biofuels production to rise to the point where it can compete with petroleum products on an even footing. Although this approach may forego some short-term revenues for the government, the domestic investment and job creation that such measures will spur should more than make up for the lost revenue in terms of overall economic benefit to the country.

2.0 Introduction

2.1 General introduction

This is a report of the findings of a feasibility study carried out in Kenya to determine communities' willingness to participate in the production and marketing of biodiesel in order to strengthen their livelihoods, increase income generation and alleviate poverty. There is growing interest in biodiesel, fuelled by the demand from developed and developing countries for a number of reasons, but mainly increasing fossil fuel prices and the demand for reduced Green House Gas (GHG) emissions. A full grown shrub or tree absorbs around 18 pounds (8 kilograms) of carbon dioxide every year. 2500 shrubs can be planted in a hectare (about 2.5 acres), resulting in more than 20 tons of greenhouse gas sequestration per year. The fact that some bio-diesel producing plants such as *Jatropha* (*Jatropha curcas* L.) grow in unproductive and marginal lands has made biodiesel production more appealing in Kenya.

Next to biodiesel production and wasteland reclamation, *J. curcas* also hosts socio-economic development potential. The multipurpose character of the plant and the labor-intensive production chain are thought to be the main drivers for rural development, but are uncertain. Next to biodiesel production and wasteland reclamation, *J. curcas* also hosts socio-economic development potential. The multipurpose character of the plant and the labor-intensive production chain are thought to be the main drivers for rural development, but are uncertain.

Eighty per cent (80%) of Kenya's expansive land area is marginal. Establishing biodiesel plants on such land has the potential to stem rural urban migration, increase income generation potential for poor families, create employment and reverse environmental degradation. However, for these benefits to be realized there is need for careful introduction of such programmes.

2.2 Scope of the Study

The scope of the study was to assess the opportunities available in Kenya for production and manufacturing of *Jatropha*. The study looked at the geographic and climatical conditions, political and economic environment, and infrastructure and policy environment. In addition and feasibility study was also meant to come up with recommendations that will provide an enabling environment for the production of biodiesel as a commercial fuel in Kenya.

2.3 Background

The term bioenergy is used to refer to energy derived from one of three sources: Bioresources (natural wood growth), Biowaste (by-products from human Agricultural and Industrial Processes) and Biofuel (crops purpose grown for energy). Biodiesel is a liquid substitute for petroleum-based diesel fuel made using vegetable oil derived from a wide variety of oil-bearing plants such as castor, coconut, croton, *jatropha*, rapeseed (canola), and sunflower. Waste vegetable oil can also be used for biodiesel. Unlike

ethanol, which has several markets aside from energy, biodiesel's only use is as an alternative source of fuel for transport and stationary power.

Biofuels have assumed significant importance globally as the world addresses changing patterns in energy supply and demand. Growing world energy demand, the insecurity of long-term supply and the consequences of fossil fuel use for climate change are driving governments to look for alternatives. With the price of fossil oil surging above the historical mark of US\$ 100 a barrel in the year 2007/2008 the search for alternative energy sources has become more urgent than ever. Many countries are promoting the production and use of biofuels - energy extracted as gas, liquid or oil from plants. Biofuel derived from food crops such as corn, sugarcane, soybean, oil palm and sugarbeet has been on the rise in recent years (Prota, 2007). It is seen by many as a clean form of energy in an era of soaring oil prices and concerns over carbon emissions.

The world biofuels market has been growing at an accelerated pace in the last twenty years, and this trend is expected to continue in the future. This market can be divided into two broad categories: biodiesel and ethanol. Biodiesel is manufactured from natural oils, whether they are from animal or vegetable matter. Ethanol is produced from sugars, either harvested directly or broken down from starches. Both sectors of the industry have grown significantly. It is estimated that the United States produces 44%, Brazil 41%, the European Union 13% and South East Asia 2% of the world's total supply of biofuel, which is about 16Mtoe (million ton oil equivalent comprising 80% ethanol and 20% biodiesel) (Prota, 2007a).

With the push to find alternative and renewable sources of fuel, oil from *Jatropha curcas* seeds has arisen as a good source of biodiesel. *Jatropha*, a plant originating in Central America that grows wild in many developing countries, including South Africa, India, Thailand, Malaysia, Indonesia, China and the Philippines, has suddenly found itself at the centre of a new phase in the world's alternative energy boom. *Jatropha curcas* is a drought-tolerant non-edible shrub. It produces fruits the size of golf balls which contain oil that can be converted into biodiesel, a substitute for fossil fuel. *Jatropha curcas* is a drought-tolerant non-edible shrub. It produces fruits the size of golf balls which contain oil that can be converted into biodiesel, a substitute for fossil fuel.

Oil extracted from the seed can be used (without refining) in adapted engines to power local grain mills, oil presses, water pumps and small electricity generating plants. It is estimated that large-scale plantations and oil extraction mills could produce *jatropha* biodiesel in West Africa at a price 5-12% cheaper than current gas oil prices. In remote areas, small-scale production and use of bio-fuel from *Jatropha curcas* is obviously more promising than the modest margins predict.

Studies from India show favourable energy balances for the physic nut or *jatropha* (*Jatropha curcas*) when used as feedstock for biodiesel production. Besides being unfit for human consumption, *jatropha* appears to have the necessary qualities of becoming the major vegetable oil crop for economically and environmentally sustainable biodiesel production in tropical Africa. Each hectare can produce an average of 500 gallons (1900

liters) of biodiesel per year from its nuts as well as more than 7500 lbs (3400 kilograms) of waste biomass. For biodiesel, *Jatropha* yields more than four times as much fuel per hectare as soybean; more than ten times that of corn.

This report of a study designed to assess the feasibility of development of *Jatropha* industry in Kenya. It contains describes the assessment methodology, findings as well as the final conclusions and recommendations. The paper begins by outlining the global market of biofuels, and it is followed by an overview of the national enabling environment and processes to follow in setting up a biodiesel business in Kenya. The paper concludes with recommendations and conclusions based on the study.

2.4 Purpose of Study

The purpose of the project was to assess the feasibility of developing a biodiesel industry in Kenya by conducting a preliminary analysis on the industry's value chain. The main objectives were to: assess the industry's competitiveness in the global and national market; identify major players in the supply chain; and estimate the developmental impact in the Kenyan agricultural sector.

In order to attain the project objectives, the research was broken down into four areas of study that included the following tasks.

1. The world environment
 - a) An industry overview and analysis of worldwide biofuels markets
 - b) The world demand and supply analysis
 - c) A brief examination of other nation's practices regarding promoting the biofuels industry
2. An analysis of the opportunities and challenges in developing biodiesel industry in Kenya
 - a) Geographical and climatic situation
 - b) Environment and land use
 - d) Economic conditions
 - e) Politics and parties
 - f) The assessment of the infrastructure challenges faced in the country
 - g) Policy and regulations influencing investment in biodiesel
3. Modalities for starting a biodiesel industry in Kenya
4. Recommendations and conclusion

3.0 Methodology

The study was divided into three phases. The first phase began with the review of academic literature, business reports and available statistics on the biofuel global environment. This was followed by the second phase which was composed on-the ground assessment in part of Kenya designed to understand the national enabling environment and the industry's supply chain. Tools utilized on the field study included: site visits, interviews of local producers, entrepreneurs, intermediaries, service providers, export agencies, government officials, and non-governmental organizations.

Limitations

Due to time constraints, research on-the ground was limited thus limiting the information that could be obtained from other regions of the country. Moreover, lack of current information on *Jatropha* production was encountered when meeting with the Ministry of Agriculture, Ministry of Energy, and other stakeholders because the industry is yet to develop in Kenya.

4.0 The World Environment

4.1 Production and international trade

The world market of biofuels has been steadily growing in the last years, with an increasing number of countries participating in it for environmental and security reasons. In 2002 world production of ethanol reached 21,841 million liters, while biodiesel production was 1,503 million liters. This production not only provided an alternative to fossil fuel, but it is also generated large number of employment since biofuel production requires 100 times more workers per unit of energy produced than fossil fuels. In 2002, the ethanol industry provided more than 200,000 jobs in the US and ½ million direct jobs in Brazil (IEA, 2004).

In recent years, *Jatropha curcas* has become the focus of large planting programmes in several tropical countries on account of its potential as a bio-fuel crop with low agro-ecological demands. Most of these are still in pilot stage of development, together probably not exceeding 100,000 ha. India alone may have more than 10 million ha of small-scale and large plantation by 2030, mostly reclaimed wastelands. Countries in tropical Africa with major development projects for *jatropha* biodiesel production include Mali, Burkina Faso, Ghana, Tanzania, Malawi, Zambia and Madagascar. The total length of *Jatropha* hedges in Tropical Africa is estimated at 75,000 km, yielding potentially 60,000 t of seeds per year.

Prices of *Jatropha* seeds vary between countries. Where seeds were used for manufacturing soap (Malawi, Tanzania) the price per kg was close to US\$ 0.10 once the demand for seeds rise. India a price of US\$0.40 per 1 of *Jatropha* –based fuel is expected to be realistic (cost price plus modest profit margin). To this price tax has to be added and the value carbon-credit-certificates deducted. Prices for gas oil in landlocked countries of West Africa were US\$ 0.80- 0.97 in 2007 (Prota, 2007a).It is estimated that large-scale plantations and oil extraction mills could produce *jatropha* biodiesel in West Africa at a price 5-12% cheaper than current gas oil prices. In remote areas, small-scale production and use of biodiesel from *Jatropha curcas* is obviously more promising than the modest margins predict.

4.2 World current and future trends

There are many crops that can be used for producing biodiesel, but the choice normally depends on local availability, affordability and government incentives. For example, rapeseed oil is preferred in Western Europe, while the United States favors refined soybean oil as a feedstock. Although Brazil is the world's second-largest producer of

soybeans, its government is fostering a castor oil-based biodiesel industry. The big palm oil producing countries in Southeast Asia are Malaysia and Indonesia. They are currently focusing on palm kernel and palm seed oil. Both India and China have large jatropha (physic nut) plantations under development. In addition, China is investigating recycled cooking oil as an option. The most important feedstocks by 2010 are expected to be soybean, rapeseed and palm oil, in descending order. Nevertheless, Jatropha and cottonseed oils will show the highest growth rates. In terms of the market size, the biodiesel industry reached 3,524 million liters in 2005, with Western Europe having the largest share of the market. Although it is still the largest producer, market fragmentation has decreased Western Europe's monopoly in the biodiesel market. Its share which represented 95% of the market in 2000, had been reduced to approximately 80% by 2005. This is accounted by new players, such as Asia, entering into the market.

4.3 The jatropha programs in India

In April 2003, the committee on development of biofuel, presented a report with recommendations to replace 20% of India's diesel consumption. This has brought numerous institutions, private investors and farmers to prepare and start with work on a major Jatropha program. To plant 11 Million ha Jatropha, the program was to become a "National mission" mobilizing a large number of stakeholders including individuals, communities, entrepreneurs, oil companies, business, industry, the financial sector as well as Government and most of institutions.

Biodiesel from jatropha is fast gaining popularity and although jatropha cultivation is being encouraged in India to reduce the dependence on high crude imports, there continues to exist some major barriers, including lack of R&D and farmer-level support besides the commercial viability and pricing issues which need to be addressed.

Several states in India have distributed plants free of charge to small farmers, encouraging private investment in jatropha plantations and setting up biodiesel processing plants. The state of Chhattisgarh has the most well-developed jatropha biodiesel programme in the country. About 380 million jatropha seedlings has been given away to farmers, enough to cover 150,000 ha, and 80 oil presses have been provided to various village governing bodies with guarantees to buy back jatropha seeds at USD 0,16 a kilogram.

The widespread government support has attracted investments and there are very recent plans for large investments in jatropha production. Indian state-run refiner Bharat Petroleum Corp Ltd announced in April 2008 that they would invest USD 66 million in biodiesel production out of jatropha and karanj plantations. They will build 10 biodiesel producing units over the next ten years. The State Trading Corporation of India is planning a foray into biofuels and is in talks with global companies which have biofuel refineries in jatropha plantation. UK-based D1 Oils, the worlds largest commercial cultivator of jatropha, has around 80,000 hectares, with plans for an additional 350,000 ha over the next several years. The Indian Railways have started to use jatropha oil blended with diesel to power its diesel engines with great success.

Not all outcomes of the jatropha production in India have been positive. The forest department cancels its plans to produce biodiesel from jatropha because they do not find it feasible. The costs will be much higher than expected and they will not be taking up any project or research related to jatropha. The unique selling point of jatropha was its ability to grow anywhere and have an oil ratio as high as 40 per cent. The yield was good on fertile land but went to one-third level when grown on infertile land. For better results the plant needs fertile land, irrigation, fertilizers. Growing the plant on wastelands will also prove costly as it will have low oil content. The cost is bound to go up and it is estimated that biodiesel will be two times costlier than the regular fuel.

Other results have shown the ongoing large-scale jatropha plantation to become a curse for rural children. During the first months of 2008 hundreds of cases of jatropha poisoning have been reported. Research has also shown that jatropha has harmful effects on Indian crops like pigeon pea. A local agricultural scientist stresses that there is a need for longterm studies on jatrophas impact on human beings, livestock and plants before giving the green signal for its large scale plantation and use as bio-diesel.

5.0 Jatropha Industry Development in Kenya

5.1 Why Biofuel in Kenya?

5.1.1 Poverty and environmental degradation

Arid and semi arid lands (ASALs) are home to the world's poorest and most marginalized people. In Kenya, the ASALs occupy over 80% of the country and host about 10 million people. These areas have the lowest development indicators and the highest incidence of poverty. Over 60% of ASAL inhabitants live below the poverty line (subsisting on one dollar per day). Although there is great potential for ASAL development in Kenya, the current picture is rather grim. The economy of the drylands is over-dependent on livestock production. Droughts and conflicts which are common in these areas and which affects livestock production have adverse impact in both lives and livelihoods in these areas. The growing population has put enormous pressure in the natural resources of the country. Over exploitation of the natural vegetation for timber and fuelwood has continued to cause land degradation and loss of genetic recourses all posing serious challenges to sustainability of the rural economy. The worst affected areas being the Arid and semi arid lands (ASALs) with its fragile ecosystem. There is therefore need to diversify livelihoods in the ASALs. Furthermore interventions on sustainable energy and environmental management are directly linked to poverty, food security and issues of equity in integrated rural development.



Fig.1 Degraded land in arid and semi arid areas of Kenya



Fig.2 Famine in northern Kenya

5.1.2 Clean energy source

Before 2030 the world is projected to experience net deficits of petroleum supplies as new oil discoveries are offset by depletions. Further, as the world focuses on global climate change, biofuels have assumed importance as the most practical alternative to petroleum fuels in efforts to reduce carbon emissions. Although Kenya is not at the moment obliged to cut down emissions of Green House Gases (GHG) by the Kyoto Protocol, it can be assumed that it is only a matter of time before the country subscribes to future global warming protocols.

5.1.3 High cost of fossil fuel and dependence on fossil oil

In addition, to addressing the energy security and global warming, biofuels will address the issue of high energy costs associated with imported fossil fuels. Further, the beneficial socio-economic impacts on the Kenyan rural community by a successful biofuels program could be significant. Kenya does not yet have locally produced fossil fuels and is net importer. It suffers the burden of importing fossil fuels depleting the limited foreign exchange resources available. Oil imports for the year 2005/06 consumed up to Ksh.95, 188 billion which was 7.4% of the GDP and 25% of the foreign exchange earnings (Government of Kenya, 2007). The Economic Survey 2007, indicates that the petroleum import bill increased by Ksh.18 Billion in the year 2006 from Ksh.95.7 billion in 2005 to Ksh.113.7 Billion in 2006 (an increase of 18.8%). It also reported that importation of diesel in the year 2006 constituted 57% of the total oil imports. The cost of oil imports is dictated by factors well beyond the control of the nation and thus the need to have secure oil supplies. There is therefore, need to encourage wider adoption of renewable energy technologies.

