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Disappearing forests of Uganda: The way forward

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Encroachment on state lands is a common practice in Uganda. Forest reserves are a form of state land under forest cover of either high land tropical forest (HLTF) or low land moist forest (LMF), and woodlands. Deforestation is eminent in Uganda considering the reduction of forest cover from the pre-colonial days to present.

Forest clearance for agriculture in southwestern Uganda montane forests is thought to have begun some 2200 years ago with arrival of Bantu-speaking peoples who had iron-smelting technology. These ethnic groups encountered the Batwa (pygmies) people, who traded forest products for food, a scenario that initiated accelerated deforestation.

Deforestation in Uganda has reduced the ecological interactions that support sharing of resources. These include light, temperature, rainfall, wind, humidity, pests, diseases, symbiots, soil nutrients, organic matter, moisture and space. As a result areas which were formally under forest cover now hardly support any plant life. Efforts are being made to contain the situation by adopting collaborative forest management, enacting laws and regulations that can help guide forest conservation.

Introduction

Uganda has suffered serious deforestation, yet forests and woodlands are a mainstay in the three pillars of sustainable development namely, the economy, society and the environment. Uganda's forest resources provide energy, raw materials for industry, environmental services, high biodiversity values and employment. A reduction of the area under forest resources endangers several production sectors.

Biodiversity increases towards the Equator (Latitude 0°). Uganda lies astride the equator and therefore harbours a lot of biodiversity. Some forest trees are endemic to Uganda especially in the montane ecosystems (1400 m above sea level) of Rwenzori Mountain, Bwindi, Mgahinga, Elgon and Katsyoha–Kitomi forests. Uganda being also part of the greater African refugia has a lot of biodiversity. Out of 234 centres of biodiversity, Africa contributes 30 and Uganda in particular is part of these centres. Plants are variably used for food, fuel, fodder, and medicine in the tropics. Sustainability is a key issue to consider when problems of deforestation and forest resource management are raised.

Uncontrolled degradation and conversion to other types of land use are threatening Uganda's forests. This is influenced by increasing human needs, agricultural expansion and environmentally harmful mismanagement including, for example, lack of adequate forest-fire control measures (e.g. the seasonal burning for fresh pasture in the rangelands of Karamoja/Teso, Mbarara/Ntungamo, and Masindi/Nakasongora areas), inadequate anti-poaching measures for both wild animals and plants, unsustainable commercial logging especially pitsawing, charcoal burning and fuel wood collection. Unsustainable domestic tree-harvesting for firewood and non-timber forest and woodland products is taking place. Overgrazing, unregulated browsing and all economic measures leading to the loss of biodiversity have been of global concern. Some of the services provided by forests, like serving as carbon sinks, reduction of pollution, climate modification and ecological balance are not measurable to many people. The majority envisages short-term economic gain from forests rather than long-term benefits. As a result deforestation continues to bite hard nationally, regionally and, in totality, it is a global problem.

Loss and degradation of forests causes soil erosion (Kabale, Mbale, Moroto), loss of biological diversity (e.g. over 30% of Uganda tropical high forests are classified as degraded)[1]. Animal species are threatened due to loss of wildlife habitats, and degradation of watershed areas is leading to deterioration of the quality of life and reduction of the options for development.

Current status of forest in Uganda

In this paper the word 'forest' means all types of tree-covered land, including alpine, high and medium altitude forests, savanna woodlands, wetland and riparian forests, plantation wood lots and trees. These forests may be located on government land (land held in trust by government, such as gazetted Forest Reserves, National Parks and Wildlife Reserves) land including leasehold, freehold (and mailo), or customary land. The terms 'tropical high forest' (THF) and 'woodlands' are used to dinstinguish between the wetter 'rainforest', and the drier woodlands with a lower, sparser canopy.

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There are nearly 5 million hectares of forests, which is 24% of Uganda's land area. Of the total forest area, 80% is woodland, 19% is highland forest and less than 1% is plantation. There are also many trees in 'other landuses', for example in peri-urban settings or in traditional agroforestry systems.

The highland forest is found in the west of the country (western arc forests – Bugoma, Budongo, Kibale, Rwenzori Mountains, Kalinzu-Maramagambo, Katsyoha-Kitomi, Bwindi Impenetrable and Mgahinga and in eastern Uganda around Mt. Elgon). Around the shores and islands of Lake Victoria, low moist forest zone covers a big area though degraded. Woodlands occupy the drier parts of the country mainly in the centre and in the north.

Of the total forest area, 70% is on private land, while 30% is in the permanent forest estate (PFE) as some form of protected area, such as Forest Reserves (central and local), National Parks and Wildlife Reserves. Of the PFE's 1,881,000 ha, 1,145,000 ha (60.9%), is managed by the Forest Department (FD) as central forest reserves, 5,000 ha (0.3%) is controlled by local governments (LG) as local forest reserves and 731,000 ha (38.8%) is managed by the Uganda Wildlife Authority (UWA).

