



Loading of industrial firewood in Kericho. Prices are good, as the demand by tea factories is growing and they do not produce enough for themselves. (Photo BGF)

Farm forestry to the rescue

Kenyan small-holders have stepped in to grow trees to meet the demand for wood products

By JOSHUA CHEBOIWO

Tree-growing on farms in Kenya has a long history. It has evolved through several stages within the last 60 years in terms of planting patterns, species mix, density, utilisation, markets and marketing.

KEFRI has undertaken studies on development of farm forestry in Kenya within the last 25 years that have shown regional patterns in terms of species. *Grevillea robusta* and *Cupressus lusitanica* are mostly grown in central Kenya; *Casuarina equisetifolia* at the coastal strip and *Acacia mearnsii* and *Eucalyptus* species in western Kenya. However, most farmers grow a mixture of these species in their agricultural land for various purposes such as fencing, timber, posts, fodder, food, poles, fuel wood and bark.

Farm forestry also provides vital environmental goods and services to households and the society, such as windbreaks/shelter belts, water catchment protection, shade, soil conservation, boundary markers and enhancement of scenery.

The farm forestry development is traced to various policy initiatives. One of these, The White Paper on Forest Policy of 1968, resulted in the formation of Rural Afforestation and Extension Services Division (RAES) in 1971 to facilitate its implementation through training of farmers, establishment of tree nurseries countrywide and deployment of extension staff to offer technical services to rural farmers.



Timber production in an agroforestry set-up: *Melia volkensii* (mukau) in Mbeere district. This exceptional tree was selected as a superior specimen by KEFRI genetists, but two years later, the owner felled it when he needed money. (Photo BGF)

Through the Local Afforestation Programmes (LAP), an estimated 370 Local Chiefs Nurseries (LCN) were established (GOK, 1989). The output of public nurseries and farmers' backyard nurseries was over 200 million seedlings per annum by 1989; reflecting an equivalent area of between 106,000 and 168,000 hectares.

The presence of trees on farms was already

significant by the 1980s in highly populated medium and high potential areas. Reports showed that woody biomass occupied 21.9 per cent of land area in Kakamega, 20.0 per cent in Kisii and 20.8 per cent in Murang'a (KWDP, 1985).

Further, by 1995, reports showed that trees on farms and settlements in these areas contained an average of 9.3 cubic metres per

hectare that was projected to increase to 27 cubic metres per hectare by 2020. This would expand annual roundwood production from 11.5 million cubic metres in 1995 to 22.2 million cubic metres and its share of national output from 65 per cent to 80 per cent.

The sector was projected to grow from 690,000 hectares in 1994 to 830,000 hectares by 2020, to occupy roughly 10 per cent of the total prime agricultural land in the country.

The forestry products generated from farm forestry in the form of firewood, pole wood, sawn wood, saw logs and charcoal for subsistence consumption and traded in markets was predicted to expand to Ksh 31.6 billion by 2020.

Studies by KEFRI have shown that as public forests decline as major suppliers of wood products, farm forestry has filled the widening gap between demand and supply of wood products. Recent reports indicate that farm forests are producing between 300,000 and 400,000 cubic metres of saw logs and between 100,000 and 150,000 cubic metres of pulpwood annually.

In its State of the World Forests, the UN Food and Agriculture Organisation (FAO) indicates that Kenya's forests contribute at least 19 per cent to the gross domestic product (GDP). On the other hand, Kenya's Economic Surveys estimate the contribution of forests to the GDP at 1.1 per cent, a figure that has remained constant for years. This could be attributed to failure to take into account the contribution of farm forestry products, mostly consumed at household level, and small-scale enterprises and environmental goods and services.

The national demand for products such as firewood, charcoal, construction timber, fencing poles, furniture and constituted products has been increasing with population growth rate, currently estimated at 2.8 per cent per year (GOK, 2009).

Key farm forestry development in Kenya

Farm Forestry Productivity

Efforts by KEFRI to develop high-yielding commercial tree species and intensive management techniques (mostly in the Rift Valley and central Kenya) have seen expansion of biomass production for *Eucalyptus grandis* from 45 to 65 cubic metres per hectare per year in high-potential areas and 16 to 35 cubic metres per hectare in low-potential areas.