6.0 Opportunities for Jatropha Industry Development

6.1 Geographical Condition and Climate

6.1.1 Geography

Kenya lies astride the equator in Eastern Africa between Somalia and Tanzania and bordering the Indian Ocean with a total area of 582,650 square kilometers, which includes 13,400 square kilometers of water. Kenya's land boundaries total 3,477

kilometers. The country is bounded by Ethiopia (861 kilometers), Somalia (682 kilometers), Sudan (232 kilometers), Tanzania (769 kilometers), and Uganda (933 kilometers). Kenya has 536 kilometers of coastline on the Indian Ocean. Kenya's territorial sea extends 12 nautical miles. The exclusive economic (fishing) zone is 200 nautical miles, and the continental shelf extends to a 200-meter depth or to the depth of exploitation.

Kenya rises from a low coastal plain on the Indian Ocean in a series of plateaus to more than 3,000 meters in the center of the country. An inland region of semi-arid, bush-covered plains constitutes most of the country's land area. In the northwest, high-lying scrublands straddle Lake Turkana and the Kulal Mountains. In the southwest lie the fertile grasslands and forests of the Kenya Highlands, one of the most successful agricultural production regions in Africa. North of Nairobi, the Kenya Highlands is bisected by the Great Rift Valley, an irregular depression that cuts through western Kenya from north to south in two branches. The Rift Valley is the location of the country's highest mountains, including, in the eastern section, the snow-capped Mt. Kenya (5,199 meters), the country's highest point and Africa's second highest. In the south, mountain plains descend westward to the shores of Lake Victoria.

6.1.2 Climate

Kenya's climate varies from tropical along the coast to arid in the interior, especially in the north and northeast. Intermittent droughts affect most of the country. Less than 15 percent of the country receives somewhat reliable rainfall of 760 millimeters or more per year, mainly the southwestern highlands near Lake Victoria and the coastal area, which is tempered by monsoon winds. Most of the country experiences two wet and two dry seasons. The driest month is August, with 24 millimeters average rainfall, and the wettest is April, the period of "long rains," with 266 millimeters. The hottest month is February, with temperatures of 13°C to 28°C, and the coolest is July. ASALs constitute about 80% of the country's land mass, host about 10 million people and approximately 70% of the national livestock herd.

6.1.3 Population

In 2007 Kenya's population was estimated at 36,913,721, up from 28.7 million reported in the 1999 national census and from 15.3 million in the 1979 census (Government of Kenya, 2007). In 2006 the annual population growth rate was about 2.8 percent, a rate substantially below that of the early 1980s, when Kenya's growth reached 4 percent, the highest rate in the world. As of the end of 2006, Kenya was host to some 220,000 refugees from neighboring countries, including 162,000 from Somalia and most of the remainder from Sudan. Somewhat more than one-third of Kenya's population lives in urban areas, with the greatest concentration in Nairobi. The population is also heavily concentrated in areas of fertile land in the center and west of the country. The country's population density is about 59 people per square kilometer, with extremely uneven distribution. *Jatropha* production is labour intensive may play a role controlling rural urban migration through employment creation in the ASALs.

6.2 Natural Resources and Land Use

6.2.1 Natural resources

Kenya's most valuable natural assets are rich agricultural land and a unique physiography and wildlife. The highly diverse wildlife is a key draw for the tourism industry. The country is not well endowed with mineral resources. Mineral resources currently exploited are gold, limestone, soda ash, salt, rubies, fluorspar, and garnets. Although closed forests cover just 1.7 percent of Kenya (Mutimba, 2008), they continue to play a critical role as water catchments, sources of fuel and food, and climate regulators. They slow the spread of deserts, promote rainfall, and serve as 'sinks' for manmade carbon dioxide. In addition to commercial logging, charcoal production and settlement, Kenya's forests have been hit hard by the growing cycle of climate-aggravated droughts and floods. Wide planting of *Jatropha* could therefore, contribute to the overall total land cover especially in the ASALs which have low land cover.

6.2.2 Land use

Of Kenya's land surface, between 7 and 8 percent is arable, while slightly less than 1 percent is in permanent crops. According to a 1998 estimate, irrigated land totaled about 670 square kilometers. About 80% of the total land mass in Kenya is categorized as ASALs which is host about 10 million people and approximately 70% of the national livestock herd. The economy of the dryland communities is dependent livestock production with semi-sedentary farming in some marginal agricultural areas. Most of these areas are suitable for *Jatropha* production.

6.2.3 Environmental factors

Kenya faces serious interrelated environmental problems, including deforestation, soil erosion, desertification, water shortage and degraded water quality, poaching, and domestic and industrial pollution. Water resources are under pressure from agricultural chemicals and urban and industrial wastes, as well as from use for hydroelectric power. A shortage of water is expected to pose a problem in the coming years. Water-quality problems in lakes, including water hyacinth infestation in Lake Victoria, have contributed to a substantial decline in fishing output and endangered fish species. Output from forestry also has declined because of resource degradation. Overexploitation over the past three decades has reduced the country's timber resources by one-half. At present only about 1.7 percent of the land remains under closed forest cover (Mutimba, 2008), and an estimated 5,000 hectares of forest are lost each year. This loss of forest aggravates erosion, the silting of dams and flooding, and the loss of biodiversity. In response to ecological disruption, activists have pressed with some success for policies that encourage sustainable resource use. *Jatropha* has been reported to control land degradation and reverse deforestation. As a perennial it can sequester carbon too.

6.2.4 National reserves

The national reserves are governed under Wildlife (Conservation and Management) Act. This is the main implementing legislation for biodiversity conservation in Kenya. The Act creates different categories of protected areas but most of the wildlife conservation areas in Kenya are found within the drylands.

The Wildlife Act makes it an offence for any person to enter or resides in a national park otherwise than in the course of his duty as a park officer, cut or injure or set fire to any vegetation within a national park, collect or attempt to collect honey or bees wax in a national park, or knowingly introduce any animals or domestic animal into the national park without authorization.

The Act restricts unauthorized entry into protected areas. Although there is absolute prohibition against entry into national parks and game sanctuaries, entry into game reserves is controlled and dependent on agreements with the communities living around the reserves. This makes it possible for local communities to be integrated into the conservation and management of biodiversity.

Restrictions of land use within protected areas together with increased population pressure have lead to wildlife and human conflict. There has also been increased conflict between the pastoralist livelihoods and agricultural livelihoods. Increased pressure on the land has led to people farming marginalized lands and subdividing them into uneconomical pieces. Conflict over resources use becomes even more pronounced during drought.

Due to the restrictive nature of the laws guiding, the use of land under national reserve, these areas are not candidate for *Jatropha* production and must be mapped out of the total land suitable for *Jatropha* production (Fig. 2).

6.2.5 Agriculture

Agriculture remains the population's main occupation and source of income. Although only about 20 percent of Kenya receives sufficient rainfall to support cultivation, agriculture accounts for over 70 percent of the country's employment and, directly and indirectly, for over 50 per cent of GDP (Mutimba, 2008). About one-half of total agricultural output is non-marketed subsistence production. In 2005 agriculture, including forestry and fishing, accounted 50 percent of revenue from exports. Kenya's labor force is estimated to include about 12 million workers, almost 75 percent in agriculture. The number employed outside small-scale agriculture and pastoralism is about 6 million.

The principal cash crops are tea, horticultural produce, and coffee; horticultural produce and tea are the main growth sectors and the two most valuable of all of Kenya's exports. In 2005, horticulture accounted for 23 percent and tea for 22 percent of total export earnings. Coffee has declined in importance with depressed world prices, accounting for just 5 percent of export receipts in 2005. The production of major food staples such as corn is subject to sharp weather-related fluctuations. Production downturns periodically necessitate food aid—for example, in 2004 aid for 1.8 million people because of one of Kenya's intermittent droughts.

Tea, coffee, sisal, pyrethrum, corn, and wheat are grown in the fertile highlands, one of the most successful agricultural production regions in Africa. Production is mainly on small African-owned farms formed from the division of formerly European-owned

estates. Livestock predominates in the semi-arid savanna to the north and east. Coconuts, pineapples, cashew nuts, cotton, sugarcane, sisal, and corn are grown in the lower-lying areas.

The Strategy for Revitalizing Agriculture (2006) offers development opportunities through the Agriculture Product Value Chain which aims at developing business linkages through new extension approaches between producers, suppliers, processors and the market. The country's vision 2030 aims at industrializing the agricultural sector through enhanced agro-processing and value addition to.

6.2.6 Land areas for *Jatropha* production

Jatropha can be cultivated in tropical Africa's semi-arid regions where the climate is harsh and soils are of relatively low physical and chemical quality. It does not need much water to survive - only about 10 inches (250 mm) of rainfall per year - thus can be grown in arid regions and will grow well on marginal land. The areas suitable for growth of *Jatropha* in Kenya range from the coastal lowlands, the vast ASALs to the midlands (0 – 1500m above sea level).

It is a suitable cash crop for the generally poor farmers in these regions given its ability to generate income in a short time without the need of large capital and recurrent expenditure. The crop however needs about 1,000 mm precipitation annually, well-drained soils of reasonable quality and regular inputs of organic/inorganic fertilizers for economically sustainable production. As with other African regions, in Kenya the species can be planted in most of the semi-arid areas agro-ecological zones III-IV (Fig. 1).

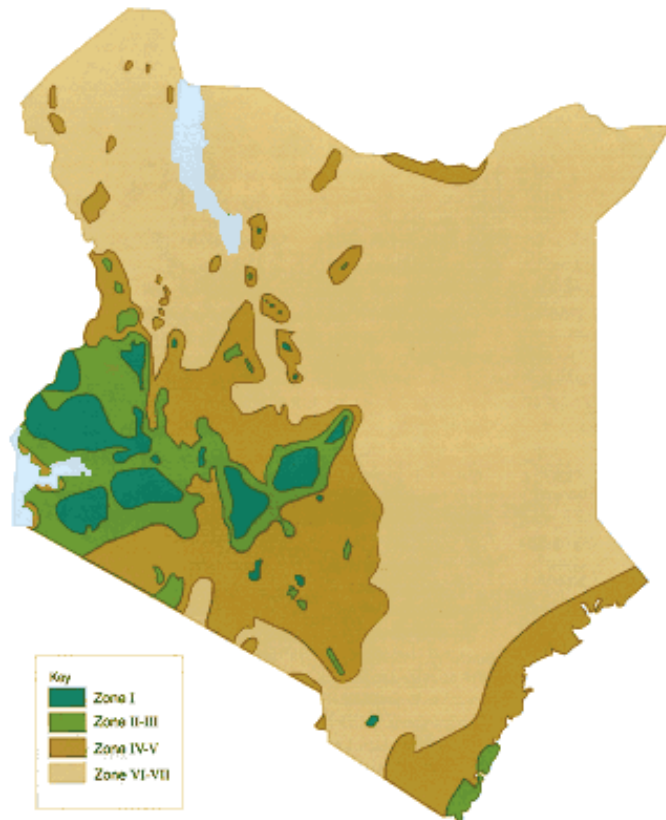


Fig. 3 Agro-ecological zones of Kenya

In mapping suitable areas for planting *Jatropha* other land use practices should be taken into consideration. For example, most of the national reserves though are mainly located in semi arid areas, they cannot be for planting *Jatropha*. Other areas which are not available include wetlands in the ASALs and land under crop production. It should however be noted that the growing of *Jatropha* is not restricted to ASALs and selection of the areas for *Jatropha* growing will be guided by the following criteria (Government of Kenya, 2000) (Fig.2):

- i. **Competition with food crops:** there should be no threat to food production.
- ii. **Rainfall regime:** mainly in areas with average annual rainfall of 300 to 1500 mm.
- iii. **Altitude:** should be within 0-1500m above sea level
- iv. **Temperature:** 20 °C to 32 °C
- v. **Soils:** low-fertility and alkaline

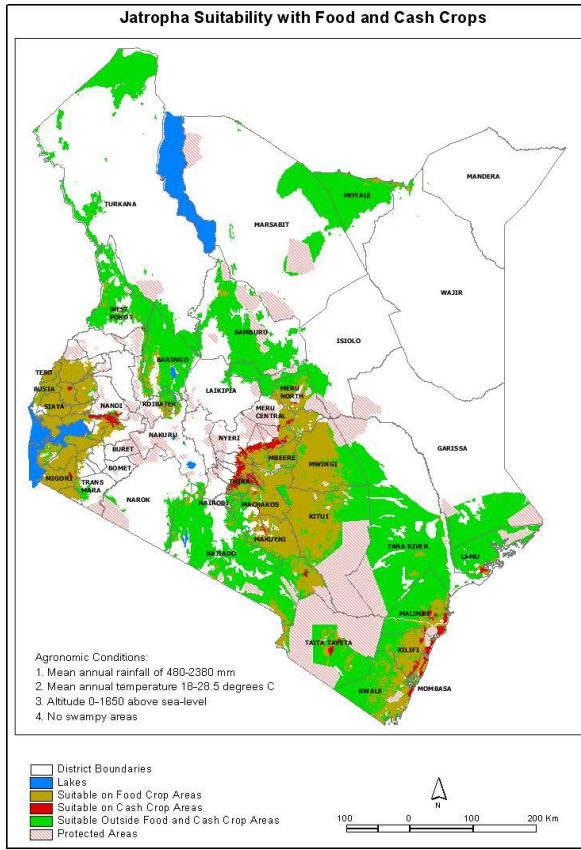


Fig. 4 GIS based *Jatropha curcas* suitability map (GTZ, 2008)

Much breeding and agronomic work remains to be done on *Jatropha curcas* to maximize its soil production per hectare as well as the product quality and quantity. Some of the priority areas for scientific research include:

1.Crop development / germplasm improvement: development of early maturing varieties (early fruiting jatropha), day neutral varieties –less sensitive to seasonal changes, high yielding seed / oil cultivars, high quality oil and other by products and site specific cultivars/ provenances



Fig. 5 Improvement trials of *Jatropha curcas* in Kenya

2. Agronomic/ silvicultural researchable issues: Development of production packages seed sources and multiplication nursery techniques, spacing determination, application of production inputs (fertilizer, manure, irrigation, pests/disease protection, etc)

3. Processing and Industrial Researchable issues: Evaluation of processing technologies (post-harvest), handling; Existing equipments and tools; Development of products and standards, Oil blending; Sanitation and waste management, Testing procedures, Training and measurements, innovative technology application

4. Market researchable issues: Market chain analysis, Market research, Production aspects, including planting material, Processing and markets (linkages), Stakeholder analysis dynamics and Certification

5. Policy researchable issues: Tax regime issues, Licensing and regulatory, Formulate a framework to guide the development of bio-diesel industry. Making and standard-setting procedures and functions of bio diesel, Environmental and social policies,

6. Social Researchable issues: Acceptability and affordability on use of Jatropha Based products, public awareness and sensitization / education, information sharing, watchdog functions and public transparency, impacts on Health, Poverty alleviation, food security development of rural enterprises, Human capacity development job security.

7. Global Competitive researchable issues: Carbon regulation, clean development mechanism

6.2.7 Environmental impact of growing and manufacturing Jatropha

Even if we can solve the social and economic questions, are biofuels really environmentally friendly?