Within the PFE currently 78% (1,468,000 ha) is under forests and woodland, while the rest is mainly grassland. Of UWA's protected areas only 39% is covered with forests or woodlands, and it is only these that are counted as part of the PFE, whereas all the FD's reserves (of which 64% is forest) are included due to different classification methods.

Of the protected areas under forest, the FD manages 50% (737,000 ha), and UWA manages the remaining 50% (731,000 ha). Most private forest is woodland. The largest part of the Tropical High Forest (38%) is held under private and customary tenure (Review of the Forest sector, 2000).

Economic and other functions of trees, forests, forest cover and forest resources in Uganda

The degradation of forest resources is of particular concern because their crucial, though often-ignored benefits (economic, environmental and social functions) are at risk.

The main functions or benefits can be classified as follows:

- Products from the forest resource, such as timber, poles, firewood, charcoal, non-wood forest products (NWFP) and non-timber forest products (NTFP).
- Employment (in plantation, establishment and forest maintenance, forest harvesting including NWFP, NTFP, fuel wood and charcoal production, and institutions like eco-tourism centres, etc.)
- Subsistence production and commercial agriculture (crop shade and wind protection, erosion protection, nutrient recycling).
- Environmental services (watershed and soil protection, genetic pool, carbon sequestration, research potential, climate regulation).
- Tourism and recreation.
- Cultural or spiritual values.

Forestry in the wider economy

Forestry makes a substantial contribution to the nation's economic development and well being, although the extent is not fully recognized. There are many opportunities for poverty alleviation, for economic development and for environmental improvement through forest sector development.

Gross Domestic Product. The contribution of forestry to the nation's GDP was about 6% in 1999. The current annual turnover of business in forestry is about 200 million US$, with a further estimated annual value of 62 million US$ attributed to environmental services.

Forests products. Over 90% of the national energy demands are met from wood fuels. About 18 million tonnes of firewood and nearly 500,000 tonnes of charcoal are consumed annually. Large volumes of timber are used for construction, furniture making and other manufacturing processes (800,000 m^3 per year). A further 875,000 m^3 of poles are produced each year. The value of non-timber products derived from forests such as medicines; craft materials and food are also known to be significant.

Employment. The forests sector creates significant employment, probably the equivalent of nearly one million jobs. Of these, perhaps 100,000 are in the formal sector, the majority in fuelwood and charcoal production. In the informal sector, the majority of activity is in household fuelwood production, but a significant amount of employment is found in commercial and industrial fuelwood production. This clearly shows that a sizeable portion of the population in Uganda, is dependant on the forest resource for livelihood. Consequently as population pressure increases, forest resources come under increasing pressure.

Subsistence needs and agricultural production. A large proportion of the rural population of Uganda depends on forest resources for basic subsistence needs, whether from farm forestry or from natural forests and woodlands. These needs are for wood and non-wood forest products, food security, agricultural productivity and cultural and spiritual values that depend on trees and environmental services from forests and woodlands.

Table 1. Approximate areas (in hectares) of forest and woodland under different categories of ownership and management

	Government entrusted land		Private land	
	Central and local forest reserves	National Parks and wildlife reserves (UWA)	Private customary land	Total
Tropical high forest	306,000	267,000	351,000	924,000
Woodlands	411,000	462,000	3,102,000	3,975,000
Plantations	20,000	2,000	11,000	33,000
Total forest	737,000	731,000	3,464,000	4,932,000
Other cover types	413,000	1,167,000	13,901,000	15,481,000
Total land	1,150,000	1,898,000	17,365,000	20,413,000

Source: National Biomass Study (Forest Department, 1999).

Whether these forests are under the protected area system or not (Table 1), local people must access resources especially wild food plants and spiritual satisfaction[2]. This strong bond continues to harm forest products and also increases degradation.

Environmental services and biodiversity. A significant contribution of the forest sector to the economy of Uganda is the range of ecological services and biodiversity values the forests provide. Although these services and values are not easily quantified, they are recognized as integral to agricultural productivity, climate regulation, soil and water conservation and nutrient recycling. Forests are also reservoirs of the country's biodiversity, including its unique genetic resources and diverse ecosystems.

Tourism. Much tourism in Uganda is based on forests, woodlands and their constituent wildlife and natural beauty. Although, as yet poorly developed, tourism contributes to economic and social development, and the resource conservation. The Uganda Wildlife Authority revenues from tourism are approximately 2 million US$ annually. Over one third of this is derived from forest-based mountain gorilla tourism in Bwindi Impenetrable Forest and Mgahinga Forest.

