

## LEAD THEME



Integrated processing of wood products: charcoal briquettes from pine sawdust (Rosoga Investments Ltd, Rift Valley Province). Photo BGF

# Trends and opportunities in forestry development in East Africa

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Recent investors in the vibrant Eucalyptus sector have targeted the wooden transmission poles and industrial firewood sector across the country due to profitability. The investors range from smallholders to private companies that differ only in scale, from small woodlots of tens of trees, to large estates of up to 400 hectares (Cheboiwo 2013).

Tremendous competition however, is being experienced from the use of concrete poles that has driven prices and profit margins down. The projections indicate that many Eucalyptus growers may need to diversify their product portfolios into the high-demand sawnwood sector. Eucalyptus has provided timber for many years to many users in western Kenya and currently accounts for 80% of marketed sawnwood in rural areas and small urban centres. Unfortunately, in most cases it is produced at lower quality that cannot meet the standards for construction.

In the Americas, Chile and Brazil have invested

heavily in timber production from Eucalyptus for local use and export to Europe by adopting appropriate stocking densities and pruning schedules for higher end quality production. The companies have also invested in efficient processing machinery and seasoning procedures to produce premium hardwood timber for various uses. The success cases of the Americas can be adopted in Kenya by many Eucalyptus growers through acquisition of efficient processing and seasoning technologies for production of premium timber that can compete with mahogany timber in the country's markets as well as for regional export markets.

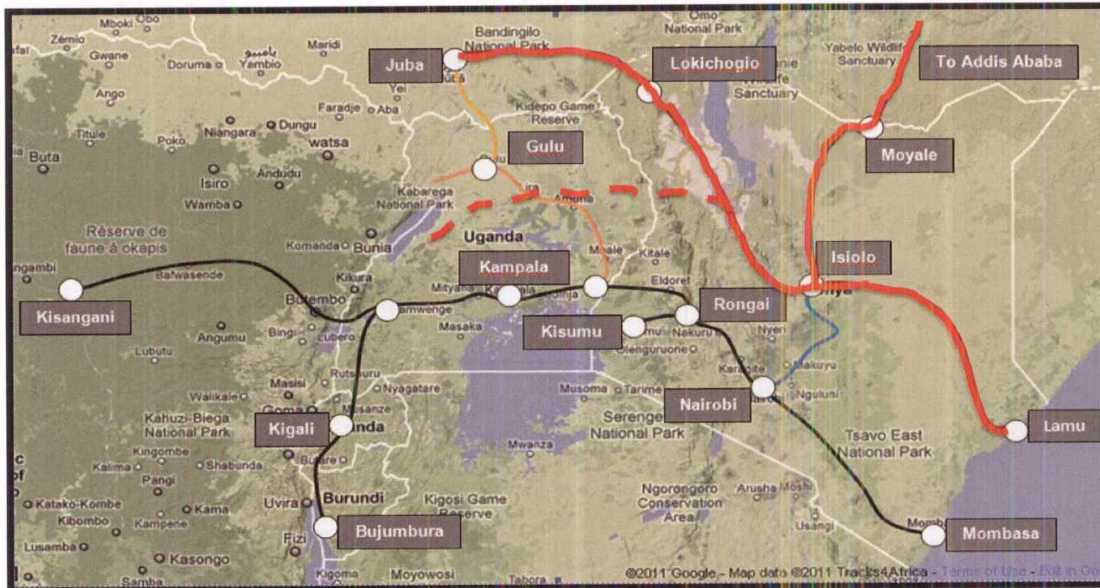
The first step will be provision of technical support to Eucalyptus growers to respace their woodlots and plantations from polewood production to those for timber production. Secondly, local saw millers or forest owners need to purchase and deploy appropriate processing and seasoning technologies. The country still maintains a timber deficit and hence markets for

premium timber are huge and can compete with hardwood imports from DRC.

## The opening of a truly East African market

Many countries globally are forming regional blocks solely to promote trade and economic developments through market integration. This is aimed at creating larger markets to attract investors and enable a smooth flow of goods and services. Within the umbrella of the African Economic Community (AEC), an organ of African Union (AU), there are various economic blocks; notably the East African Community (EAC) and the Common Market for East and Southern Africa (COMESA). Others relevant to Kenya are the Southern African Development Community (SADC) and the Community of Sahelian-Saharan African States (CEN-SAD).

These economic blocks include countries rich in forestry resources like Tanzania, DR Congo, Congo, Angola, the Central Africa Republic, Gabon



Kenya's regional network plans: (i) railway from Mombasa to Bujumbura (Burundi) and Kisangani (DRC), (ii) Lamu port to Juba (South Sudan), and (iii) Nairobi to Addis Ababa (Ethiopia)

and Cameroun. The forest types found in these countries include tropical rain forest, tropical moist forests, tropical dry forests, mountain forests, mangrove forests and tropical lowland woodlands that can produce goods and services driving economic development.