*Generally speaking, transplanting a species from one part of the world to another - either accidentally or on purpose - has, on occasion, had some really negative consequences. A prime example in Kenya is *Prosopis* species that was introduced to Kenya beginning in the 1970's to solve fuelwood problem. It did that but now *Prosopis* spp. overgrows just about everything in its path and is almost impossible to get rid of.*

The origin of *Jatropha* is thought to be Central America, or perhaps the Caribbean, but it is now grown in Asia and Africa and elsewhere. With the push to find alternative and renewable sources of fuel in the world, oil from the seeds from a shrub called *Jatropha curcas* has arisen as a very good source of biodiesel. But it is not a native plant to every corner of the Earth; thus if it is transplanted in places outside its natural range would it become an invasive species? What would be the impacts, the consequences, of farming *Jatropha curcas* on a large scale? (It's already classified in Western Australia as an invasive species and its use in biodiesel production is banned). It is also considered poisonous (to some degree) as its seeds or nuts, and oil from them are non-edible.

Many studies have questioned their carbon neutrality when all the emissions resulting from planting, fertilization, transport and refining are taken into account. More recently, it has been suggested that the extra emissions of nitrous oxide (a greenhouse gas with a potential impact nearly 300 times greater than carbon dioxide) as a result of microbial action on nitrate fertilizers used in the growth of biofuels may be 3 – 5 times higher than estimated by the recent Intergovernmental Panel on Climate Change.

Although it can grow on marginal land in arid areas, there is little knowledge yet about the level of water and nutrients it will need to generate commercially-viable yields or how it might begin to invade better quality agricultural areas once it is grown in large quantity. Current harvesting and processing techniques are labour-intensive, even though the oil is a known skin-irritant.

Many attempts to predict the future are notoriously unsuccessful, and the unfolding biodiesel conundrum looks to be no exception. Resolving it will require sound science, which at its most basic is the organization of information and knowledge into forms that help us confront and solve problems. This will be necessary but not sufficient. The scientific community must communicate with the general public in a clear and balanced.

Though *Jatropha* is not indigenous to Kenya, the species seems to have been introduced close to a century ago, judging from the age of the trees growing wild in the country. The history of its introduction however is not well known. From the natural stands in Kenya, the tendency to spread has not been observed and it is rare to find young trees. This by no means should be taken as a proof that it is not invasive but could give indications that the problem may not be to the scale reported such as in Australia. Long term observation, especially and large scale planting should be undertaken. The debate must not be held purely in the scientific community or the developed world. It must involve the poor rural communities in the developing world where many of these biofuel crops will be grown. Their needs for improved living standards must be addressed and their involvement sought in achieving the best balance between revenue generation and long term sustainability.



Fig. 6 Natural growing *Jatropha curcas* tree in Nyanza Province, Kenya

Development impact

The expansion and development of the biodiesel industry will have positive developmental impacts on the economy, the people and the environment in Kenya. Jatropha production will create employment in rural areas that will not only reduce unemployment in these areas but will also reduce rural urban migration thus improving the rural economy. In addition, the biodiesel industry has the potential to positively impact foreign reserves, because less oil will need to be imported. And finally, the use of biofuels decrease the amount of CO₂ emissions, thereby creating a sustainable industry that is friendly towards the environment.

6.2.8 Current status of production of Jatropha in Kenya

In Kenya, Jatropha is mainly grown in Kitui, Thika, Namanga, Kajiado, Malindi, Nyanza, Nakuru, Marakwet, Naivasha, in the coastal regions and in Meru. In East Africa, Tanzania is said to have made the biggest strides in terms of growing the fuel tree on large scale. However, Kenya is said to be well ahead of other African countries in research on the same the biofuel funds come in through organizations like the World Bank, EC, WWF, etc.

Earlier in the year, Yuri Mito and Masanobu Yamamoto, bio-fuel experts from the University of Hiroshima in Japan visited the country and pledged to support small scale fuel farmers in establishing the crop on about four million acres of land countrywide. The project has already commenced. So far close to 3,860 acres of Kenyan land has been covered by the plant. The new entrants, Hydronet Energy Company Ltd., and Biwako Bio-Laboratory Inc., both from Japan could be the first to commence commercial biodiesel operation in Kenya.

A workshop was recently organized by the government through the Ministry of Energy to come up with the way forward on biodiesel and one of the resolutions passed was formation of Kenya national biodiesel association and its main task is to promote development of biodiesel industry in Kenya.

6.3 Current Economy Situation in Kenya

6.3.1 General economic situation

Kenya has one of Africa's worst performing economies, notwithstanding a pick-up of economic growth in the past five years. The economy is market-based, with some state-owned infrastructure enterprises, and maintains a liberalized external trade system. The economy's heavy dependence on rain-fed agriculture and the tourism sector leaves it vulnerable to cycles of boom and bust. The agricultural sector employs nearly 75 percent of the country's 37 million people. Half of the sector's output remains subsistence production.

Kenya's gross domestic product (GDP) growth rate declined continuously from a peak of about 6.5 percent per year during the first decade after independence to less than 4 percent per year in the following decade, to only about 1.5 percent per year during the 1990s. It has experienced an upturn to more than 5 percent per year since 2004. Several

decades of declining economic performance, combined with rapid population growth, translated over time into reduced income per head, increased poverty, and worsening unemployment. Between the 1970s and 2000, the number of Kenyans classified as poor grew from 29 percent to about 57 percent.

Kenya's economic performance has been hampered by numerous interacting factors: heavy dependence on a few agricultural exports that are vulnerable to world price fluctuations, population growth that has outstripped economic growth, prolonged drought that has necessitated power rationing, deteriorating infrastructure, and extreme disparities of wealth that have limited the opportunities of most to develop their skills and knowledge. Poor governance and corruption also have had a negative impact on growth, making it expensive to do business in Kenya. Kenyans, 23 percent of the population are living on less than US\$1 per day. Another large drag on Kenya's economy is the burden of human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS).

Prospects brightened somewhat with the coming of the NARC government, in 2003, whose policy aims included budgetary reforms and debt restraint. Despite some bottlenecks experienced, the economy has seen a broad-based expansion, led by strong performance in tourism and telecommunications, and acceptable post-drought results in agriculture, especially the vital tea sector. Nevertheless, risks to continuing robust growth remain, including weak infrastructure, drought, political instability in the run-up to the December 2007 elections and the post election violence that followed in addition to diminution of financial flows from donors because of ongoing corruption allegations.

In 2006 Kenya's GDP was about US\$17.39 billion. Per capita GDP averages somewhat more than US\$450 annually. Adjusted in purchasing power parity (PPP) terms, per capita GDP in 2006 was about US\$1,200. The country's real GDP growth picked up to 2.3 percent in early 2004 and to nearly 6 percent in 2005 and 2006, compared with a sluggish 1.4 percent in 2003 and throughout President Moi's last term (1997–2002). Real GDP is expected to continue to improve, largely because of expansions in tourism, telecommunications, transport, and construction and a recovery in agriculture. The Kenya Central Bank forecast for 2007 was between 5 and 6 percent GDP growth. However, this has been down graded following the post election that engulfed the country, however, the prospects looks bright with the formation of the grand coalition government. GDP composition by sector, according to 2004 estimates, was as follows: agriculture, 25.7 percent; manufacturing, 14.0 percent; trade, restaurants, and hotels, 13.8 percent; transport and communications, 6.9 percent; government services, 15.6 percent; and other, 24.0 percent.

Provided that the settlement holds, the new government, with input from the IMF, is likely to put an economic recovery package in place. This will be mainly based on fiscal stimuli, such as targeted tax cuts and spending increases "possibly including public-works programmes" although the details have not been finalized: the full extent of the damage, and the number of people displaced, is still being assessed. Donors may provide funding to support the programme, depending on Kenya's needs. Assuming that the unity

government remains intact, the policy focus will return to structural reforms, including privatisation and deregulation.

The post-election disruption will have a significant impact on the fiscal accounts in 2007/08, as pressure for extra spending will rise to fund reconstruction, the resettlement of internal refugees, and the likely expansion in the size of government to accommodate the ODM and other parties. The various new commissions of inquiry will impose an additional burden. Monetary policy will remain geared towards bringing underlying inflation (excluding food and energy prices) back below the official 5% target. Tourism suffered the most, with visitor numbers down to 10% of expected levels.

The economy is now returning to normal after the political settlement in February, but not all the losses" estimated at KSh100bn" can be recouped. It may take several months for tourism to recover, while the displacement of more than 300,000 people, mainly farm workers and their families, will continue to hamper agriculture. The settlement, if it holds, nevertheless means that growth is likely to be fairly buoyant in 2008, spurred by transport and communications, wholesale and retail trade, manufacturing, construction and financial services. Growth may be higher than forecast if the main rains (mid-March to June) are favorable, or lower if there is a drought.

Kenya's Inflation surged to 21.8% year on year in March 2008, owing to early-season drought and supply-chain dislocation resulting from post-election violence, which added to pre-existing pressure on food and oil prices. The gradual return to normal marketing patterns will ease price pressures. The shilling has been more volatile in 2008 than in 2007 owing to post-election disruption and wavering confidence. The currency slid to KSh70.5: US\$1 in February owing to political and economic uncertainty but strengthened again, to about KSh63: US\$1, in June following the peace settlement and the relative peace that has returned.

Post-election unrest and disruption, although fading, is having a negative impact on trade in 2008, leading to slippage in both exports and imports. Trade will rebound, provided that the political settlement holds, but damage already caused suggests that export growth in 2008 will be modest. The recovery in imports is likely to continue, given reconstruction needs and high oil prices, leading to a wider merchandise trade deficit. Tourism earnings are likely to recover (politics permitting) but perhaps only returning to 2007 levels.

6.3.2 Current macro economic

Tourism is now Kenya's largest foreign exchange earning sector, followed by flowers, tea, and coffee. In 2006 tourism generated US\$803 million, up from US\$699 million the previous year. In 2005 the combined value of these commodities was US\$1,150 million, about 10 times the value of Kenya's third most valuable export, coffee. Kenya's other significant exports are petroleum products, sold to near neighbors, fish, cement, pyrethrum, and sisal. The leading imports are crude petroleum, chemicals, manufactured goods, machinery, and transportation equipment. Africa is Kenya's largest export market, followed by the European Union. The major destinations for exports are the United

Kingdom (UK), Tanzania, Uganda, and the Netherlands. Major suppliers are the UK, United Arab Emirates, Japan, and India. Kenya's main exports to the United States are garments traded under the terms of the African Growth and Opportunity Act (AGOA). Despite AGOA, Kenya's apparel industry is struggling to hold its ground against Asian competition and runs a trade deficit with the United States.

Kenya typically has a substantial trade deficit. The trade balance fluctuates widely because Kenya's main exports are primary commodities subject to the effects of both world prices and weather. In 2005 Kenya's income from exports was about US\$3.2 billion. The payment for imports was about US\$5.7 billion, yielding a trade deficit of about US\$2.5 billion. In 2006 Kenya had a current account deficit of US\$1.5 billion. This figure was a significant increase over 2005, when the current account had a deficit of US\$495 million. In 2006 the current account balance as a percentage of gross domestic products was -4.2. In 2006 Kenya's external debt totaled US\$6.7 billion. The debt is forecast to be a manageable 30 percent of gross domestic product in 2007.

After the controversial December 2007 election and the post election violence which followed, the two main parties PNU and ODM entered in a negotiated grand coalition government, the first of its kind in Africa. Provided that the settlement holds, the new government, with input from the IMF, is likely to put an economic recovery package in place. This will be mainly based on fiscal stimuli, such as targeted tax cuts and spending increases "possibly including public-works programmes" although the details have not been finalized: the full extent of the damage, and the number of people displaced, is still being assessed. Donors may provide funding to support the programme, depending on Kenya's needs. Assuming that the unity government remains intact, the policy focus will return to structural reforms, including privatization and deregulation.

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6.4 Infrastructure and utilities

Road, rail, and air transport are all significant in Kenya, while water transport plays a minor role. All of Kenya's transportation sectors, but particularly road and rail, are in need of stepped-up investment for better maintenance and expansion.

6.4.1 Roads

Kenya has an extensive 64,000-kilometer road network, about 8,000 kilometers of which are paved. The roads, which carry more than 80 percent of passenger and freight traffic, offer increasing coverage of all parts of the country. However, serious under-investment and corruption in contracts have left the road network in a poor state of repair. This poor condition contributes to an appalling rate of road accidents and deaths, the highest in the world. Road safety is further reduced by the operation of 25,000 matutas (minibuses), which constitute about 78 percent of the country's public transport system. Aiming to cut carnage on the roads, the NARC government in February 2004 obliged matuta owners to install safety equipment, a measure that led to sharp fare increases and overcrowded trains. The government and donor countries have prioritized the rehabilitation of the road infrastructure as a key part of the country's development strategy. In April 2004, the World Bank approved funding of US\$207 million to support the Northern Corridor Transport Improvement (NCTI) project, 80 percent of which will be spent on roads. Other funds will come from private capital offset by toll charges, as well as donations from the European Union and the United States. Heavy investment in road network including grading of feeder roads in the Jatropha growing zones is needed.

6.4.2 Railroads

Kenya's railroad system has about 2,778 kilometers of narrow-gauge, one-meter track, 150 stations, and a fleet of 156 locomotives and some 7,000 coaches and wagons, including container-carrying Railtrainers. The system, managed by the Kenya Railway Corporation (KRC), serves both Kenya and land-locked countries in the East African region. The most important route runs from Mombasa through Nairobi to the Ugandan border. Kenya also has commuter rail that serves the Nairobi suburbs. In 2004 Kenya and Uganda approved a merger of their railroad corporations and jointly offered the merged

railroad for concession to private operators/investors. In 2006 the winning concessionaire was Rift Valley Railways (RVR), a consortium led by South Africa's Sheltam Rail Company. RVR acquired rights to 1,920 kilometers of track in Kenya, which carried an average of 2.3 million tons of freight and 4.7 million passengers per year between fiscal year (FY) 2000 and FY 2003.

6.4.3 Ports

Kenya's port traffic climbed to 14.4 million metric tons of freight in 2006. The principal seaport, Mombasa, is the main sea outlet for both inland Kenya and the land-locked countries of East and Central Africa, e.g., Uganda, Rwanda, Burundi, the eastern Democratic Republic of the Congo, and southern Sudan. The Kenya Ports Authority (KPA), created in 1978, manages port operations at Mombasa, as well as inland container depots in Nairobi, Eldoret, and Kisumu. The KPA also has jurisdiction over the small ports of Lamu, Kiunga, Kilifi, Malindi, Funzi, Mtwapa, Shimoni, and Vanga. Mombasa is a deep-water port with 21 berths that can handle all sizes of ships and 300,000 containers per year. Freight handled through Mombasa jumped by 12.6 percent in 2003, but inefficiencies, corruption, and deteriorating infrastructure at the port continue to be cited as a major deterrent to business in Kenya. There are plans to refurbish some of the port's equipment.

6.4.4 Inland Waterways

Water transport is the least used mode of transportation in Kenya, limited to the coastal and lake regions. The only significant inland waterway is the part of Lake Victoria within the boundaries of Kenya. The Kenya Railways Corporation (KRC) operates ferry services there to link Ugandan and Tanzanian locations with Kisumu, Kenya's third largest town and a once bustling port. The ferry supplements interstate rail and road traffic. In addition to the ferry, the KRC has two freight tugs, nine lighter barges, and three passenger vessels on Lake Victoria.