Energy resources

Some 95% of the wood consumed in Uganda is for fuelwood, of which approximately two thirds is used as firewood for household purposes. As most of this forms part of the informal sector, accurate figures for total wood consumption are almost impossible to compile. The National Biomass Study (NBS)[3] has reviewed international and national studies of wood fuel consumption, and obtained an estimate of 1.04 m^3 as the annual per capita consumption of woody biomass for fuel purposes in developing countries. This corresponds to an annual per capita consumption of 0.6 tonnes of air-dried wood, giving a total fuelwood consumption 12.6 m tonnes in Uganda in 1998. This corresponds to some 60% of previous official estimates of Uganda's total fuelwood consumption. Considering the slow rate of forest rejuvenation and recruitment in tropical moist forest (TMF), at this rate of fuelwood extraction forest degradation might reach alarming rates in the near future.

The importance of wood in the energy sector

Even though the importance of petroleum and hydroelectric power is growing, wood is by far the most important source of energy. Wood as a source of energy has the following characteristics:

- Wood is the main source of energy in rural areas and among the poor (only 2% of rural population had access to electricity in 1996).
- Extraction and supply of fuelwood is an important source of income and employment.
- Use of fuel wood is vital for food security.
- Wood is widely used in many industrial processes: brick and tile making, lime production, tea and tobacco curing, and the baking and food processing industries.

Charcoal and firewood are used in urban households, and in many institutions and commerce (restaurants, hotels and bakeries).

National, widespread use of fuelwood reduces dependence on foreign currency and imported fossil fuels.

It is expected that wood fuel will continue to be the dominant source of energy in Uganda for the foreseeable future. Even if the entire hydroelectric potential in Uganda is fully utilized (about 2000 MW), it is expected that wood will still supply 75% of the total energy consumption in year 2015.

The main challenge in the energy sector is to increase the biomass resource base while simultaneously developing Uganda's hydroelectric potential. Improved wood

utilization efficiency, better protection of forests and woodland and increased investment in wood production, are important challenges in relation to sustainable use of wood as a source of energy.

- Most charcoal comes from woodlands on private land cleared for agriculture. For every 1 m^3 of wood made into charcoal, another 2 m^3 are burnt *in situ*. However, for every 4 ha cleared, only 1 ha is used for charcoal.
- Many forest woodland reserves are also used for charcoal production, although this is largely informal and unregulated.
- Current charcoal making is inefficient, typically yielding 8–12% recovery. If kiln efficiency increased to 30%, the land area required for the same amount of charcoal would drop by 66%, from 0.78 ha to 0.26 ha per tonne of charcoal.
- If improved cooking stoves were used by 40% of urban households this would save 46,000 tonnes of charcoal per year.

The forests of Uganda is any form and at any location are prone to degradation considering the high demand for forest resources. Despite being mostly illegal, charcoal production is one of Uganda's most important economic activities. It provides nine million US$ for the rural economy every year, 25% to rural landholders, 25% to Government in taxes and revenues. The charcoal sector employs over 20,000 people on a full-time basis; thousands more are employed in transport, distribution, and marketing. It supplies hundreds of thousands of consumers daily. The Forest Department and Local Governments should earn over seven million US$ annually from fees and permits charged on charcoal. The real price of charcoal fell by 50% over the period 1989–1994 and has decreased against every major consumer commodity because the resource is so undervalued.

The paper mulberry (*Broussonetia papyrifera*), an aggressive exotic, produces good light charcoal for industry and could yield 90–100 tonnes/ha managed on a 4–5 year rotation, as opposed to approximately 13 tonnes/ha from depleted sites. Charcoal briquettes are also being made from coffee husks and sawdust, though on a very small scale. This is a venture that could help to save the endangered forest resources.

Many indigenous species (*Combretum, Albizia,* etc.) are locally preferred. Capable of coppicing, they are widespread in many traditional agro-forestry systems, yet virtually nothing is known as to their potential for sustainable charcoal production.

Fuelwood demand has increased because of its low prices:

- By far the greatest consumption is for household use, with over 90% of rural households gathering firewood for free. The catering industry uses around 610,000 m^3 of fuelwood a year. Per capita consumption varies. Typical figures for household use are 490–590 kg/head/year; for alcohol brewing/(malwa) 438 kg/head/year; for kiosks and restaurants 365 kg/head/year; and for schools 155 kg/head/year.
- Tobacco curing requires an estimated 129,000 m^3/year. Much of this demand is still met from natural forest and woodlands. The average is about 5.5 kg of fuelwood per kg of cured tobacco. The tea industry is, however, becoming more self-sufficient as productive fuelwood plantations are already established. One recent estimate has indicated that with an average of 250 kg of made tea per m^3 of fuelwood, around 120,000 m^3 of fuelwood was used to produce the estimated 30,000 tonnes in 1999.
- Fuelwood comes from farmland and fallow areas, bushland, woodlands, natural high forest, and plan-

Luxuriant growth in Mbwa river truck Bwindi Impenetrable Forest, south western Uganda, formerly encroached by farmers.