Similarly, investment in forest-based industries and value addition businesses within the region will create employment opportunities, wealth and reduce imports of wood-based products from outside the region. The market opportunities for forest-based industries are enormous; AEC membership countries count approximately 860 million people, COMESA 190 million and EAC 150 million. Raw hardwoods and softwood roundwoods can be processed into tradeable products such as hardwood timber, charcoal, reconstituted wood products (such as plywood, boards, paper products, parquets), treated transmission poles and other allied products that can be traded within the regional blocks.

The development of the Northern Road Corridor, the Southern Road Corridor and the Great Northern Road, and subsequent agreements among countries in the region, has already opened up the timber trade between Kenya and DRC, Tanzania and South Sudan and is likely to expand to the Central Africa Republic, Angola and Cameroun. Local and international players need to position themselves to take advantage of the existing regional opportunities to invest in processing and trade in the wide range of forest allied products to meet the growing demand for timber products from a booming construction sector and strong economic growth currently being witnessed in

### Increased cultivation of bamboo

Bamboo is touted as a fast growing plant and Kenya is lucky that there many species that can be grown under its various ecological zones. Bamboo is very useful in stabilizing top soils and conservation of water quality and is good for protection of fragile areas such as steep slopes and riverine areas. An undisturbed crop can carry about 10,000-17,000 stems per hectare with the capacity to produce 100 tonnes of air dry weight of culms (Kigomo, 1988).

Species range from the local indigenous *Yushania alpina* (thriving between 2,400 and 3,350masl), to others, imported from Asia. *Y. alpina* is restricted to the mountain ranges of Mt Kenya, the Aberdares, Mt Elgon, and the Cherangany and Mau Complex where it occupies an estimated 155,821 hectares. On average it is estimated that its life cycle is 40 years before mass flowering and death occurs (Wimbush, 1945) during which it can produce 3,700-4,000 culms per hectare every three years.

The country has embarked on rigorous bamboo production on farms through introduction of eight lowland Asiatic bamboo species. It also has undertaken some robust measures to promote expansion of bamboo growing, including awareness creation, building capacity on propagation and nursery management, and training on product harvesting and processing. These developments culminated into the recent drafting of a bamboo policy paper that is aimed at facilitating the promotion of bamboo as one of the key intervention measures for supply of materials to cottage industries.

Kenya held an international bamboo

workshop in April 2014 to share experiences with key players in the bamboo sector that involved local investors, experts, farmers, and international agencies engaged in bamboo promotion. Some nascent investors on nursery production, commercial growing and processing have started in earnest in various parts of the country. However, there are some outstanding issues that are yet to be addressed that include rigorous evaluation of economic potential contribution to household livelihoods through some cost-benefit analysis of bamboo enterprises, guidelines on commercialization of bamboo and development of efficient market value chains.

However, any fast-growing plant requires serious amounts of water, and secondly, bamboo displays an invasive nature. Does that sound a bell (eucalyptus & drying of streams, and prosopis/mathenge)?

### Increased planting of indigenous species

People slowly become aware of the many benefits indigenous species have, though they cannot (yet) be exploited as profitably as the conventional pine, cypress, grevillea and eucalyptus. Sometimes it's about cultural values (fig trees), or traditionally valued species such as mutuya (*Myrianthus holstii*, see further in this magazine) and murathina (the sausage tree – *Kigelia Africana*), to name but a few.

An example of commercial value is however *Melia volkensii* (mukau), a species that due to its outstanding ability to produce value in semi-arid areas, in the form of prime timber, is being planted more and more in the country side.

context. Because of its fast growth, it is poised for mass-scale planting.

### A push by industries towards integrated processing

Roundwood is converted into various products ranging from furniture and construction wood, to biomass energy for both domestic and industrial uses. The conversion processes have varied recovery rates. In the saw milling sector, processing is done through technologies such as sawmills, mobile saw benches, pit sawing and power saws. It is estimated that 65% of roundwood comes from public plantations, processed by sawmills, while 35% comes from private, community and farm forests, processed by mobile sawmilling technologies.

The estimated recovery rates for sawmills are between 26% and 35%, translating into an average of 32% while that of mobile saws is estimated at 25%. Other forms of processing (plywood, pulp, paper and particle boards) take an average of 5% of the total roundwood supply, with recovery rates of 95% (Githiomi 2012). Processing trees into poles and firewood is mostly done at stump site with a processing efficiency estimated at 95% for both products. Roundwood processing into charcoal has the most inefficient conversion rate with a 16% recovery (ENSDA, 2005).

This shows that the highest losses are recorded in charcoal and saw milling. This inefficiency is attributed to the use of old, inappropriate, inefficient machinery and lack of provisions towards integrated approaches in roundwood utilization. The use of inefficient technologies is a problem in wood-based SMEs and other small-scale operators that still use old machinery.