6.4.5 Civil Aviation and Airports

Kenya has more than 200 airports and airfields, 15 of which have paved runways, including four with runways longer than 3,000 meters. About 35 airfields can be considered commercial. Three airports handle international flights, Nairobi's Jomo Kenyatta International Airport (JKIA), Mombasa's Moi International Airport (MIA), and Eldoret International Airport. Other facilities include Wilson Airport in Nairobi; airports at Malindi, Kakuma, and Kisumu; and numerous airstrips throughout the country. The Northern Corridor Transport Improvement (NCTI) project approved in mid-2004 includes US\$41 million for aviation. The funds are earmarked to enhance facilities and safety at JKIA and MIA, including perimeter fencing and new navigation, security, and baggage-handling equipment. The runway extension at JKIA will raise capacity from 2.5 to 5.5 million passengers per year. A key objective of the airport upgrade is to win "category one" status from the U.S. Federal Aviation Administration to allow for direct flights between JKIA and U.S. airports. Direct flights would boost tourism and trade and secure JKIA's status as a regional hub.

6.4.6 Pipelines

The Kenya Pipeline Company (KPC), a state-owned enterprise (parastatal) formed in 1973, transports about 90 percent of the petroleum products consumed in Kenya's domestic market. The KPC owns and operates the Mombasa–Nairobi pipeline, whose throughput has risen because of restrictions imposed on the road transport of petroleum to stem the diversion of supplies to local markets. A second pipeline stretches from Eldoret to Kisumu in the west of the country, and a recent project is to extend the pipeline from Eldoret to Kampala in Uganda, under the auspices of the East African Community. The KPC is the dominant player in the regional energy sector, exporting to Uganda, Tanzania, Rwanda, Burundi, the Democratic Republic of the Congo, and Sudan.

6.4.7 Telecommunications

This sector, a key to sustained economic development in Kenya, experienced rapid growth in 2000–2006 because of the proliferation of mobile cellular telephones. The number of cell phone subscribers increased from 24,000 in 1999 to 5 million in 2005. In 2005 Kenya's telephone landlines numbered 282,000, compared with 106,000 in 1984. The landline system has been generally unreliable, having seen little modernization except for service to businesses. The burgeoning cellular phone system is operated by two license holders, Safaricom and Celtel, to be joined eventually by a third, Econet Wireless Kenya. Internet use also has expanded rapidly, reaching 1 million by 2005. The country had six television broadcast stations in 2007 and more than three dozen radio stations. Kenya is estimated to have 22 televisions per 1,000 people.

6.4.8 The agribusiness and its support institutions

Kenya has had a successful agricultural sector development since the early 50's. However it was not until mid 1960's, immediately after independence, that heavy interventions were injected in the agricultural sector. Policies covered every sphere of agriculture such as production, marketing, research, credit extension and price controls. Policies advocated the promotion of cooperatives and farmer based companies as well as promoting agro-industries for processing of agricultural products. In the 1970s an import substitution policy was instrumental in the development of agribusiness firms, especially those that could play an important role of import substitution. In the late 1970s and early 1980s, the government introduced an export diversification and expansion program to broaden the country's export base and enhance the drive towards industrialization. The Industrial and Commercial Development Corporation (ICDC) and the Development Finance Company of Kenya (DFCK) were major sources of loan capital and equity finance. By the 1990's the agro-processing sector employed about 10 percent of Kenya's workforce and contributed about 31 percent to GDP.

Farm-agribusiness linkages in dairy, cereals, traditional cash crops and horticulture have in the past been influenced by government policies towards agriculture. These policies include the general as well as the more sub-sector specific policies that have in the past been targeted towards the development of sub-sectors of special interest to the government, often through commodity specific marketing agencies.

In the dairy sub-sector, the policy effectively prohibited development of private sector based processing companies. This policy was implemented through the Kenya Dairy Board (KDB), whose major function still remains as that of regulating the industry by controlling private sector entry into dairy processing and marketing. Through these policies, the Kenya Cooperative Creameries (KCC) emerged as the main dairy processing and marketing body in Kenya and dairy cooperative societies as focal points for small-holder milk collection were established. A few of these cooperative societies later developed into dairy processing organizations. This policy changed in 1993 when private sector involvement in dairy processing was allowed, while the licensing role in the hands of the KDB was retained. The implementation of this policy also coincided with the collapse of the KCC, thereby providing a viable opportunity for private sector entry and development. By 2000, the number of registered private processing plants in Kenya was about 40, with a total employment of about 4,500 people.

The development of the small holder tea saw the deliberate support through the Kenya Tea Development Authority (KTDA). The authority was a parastatal apex body under which were a number of tea factories that were jointly owned by tea farmers and the KTDA. The liberalization policies between 1995-8 have resulted in the establishment of a Kenya Tea Development Agency (KTDA), which is more farmer-inclined; and the total ownership of the 46 tea factory companies by tea farmers.

Rice is the second major cereal after maize, and has largely developed as an irrigation crop though little amounts are produced under rain-fed conditions. As a way of promoting rice growing under irrigation, a National Irrigation Board (NIB) was established as a parastatal, to develop irrigation schemes, and process paddy into rice; and market the commodity on behalf of farmers. The sub-sector as a whole was heavily protected by the policy of quantitative import controls to restrict imports. By 2000 the Mwea irrigation scheme had a total membership of 3 381 farmers producing about 31 900 tonnes of rice from about 6 052 acres. This is about 40 percent of the total domestic requirements and about 80 percent of domestic rice production in the country. Liberalization in the sub-sector in 1993 has witnessed several changes in both marketing and milling of rice with implications on production of rice in the Mwea irrigation scheme.

Horticultural development in Kenya has been characterized by less presence of government, despite the existence of the Horticultural Crops Development Authority (HCDA), and a department within the Ministry of Agriculture (MoA) in charge of horticulture. The HCDA is mainly a regulatory one, but also provides market information and extension services to the sub-sector. Private sector based institutions such as the Fresh Produce Exporters' Association of Kenya (FPEAK), the Export Promotion Council (EPC) have played a great role in ensuring that the sector grows. However, a cloud of uncertainty surrounds the sub-sector due to a decision by the government to regulate it, and also establish a central auction centre in Nairobi.

A major lobby group in the entire agricultural sector has been the Kenya National Farmers Union (KNFU), whose original mandate was the promotion of large-scale

farmers' interests in the country. In the last two decades the role of the union in spearheading farmers' welfare has reduced greatly, due to lack of focus. Its role in a liberalized market environment has become murkier in the last ten years.

Major players in Kenya agribusiness

Kenya national farmers Union (Lobby group for entire agricultural sector)
Homegrown company ltd.
Kenya agricultural research institute
Kenya export development support Programme
Kenya external trade authority

Agrochemicals

Amiran Kenya Ltd
Cimbria East Africa Ltd
Bayer East Africa Ltd
Syngenta East Africa Ltd

Dairy

Kenya Dairy Board
Brookside Dairy Ltd
New Kenya co-operative creameries ltd
Land O'Lakes Inc

Tea & Coffee

Kenya Tea Development agency
Sasini tea and coffee ltd.
James Finlay Kenya ltd.

Rice

National Irrigation Board

Horticulture

Horticultural crops development authority
Fresh produce exporters association of Kenya
Export promotion council

Sugar

Kenya sugar board
Mumias sugar company

6.5 Government and Politics

6.5.1 Government structure

Kenya is a republic dominated by a strong presidency. The political system is in flux as contentious debate continues on efforts to adopt a new constitution. A popular referendum in 2005 defeated a proposed constitution supported by the government. The

constitution to be replaced was drawn up at independence. This constitution, heavily indebted to English law, has already been amended more than 30 times but is widely agreed to require a major overhaul. Until the National Accord Act was enacted in 2008, the constitution gives the president wide-ranging powers, provides for no prime minister, and is ill-suited to multiparty politics. Following the December 2007 disputed elections and the formation of the grand coalition government, the post of the prime minister was introduced in the constitution to share power with the president.

Besides the constitution, a pressing concern in Kenyan politics is corruption. Recent anticorruption efforts have led to the establishment of the Kenya Anti-Corruption Commission (KACC) and two laws requiring civil servants to disclose assets and mandating transparency in procurement. The government also promised to trace ill-gotten assets and has set up commissions to unravel the decades-old illegal allocation of public lands and a major corruption scandal from the 1990s, the Goldenberg Affair. Despite such anticorruption activity, Kenya's anticorruption campaign, in the perception of most Kenyans surveyed, has stagnated.

Executive Branch: Under Kenya's current constitution, the president is both the chief of state and head of government. The president is elected by popular vote for a five-year term, with the possibility of re-election to a second term. The presidential candidate must receive the largest number of votes in absolute terms and also, in order to avoid a runoff, must win 25 percent or more of the vote in at least five of Kenya's seven provinces and the Nairobi area. The president appoints the vice president and members of the cabinet, who must be members of the National Assembly. The president also exercises direct control over the key areas of security and defense and has extensive powers over the appointment of the attorney general, the chief justice of the Court of Appeal, and Court of Appeal and High Court judges.

Legislative Branch: Kenya's National Assembly, or Bunge, is a unicameral legislature with 224 members, 210 of whom are elected by popular vote for five-year terms. The president appoints 12 "nominated" members, who are selected by the parties in proportion to the votes the parties receive in parliamentary elections. Two members serve ex-officio.

Judicial Branch: Kenya's court hierarchy consists of the Court of Appeal, High Court, resident and district magistrates' courts, and kadhis courts, which adjudicate Muslim personal law concerning personal status, marriage, divorce, and inheritance among Muslims. Kenya's president appoints judges, including the chief justice, who presides in the Court of Appeal. The High Court is responsible for judicial review. Kenya accepts compulsory International Court of Justice jurisdiction, with reservations. The judiciary is constitutionally independent, and judges have security of tenure. This constitutional status and the theoretical life tenure of judges have not, however, ensured immunity from executive-branch pressure.

Administrative Divisions: Kenya is divided into seven provinces and the Nairobi Area. The provinces are Central, Coast, Eastern, North-Eastern, Nyanza, Rift Valley, and

Western. Lower-level administrative units include districts and further to divisions, locations and sub-locations. The seven provinces and the Nairobi Area are administered by provincial commissioners who are answerable to the president. Further, there are local governments represented by local councils operating under the Local Government Acts. They consist of the City Council of Nairobi, Mombasa, Kisumu and Eldoret, county councils, municipal councils, urban councils and town councils. These elective municipal, town, and county councils have limited powers delegated by the national government. Important council officials such as the town clerk and treasurer all are appointed by the central government in Nairobi. The councils have the authority to allocate land for investment under the Trust Land Act.

Judicial and Legal System: Kenya's legal system is based on Kenyan statutory law, Kenyan and English common law, tribal law, and Islamic law. Bias and corruption in the court system frequently compromise the right to a fair trial. In 2003, following the resignation of the chief justice, the anticorruption authority found credible evidence of corruption against five of nine Court of Appeal judges and proof of misconduct against 18 of 36 High Court judges and 82 of 254 magistrates. In October 2003, one-half of Kenya's senior judges were suspended over allegations of corruption, and tribunals were established to investigate the charges against them. Many of the judges resigned rather than face tribunals.

Electoral System: Suffrage in Kenya is universal at age 18. National presidential and parliamentary elections are held every five years. Election is by a plurality of votes. The most recent elections for president and for parliament were held in December 2007 and will next be held in late 2012.

6.5.2 Politics and political parties

Multiparty politics reemerged in Kenya after December 1991, with the repeal of Section 2a of the constitution. In 1982 Section 2a had officially made Kenya a one-party state, with the Kenya African National Union (KANU) the sole legal party. Kenya had been a de facto one-party state since 1969. As of that date, all political candidates had to be members of KANU. The reemergence of a multiparty system in the 1990s initially produced a fractured opposition to President Moi and KANU. After 1991 an important new opposition party, the Forum for the Restoration of Democracy (FORD), soon split into factions, and numerous other parties emerged. After two national elections in which Moi won against divided opposition, various opposition elements formed the National Rainbow Coalition (NARC), a coalition of a dozen parties, including the National Alliance of Kenya (NAK) and the Liberal Democratic Party (LDP). NARC ran Mwai Kibaki as its candidate for president in 2002 and won a solid victory to become the governing party. Several years after the election, NARC broke up over disagreements about the draft constitution. Some constituent elements of NARC joined KANU to form a new opposition coalition, the Orange Democratic Movement, while other elements became part of a new pro-Kibaki group, NARC–Kenya and PNU.

After the controversial December 2007 elections and the post election violence which followed the country is slowly recovering from the worst case of political instigated

violence since independence. The explosion of violence which followed the announcement of the 2007 General Elections results combined with the inability of the two leaders (Mwai Kibaki and Raila Odinga) to control it or to enter into constructive dialogue, created international alarm for the stability of a region already racked with conflict. With considerable difficulty, the former UN Secretary-General, Kofi Annan, persuaded the two sides to back a National Accord and Reconciliation Act which defines a basis for the power sharing agreement. A new post of prime minister went to Raila Odinga as the leader of the dominant party in parliament, and cabinet positions were awarded in proportion to parliamentary representation. The new cabinet, in which ODM members have exactly half of the posts, was sworn in during April 2008. There is no clarity about the date of the next elections nor the extent of executive power awarded to the prime minister. Any signs of wavering in the reconciliation process are likely to be met with donor threats of sanctions against senior government figures.

The new government has an urgent priority to address the problems of internal displacement. There may be tensions with humanitarian agencies over the assessment of conditions in which displaced people can return safely. Clearly cautious about prospects for swift and painless reconciliation, the UN has launched the Emergency Humanitarian Response Plan, appealing for \$189 million to support and resettle internally displaced persons in Kenya, alongside measures for food security.

The power-sharing agreement, if fully enacted, will improve Kenya's international standing, lifting the threat of targeted sanctions (such as travel bans) by the West and the possible suspension of crucial donor assistance.

6.6 Policy Environment

6.6.1 Land tenure laws

Land tenure is profoundly political, and it continues to be a critical factor in the development of Kenyan politics and economies. Land tenure, and in particular ownership and access rights, has been widely recognized to have important bearings on effective, efficient and sustainable management and production regimes. Land in much of the ASALs of Kenya is governed by the Trust Land Act. The Constitution of Kenya vests trust land in county councils to hold in trust "for the benefit of the persons ordinarily resident on that land" and to "give effect to such rights, interests or other benefits in respect of the land as may, under the African customary law for the time being in force and applicable be vested in any tribe, group, family or individual" (Constitution of Kenya).

While the provisions of the Constitution appear to be very benign and supportive of the communal tenure system found in the drylands, in practice, the county councils have done little to protect the interests of the beneficiaries. Instead, they have dealt with the land as if it was their private estate, allocating vast portions of it to individuals without consulting the communities. The communal tenure system of the drylands has been indiscriminately converted into freehold tenure within the meaning of the Registered Land Act (RLA). Once this is done, a title deed is issued in the name of the individual, conferring upon him an absolute indefeasible title. This means in effect that it does not

matter how the title was obtained, whether by fraud or without the consent or the knowledge of the persons for whose benefit the county councils hold the land. Such privatization of drylands has diminished grazing land and interfered with biodiversity use in as it puts pressure on the remaining commons.

Another piece of legislation that affects land use in the drylands is the Land (Group Representatives) Act. This Act has attempted to incorporate elements of traditional land tenure systems into statutory law. It provides for the establishment of group ranches, bringing together community members who adopt a constitution and elect not more than 10 people and not less than three to act as group representatives. Upon application, group representatives get incorporated with power to sue and be sued, to acquire, hold, and charge and dispose of property of any kind and to borrow money with or without security in their corporate name on behalf of the group. They are enjoined by law to do all these acts for the benefit of all members of the group and to fully and effectively consult them in making decisions.