Pteridophytes: Common features in highly degraded montane areas which suppress regeneration.

tations. The National Biomass Study in 1986 found that wood for fuel came mostly from farmland (48%), bushland (30%) woodlands (20%) and natural forest (2%). This has probably changed as the majority of commercial fuelwood for small industries comes from woodlands. Plantations are a source for the tea and tobacco industries, and there are increasing numbers of small private wood lots.

- Although industrial demand is growing at about 10% per year, improved energy yield efficiency at the point of use, particularly in lime and brick making, could reduce consumption by up to 50%.

Demand and production of saw logs

The annual consumption of sawn wood is estimated to be 200,000 m^3 (ref. 1). The annual production of saw logs was 903,000 m^3 in 1997 (ref. 4, using a conversion factor from tonne to m^3 of 1.67). Due to importation of sawn wood and saw logs, the total annual consumption of sawn wood and saw logs is somewhat higher than these figures.

Sawn timber

- Comes mainly from natural forest and plantations on government and private land.
- Over 90% of the sawn timber from natural forests are pitsawn: most of the plantation is saw milled.
- Forest Department (FD) movement permits record 50,000–60,000 m^3 as sawn timber per year for the years 1997–1999. The amount sold within districts is not known as it is not recorded on the movement permits.
- The actual volume from private land and forest reserves is not known, as there are no reliable figures for the volume cut and traded both legally and illegally, although confiscated timber in 1999 amounted to 715,000 m^3.
- An estimated 200,000 m^3 of sawn timber (equivalent to 800,000 m^3 of roundwood) was consumed by the formal sector in 1999.
- This implies that there is a considerable volume of illegal timber entering the market over 15 (timber vs roundwood) times the volume recorded.
- The Forest Department currently earns over 400,000 US$ a year from timber sales.

Only 0.2% of the forested areas are plantations and, supplies from natural forests are currently unsustainable. Plantations are generally increasing in number and area. Available figures indicate that forest plantations in Uganda cover a total of 34,000 ha of which 20,000 is located within Central Forest Reserves (managed by Forest Department and partly by private investors), 2000 ha is located in National Parks (managed by Uganda Wildlife Authority), and 12,000 ha is located on private land.

Other 'non-wood' forest benefits or services

There is limited reliable information on non-wood forest products (NWFP) but it has now become clear that they are key products in subsistence households, with some having a fast-growing commercial value – especially rattan, bamboo, and medicinal plants. A few examples include:

Gum arabic. Harvested from *Acacia* trees, is an important product in the northeastern region. The utilization and marketing of gum arabic started during the 1960's, all of which was being produced from the Karamoja area[5]. In the 1970's the Forest Department was the sole dealer in gum arabic, with production rising from 400 kg in 1970 to some 4,000 kg in 1974. This was fol-

Clear stands of *Entandraphragum* species and clear structures of the after effects of fire near Nyakashunju Bwindi Forest, south western Uganda.

Mbarara University graduate students with pygmy (Abayanda) resource persons near Ishasha Gorge; A place with several endemic plant species but dominated by *Palnari* and *Carapa* species.

lowed by a rapid decline due to the civil unrest that ensued. There is no indication of its current production levels.

Medicinal plants. Over 100 different types of medicines are collected from natural forests such as Bwindi, Mgahinga, Katsyoha-Kitomi, Budongo and Mabira. Trade in medicines is not normally recorded, but in Nyimbwa Sub-county, Luwero district, it was estimated that in 1999 monthly revenue of around 170 US$ was generated by medicine collectors in the area.

Shea butter. For oil and medicinal use, it is an important multiple-use product for people in northern Uganda. Surveys indicate that the shea tree has over 100 different uses. The trees produce an average of 7–10 kg of dry shea nuts per annum and there is an average of 7 trees per ha on farmland in northeast Lira District. The major product is shea butter oil that in the year 2000 was valued at three US$ per litre of oil.

Neem. It is another important multiple product tree, becoming popular for its medicinal values against common ailments such as malaria, skin diseases and AIDS-related opportunistic infections. It is currently grown in Karamoja and Adjumani in the dry northern part of Uganda. It is now being promoted by a local Non-Government Organization (NGO), UGANEEM, to the rest of Uganda. In addition to its timber and fuelwood uses, all its other parts are used. Seeds, leaves, bark and roots are used for medicine and insecticide production purposes. Neem seeds are crushed to get oil, with the cake being used as an organic pesticide and fertilizer. The oil is internationally used in the manufacture of soap, insecticides, cosmetics, toothpaste and drugs.

Bushmeat. This is significant, but largely unrecorded. In Nyimbwa sub-county, Luwero district, the bushmeat trade in 1996 was worth 600 US$ per year. The important factor related to deforestation here is that all hunters use fire as an implement in their hunting especially in riverline and swamp forests.

Rattan. This is of considerable socio-economic importance and there is concern regarding over harvesting.

Bamboo. In a recent study by the Forest Resources Institute (FORRI)[6], it was estimated that from bamboo alone monthly net income to bamboo collectors in Mbale and Kabale is about 30 US$. Bitariho[7] puts bamboo use in Kabale and Kisoro districts at 20% of the household utensils.