Most operators attribute the low recovery rates to lack of supportive policies on technology access. The country needs to move from single product processing into integrated processing units that utilize the roundwood completely, and go into many reconstituted wood products such as charcoal briquettes, fancy products, biomass energy and many others that leave no by-products unused. A recent study on volumes of wood products available after processing, indicates that nearly a third is lost during processing - out of a total wood supply of 31,372,531 m<sup>3</sup>, 11,979,146 m<sup>3</sup> is lost during processing; leaving only 19,428,576 m<sup>3</sup> available for the intended purposes (MEWNR, 2013).

Public and private sector agencies that support forestry sector development need urgent support in their efforts to provide access to efficient technologies for integrated use in the wood industry.



Loading of eucalyptus fire wood for sale to a tea growing company (Kericho, Rift Valley). Photo BGF

### Increased exploitation of Non-Wood Forest Products (NWFPs)

The country over the years has attempted to exploit its vast non-timber resources to enhance its socio-economic development. The NWFPs so far developed, range from gums and resins, baobab and tamarind fruits, prunus bark and black wattle bark among many other minor resources.

In Kenya many communities use tamarind (*Tamarindus indica*) fruits to treat various ailments such as abdominal pain, diarrhea and dysentery among others since it is rich in phytochemicals, and hence possess antidiabetic, microbial, venomous oxidant and anti-malarial activity. Thus the plant has potential for commercial utilization in medicinal and pharmacologic activities. The ripe fruit is usually eaten fresh and also made into juice, jam, syrup and candy in India, something that can be adopted by local firms.

The baobab (*Adansonia digitata*) fruit has the potential to play an important role in family nutrition and food security in marginalized rural communities. Traditional use of baobab has largely remained subsistence with a minimal outflow to markets to generate incomes producers. However, baobab products have a growing market in the country, Europe and the US.

In its good days the East African Wattle and Extract Company (EATEC) had 10,000 hectares under black wattle (*Acacia mearnsii*), producing 25,000 tonnes of wattle bark per year. The exit of EATEC saw the closure of the tannin extract factory in Eldoret, leaving the country with only three factories in Nairobi and Thika. These are still being sustained by small-holder bark supplies from North Rift, Central and Eastern Kenya and imports

country's leather industry that rose from 9 plants in 2005 to 13 in 2009, with a capital investment of KES 3.8 billion (USD 38 million).

Their production rose from 5,000 tonnes in 2003 to 20,000 tonnes in 2007. The turn-around has been largely due to an increase on tax levied on raw hide export from 20% in 2006 to 40% in 2007. The leather industries directly employ 4,000 people. However, the country's black wattle extract exports fell from 5,340 tonnes in 2002 to 46 tonnes by 2008. This was due to a combination of falling production of bark (the closure of EATEC) and increased domestic demand because of the expanding leather tanning sector (requirements: up to 10,000 tonnes of tannin per year). The main importers of tannin from Kenya were UK and India. Tannin demand in the country is expected to increase with the growth of the domestic leather sector.

Aloes are a group of succulent plant varieties adapted to dryland conditions that have emerged as an important resource for production of various medicinal and industrial products. Key Aloe species of high value include *Aloe turkanensis* and *Aloe secundiflora*, containing highly valued aloin, sought after for body lotions and medicinal products. There are two aloe products processors in the country; Pwani Aloe Processors based at the Coast, and the Baringo Bio-enterprise based in Baringo County. They purchase and process indigenous aloe products for local and export markets. The sector is still at its infancy stages and likely to expand due to high interest from various investment groups. However, global trade in indigenous aloe products is regulated under CITES and therefore local producers eyeing international

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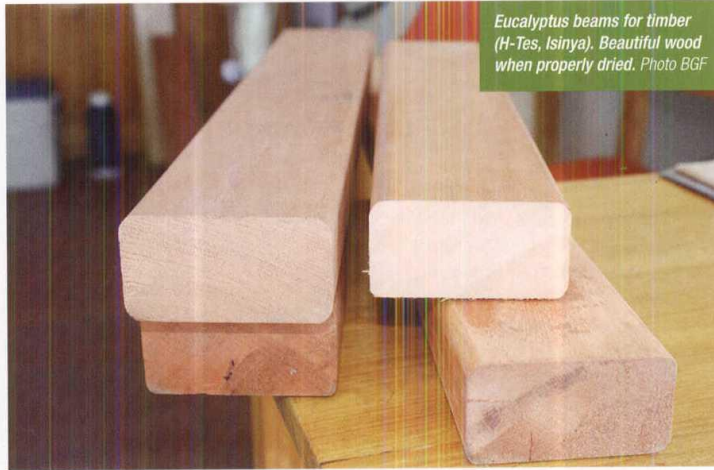
put in place sustainable management practices that meet stringent licensing requirements by Kenya Wildlife Services (KWS).