However, studies by KEFRI indicate that the average growth ranged from 19.8 cubic metres per hectare for poorly managed stands to 63 cubic metres per hectare for improved stands due to better germplasm selection and silvicultural management. On-going improvement work on pines and cypress will see farmers getting higher yields from commercial trees in the future.



A eucalyptus (*E. grandis*) woodlot in Eldoret, one of the many that today supply the bulk of Kenya's wood products needs. (Photo BGF)

Profitability of growing eucalyptus

A study by KEFRI on the viability of improved *Eucalyptus grandis* in Kericho and Uasin Gishu shows that an eight-year-old plantation for transmission poles can generate undiscounted net revenue of over Ksh 1 million per hectare, as compared to Ksh 540,000 for *E. grandis* firewood and Ksh 400,000 for well-managed maize. The undiscounted gross margin for eucalyptus pole wood is Ksh 1.07million and NPV (net present value) ranges between Ksh 280,000 and Ksh 570,000. This represents an expected annual equivalent income of Ksh 57,000 to Ksh 100,000.

These figures translate into perpetual income streams of between Ksh 360,000 and Ksh 1.24 million at varied discount rates. Based on the findings under the current assumptions and conditions, growing eucalyptus for production of semi-processed transmission poles in medium-potential areas is very attractive. This explains why across the country, the number of farmers planting eucalyptus as a commercial enterprise is growing.

Tree species preferences and planting patterns

Although the choice of species planted on farms varies depending on ecological conditions, the dominant species are grevillea (*Grevillea robusta*), cypress (*Cupressus lusitanica*) and eucalyptus (*Eucalyptus saligna*).

Indigenous timber tree species common on farms include Meru oak (*Vitex keniensis*) and *Cordia africana*, many of which had been planted in colonial times.

For example, in North Nandi Rift Valley highlands, 66 per cent of farmers plant *Eucalyptus grandis*, 72 per cent *Cupressus lusitanica*, and 35 per cent *Grevillea robusta*, while in the Mt Kenya region, *Grevillea robusta* (mukima) is the most abundant species.

In Uasin Gishu, 55 per cent of trees on the farms were *Acacia mearnsii* (black wattle), 30 per cent cypress and 14 per cent eucalyptus, whereas in Vihiga in Western Kenya, eucalyptus was dominant at 88 per cent. In the Mt Kenya region, trees were predominantly planted on

boundaries, accounting for 49 per cent of the total planted and 37 per cent in Uasin Gishu.

Tree product supply and demand

Timber - sawn wood

It is estimated that consumption of timber in Kenya is approximately 12 million cubic metres per year. Of this, 2.8 to 3 million cubic metres supports key economic sectors of construction and woodworks while the rest is consumed within the production areas by households and small enterprises.

The banning of roundwood harvesting in public forests in 1999 ensured there were minimal supplies of forest products from public forests; leaving farm forests to supply the bulk of marketed and local consumption.

Studies by KEFRI show that between 1999 and 2012, sawn wood prices rose from Ksh 8,000 to Ksh 35,000 per tonne, with farmers and importers being the main beneficiaries. By 2005 the bulk of the trade in timber was between the farmers (62 per cent), merchants (24 per cent), and industry (12 per cent).

Many regions in the country have become key suppliers of timber into the sawn wood market as shown by findings from a few selected districts in the Rift Valley (Table 1). The same is repeated in most areas in Central, Western and Nyanza provinces that are the major producers of farm forestry products in the country.