Tourism. In Uganda, tourism is dependant on the availability of places of natural beauty and interest to visit. Many of these sites are endowed with extensive forest resources and wildlife, that tourists wish to see (gorillas, chimpanzees, etc.)

Environmental services. Environmental services provided by forests include the maintenance of soil, water and climate quality that support productive agriculture and fisheries.

Watersheds. Uganda has many watershed areas. The Rwenzoris and Mt Elgon alone represent the primary water source for 3.2 million people. Forests are crucial for maintaining water supply. Intact watersheds also support productive agriculture and the fisheries industry.

A research fellow with resource persons on plant inventory checking the cleanliness of the montane water streams at river Ihihizo, an indicator of intact forest.

An east-facing slope at Ruhija Bwindi forest dominated by *Faurea salgina, Podocarpus melangianus* and *Albizia* species.

Forests protect soils and therefore crops. Forests and vegetation help avoid or reduce soil erosion. Forests help reduce runoff, topsoil loss and sedimentation, which means that soil fertility and productivity is retained.

Forests improve local, regional and global climates. The impact of forests on local climate in Uganda (in terms of moderating or helping rainfall and thus supporting agriculture) is poorly understood. Forests absorb carbon, and there is growing interest in the role Uganda's forests can play in helping the carbon balance in the atmosphere.

Biodiversity and genetic resources. There is a wide range of ecological communities in Uganda, including lakes and rivers, wetlands, dry bushlands and grasslands, moist wood lands, tropical high forest and montane vegetation. The country, as a result, has internationally significant biodiversity, a variety of living things. It is one of the most species-rich countries in the world for its size with around 315 species of mammals, over 1000 species of birds and 1200 species of butterflies. In only 0.02% of the world's land area, Uganda contains 11% of world bird species and 7% of the world's mammal species. Some forest trees are endemic to Uganda especially in the montane ecosystems (1400 m above sea level) of Rwenzori mountain, Bwindi, Mgahinga, Elgon and Katosha–Kitomi forests. Uganda being part of the greater African refugia has a lot of biodiversity. Out of 234 centres of biodiversity, Africa contributes 30 and Uganda in particular is part of these centres.

Cultural use. Finally the traditions of the people of Uganda need recognition and respect as forests also have an important cultural/spiritual value. These are reflected in the cultural management tools employed in traditional systems and the numerous sacred trees and forests in the country. Once again, quality information on the importance of this aspect is still scarce and further research is strongly recommended.

Supply and demand of forest resources

- Quality data on forest resources of Uganda has only become available recently. Studies indicate that even this data may already be out of date.
- Data on supply and demand is generally inaccurate or not available as has already been indicated.
- Forested areas are being converted into other land uses, such as agricultural and pastural land.
- Despite inaccurate data, it is clear that, within the next decade, demand will far exceed supply of forest-related products and Uganda will be forced to import them.
- The fastest growing demand is for processed timber, either as sawn logs or quality poles, and there is need to establish quality plantations to meet the demand.
- Biomass energy is the major product of forests. Fuelwood is expected to continue to be of national importance well into the distant future. The problem requires urgent attention for sustainable supply.
- Non-Wood Forest Products (NWFP) are also of major national importance. Supply and demand is, however, largely unquantified, having been largely ignored in previous forest planning.
- Other 'non-wood' services provided by forests (environment protection, biodiversity, tourism, cultural value, etc.) should be quantified and recognized in forest planning processes.

How do forests fit in with the peoples' livelihoods and finally why fear deforestation?

The constitution of Uganda, and most of the sectoral policies, recognize the fact that people are the country's most valuable asset and are an integral part of development. However, despite government efforts to improve the quality of life for her people, the Ugandan population is characterized by widespread poverty. The Government has developed a Poverty Eradication Action Plan (PEAP) that aims at combating poverty through public action. The key sectors and aspects identified are education, health, plan for modernization of agriculture (PMA), road maintenance and private sector promotion. Although agro-forestry is included in the PMA, there are no focused plans to support the forest sector's role in poverty alleviation. Due to the multipurpose nature of forests and the reliance of poor people on them, it is expected that any aspects of poverty can be significantly mitigated by increasing the sustainable economic, environmental and social benefits from Uganda's forests.

Extent of degradation of Uganda's forests

Drastic changes in the forest cover have taken place in Uganda during the past century. FAO estimated the forest cover to have been as much as 10,800,000 ha in 1890 (35% of Uganda's land area). According to the National Biomass survey (data collected between 1989 and 1995), this has now shrunk to less than 5 million ha, or 16% of the land area.

The quality of the Tropical High Forest (TMF), in terms of number of species and trees, has also declined over time. Well over 30% of this THF is now classified as degraded although there is no clear definition or

measurement of this degradation. Experienced foresters estimate that, following timber extraction, 75% of the remaining high forest has been degraded.