In practice, the group ranch experiment has been a failure for the most part. Group representatives ended up abusing their powers, leading to pressures for the privatization of group ranches, with serious consequences for the management of land and biodiversity in the drylands. The impact of privatization of group ranches on livelihoods and biodiversity use and conservation has been well documented. There is general agreement that the impact has been largely negative on both fronts. Infighting, corruption, lack of knowledge of rights and the law has been a major setback for most of the group especially when leasing out their land to international clients. The group ranches have also been sub-divided which has caused imbalances in the ecosystem and effected biodiversity such as wild life (Rutten 1992).

In the view of the above, it can be said that the present public land tenure management system in Kenya is fragmented, uncoordinated and non-transparent. The public land tenure as embodied in the Government Lands Act, Cap 280 of the Laws of Kenya lacks a coherent information system and is bedeviled by a lack of clarity in the roles, responsibilities and policies of different institutions in its administration, planning and disposal. Though *Jatropha* development can still be done under the current system, there is a need for a set of national norms and standards to ensure efficient and effective use of public land as an asset in support of land reform.

6.6.2 Energy policy and regulation

Kenya's predominant energy source is biomass – firewood, charcoal and agricultural wastes, which between them supply 70 percent of the country's total energy requirement (Mutimba, 2008). Next in importance is imported petroleum, which meets about 20 percent of the national energy demand. Kenya's transport, manufacturing and commercial sectors depend on imported petroleum products, while most rural households, rural services and small businesses depend on biomass energy.

Kenya has yet to find hydrocarbon reserves on its territory, despite several decades of intermittent exploration. Although Australia continues the search off Kenya's shore,

Kenya currently imports all crude petroleum requirements. Petroleum accounts for 20 to 25 percent of the national import bill (Mutimba, 2008). Kenya Petroleum Refineries—a 50:50 joint venture between the government and several oil majors—operates the country's sole oil refinery in Mombasa, which currently meets 60 percent of local demand for petroleum products. In 2004 oil consumption was estimated at 55,000 barrels a day. Most of the Mombasa refinery's production is transported via Kenya's Mombasa–Nairobi pipeline.

The largest share of Kenya's electricity supply comes from hydroelectric stations at dams along the upper Tana River, as well as the Turkwel Gorge Dam in the west. A petroleum-fired plant on the coast, geothermal facilities at Olkaria, and electricity imported from Uganda make up the rest of the supply. Kenya's installed capacity stood at 1,142 megawatts a year between 2001 and 2003. The state-owned Kenya Electricity Generating Company (KenGen), established in 1997 under the name of Kenya Power Company, handles the generation of electricity, while the Kenya Power and Lighting Company (KPLC), which is slated for privatization, handles transmission and distribution. Shortfalls of electricity occur periodically, when drought reduces water flow. In 1997 and 2000, for example, drought prompted severe power rationing, with economically damaging 12-hour blackouts. Frequent outages, as well as high cost, remain serious obstacles to economic activity. Tax and other concessions are planned to encourage investment in hydroelectricity and in geothermal energy, in which Kenya is a pioneer. The government plans to open two new power stations in 2008, Sondu Miriu (hydroelectric) and Olkaria IV (geothermal), but power demand growth is strong, and demand is still expected to outpace supply during periods of drought.

It is clear that without a major investment in alternative energy, power failures and rationing will become even more regular feature of life as we face longer and more frequent droughts brought about by climate change. One option is to invest in renewable energy technologies that utilize solar, wind, bio-ethanol and bio-diesel and other naturally-occurring resources. At the rural level, bio-diesel can be used to benefit the rural communities, by using community managed bio-diesel electricity generators to provide lighting for rural households. This has proved very successful in Tanzania. According to KIHBS 2005/06, only about 15.6% of the population has access to electricity (Ministry of Energy, 2007). Biodiesel can be used to generate electricity and this could make it possible for more people to access electricity by using decentralized power generation systems. The use of biodiesel in such systems would help cut down on green house gas emissions associated with use of fossil diesel for power generation. The same survey indicates that over 76.4% of the population relies on paraffin for lighting (Ministry of Energy, 2008). 13.2% of the population use paraffin for cooking with Nairobi giving the highest percentage at 63.5%. Substitution of biodiesel for kerosene offers a cleaner alternative by minimizing the pollutant effects from use of kerosene for cooking and lighting.

Current efforts to implement the necessary activities are constrained by the absence of a national strategy that would in effect harness and coordinate the efforts and resources on the ground. Therefore Kenya needs a strategy for development of a sustainable biofuels

program. This is supported by the National Energy Policy (Sessional Paper No. 4 of 2004 on Energy) (Ministry of Energy, 2004) and the subsequent Energy Act, 2006 (Government of Kenya, 2006). The Sessional Paper No. 4 of 2004 on Energy seeks to encourage wider adoption of renewable energy technologies, thereby enhancing their role in the country's energy supply matrix. The Policy recognizes the potential for production of biodiesel from locally grown crops, and in order to utilize biodiesel, observes that a system for production, distribution and use will need to be put in place. It recognizes the need to set aside land for the production of energy crops from which biofuels can be produced, and to formulate strategies to optimize land use and to harmonize the existing land use policy with the energy policy. It also calls for resources to be mobilized for research and development to facilitate its introduction as a motor blend in the medium term (Ministry of Energy, 2004).

A draft policy on strategy for the development of the bio-diesel industry in Kenya (2008-2012) is in place (Ministry of Energy, 2008). Its objective is development of bio-diesel is in conformity with broad national objectives and has the following major objectives:

- a. To increase security of energy supply by reducing vulnerability resulting from dependence on imported fossil fuels. It is estimated that a 5% reduction in imported diesel can be achieved by year 2012 through substitutions with biodiesel.
- b. To diversify rural energy sources by promoting substitution of kerosene with biodiesel and the use of decentralized energy systems. The number of people using kerosene for lighting can be reduced from 76.4% in 2005/06 to 50% by 2012 through this substitution.
- c. To contribute to efforts to address global warming through substitution of petroleum fuels. The biodiesel industry is expected to contribute to a 6% reduction of poverty incidence by 2012. A poverty incidence of 46.6% was recorded in 2005/06 according to the Kenya Integrated Household Budget Survey (KIHBS).
- d. To contribute to poverty alleviation through diversification of income sources. Through rural agricultural mobilization, especially in the marginal semi-arid areas, bio-diesel industry can increase household income levels by 30% by 2012.

6.6.3 Policies supporting direct foreign investment (DFI)

Kenya has had a long history of economic leadership in East Africa as one of the largest and most advanced economies in the region. Kenyan policies on foreign investment generally have been favorable since independence, with occasional tightening of restrictions to promote the "Africanization" of enterprises. Foreign investors have been guaranteed ownership and the right to remit dividends, royalties, and capital. In the 1970s, the government disallowed foreign investment unless there was also some government participation in the ownership of an enterprise. Notwithstanding some restrictions, between 60% and 70% of industry is still owned from abroad.

Political attitude towards facilitating foreign direct investments

The Kenyan government has introduced various incentives to attract foreign investors to Kenya. Such measures include:

- An investment allowance is offered on buildings, equipment and plant machinery
- Loss carried forward option whereby a company is allowed to carry forward their losses to future taxable profits
- VAT waiver for all plants set up and machinery
- Depreciation of assets based on book value
- Removal of exchange controls
- Laws in place against expropriation
- Rationalized trade licences regime which requires less licences than before
- Decontrolled prices
- Importation of agricultural products attracts zero duty

In addition to these incentives;

- Kenya is a member of ICSI (International Centre for Settlement of Investment disputes) with its headquarters in London. This membership allows foreign investors to have their investment disputes judged impartially
- Kenya is a member of ATIA (African Trade Insurance Agency) which enables the foreign investor to insure against political risk.

Openness to foreign investment

A new investment code, the Investment Promotion Act 2004, is expected to streamline the administrative and legal procedures to achieve a more effective investment climate. The legislation replaces the government's Investment Promotion Center with the new Kenya Investment Authority (KIA). The new law creates some new barriers, namely, it sets the minimum foreign investment threshold at US \$500,000 (likely to be reduced to \$100,000 in 2006), and conditions some benefits on obtaining an investment certificate from the KIA. Foreign employees are expected to be key senior managers or have special skills not available locally. Foreign investors are required to sign an agreement with the government stating training arrangements for phasing out expatriates. Any enterprise, whether local or foreign, may recruit expatriates for any category of skilled labor if Kenyans are not available.

The Kenyan government focuses its investment promotion on opportunities that earn foreign exchange, provide employment, promote backward and forward linkages, and transfer technology. The only significant sectors in which investment (both foreign and domestic) are constrained are those where state corporations still enjoy a statutory monopoly. These are restricted almost entirely to infrastructure (e.g., power, posts, telecommunications and ports) and the media, although there has been partial liberalization of these sectors. For example, in recent years, five Independent Power Producers (IPPs) have begun operation in Kenya.

All resident companies are subject to tax on their incomes at the rate of 30%. Branches of non-resident companies pay tax at the rate of 37.5%. Taxable income is generally defined to be income sourced in or from Kenya. Value Added Tax (VAT) is levied on goods imported into or manufactured in Kenya, and taxable services provided. The standard VAT rate is 16%. Work permits are required for all foreign nationals wishing to work in the country. It is becoming increasingly difficult for expatriates to obtain work permits because the government says qualified middle level managers and technical staffs are available locally but this may be driven more by the high unemployment level in the country. There is no discrimination against foreign investors in access to government-financed research. The government's export promotion programs do not distinguish between local and foreign-owned goods.

The United Nations Conference on Trade and Development (UNCTAD), in conjunction with the International Chamber of Commerce (ICC), published an Investment Guide to Kenya in May 2005. The guide provides comprehensive analyses of investment trends, opportunities, and regulatory framework in the country. According to the UNCTAD report, and most observers, significant disincentives for investment in Kenya includes government overregulation and inefficiency, expensive and irregular electricity and water, an underdeveloped telecommunications sector, a poor transportation infrastructure, and high costs associated with crime and general insecurity.

Efforts have been made to harmonize the investment regimes and investment incentives among the East African Community (EAC) countries (Tanzania, Kenya and Uganda). Tariff barriers between the three East African countries were removed in 1999. In 2004, Kenya, Tanzania and Uganda signed a Customs Union Protocol, putting in place a three tier taxation systems and paving the way for further steps towards a common market. Under the protocol, EAC member states are to allow free entry of raw materials from members, levy a 10% on semi-processed goods and a 25% levy on finished goods. Non-Tariff Barriers (NTBs) remain a problem in the EAC. A March 2005 report on NTBs and Development of a Business Climate Index in the Eastern African Region by the East African Business Council identified administration of duties and other taxes as the main NTB, followed closely by corruption. The report also indicates that Kenya's level of investment and business optimism is dampened by low expectations relating to improvements in infrastructure, access to land, and profitability in business.

The GOK has sought-out foreign investment through investment conferences and foreign trips occasionally lead by the Head of State. In August 2005, the Kenyan President made a five-day visit to China to market the country as an investment destination to Chinese investors.

Conversion and transfer policies

There are no restrictions on converting or transferring funds associated with investment. Under Kenyan law, amounts above KSh 500,000 (about US \$6,400) have to be declared as a formal check against money laundering although this is rarely enforced due to lack of appropriate legislation.

Under the Foreign Investment Protection Act (FIPA) (Cap 518), foreign investors are free to convert and repatriate profits including retained profits, which have not been capitalized proceeds of the investment after payment of the relevant taxes and the principal and interest associated with any loan. Foreign exchange is readily available from commercial banks and foreign exchange bureaus. Local and foreign investors are allowed to freely buy and sell foreign exchange. Kenya has a floating exchange rate. The Kenya shilling is tied to a basket of foreign currencies and has remained relatively stable in recent years.

Expropriation and compensation

Kenyan law provides protection against the expropriation of private property except where due process is followed and adequate and prompt compensation is provided. Expropriation may only occur for either security reasons or public interest. The GOK may revoke a foreign investment license if: an untrue statement is made while applying for the license; the provisions of the Investment Promotion Act or of any other law under which the license is granted are breached; or, if there is a breach of the terms and conditions of the general authority. In practice, licenses are rarely revoked.

Dispute settlement

Kenya is a member of the World Bank-affiliated Multilateral Investment Guarantee Agency (MIGA), which issues guarantees against non-commercial risk to enterprises that invest in member countries. It is also a signatory to the Convention on the Settlement of Investment Disputes Between States and Nationals of Other States. The Convention established the International Center for Settlement of Investment Disputes (ICSID) under the auspices of the World Bank and is also a member of the Africa Trade Insurance Agency (ATIA).

Kenya's judicial system is modeled after the British, with magistrates' courts, high courts in major towns and a Court of Appeal at the apex of the judicial system. In addition, there is a separate industrial court that hears disputes over wages and labor terms. Its decisions cannot be appealed. Kenya has commercial courts to deal with commercial disputes. Company and investment law is centered on the Companies Act of 1948. Property and contractual rights are enforceable, but long delays in resolving commercial cases are common.

The Foreign Judgments (Reciprocal Enforcement) Act provides for the enforcement in Kenya of judgments given in other countries that accord reciprocal treatment to judgments given in Kenya. The countries with which Kenya has entered into reciprocal enforcement agreements are Australia, the United Kingdom, Malawi, Tanzania, Uganda, Zambia and Seychelles. Without such an agreement, a foreign judgment is not enforceable in the Kenyan courts except by filing suit on the judgment. Kenyan courts as a general rule recognizes a governing-law clause in an agreement that provides for foreign law. A Kenyan court would not give effect to a foreign law if the parties intended to apply it in order to evade the mandatory provisions of a Kenyan law with which the agreement has its most substantial connection, and which the court would normally have applied.

Foreign advocates are not entitled to practice in Kenya unless they are instructed and accompanied by a Kenyan advocate, although a foreign advocate may practice as an advocate for the purposes of a specified suit or matter if appointed to do so by the Attorney General.

Kenya does not have a bankruptcy law. Creditors' rights are comparable to those in other common law countries. Monetary judgments are usually made in Kenyan shillings. The government does accept binding international arbitration of investment disputes with foreign investors. Apart from being a member of the ICSID, Kenya is a party to the New York Convention on the Enforcement of Foreign Arbitral Awards (1958).

Performance requirements and incentives

Investors in the manufacturing and hotels sectors are permitted to deduct from their taxes a large portion of the cost of buildings and capital machinery. All locally financed materials and equipment (excluding motor vehicles and goods for regular repair and maintenance) for use in construction or refurbishment of tourist hotels are zero-rated for purposes of Value Added Tax (VAT). The Permanent Secretary to the Ministry of Finance must approve such purchases. The Government permits some VAT remission on capital goods, including plants, machinery and equipment for new investment, expansion of investment and replacement. The investment allowance under the Income Tax Act is set at 100%. Materials imported for use in manufacturing for export or for production of duty-free items for domestic sale qualify. Approved suppliers, who manufacture goods to be supplied to the exporter, are also entitled to the same import duty relief. The program is also open to Kenyan companies producing goods that can be imported duty-free or goods for supply to the armed forces or to an approved aid-funded project. Fiscal incentives offered by the government to Export Processing Zone (EPZ) investments and registered and approved venture-capital-fund investments include 10 years' tax holiday and a flat 25% tax for the next 10 years; exemption from withholding taxes during the first 10 years; exemption from import duties on machinery, raw materials, and inputs; no restrictions on management or technical arrangements; and exemption from stamp duty and from the VAT on raw materials, machinery and other inputs. The Export Promotion Programs Office, set up in 1992 under the Ministry of Finance, administers the duty remission facility.