*Prunus (Prunus africana)* bark products are used in the treatment of prostate cancer, common with ageing population mostly in developed countries but also receiving local attention. The *Prunus* bark is traded in various forms such as dried bark, bark extracts, herbal concoctions, capsules and tonics (Schippmann, 2001). Kenya is listed among the leading countries in planting of *P. Africana*, accounting for 628 hectares out of 878 hectares found in Africa. A recent study in western Kenya (Gachie et al, 2014) showed that *Prunus africana* is one of the widely retained or planted indigenous species in small-holder farms with a mean density of 0.8 trees per household. The species is mostly planted for ornamental purposes and medicinal use. In the local markets the bark is sold in various forms; mostly air-dried bark, ground bark powder and herbal liquid concoctions.

The *Prunus* bark trade and associated activities have the potential to generate income in excess of KES 3 billion (\$35 million) to the country's economy annually. To realise this however, the country needs to put in place policies and legal structures to promote planting, sustainable harvesting procedures and appropriate extraction technologies.

Gums and resins (from *Acacia*, *Commiphora* and *Boswellia* species) are among the most valuable dryland woodland resources to ASAL communities. Most gums and resins produced in Kenya are exported in raw form and only small quantities are processed into essential oils for domestic uses. The current annual global demand for gum arabic is about 100,000 MT projected to grow to 150,000 MT by 2020 (Muller and Okoro, 2005). The country is estimated to have the potential to produce 3,000 MT of gums and 3,500 MT of resins, as compared to current production of 400-500 MT for gum arabic and 1,000MT of gum resins (Luvanda, 2015).

The sector is undergoing some transformation with the entry of several agencies to promote sustainable management and utilization of gums and resins. Kenya Forestry Research Institute (KEFRI) in collaboration with the Ewaso Nyiro North Development Authority (ENNDA), the Centre for Training and Integrated Research in ASAL Development (CETRAD) and many CBOs such as Mandate For Future (MTF) have trained people on production and post harvesting handling procedures (Wekesa, et al, 2013). New developments include the opening of one processor in the country (Vetochem



that extracts opoponax essential oils through distillation. Arid Land Resources Limited (ALRL) adds value to gum arabic by grinding and grading before export. So far, trade in gums and resins has remained a largely informal business due to various factors that range from a non-conducive environment for business, availability, quantity, quality and operational economics (Wekesa et al, 2013).

### More industrial demand for wood energy

The key uses of industrial firewood in the country are the textile and food processing industries, chemical processes and recently generation of electricity. The major supplier of industrial firewood is the small-holder tree growers spread across the country. One of the major consumers of industrial firewood is the tea sector which is one of the major agricultural activities contributing to both GDP and foreign exchange. The tea sector in Kenya consists of the small-holders affiliated to the Kenya Tea Development Agency (KTDA, with 65 factories constituting 80% of tea output in the country) and the large-scale sector affiliated to Kenya Tea Growers Association (KTGA, with 29 factories accounting for 20%).

The KTGA affiliated factories were the first group to realize the cost savings of switching from furnace oil to firewood. Firewood use in tea processing has triple benefits because (i) it increases profitability of the sector by cutting costs, (ii) it saves foreign exchange and (iii) it increases overall incomes to tea growers that supply firewood to factories. In 2010 the tea sector demand for firewood stood at 1,592,000 m<sup>3</sup> with an estimated value of Kshs 2.2 billion. KTDA accounted for 60%. To sustain the demand for firewood by KTDA affiliated factories, requires a total of 22,800 hectares of forest plantations

to be planted, with an equivalent annual output value of KES 1.3 billion (Cheboiwo, 2012).

Recent development has diversified electricity generation from traditional water, hydro and geothermal infrastructure, towards use of woody biomass for steam technology and gasification processes. BIDCO, a vegetable oil manufacturer in Thika, uses firewood to fire a steam turbine to generate 2 KW electricity for its use. Cummins Cogeneration Ltd in Marigat (Baringo County) currently nearing completion, will utilize *Prosopis juliflora* to produce 10-30 MW through gasification.

The biomass energy sector is expanding and woody wastes are likely to have market as the country expands its electricity generation through mixes of sources with green-based technology. Cummins has organized the local communities into CBOs that will be contracted to supply *Prosopis* wood to the factory from their own farms and community lands. Cummins estimates it will require 240,000 tonnes of *Prosopis* wood per year to produce 30 MW electricity. Cummins counts on a potential yield of 12,000 tonnes per hectare, for well-stocked *Prosopis* areas.

The country therefore has great opportunities in production of biomass energy, ranging from firewood to drive industrial processes, to power generation for institutional use and domestic businesses.

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