FAO in 2000 estimated the deforestation rate in Uganda to be about 0.9% per year based on the change in the amount of bushland and woodlands from 1990 to 1995. Other official estimates of the rate of land clearance range from 70,000 ha (Ministry of Agriculture, World Bank) to 200,000 ha (ref. 4). These figures imply annual deforestation rates of between 1% and 3%, respectively.

Some factors involved in the decline of forest cover and forest resource base

A number of factors have been identified as major causes of the reduction in forest cover over the century. The most important include the loss of the forest areas through conversion into agricultural and grazing land, and forest resource degradation due to firewood collection, pitsawying and charcoal burning.

Currently there are high rates of forest clearance on private land, for agriculture and charcoal production. This is now a serious threat, as 70% of Uganda's forest cover is on private land, much of which is not regulated or managed. Population growth (estimated at 2.5% per year) is leading to an increase in the demand for land, food and energy. Institutions such as schools, prisons among others, rely almost exclusively on firewood for cooking, as does over 90% of the population. Many areas are already experiencing shortages of firewood, and hence rising costs and increased burdens on women and children who collect firewood.

Over-harvesting. Poor planning, weak regulation and inappropriate processing technology have resulted in the unsustainable harvesting of forest products, and the degradation of the resource base. It is estimated that 800,000 m^3 of logs are cut each year, a rate of timber harvesting that exceeds sustainable cutting levels by a factor of four. This problem affects both government and private land. There is limited institutional capacity and limited resources in both central and local government to improve planning and regulation, and little incentive for the private sector to improve its performance in the absence of firm regulation and the enforcement of professional standards.

Encroachment. There was much clearance of forest cover to make settlements in the Forest Reserves during the troubled 1970s and 1980s. Residual encroachment of the government lands still continues. Most of the boundaries of the encroached reserves have not been reopened and are not clearly demarcated, which is part of the reason for the current confusion. Werikhe[8] considers the dangers of encroachment in forest reserves as a direct result of poor governance and lack of vision about the benefits for forest resources to the people.

Urbanization and industrial growth. Urbanization and industrial growth are also putting pressure on the forest estate. Many urban and peri-urban reserves are under threat of being degazetted. The increasing demand for industrial land has led to the degazetting of nearly 10,000 ha, which will result in a permanent net reduction of the forest estate unless alternative non-forested areas are identified and developed. The most affected forest reserves are those close to the urban and industrial centers, for example Namanve forest near the capital, Kampala.

Underlying factors. A number of factors that underlie this decline in the forest resource base can be identified. There are *policy deficiencies* relating to the private sector and local communities over land tenure, access rights and responsibilities for resource management. There are *market failures*, including inappropriate royalty rates, poor market information, trade restrictions and hidden subsidies which distort the markets for forest products. There is *poor regulation* by weakened institutions, which lack funding, and capacity. *Population growth and migration* has increased demand for agricultural land and firewood energy, and *rural poverty* restricts the ability to invest in sustainable land use practices.

Much of current wood for consumption comes from the clearance of land for agriculture, especially wood for charcoal production. However, it is reported[9] that only one third of the wood that is cut in the clearance of land for agriculture is used in charcoal production, the remainder being burned off as waste, used for firewood, or in construction.

Deforestation is not uniform around the country but has a regional pattern, which is likely to be more intense in areas with high population densities. In districts such as Mukono, Mpigi and Luwero, major tracts of land have been cleared in the last decade. Much of this vegetation has secondary woody biomass resulting from the abandonment of the land during the period of civil strife[9].

Combating deforestation in Uganda: The way forward

The vast potential of forests and forest lands, as a major resource for development is not yet fully realized in Uganda. The improved management of forests can increase the production of goods and services. The yield of wood and non-wood forest products should help to generate additional employment and income. Additional

value through processing the trade of forest products, would lead to increased contribution to foreign exchange earnings, and increased return on investment. Forest resources, being renewable, can be sustainably managed in a manner that is compatible with environmental conservation. The implications of the harvesting of forest resources in relation to the other values of the forests, should be taken fully into consideration in the development of policies affecting forests. It is also possible to increase the value of forests through non-damaging uses such as eco-tourism and the managed supply of genetic materials. Concerted action is needed in order to increase people's perception of the value of forests and of the benefits they provide. The survival of forests and their continued contribution to human welfare depends, to a great extent, upon succeeding in this endeavour. The following are the pertinent issues that augment and aggravate the forest resource management situation in Uganda.

What should be considered?