The government established a Manufacturing Under Bond (MUB) program in 1986 that is open to both local and foreign investors. Enterprises operating under the program are exempted from duty and VAT on imported plants, machinery, equipment, raw materials and other imported inputs. The Kenya Revenue Authority (KRA) administers the program.

Foreign investors are attracted to the EPZs by the single licensing regime, tax incentives and support services provided such as power and water. The number of enterprises operating in EPZs has increased from 66 in 2003 to 74 in 2004. The increase is largely due to preferential access and duty free status accorded to Kenyan apparel exports into the U.S. under the African Growth and Opportunity Act (AGOA). Kenya's major exports

under AGOA include apparel and handicrafts. The majority of Kenya's manufactured products are entitled to preferential duty treatment in Canada and the European Union. By statute, manufacturing companies are not permitted to distribute their own products. With the exception of the insurance and telecommunications sectors and other infrastructure and media companies discussed earlier, Kenya does not require that its nationals own a percentage of a company. The percentage of foreign equity need not be reduced over time. Technology licenses are, however, subject to scrutiny by the Kenya Industrial Property Office (KIPO) to assure that they are in line with the Industrial Property Act. Licenses are valid for five years and are renewable. Foreign investors are free to obtain financing locally or offshore.

The government does not steer investment to specific geographic locations. Local content rules are applied but only for purposes of determining whether goods qualify for preferential duty rates within the Common Market for East and Southern Africa (COMESA).

Right to private ownership and establishment

Private enterprises can freely establish, acquire and dispose of interest in business enterprises. In general, "competitive equality" is the standard applied to private enterprises in competition with public enterprises. However, certain parastatals have enjoyed preferential access to markets. Examples include Kenya Reinsurance with a guaranteed market share, Kenya Seed Company with fewer marketing barriers than its foreign competitors, and the Kenya National Oil Corporation with retail market outlets developed with government funds. Some state corporations have also benefited from easier access to cheap government credit.

Protection of property rights

Secured interests in property are recognized and enforced. In theory, the legal system protects and facilitates acquisition and disposition of all property rights – land, buildings and mortgages. In practice, obtaining title to land is a cumbersome and often non-transparent process, which is a serious impediment to new investment. It is frequently complicated by improper allocation of access and easements to third parties. There is also a general unwillingness of the courts to permit mortgage lenders to sell land to collect debts. Foreigners may require Presidential approval to acquire large tracts of agricultural land or any seashore property. Since January 2003, the government has been nullifying some land allocations that were illegally acquired. The question of title to land acquired irregularly under the previous government is the subject of continued controversy. The issue is particularly important because 80% of bank loans are secured with land.

Kenya has a comprehensive legal framework to ensure intellectual property rights protection, which includes the Industrial Property Act 2001, the Trade Marks Act, the Copyright Act 2001, the Seeds and Plant Varieties Act, and the Universal Copyright Convention. The Copyright Act protects literary, musical, artistic, audio-visual works, sound recordings and broadcasts, and computer programs. Criminal penalties associated with piracy in Kenya include a fine of up to KSh 800,000 (about US \$10,700), a jail term of up to 10 years and confiscation of pirated material, but enforcement and the

understanding of the importance of intellectual property, are poor. The Kenya Industrial Property Institute (KIPI) is responsible for patents, trademarks and trade secrets, under the Ministry of Trade and Industry. Copyright protection is the responsibility of the Attorney General's office.

Kenya is a member of the World Intellectual Property Organization (WIPO) and of the Paris Union (International Convention for the Protection of Industrial Property) along with the U.S. and 80 other countries. A future prospect for patent, trademark, and copyright protection is embodied in the African Intellectual Property Organization, although its enforcement and cooperation procedures are yet untested. Kenya also is a member of the African Regional Intellectual Property Organization (ARIPO). Kenya is a signatory to the Madrid Agreement Concerning the International Registration of Marks, however, the other EAC members (Uganda and Tanzania) are not.

Investors are entitled to national treatment and priority right recognition for their patent and trademark filing dates. The Trade Marks Act provides protection for registered trade and service marks that is valid for 10 years and is renewable. However, actual protection for intellectual property -- copyrights, patents and trademarks -- is inadequate. The sale of pirated audio and videocassettes is rampant, although there is little domestic production. According to the Business Software Association, an estimated US \$3.5 million is lost every year as a result of the use of illegal software, mainly by businesses. Kenya enacted Industrial Property Act (KIPA) in 2002 to comply with WTO obligations, but its implementation of the law remains weak. In 2003, the Kenya Bureau of Standards indicated that over KSh 37 billion (about US \$493.3 million) is lost annually in customs and value added taxes due to the sale of counterfeit goods. The government has not yet published its draft anti-counterfeit Bill nor submitted it to Parliament. However, Kenyan authorities have recently increased their IPR enforcement efforts on behalf of textile producers to limit the transshipment of foreign-made garments through the Port of Mombasa (mostly from Asia) that are fraudulently being exported to the U.S. under AGOA preferences. Kenya has also begun a campaign to crackdown on the entry into the local market of counterfeit or "substandard" goods.

Transparency of the regulatory system

Investors in Kenya are required to comply with environmental standards. The National Environment Management Authority (NEMA) oversees these matters and is the principal regulatory agency for them. Developers of particular projects are therefore required to carry out Environmental Impact Assessments (EIA) prior to project implementation. Companies are required to submit their up-to-date assessment reports to NEMA for verification by the environment auditors before they can receive an Environmental Impact Assessment license.

In theory, all investors receive equal treatment in the initial screening process. The government screens each private sector project to determine its viability and implications for the development aspirations of the country. For example, a rural agro-based enterprise, with many forward and backward linkages, is likely to receive licensing fairly quickly. However, new foreign investment in Kenya has historically been constrained by

a time-consuming and highly discretionary approval and licensing system that have been vulnerable to corrupt practices.

Kenya's competition framework is governed by the Restrictive Trade Practices, Monopolies and Price Control Act 1989 (with subsequent amendments). The Act is relatively modern and has worked well in avoiding anti-competitive practices since the abolition of price controls in 1994. However, the Monopolies and Prices Commission is not an independent regulatory body but rather is under the Ministry of Finance. Although the Commission is independent in its investigation of competition-related issues, it must rely on ministerial powers to enforce orders on companies found to have breached competition rules. The Commission lacks the capacity to fully implement the legislation. Practices that seek to block entry into production and discrimination vis-à-vis buyers (for production, resale or final consumption) are illegal. Mergers and acquisitions must receive the green light from the Commission and the Minister of Finance in all cases, regardless of the sector, size or market share of the companies involved. This puts an unnecessary burden on investors and the Commission. However, the Commission has no jurisdiction over the electricity, telecommunication or insurance sectors. Under the law, manufacturers may not distribute their own products, and they are required to supply information to the government about their distributors.

Incoming foreign investment through acquisitions, mergers or takeovers is governed by antitrust legislation that prohibits restrictive and predatory practices that prevent the establishment of competitive markets. The legislation also aims at reducing the concentration of economic power by controlling monopolies, mergers and takeovers of enterprises. Mergers and takeovers are subject to the Companies Act, the Insurance Act (in case of insurance firms) or the Banking Act (in case of financial institutions).

Efficient capital markets and portfolio investment

Kenya has a small capital market consisting of the government controlled Capital Market Authority (CMA), Nairobi Stock Exchange (NSE), 19 securities and equities brokerage firms, 18 investment advisory firms, 6 investment banks, 13 stock brokers, 8 fund managers, 1 credit rating agency, 1 capital venture fund, 2 collective investment schemes, 3 authorized securities dealers, and 4 authorized depositories. The CMA regulates and supervises all these institutions and oversees the development of Kenya's capital market. The NSE trades had a market capitalization of KSh 455.5 billion (about US \$6.0 billion) at the end of November 2005, up from KSh 321.1 billion (about US \$4.2 billion) in January 2005.

By November 2005, Kenya's banking sector consisted of 47 financial institutions, including 41 commercial banks, 2 mortgage finance companies, and 2 building societies. At the end of July 2005, the total banking assets were KSh 612.5 billion (about US \$7.9 billion). Loans and advances accounted for 52% of the total assets equivalent to KSh 320.5 billion (about US \$4.1 billion). Seven banks dominate the banking sector accounting for two thirds of the total deposits in the banking institutions. Asset quality of Kenyan banks though improving remains poor with about 19.5% equivalent to KSh 70.8 billion (about US \$0.92 billion) of assets classified as non-performing. Realization of the

collateral is difficult because of a slump in the property market as well as a cumbersome court system.

The NSE into three segments: the Main Investment Market (MIM), the Alternative Investment Market (AIM) and the Fixed Income Securities Market (FISM). The MIM targets mature companies with strong dividend streams. The AIM is more favorable to small and medium sized companies, and allows firms to access cheaper, longer-term sources of capital through the capital markets. And, the FISM allows businesses, financial institutions, government and supranational authorities to raise capital through the issuance of debt securities. As of October 2005, the CMA categorized the listings into 38 companies for the MIM segment, and 9 companies in the Alternative AIM. The CMA is involved in the preparation of a proposed integrated East African Capital Market. As from February 28, 2005 the NSE started settling all equity trades through an electronic Central Depository System (CDS).

Trading in commercial paper and corporate bonds issued by private companies has diversified activity at the NSE, and is regulated through a set of guidelines developed in collaboration with private sector. They allow private companies to raise funds from the public without being quoted in the NSE. Establishing the CDS encouraged the development of a secondary market for the government's one-year floating rate bond. The CDS opened a shop window for small investors offering products in multiples of KSh 50,000 (about US \$667) up to KSh 1 million (about US \$13,333). Expenses related to credit rating services by listed companies and other issuers of corporate debt securities are tax deductible. "Cross-shareholding" and "stable shareholder" arrangements are not used to restrict foreign investment through mergers and acquisitions. Hostile takeover defenses are uncommon. Private firms are free to adopt articles of incorporation, which limit or prohibit foreign investment, participation or control.

Foreign investors can acquire shares freely in the stock market subject to a reserved ratio of 25% for domestic investors in each listed company. To encourage the transfer of technology and skills, foreign investors are allowed to acquire up to 49% of local stockbrokerage firms and up to 70% of local fund management companies.

Credit is allocated on market terms and foreign investors are able to obtain credit on the local market. However, the number of credit instruments is relatively small. Legal, regulatory, and accounting systems are generally transparent and consistent with international norms. The corporate tax for newly listed companies is 25% for a period of five years from the date of listing. The withholding tax on dividends is 7.5% for foreign investors and 5% for local investors. Foreign investors can acquire shares in the stock market subject to a minimum reserved ratio of 25% of the share capital of the listed company for domestic investors. The 75% portion is considered as a free float available to local, foreign and regional investors without restrictions on the level of holding. Dividends distributed to residents and non-residents are subject to a final withholding tax at the rate of 5%. Dividends received by financial institutions as trading income are not subject to tax.

The Parliament amended the Banking Act 2004 to delegate the power to register and deregister commercial banks and financial institutions from the finance minister to the Central Bank of Kenya (CBK). Under the Central Bank of Kenya Act, the security of tenure for the Governor is enhanced, the Bank's operational autonomy is increased, the CBK's bank supervision functions are strengthened, and statutory restrictions on government borrowing from the Bank are codified. The CBK sets requirements for all banking institutions and building societies to disclose their un-audited financial results on a quarterly basis by publishing them in the print media.

Parliament amended the Central Bank of Kenya Act in December 2004 to establish an independent Monetary Policy Advisory Committee whose mandate is to advise the Bank with respect to monetary policy. The amended Act provides for the CBK to publish the lowest interest rate it charges on loans to banks referred to as the "central bank rate". Other amendments transferred powers to revoke and issue licenses to financial institutions from the Ministry of Finance to the CBK and introduced an "in Duplum Rule," which limits fees and fines on non-performing loans to the amount of the outstanding principal. However, the rule is yet to be implemented.

Foreign-trade zones/free ports

By December 2005, 41 Export Processing Zones (EPZs) had been established around the country and 77 export-oriented firms were in operation. A government agency, Kenya Export Processing Zone Authority (EPZA) regulates the zones. Of the 41 zones, only 2 are developed and managed by the public sector. The rest are privately owned and managed by licensed EPZ developers/operators. Of the 77 enterprises operating in EPZs, 14% are Kenyan owned, 58% are foreign investments, and 28% are joint ventures. In 2004, 74% of EPZ exports went to the U.S., with the European Union accounting for 8.5% and EAC/COMESA 4%. The largest privately owned EPZ is the Sameer Industrial Park located in Nairobi's Industrial area. It has been operational since 1990. The Athi River EPZ, near Nairobi, is the largest publicly owned EPZ, with 230 acres currently developed. The GOK is also developing another large export processing zone in Mombasa, Kenya's main seaport.

6.6.4 Other supporting policy frame work

The Government of Kenya has attempted to address the issue of development of ASALs through numerous development plans, but little success has been registered in the implementation of the plans, largely on account of the absence of political will. The plans have not specifically addressed sustainable management of natural resources within the drylands but addressed development in general. As a result, they often lack focus on the issues of greatest concern to the inhabitants of the ASALs and their livelihoods which are dependent on the sustainable management of natural resources. Policies and laws have also tended to focus more on control and exploitation of natural resources rather than empowering local people and their systems and institutions to manage the natural resources in a sustainable manner. The laws dealing with the natural resources management in Kenya are sectoral in nature and trace their origins to colonialism, when a mentality of extraction informed policy making and practice with regards to natural resources. The sectoral laws were often not connected to the environmental protection

but merely governed the exploitation of the natural resource base to feed the needs of the imperial economy.

Colonial policies tended to ignore the ASALs as they were considered to be economically unproductive. Where policies were formulated that dealt with these areas, they were meant to “protect” the inhabitants from their “ignorance” by taking away their means of access to resources and placing it under the control of some trustee to manage for the benefit of the communities (Constitution of Kenya). The coming of independence and self-rule did not result in any significant change in imperatives or approaches to the management of natural resources in the ASALs. No significant changes were made in the laws until the 1990s, with the most significant change being the enactment of EMCA in 1999.

National Development Plans are key policy instruments in the management of economic development in Kenya. Prepared in five-year cycles, National Development Plans (NDP) has a significant influence in prioritization and resource allocation. Thus, by examining previous NDP it is possible to gauge the level of attention and resources that the government has given drylands biodiversity. In this connection, it is evident that there has been very inadequate attention in the past. The exception came with the current development plan, the *Economic Recovery Strategy for Wealth and Employment Creation* (ERS), which for the first time laid out an elaborate plan of action for the drylands. Of course it is one thing to lay out an elaborate plan, and quite another to actually implement it, and thus as the period for the implementation of the ERS comes to a close, it will be useful to undertake a review and evaluation to see how much of the promise it made at the beginning has actually been realized.

Economic recovery strategy for wealth and employment creation (ERS) 2003-2007

Following the General Elections of 2002 and the coming to power of the National Rainbow Coalition (NARC), a new economic recovery plan was unveiled dubbed Economic Recovery Strategy for Wealth and Employment Creation (ERS) 2003-2007. The ERS was a five-year roadmap to guide the country through an economic recovery process and lead it back to the path of economic prosperity. It was prepared through extensive consultations with key stakeholders, among them employers, manufacturers, labour unions, professional bodies, civil society organizations, and people from the drylands.