Table 1: Timber movement records (tonnes) from selected districts in Rift Valley 2005 - 2009

Year	Uasin Gishu	Kericho	Nakuru	Bureti
2005	-	-	1,713	-
2006	-	-	1,429	6,578.5
2007	1,826	6,370.8	4,594	2,985
2008	2,109	5,222.5	3,870	3,333
2009	1,291	2,582.7	708	2,260

Charcoal trade

The Ministry of Energy estimates that the annual domestic demand for charcoal in 2005 was 2.4 million tonnes, at current prices equivalent to Ksh 48 billion. KEFRI studies show that between 1999 and 2012, farm gate prices rose from Ksh 130 to

Ksh 500 and retail outlets from Ksh 220 to Ksh 800 per bag. Most of the charcoal is produced from farms across the country - from drylands to high-potential regions - hence farmers are the major players in the charcoal value chain trade.

Construction poles

The national demand for construction and fencing poles was estimated at 7.23 million and was valued at Ksh 12 billion in 2005, mostly in domestic construction of houses, farm and business structures in rural and informal settlements in peri-urban areas. The sector is currently estimated to be worth in excess of Ksh 23 billion. The vibrant modern housing construction activities in major towns consume huge amounts of construction poles, mostly for scaffolding. Prices for construction poles have recorded a steady rise at both farm and retail levels, due to rising demand from housing developments in major towns.

Industrial firewood

The Ministry of Energy estimates that 70 per cent of Kenyans use firewood for their domestic energy needs. Firewood demand is estimated at approximately 47 million tonnes per year at Ksh 94 billion. The industrial sector that comprises tea processing, food and textile industries, has switched to firewood to cut costs on expensive electricity and heavy furnace oils. Other large consumers include institutions, mostly schools and hospitals, hotels and restaurants. Non-domestic firewood demand is estimated at 20 million tonnes, valued at Ksh 40 billion.

The factory gate prices of firewood rose from Ksh 600 in 1999 to Ksh 2,000 per tonne by 2012, due to stiff competition from several firewood consuming industries. The major suppliers and beneficiaries in the firewood sector are farmers.

Treated transmission poles

By 2010, there were 12 registered commercial treatment plants with an installed capacity of 834.1 cubic metres of wood or 580,800 poles per year, and more were under construction. The imports from Tanzania, South Africa, Brazil and Finland have reduced to a minimum with this increased local production. In 2012, the Kenya Power and Lighting Company (KPLC) projected demand for treated poles at Ksh 6.4 billion. Farm gate prices rose from Ksh 400 to Ksh 2,200 between 1999 and 2012 and factory gate prices from Ksh 750 to Ksh 3,800.

KEFRI surveys indicate that farmers receive between 14 and 23 per cent of the KPLC transmission pole prices of between Ksh 11,000 and Ksh 15,000 per piece, with the rest being shared between logging, transport and treatment costs and merchants. Farms and private tea



Transmission poles from eucalyptus. Such poles are increasingly supplied by private farmers, in this case around Jinja in Uganda. (Photo: BGF)



Growing eucalyptus (*E. saligna*) and sugarcane together in an unlikely place – a few kilometres north of Kitui town. The area is known for production of construction poles that are marketed as far as Nairobi. (Photo: BGF)

estates are the major suppliers of poles for the treatment plants and most of the recent private commercial investment in the forest sector is targeted at transmission pole production.

The future of farm forestry

Studies by Cheboiwo and Langat (2008) indicate that farmers in high potential areas of North Rift Valley planted 38,000 hectares of trees between 2000 and 2005. The species planted were – in order of preference - *Eucalyptus grandis*, *Cupressus lusitanica*, *Acacia mearnsii* and *Grevillea robusta*. Tree-planting has been shifting from subsistence to commercial. Another survey involving 448 households in Western Kenya showed that 95 per cent of farmers planned to plant more trees on their farms. Of those, 66 per cent indicated that the purpose was commercial and 48 per cent were setting aside between 0.4 to 2 hectares for tree-planting.

Conclusions and recommendations

Farm forestry has increasingly become an important economic activity in the country and trade in its various products is a multibillion business and growing. The prices of various tree products have risen in line with global trends. Farm forestry in Kenya has great potential to transform livelihoods of millions of smallholder tree-growers through diversification of on-farm incomes. Thus policy and legal reforms to support the sector will enable tree growers to tap the vast income opportunities in the forestry sector.

(A list of references for this article is available at the Miti offices)

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