- How to maintain and enhance the Permanent Forest Estate.
- How to improve the management of forest resources on private and customary land.
- How to address the underlying causes of deforestation, including lack of policy support, market failure, weak regulations and rural poverty.
- How to capitalize on the economic, social and environmental opportunities in forestry without undermining the resource base.
- How to encourage forest owners, farmers and local communities to improve their livelihoods through new approaches to forestry.
- How to ensure the survival of forest biodiversity and to balance this with the pressing development needs of the country.
- How to rehabilitate and conserve key watershed forests.
- How to promote and maintain the greening of the urban environment, and to meet the increasing demand for forest products by urban centres.
- How to ensure that improved tenure to land and trees acts as an incentive for individuals, and women in particular, and communities to invest in forestry.
- How to help private owners or communities 'reserve' land for forestry.
- How to reduce actual and potential conflicts with institutional, technical and policy solutions, and to turn these to advantage by building synergy between institutions.
- How to harmonize the creation of a new National Forestry Authority with the new institutional, policy and planning framework that is being developed for the forest sector.
- How to build capacity and systems for local government to engage actively in government and private forestry.
- How to apply an effective regulatory system to safeguard public interests under private sector forest management agreements.
- How to develop and apply high technical standards to private forestry.
- How to ensure better legal provisions for tenure to encourage long-term investment.
- How to create more positive attitudes in the public and private sectors to ensure effective partnerships between government and private businesses.
- How to develop partnerships or management agreements with local communities that improve forest management and alleviate poverty.
- How to strengthen and make best use of the capacity, and reach, of NGOs and community-based organizations (CBOs) in facilitating forestry development.
- How to develop and support responsive, affordable, well-informed and decentralized forestry advisory services to farmers, communities and the forest industry.
- How to develop and support demand-driven, affordable, and well co-ordinated research and training institutions and programmes.
- How to anticipate the future demands for specific skills and competencies in forest sector development.
- How to develop a sector-wide programme that translates forestry policy into action in a way that complements programmes in related sectors.

Ideally, efforts to combat deforestation in Uganda should target:

– Sustaining the multiple roles and functions of all types of forests, forest lands and woodlands by expending effort:

- To strengthen forest-related national institutions; to enhance the scope and effectiveness of activities related to the management, conservation and sustainable development of forests; to effectively ensure the sustainable utilization and production of forest goods and services to strengthen capabilities of institutions.
- To strengthen and improve human, technical and professional skills as well as expertise and capabilities to effectively formulate and implement policies, plans of all types of forests and forest-based resources and forestland.

– Enhancing the protection, sustainable management and conservation of all forests and the greening of

degraded areas, through forest rehabilitation, afforestation, reforestation and other rehabilitative means, by trying to:

- Maintain existing forests through conservation and management; sustain and expand areas under forest and tree cover.
- Prepare and implement, appropriate national forestry action programmes, and/or plans for the right conservation and sustainable development of forests.
- Ensure sustainable management and conservation of existing and future forest resources.
- Maintain and increase ecological, biological, climatic, socio-cultural and economic contributions of forest resources.

– Promoting efficient utilization and assessment, to recover the full value of the goods and services provided by forest, forestlands and woodlands:

- To improve recognition of the social, economic and ecological values of trees, forests and forestlands, including the consequences of the damage caused by the lack of forests; to promote methodologies with a view to incorporating social, economic and ecological values of trees and forest lands into the national economic accounting systems; to ensure their sustainable management in a way that is consistent with land use, environmental considerations and development needs.
- To promote efficient, rational and sustainable utilization of all types of forests and vegetation inclusive of other related lands and forest-based resources. The processing and trade in forest products, should be based on sustainably managed forest resources and in accordance with plans that integrate all wood and non-wood values of forests.
- To promote more efficient and sustainable use of forests and trees for fuel wood and energy supplies.
- To promote more comprehensive use and economic contributions of forest areas by incorporating ecotourism into forest management and planning.

– Establishing and/or strengthening capacities for the planning, assessment and systematic observations of forests and related programmes, projects and activities including commercial trade processes. This is necessary because assessment and systematic observations are essential components of long-term planning, for evaluating effects, quantitatively and qualitatively, and for rectifying inadequacies. This mechanism, however, is one of the often-neglected aspects of forest resources, management, conservation and development. In many cases, even the basic information related to the area and type of forests, existing potential and volume of harvest is lacking. In many developing countries, there is a lack of structures and mechanisms to carry out these functions. There is an urgent need to rectify this situation for a better understanding of the role and importance of forests and to realistically plan for their effective conservation, management, regeneration, and sustainable development. This effort should strive:

- To strengthen or establish systems for the assessment and systematic observations of forests and forest lands with a view to assessing the impacts of programmes, projects and activities on the quality and extent of forest resources, land available for afforestation, and land tenure, and to integrate the systems in a continuing process of research and in-depth analysis, while ensuring necessary modifications and improvements for planning and decision-making. Specific emphasis should be given to the participation of rural people in these processes.
- To provide economists, planners, decision-makers and local communities with sound and adequate updated information on forests and forest land resources.

Measures aimed at addressing major weaknesses raised and operationalizing and fulfilling the expectations, should be the responsibility of the forest resource controlling authorities. These include sector wide planning, proposed investment, proposed sector coordination, proposed institutional reform, proposed forestry legislation, gender and equity proposals contained in the Uganda Forestry Policy statement of 2001. The salient features of this policy are the principles on which the policy is to be based.