The ERS acknowledges the wanton neglect that the drylands have suffered in the past and tries to remedy them by making special provisions for the region. It is the boldest attempt by government to-date to include the drylands into a sustainable development plan. It recognizes that the ASALs need special attention due to historical and physical reasons. It sets out to strengthen livelihoods in the drylands through support to livestock and range management, eco-tourism and where feasible long-term irrigation projects to contribute to the overall food production and food security in the country.

It addresses the issues of natural resource management as well livelihoods. It has a clear focus on improvement of drylands biodiversity through greater participation of the

communities. It also recognizes the need to provide incentives for the communities in order to conserve the biodiversity. In this sense, the ERS makes a clean break with previous government policies on the drylands which failed to address their special characteristics and the unique needs of the local communities.

ASAL Policy, 2007

There have been numerous ASAL policies in the past, but they have previously sought to convert pastoralists into sedentary farmers. For instance, the 1979 ASAL Policy sought to promote the establishment of irrigation schemes, group ranches and other settlement systems to sedentarize pastoralists. Such policies were conceived by technical people with little input from the inhabitants of the drylands.

In contrast, the Policy for the Sustainable Development of the Arid and Semi-Arid Lands of Kenya, 2007 (ASAL Policy) has been developed through an extensive process of consultation with key stakeholders, including communities living in the drylands. It is informed by international instruments and other government policy documents such as the Millennium Declaration, the ERS and the PRSP.

The ASAL Policy is widely acknowledged as an effective policy for the development of the drylands. It is a comprehensive instrument that sets out policy direction, implementation mechanisms, and investment for drylands development. It envisages the involvement of local communities in their own development, and commits government to support pastoralism and agro-pastoralism through the improvement of local institutions and organization, the development of water, grazing, rangeland management, animal health, and marketing, while diversifying of livelihoods for women and men.

The policy recommends the provision of essential support for the development of appropriate land tenure systems, including well-defined legal framework for the settlement of land and resource-use disputes. It proposes the use of mobile schools and outreach clinics in the provision of services to the communities. It also seeks to solidify interdependence between the drylands and other land use systems through improved communication networks and infrastructure.

The policy is geared towards reducing the vulnerability of people in the drylands to natural hazards and food insecurity through positive linkages with the national disaster management framework (Oxfam 2006). Gender concerns are also addressed to ensure that women are given equal rights over land and other critical resources. The policy recognizes the trans-boundary nature of drylands biodiversity and the need to address the challenges relating to their management from a regional perspective. It commits to the use of indigenous technical knowledge and locally available materials in the development of water harvesting and irrigation. Finally, it proposes changes in land use and planning policies to check on the encroachment into the drylands by farmers and conservation ventures at the expense of local livelihoods.

Poverty Reduction Strategy Paper (PRSP)

The historical marginalization of the dryland was demonstrated in the failure to reflect the priorities of pastoralists in the interim PRSP prepared by the Government for the period 2000 to 2003. In order to remedy this situation, pastoralists and groups interested in pastoral development issues established the Pastoral Thematic Group (PTG) comprised of representatives of pastoral civil society and institutions such as the Arid Lands Resource Management Project to facilitate interests of pastoralists in the preparation of the PRSP. The Group produced a Pastoral Poverty Reduction Strategy that was ultimately incorporated into the PRSP, thereby ensuring that the specific needs of pastoralism were identified and addressed in a manner that would not have otherwise been possible. The PRSP committed the government to actions to improve the provision of veterinary services, infrastructure and marketing opportunities for pastoralists.

The PPRS addressed issues which affect dryland biodiversity use and management such as, improvement of livestock markets, drought management, land tenure, improved infrastructure and security among other issues. It also addressed social issues such as provision of education, HIV/AIDS control and awareness and reduction of drug use and abuse. It recognized that with proper interventions poverty could be eradicated within the dryland.

Existing Policy Framework

Apart from the national development plans there are other government instrument used to address development and dryland biodiversity. These include the policy documents and laws.

Agriculture Policy

Kenya does not have an updated current agriculture policy the last official document. This however does not mean that the agriculture sector does not have any recent policy guidelines. An example is the Strategy for Revitalizing Agriculture (SRA) which was launched in March 2004 as a National Policy Document for steering development of the agricultural sector in Kenya for the period up to 2014. This is a joint policy document of the Agricultural Sector Ministries comprising of the Ministry of Agriculture, the Ministry of Livestock and Fisheries Development and the Ministry of Cooperative Development and Marketing. This strategy proposes policy and institutional changes aimed at reversing the decline of the agricultural sector thus placing it competitively on the global arena.

The main focus of the SRA is a follows:-

1. Creating an enabling environment for agricultural development
2. Improving support services
3. Promoting marketing, agro-processing and trade
4. Arid and Semi-Arid Lands development; and,
5. Mainstreaming cross-cutting issues in the sector and also in the other ministries

The Strategy for Revitalizing Agriculture (2006) offers development opportunities through the Agriculture Product Value Chain which aims at developing business linkages through new extension approaches between producers, suppliers, processors and the

market. The country's vision 2030 aims at industrializing the agricultural sector through enhanced agro-processing and value addition to.

National forest policy

The Kenyan forest policy was passed in 2006. It addresses various issues concerning the management of Kenyan forest. Its main objective is to promote the levels of forest cover, farm forestry and dryland forest management. It seeks to conserve existing forests and help in the development of industrial plantations. In order to accomplish this it will involve private sector and promote community participation.

6.7 Taxes and incentives

Biodiesel may not always be economically competitive with petroleum fuels, especially as the industry is first getting established. The cost of production and the cost of petroleum will dictate the competitiveness of biodiesel at any given time. Tax policy can play a key role in either supporting or obstructing the development of a new biodiesel industry. Of particular importance is the issue of how fuel taxes will be imposed on biofuels.

Tax holidays that reduce or eliminate the fuel tax on biofuels have been used very effectively to spur the growth in the industry in Europe and other parts of the world. Production tax credits – essentially the inverse of a tax holiday – have been the tool of choice in the United States to counter the stifling effect that fuel taxes can have on biofuels. These devices are often implemented for a set period of time – usually about 3-5 years – to enable the scale of biofuels production to rise to the point where it can compete with petroleum products on an even footing. Although this approach may forego some short-term revenues for the government, the domestic investment and job creation that such measures will spur should more than make up for the lost revenue in terms of overall economic benefit to the country. Whereas there is no guarantee that revenues raised from fuel taxes will flow back into the country in a way that produces permanent employment and raises incomes, spurring industrial biofuels development with tax incentives will absolutely have that effect. Another factor to consider is the fact that the corporate and personal tax revenue from those involved in the new biofuels industry will offset at least a portion of the lost revenue from fuel taxes. A more in-depth analysis of tax trade-offs should be conducted to assess quantitatively the actual trade-offs.

The EMCA provides that the Finance Minister *may* propose to the government to put in place tax or fiscal incentives to induce or promote proper environmental management. These incentives may include: a customs and excise waiver in respect of imported capital goods which prevent or substantially reduce environmental degradation caused by an undertaking, tax rebates to industries or other establishments that invest in plants, equipment and machinery for pollution control, recycling of wastes, water harvesting and conservation, prevention of floods and *for using other energy resources as substitutes for hydrocarbons*.

7.0 How to start Biodiesel Business in Kenya

7.1 Acquiring and using land

Land in Kenya is classified into three types: public land, private land and community land. Of the three, community land occupies the largest surface. The freedom to own and deal with property is guaranteed by the Constitution. There are several land-tenure systems under which land may be held and operated. One is freehold tenure, the holding of registered land in perpetuity subject to statutory and common-law qualifications. Another is leasehold tenure, the holding of land on a lease between the lessor and lessee for a given period from a specified date of commencement, on such terms and conditions as the parties may agree on. A third way in which land may be acquired and used is having it allocated by the Government. The procedure for the allocation of alienated or unalienated Government land is that the developer identifies land suitable for development and completes an application form, which he or she forwards to the appropriate District Land Board for consideration. The Land Board meets once or twice a month (depending on the district) to consider all applications, after which a decision is made and a certificate of allocation issued. Then the developer can process a lease or transfer the title depending on the type of land acquired. This process generally takes three to four months. Dealings in agricultural land (mostly rural land) are subject to Land Control Board consent under the Land Control Act (Chapter 302, Laws of Kenya). Agricultural land (defined as freehold land outside urban areas or land held on a leasehold title that restricts its use to an agricultural purpose) cannot be acquired unless a Land Board approves an application by the owner of such land and the person who wishes to acquire it. Land Control Boards operate in each district throughout Kenya and meet more or less regularly to consider such applications. (It is worth noting that land situated outside an urban area that is held on a leasehold title for a non-agricultural purpose is not subject to this control.) Applications for consent must be considered within six months of the agreement to enter into the transaction, or they must be renewed or extended by a Court. It is possible for land to be controlled in more than one manner. For example, a freehold beachfront plot situated on the coast outside an urban area may also be subject to the provisions of the Land Control Act in that the land would be regarded as “agricultural” even if it is actually used for a hotel. For this reason, it is usual and desirable for such plots of land to be held on leasehold titles restricted to an appropriate non-agricultural purpose so that the Land Control Act does not apply to such plots of land. There is no specific legislation preventing foreigners or non-residents from owning land in Kenya, unless the land is classified as agricultural. All farmland must be owned by Kenyan citizens or by incorporated companies all shareholders of which are Kenyan citizens. This requirement is enforced by the Land Control Act, which provides that any consent of a Land Control Board will be invalid in the case of a non-citizen applicant for the purchase or lease of agricultural land. It can, however, be waived by the President of Kenya, who may, for example, waive it for an agro-processing company that needs land to grow a proportion of its basic agricultural input. No clear guidelines are currently in place on how to acquire a presidential waiver for agricultural land, which has led to complaints about excessive bureaucratic discretion.

A biofuels producer can obtain the necessary ethanol or biodiesel feedstock in any of the following four ways:

- Freehold ownership whereby they manage a plantation on land that they or their company owns outright.
- Leasehold ownership whereby they manage a plantation on land that they or their company leases.
- A contract with a landowner or lessee that creates an ownership right to the crop or portion of the crop, called a servitude.
- Purchasing crops from a farmer or on the open market.

The requirements of a particular project's business model will determine what level of control over the land is needed. Generally speaking, the size of the initial investment in the land is proportional to the level of control the investor will receive. There are various categories of property rights or estates that are capable of ownership or control.

A prospective biofuels investor should be aware that Kenya has two distinctive and not always consistent land title registration systems, each of which have particular procedural and substantive requirements that their property lawyer must be fully conversant with. Here are the main components of a land transaction in Kenya:

- Due Diligence Search – A title search checking that the land is free from any encumbrances or fetters such as a charge for a mortgage. This can be carried out by a title insurance agency.
- Purchase Documentation – A sale agreement prepared by a duly registered Advocate of the High Court of Kenya, which stipulates all the requirements of the purchase transaction such as payment schedule and completion time for a conveyance transaction.
- Lease/Transfer Documentation – A transfer of title or possession and control of property from the owner to the purchaser or lessor for the stated duration of time.
- Acquisition of Title Documents – Documents that prove ownership of the land and are issued to the new owner once a lease/transfer of property has been registered in the lands office and payment is complete.
- Land Rent Certificate – Since all land is actually owned by the state, then the “purchase” of land from the state is on leasehold and an annual rent is payable to the state. A land rent certificate is issued before land is transferred to a new owner, indicating no rent is pending.
- Land Rate Certificate – A valuation indicating the amount owed to the city council/municipal council for the “maintenance” of the land.
- Stamp Duty – A tax amounting to four percent of the value of the property being leased or sold.
- Commissioner of Lands' Consent – Required because the land is technically owned by the State.
- Land Controls Board's Consent – Required where use of land is changing from residential to agricultural use.

7.2 Environmental protections

Many aspects of biofuels production have direct and indirect environmental implications. As a result, various regulations are in place to protect land, water, air, genetic biodiversity and other resources. In terms of setting new policy, the National Environmental Management Authority (NEMA) is mandated to create incentives for the promotion of renewable sources of energy. This is to be effected through a Committee of NEMA known as the National Environmental Action Plan Committee (NEAP), which has been empowered under the EMCA to *recommend* appropriate *legal and fiscal incentives* that may be used to encourage the business community to incorporate environmental requirements into their planning and operational process.

7.2.1 Environmental impact assessments (EIA)

While the small-scale planting of biofuels crops may not require any environmental permits, large-scale biofuels plantations will require environmental impact assessments (EIAs) and licenses (EIALs). Risk assessments and performance trials may also be required for new crops under the Seeds and Plant Varieties Act. The following activities along the biofuels value chain would require consideration in an EIA:

- any activity or structure out of character with its surrounding;
- major changes in land use;
- all roads in scenic, wooded or mountainous areas and wetlands;
- railway lines;
- oil and gas pipelines;
- water transport;
- river diversions and water transfer between catchments;
- drilling for the purpose of utilizing ground water resources;
- timber harvesting;
- clearance of forest areas;
- reforestation and afforestation;
- large-scale agriculture;
- use of pesticides, including aerial spraying;
- introduction of new crops;
- use of fertilizers;
- irrigation;
- fertilizer manufacture or processing;
- oil refineries and petro-chemical works;
- chemical works and process plants;
- bulk grain processing plants;
- management of hydrocarbons including the storage of natural gas and combustible or explosive fuels;
- waste disposal, including: sites for solid waste disposal; sites for hazardous waste disposal; sewage disposal works; works involving major atmospheric emissions; works emitting offensive odors.

EIAs must be performed by a NEMA-approved expert for any biofuels project, program or policy that *may* have an impact on the environment. An environmental impact

assessment license (EIAL) from NEMA must be obtained before the project can be started. A fee of 0.1% of the total project cost is required to obtain an EIAL. NEMA must respond within three months and if no response is given, then the project is tacitly approved. Before a project is considered, NEMA must provide public notice and an opportunity for comments on the project. EIAs must conform to the EIA Regulations, as well as the provisions of the EMCA itself. NEMA has broad discretion as to whether to approve a project and, once approved, may reconsider or revoke approval at any time thereafter. An updated EIA may be required under some specifically defined circumstances. EIA licenses, which are issued upon approval of an EIA by NEMA, can be transferred along with the transfer of a business; however, both the transferor and transferee must jointly notify NEMA in writing within 30 days of the transfer.

7.2.2 Water pollution

Written approval from the Director General, Ministry of the Environment is required before erecting or constructing any structure in a waterbed or beside it for purposes of irrigation. Approval is also required before introducing or planting a substance, biological or human made, in any natural water body that would or is likely to have adverse environmental effects, or before changing or blocking a river's natural course. Cultivation or any agrarian activity is prohibited six meters from any riverbed.

As authorized by the EMCA, the Ministry of Environment and Natural Resources has established water quality standards for myriad chemicals. The Regulations require that all sources of water comply with the scheduled standards. Effluent Discharge Licenses are required of all point sources. Licensees are required to carry out regular effluent discharge quality and quantity monitoring and submit quarterly reports to NEMA. NEMA in consultation with the relevant lead agencies monitors compliance with the relevant standards.

7.2.3 Hazardous chemicals

Importing or purchasing inputs such as fertilizers, pesticides and herbicides may require special licenses under either the Pharmacy and Poisons Act or the Use of Poisonous Substances Act. Farmers and other agricultural experts should have experience with these regulatory requirements. Other chemicals necessary for the production of biofuels, such as methanol, sodium hydroxide and magnesium silicate, may also fall under these regulations.