Guiding principles for the forest sector

The following general *principles* will guide the Forestry Policy. These principles build on the government's national development priorities of poverty eradication and good governance.

National objectives. The Forestry Policy is consistent with the general principles guiding sustainable development found in the Constitution of Uganda and Vision 2025 which aimed at a set target plan of how Uganda should be in 2025.

Conservation and sustainable development. Uganda's forests should be managed to meet the needs of this generation without compromising the rights of future generations[10].

Livelihoods and poverty. The improvement of livelihood should be a major goal in all the strategies and aimed at the development of the forest sector so as to contribute to poverty eradication.

Biodiversity and environmental services. Forest sector development should safeguard the nation's biodiversity and environmental services through effective conservation strategies.

Partnerships in governance. New institutional relationships should enhance efficiency, transparency, accountability and professionalism, and build confidence in all forest stakeholders:

- *The role of central government*. Central government should withdraw from activities that can be carried out more effectively by the private sector or other stakeholders, but maintain core functions of policy development and regulation.
- *The role of local government*. More forest resources should be managed through devolved responsibility wherever practical and advisable.
- *The role of the private sector*. Private sector investment should be maximized in the development of the forest sector.
- *The role of local communities and farmers*. The public's participation in the management of the forests should be actively encouraged.
- *The role of NGOs/CBOs*. These should be encouraged to strengthen civil society, to build capacity and grassroot participation, and to help develop the rights and responsibilities of forest users.

Gender and equity. The active participation and affirmative action of women and men, young people and the elderly, and vulnerable or disadvantaged groups should be integrated into forest sector development.

Cultural and traditional institutions. Forest sector development should take into consideration cultural and traditional attributes and institutions.

International obligations. Legislation should be developed to support the implementation of current and future international commitments that affect the forest sector.

Forestry valuation. Environmental and social values should be used in cost/benefit valuations when assessing strategies to implement the Forestry Policy.

Policy statements governing the forest status in Uganda

- *Forestry on government land*
  A permanent forest estate under government trusteeship will be maintained.

- *Forestry on private land*
  The development and sustainable management of natural forests on private land will be promoted.

- *Commercial forest plantations*
  Profitable and productive forest plantation businesses will be promoted in the private sector.

- *Forest products processing industries*
  A modern, competitive, efficient and well-regulated wood and non-wood processing industry will be promoted in the private sector.

- *Collaborative forest management*
  Collaborative partnerships with rural communities will be developed for the sustainable management of forests.

- *Farm forestry*
  Tree growing on farms will be promoted in all farming systems, and innovative mechanisms for the delivery of forestry advisory services will be developed.

- *The conservation of forest biodiversity*
  Uganda's forest biodiversity will be conserved in support of local and national socio-economic development and international obligations.

- *Watershed management and soil conservation*
  Key watershed protection forests will be rehabilitated and conserved.

- *Urban forestry*
  Urban forestry will be promoted.

- *Education, training and research*
  The government will support sustainable forest sector development through appropriate education, training and research.

Other Natural Resources Government Department Policies and legislative instruments with a bearing on the multiple roles and functions of forests:

Recent key national policy and legal changes affecting the forest sector, which are a tool in protecting further forest degradation

- Constitution of the Republic of Uganda, 1995.
- The National Environment Management Policy for Uganda, 1994.
- The National Environment Statute, 1995.
- The Water Statute, 1995.
- The National Policy for the Conservation and Management of Wetland Resources, 1995.
- The Uganda Wildlife Statute, 1996.

- The Local Government Act, 1997.
- The Land Act, 1998.
- The Gender Policy, 1997.
- The Forest Reserves Order, 1998.
- The Uganda Wildlife Policy, 1999.
- The National Water Policy, 1999.

Conclusion

The Uganda Wildlife Authority (which is a body corporate) that is caring for the permanent forest estate outside forest reserves is also a major forest custodian. Uganda has drafted National Biodiversity strategy and Action Plan co-ordinated by the National Environment Management Authority (NEMA) as part of the country's obligations under the convention of biological diversity. There is a Nature Conservation Master Plan produced by the Forest Department (FD) and a Protected Areas System Plan from Uganda Wildlife Authority (UWA) that together represent a comprehensive approach to biodiversity conservation within protected areas.

Subsequently the forest department has proposed a revision and transformation of the current Forests Act to reflect the changing circumstances. The proposed legislature will, among other things, address the inequality of the Forests Act (1964) in the area of penalties, fines and forest resources on private lands.

The greatest landmark proposal is probably the institutional reform aimed at creating a national forestry authority (NFA) with the mission:

To manage the central forest reserves on a sustainable basis. To optimize the economic, environmental and social functions of the forest estate, and to reduce poverty through the active involvement of the private sector and local communities.

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