NEMA prescribes standards to regulate the importation, exportation, manufacture, storage, distribution, sale, use, packaging, transportation disposal and advertisement of toxic substances. NEMA is also mandated to provide procedures for the registration of toxic substances and to prescribe measures for the establishment of enforcement procedures and regulations for the storage, packaging and transportation of toxic substances.

7.2.4 Waste and byproduct disposal

Biofuels production creates certain waste streams that must be dealt with before they are put back into the environment. Some, such as seedcake, are extremely valuable

byproducts that can readily be sold as fertilizer, animal feed, or biomass for biogas generation. Others, like glycerol, must be treated before they are reused or disposed of in the environment.

The EMCA provides that every person whose activities generate wastes must employ measures essential to minimize wastes through treatment, reclamation and recycling. Selling the waste seedcake produced after biofuels production and the agricultural residue produced after harvesting crops can be viewed as reclamation of wastes. If the seedcake that is leftover after oil extraction is to be used as a fertilizer or animal feed, then such seedcake would fall under the provisions of the Fertilizers and Animal Foodstuffs Act, and must conform to the relevant standards for such products. A license is required to distribute or manufacture animal feed or fertilizer. NEMA has enacted regulations prescribing standards for waste handling, storage, transportation, segregation and disposal. A valid license from NEMA is required to transport certain wastes.

7.3 Equipment purchase and importation

Under Kenyan law, the purpose for which machinery will be used may affect how it is taxed or otherwise regulated. For instance, agricultural machinery and certain processing or production equipment may, in certain cases, be subject to tax exemptions. Any equipment or goods must meet Kenyan standards before they are shipped. The Standards Act prescribes that the supplier or exporter obtains a Certificate of Conformity issued by a Pre Export Verification of Conformity (PVoC) office before shipment. There are three possible routes for obtaining a Certificate of Conformity: product licensing, product registration, or consignment inspection and testing for unlicensed/unregistered products. The method used is dependant on the exporters' shipments' frequency to Kenya and level of compliance they are able to demonstrate when applying for certification.

7.4 Licensing for trade and investment

The Trade Licensing Act prohibits anyone from conducting any business except under and in accordance with the terms of a current license. Non-citizens of Kenya are prohibited from conducting business in any place that is not a designated general business area; or in any specified goods, unless their license specifically authorizes them to do so. Persons are also prohibited from entering any business transaction unless the business with which the transaction is entered into is carried on under a license.

The Investment Promotion Act (IPA) promotes and facilitates investment by assisting investors in obtaining the licenses necessary to invest and by providing other assistance. The IPA makes provision for applications for investment certificates to the Kenya Investment Authority (KIA), by any potential investors in Kenya. Investment certificates entitle investors to 71 different types of licenses that are required under different Kenyan laws, as well as entry and employment permits under the Immigration Act. Ultimately, the purpose of the IPA is threefold: to aid investors in complying with bureaucratic requirements of establishing a business, to keep track of investments, and to protect Kenya and the local investor market from potentially detrimental investments.

7.5 Purchase, domestic movement and importation of seeds & other genetic materials

Growing an adequate supply of biofuel feedstock is an essential component of the production process. This may require the purchase, domestic movement and/or importation of seeds, which are activities regulated by the Seeds and Plant Varieties Act and the Plant Protection Act. Their overriding purposes are the protection of the domestic seed market in Kenya and the limitation on the introduction of potentially dangerous organisms. The statutes apply stringent plant and seed introduction and certification procedures which are intended to prevent the importation and domestic transfer of diseased seeds, noxious weeds and injurious pests. All phytosanitary measures are based on or have equivalent international standards. The Kenya Plant Health Inspectorate Service (KEPHIS) is charged with testing, certification, quarantine, and grading, as well as the implementation of the national policy on the introduction and use of genetically modified seeds and plants.

Any commercial seed dealer or merchant must be licensed under the Trade Licensing Act. This License is issued by the respective District Trade Development Officers under the Ministry of Trade and Industry, who are located in most, if not every, district in Kenya. Prior to importation of any type of seed, the seed merchant must also be registered with KEPHIS and given an Importation Certificate. The following documents are required for the import of most types of seed into Kenya:

- Suppliers Invoice - describing the seed as well as their quantity.
- Packing List - detailing the contents of the consignment containing the seed.
- A Bill of Lading/Airway Bill - a contract of carriage of goods between a shipper and a carrier of goods.
- Import Declaration Form (IDF Form C-61) - this form is issued by the Kenya Revenue Authority's (KRA's) Customs Services Offices and is required for all imports. One needs to pay a processing fee of Ksh 5,000 minimum or 2.75 percent of the Cost Insurance and Freight (CIF) value, whichever is greater.
- Declaration of Customs Value (Form C-52) - This form is used to declare the true and accurate value of the seeds being imported.
- Phytosanitary Certificate - These are obtained from the applicable agency in the exporting country and processed by KEPHIS. Where the import is categorized as a Schedule I (one) seed then it must be up to standards of the Organization for Economic Cooperation and Development (OECD) system, which ensure compliance with phytosanitary standards such as, treatment of seed by any specified means for the control of plant disease and regulating the importation, quality, testing and sale of any material used in such treatment.
- International Orange Certificate - All imported seed shall be accompanied by an International Orange Certificate of the International Seed Testing Association (ISTA), and shall meet Kenyan quarantine standards requirements as set out in the Plant Protection Act, Chapter 324 of the Laws of Kenya.
- Plant Import Permit - This is obtained prior to its shipment from the importing country and it specifies the requirements of plant health, indicating

prohibitions, restricted quarantine importations and additional declarations with regard to pre-shipment treatments. This permit must be sent to the plant health authorities in the country of origin for adherence with Kenya's import permit requirements.

Jatropha as a feedstock is subject to a 2.75% CIF tax. The excise jatropha is yet to be set by the Ministry of Finance.

7.6 Local facilities and markets available for the Jatropha plant

The introduction of Jatropha has the potential to alleviate poverty and to offer the farmers a new and sustainable cash crop. The market for bio-energy is substantial. Jatropha oil may be blended in traditional fuel for use in diesel vehicles. In addition, a substantial part of the energy in Kenya is generator based and would be suitable for bio-fuel. Jatropha oil is a suitable paraffin (kerosene) substitute for cooking and lighting. Jatropha oil is also suitable for soap production. There are thus uses from household level to national power supply level.

Energy Africa Ltd is initially looking at rural fuel supply. The reasons are short distance from producer to consumer, reduced transport cost and high cost of fuel in rural areas due to poor infrastructure. Once supply of seed is sufficient, bio-fuel production is next stage. For example, with seeds and technical support provided by Energy Africa Ltd, 200 farmers in the Shimba hills are currently test growing around 200,000 Jatropha trees. Initially Energy Africa Ltd paid an incentive to encourage farmers however now all farmers have signed contracts with Energy Africa Ltd and agreed on conditions and selling prices. The company has collaboration with UNDP/GEF in Kwale District and links to research institutions and other bio-fuel producers in East Africa and internationally.

7.7 Funds available for Jatropha investments

Possible funds for Jatropha development in Kenya include local financial agencies and foreign investors. Locally among the possible source of funds are loans from Agricultural Farcers Co-operative (AFC). Equity bank has also recently initiated low interest rates loans to farmers.

Role of microfinance sector

The provisions of financial services to the low-income households and micro and small enterprises (MSEs), provide an enormous potential to support the economic activities of the poor and thus contribute to poverty alleviation. The potential of using institutional credit and other financial services for poverty alleviation in Kenya is quite significant. About 18 million people, or 60% of the population, are poor and mostly out of the scope of formal banking services. According to the National Micro and Small Enterprise Baseline Survey of 1999, there are close to 1.3 million MSEs employing nearly 2.3 million people or 20% of the country's total employment and contributing 18% of overall GDP and 25% of non-agricultural GDP. Despite this important contribution, only 10.4%

of the MSEs receive credit and other financial services. The formal banking sector in Kenya over the years has regarded the informal sector as risky and not commercially viable.

According to the Poverty Reduction Strategy Paper (PRSP), a large number of Kenyans derive their livelihood from the MSEs (IMF, 2005). Therefore, development of this sector represents an important means of creating employment, promoting growth, and reducing poverty in the long-term. However, in spite of the importance of this sector, experience shows that provision and delivery of credit and other financial services to the sector by formal financial institutions, such as commercial banks has been below expectation (Omino, 2005). This means that it is difficult for the poor to climb out of poverty due to lack of finance for their productive activities. Therefore, new, innovative, and pro-poor modes of financing low-income households and MSEs based on sound operating principles need to be developed.

In the past, microfinance institutions (MFIs) established using either an NGO or a savings and credit co-operative societies framework have been important sources of credit for a large number of low income households and MSEs in the rural and urban areas of Kenya. The Government of Kenya recognizes that greater access to, and sustainable flow of financial services, particularly credit, to the low-income households and MSEs is critical to poverty alleviation. Therefore, an appropriate policy, legal and regulatory framework to promote a viable and sustainable system of microfinance in the country has been developed via the proposed Deposit Taking Micro Finance Bill. In addition, full-fledged microfinance units have been established in the Ministry of Finance (the Treasury) and the Central Bank of Kenya to formulate policies and procedures to address the challenges facing microfinance institutions, especially in the rural areas, and to build a database to facilitate better regulation and monitoring of their operations.

Over 100 organizations, including about 50 NGOs, practice some form of microfinance business in Kenya. About 20 of the NGOs practice pure microfinancing, while the rest practice microfinancing alongside social welfare activities. Major players in the sector include Faulu Kenya, Kenya Women Finance Trust (KWFT), Pride Ltd, Wedco Ltd, Small and Medium Enterprise Programme (SMEP), Kenya Small Traders and Entrepreneurs Society (KSTES), Ecumenical Loans Fund (ECLOF) and Vintage Management (Jitegemee Trust). The Kenya Post Office Savings Bank (KPSOB) is also a major player in the sector but only to the extent of providing savings and money transfer facilities. Many microfinance NGOs have successfully replicated the Grameen Bank method of delivering financial services to the low-income households and MSEs.

8.0 Conclusions and Recommendations

8.1 Conclusions

Based on the research and findings, conclusions were reached and are outlined below.

The geographical position of Kenya in the tropic, abundant idle land in the ASALs (accounting for 80 percent of the total land mass), the relative political stability in the

region, the infrastructure and policies demonstrate that there is a potential for the biodiesel industry in Kenya. With enough R&D jatropha can competitively meet both the national and even surplus for export.

The expansion and development of the biofuel industry will have positive developmental impacts on the economy, the people and the environment in Kenya. Jatropha production will create employment in rural areas that will not only reduce unemployment in these areas but will also reduce rural urban migration thus improving the rural economy. In addition, the biofuel industry has the potential to positively impact foreign reserves, because less oil will need to be imported. And finally, the use of biofuels decrease the amount of CO₂ emissions, thereby creating a sustainable industry that is friendly towards the environment.

The growth of biodiesel industry is hampered by lack of information, clear policy and regulatory frameworks and lack of institutions specifically charged with the role of developing it. There are a number of biodiesel initiatives throughout the country, however they are scattered, they are small and duplicated, and lack coordination.

8.2 Recommendations

1. In order for the industry to be successful, the productivity of jatropha needs significant R&D to improve productivity in order to reduce average costs of production. Also intensive research and development needs to be undertaken to increase potential yields, and decrease average production costs so as to lower farm gate price for the seed. Research is needed to develop other potential applications of the oil, which can include its use in rural electrification schemes. It is likely that for the industry to become competitive it will require initial support from the government not only to create a demand for the product, but to provide financial incentives (such as tax breaks), and if necessary subsidies like in the case of Brazil.
2. The present public land tenure management system in Kenya is fragmented, uncoordinated and non-transparent. The public land tenure as embodied in the Government Lands Act, Cap 280 of the Laws of Kenya lacks a coherent information system and is bedeviled by a lack of clarity in the roles, responsibilities and policies of different institutions in its administration, planning and disposal. Though Jatropha development can still be done under the current system, there is a need for a set of national norms and standards to ensure efficient and effective use of public land as an asset in support of land reform.
3. Despite this potential regarding biodiesel development in Kenya, the growth of biodiesel industry is hampered by lack of information, clear policy and regulatory frameworks and lack of institutions specifically charged with the role of developing it. There are a number of biodiesel initiatives throughout the country, however they are scattered, they are small and duplicated, and lack coordination. There is a need to create a specific institutional framework to address the development of industry in Kenya.
4. There is need to address the issue of access and delivery particularly with the view to ensure equity and benefits to rural communities. The question to be asked are: Is the

industry going to adopt multilateral companies growing thousands of hectares and the local communities employed to provide labour as one of the models or are we opting for cluster farmers who are producers and selling to the processing companies?

5. There is need to generate scientific data on the issue of the environmental impact of *Jatropha* production and the question of its invasiveness. The debate must not be held purely in the scientific community or the developed world. It must involve the poor rural communities in the developing world where many of these biofuel crops will be grown. Their needs for improved living standards must be addressed and their involvement sought in achieving the best balance between revenue generation and long term sustainability.
6. Biodiesel may not always be economically competitive with petroleum fuels, especially as the industry is first getting established. The cost of production and the cost of petroleum will dictate the competitiveness of biodiesel at any given time. Tax policy can play a key role in either supporting or obstructing the development of a new biodiesel industry. Of particular importance is the issue of how fuel taxes will be imposed on biofuels. Tax holidays that reduce or eliminate the fuel tax on biofuels have been used very effectively to spur the growth in the industry in Europe and other parts of the world. These devices are often implemented for a set period of time – usually about 3-5 years – to enable the scale of biofuels production to rise to the point where it can compete with petroleum products on an even footing. Although this approach may forego some short-term revenues for the government, the domestic investment and job creation that such measures will spur should more than make up for the lost revenue in terms of overall economic benefit to the country.

9.0 Reference

GoK (2004). Sessional Paper No. 4 of 2004 on Energy.

GTZ (2008). A Roadmap for Biofuels in Kenya Opportunities and Obstacles.

International Energy Agency (IEA, 2004). Biofuels for Transport: An International Perspective. OECD.

International Monetary Fund (2005). Poverty reduction paper. IMF.

Ministry of Energy (2007). Strategy for the Development of the Bio-Diesel Industry in Kenya (2008-2012). Final Draft.

Mutimba, S.N. (2008). Climate change and development in Kenya: Implication for the economy, environment and socio-political life. *Petroleum, Insight*. pp 1:16-18.

Ngethe, R. (2008). *Jatropha* for poverty alleviation: the Kenyan experience. Paper presented at the national stakeholders consultative workshop on biofuel. KEFRI, Muguga. 5-6th June 2008.

Omino, G. (2005). Regulation and supervision of microfinance institutions in Kenya. Central Bank of Kenya.

Oxfam Briefing Paper (2006). Delivering the Agenda: addressing chronic underdevelopment in Kenya's Arid and Semi-Arid Lands.

Prota (2007). Vegetable oils. Plant Resources of Tropical Africa Vol. 14. Prota.

Prota (2007). Vegetable oils as feedstock for biodiesel in Africa. Prota Newsletter. No. 6

Government of Kenya (2005). National policy for the sustainable development of arid and semi arid lands of Kenya.

Government of Kenya (2006). The Strategy for Revitalizing Agriculture.

Government of Kenya (2007). Economic Survey 2007. Kenya National Bureau of Statistics.

Rutten, M.M.E.M. (1992); Selling wealth to buy poverty: The process of the individualization of landownership among the Maasai pastoralists of Kajiado District, Kenya 1890-1990. Saarbrucken- Fort Lauderdale: Verlag breitenbach Publishers.